
ANALYSIS OF THE ALIGNMENT BETWEEN VOCATIONAL HIGH SCHOOL (SMK) STUDY PROGRAMS AND THE COMPETENCY NEEDS OF THE WORKFORCE BASED ON REGIONAL REQUIREMENTS (A CASE STUDY IN BOGOR)

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ABSTRACT

This study aims to assess the alignment between the study programs offered at Vocational High Schools (SMK) in the Bogor region and the competencies required by the local labor market. Given the rapid development of industries in sectors such as agribusiness, manufacturing, and services in Bogor, ensuring that SMK graduates possess relevant skills is crucial to enhance their employability. This research adopts a mixed-method approach, combining both quantitative and qualitative techniques. The quantitative data, collected through surveys, measures the extent to which study programs meet industry needs, while qualitative data obtained from interviews provide deeper insights into the perceptions of educational stakeholders and industry representatives. The study involves 120 respondents, including school principals, teachers, alumni, and industry representatives. The findings reveal significant gaps in several areas, particularly in technical skills and soft skills such as communication, teamwork, and adaptability, which are essential for readiness in the workforce. Additionally, the lack of collaboration between schools and industries, outdated curricula, and the lack of industry-specific training for educators were identified as key barriers to improving this alignment. The study concludes by recommending the establishment of stronger partnerships between SMK institutions and industries, curriculum updates, and more focused teacher development programs to address the identified gaps and ensure that SMK graduates are better prepared to meet the demands of the local labor market.

Keywords: Competency Alignment, Labor Market Needs, Curriculum Development, Industry Collaboration

INTRODUCTION

Vocational High Schools (SMK) hold a very important and strategic position within the framework of Indonesia's national education system, particularly in the context of providing a ready-to-work workforce with competencies that meet the evolving needs of the industrial world (Jatmiko, A. ., &

Gunadi, 2023). Unlike general secondary education that focuses more on the development of academic and theoretical aspects, SMK is specifically designed to provide vocational education that emphasizes the mastery of practical and technical skills relevant to specific job sectors. This hands-on educational approach makes SMK a

crucial bridge between formal education and the real workforce. Through structured and relevant vocational programs, SMK aims to produce graduates who not only possess theoretical knowledge but also have practical skills that can be directly applied in the workplace. Therefore, SMK plays a vital role in meeting the needs of a highly dynamic labor market that demands quick adaptation to technological changes, production processes, and innovations in various industries. In this context, the alignment between SMK study programs and the competency requirements of the labor market is not just an option, but an absolute necessity. This is because, if study programs are not designed and implemented considering the actual needs of the industry and the labor market, SMK graduates will face difficulties in entering the workforce effectively, which will ultimately increase the risk of unemployment among the youth labor force (Hermawan, W., Zam'an, P., & Jabar, 2024). On the other hand, if this alignment is met, SMK graduates can have high competitiveness, be able to adapt to various job demands, and positively contribute to improving national productivity. Therefore, the development and continuous monitoring of SMK study programs are essential to ensure that the vocational education provided is truly relevant, effective, and in line with the evolving needs of the industrial world (Maryam Maryam, Hani Cahya Maulani, Sifa Malihatul Husna, 2025)

The focus on the Bogor region as the study area in this research is based on strong reasoning. As one of the buffer zones of the capital city of Jakarta, Bogor has experienced significant economic

and industrial growth. The city has become a center for various business sectors, ranging from manufacturing, tourism, to services, all of which require a workforce with diverse competencies. This condition makes Bogor a representative region for analyzing the alignment of vocational school (SMK) study programs with the competency needs of the workforce. Furthermore, Bogor has a complex socio-economic characteristic with varying competency needs across its regions, which demands a more specific and contextual approach in the development of SMK curricula. Such studies are important to determine whether the existing study programs reflect the real workforce demands in Bogor or whether there are still gaps that need to be addressed promptly.

The issue of the competency gap between vocational school (SMK) graduates and the needs of the workforce has long been a serious concern for various parties, including the government, academics, industry players, and the general public (Ariani et al., 2025). This phenomenon arises because the reality on the ground shows that SMK graduates often fail to meet the competency standards expected by the industrial world, both in terms of technical knowledge and non-technical skills or soft skills that are crucial in modern work environments. This competency gap is not only related to mastery of technical materials that are the main expertise of SMK study programs but also includes communication skills, teamwork, time management, and professional attitudes, which are vital assets for individual success in the workforce. Various studies and research reports conducted over the past few years

consistently reveal that the main cause of this gap is the mismatch between the vocational education curriculum implemented in SMKs and the actual needs of the industry. The curriculum, which often remains theoretical and lacks relevance to industrial practices, causes graduates to lack the necessary skills to be immediately involved in the production or service processes within companies (Suharno et al., 2020). In addition, the teaching methods applied in many SMKs tend to provide insufficient space for intensive hands-on practice and real-world work experience, making it difficult for students to optimally develop their applicative skills.

Another factor that exacerbates this gap is the lack of synergy and close collaboration between schools and the business and industrial sectors (DUDI). In many cases, the partnerships that have been established remain formal, without strong integration in curriculum planning, learning implementation, or student competency development. As a result, vocational school graduates, despite their relatively high numbers and graduation rates, still face significant challenges in entering the workforce with adequate readiness. They often struggle to find jobs that align with their skills or are forced to work in fields unrelated to the education they have completed. This situation not only harms the graduates themselves, leading to disappointment and a decline in learning motivation, but also brings broader negative impacts on company productivity and the competitiveness of both regional and national economies.

Companies are required to spend additional costs for retraining or even seek labor from outside who already

possess the necessary competencies, resulting in operational inefficiencies. Furthermore, this mismatch in competencies has the potential to lower the quality of products and services, which, in turn, can weaken the competitiveness of regions and the nation in the global market (Kabii & Kinyua, 2023). Therefore, it is crucial to take systematic efforts to identify and address these competency gaps. Strategic measures should focus on improving the relevance and quality of the curriculum, strengthening practical learning methods, and developing closer and more concrete partnerships between vocational schools and the business and industrial sectors. In this way, vocational schools can effectively fulfill their function as vocational education institutions that are capable of preparing graduates who are not only job-ready but also competitive and adaptable to the changing needs of the industrial world. This will contribute positively not only to the graduates and schools but also to national economic development as a whole.

The development of a region-based curriculum has emerged as one of the highly potential strategic solutions to address the competency gap between vocational high school (SMK) graduates and the needs of the workforce (Winata et al., 2025). This approach focuses on aligning the learning materials and the development of students' competencies with the characteristics, conditions, and specific needs of a particular region or area. Therefore, the curriculum implemented is not generic or uniform nationally, but is designed contextually and relevantly to the economic, social, and industrial potentials of the region. This is crucial because each region has its own uniqueness in terms of the

profile of industry and the labor market, making a one-size-fits-all curriculum ineffective in addressing the diverse workforce needs. For instance, the Bogor region, known for its significant development in the tourism and hospitality sectors, can develop specialized study programs such as tourism, hospitality, and services that emphasize both technical competencies and soft skills required by these sectors. As a result, SMK graduates from the Bogor region will not only have theoretical knowledge but also practical skills directly needed by the local tourism and hospitality industry. This undoubtedly enhances their job readiness and increases their chances of being absorbed into the local job market, which ultimately contributes to regional economic growth.

The implementation of a region-based curriculum also creates opportunities for closer synergy between various stakeholders, such as schools, local governments, businesses, and industries (Franco et al., 2019). This synergy is crucial in designing and implementing education that is adaptive and responsive to the dynamic changes in labor market needs. Local governments can provide policy support and facilitate resources, while industries can play an active role in offering input on competency standards, internship opportunities, and the development of skills relevant to actual work practices. This collaboration not only enriches the quality of vocational education but also ensures that SMK graduates can truly meet the expectations of the labor market, thereby reducing the risk of mismatch, which has been a major issue. Therefore, a region-based curriculum is not just a theoretical concept but also a

practical approach that can strengthen the relevance of vocational education, enhance the competitiveness of graduates, and support sustainable economic development based on local potentials.

The problem formulation in this study focuses on two main questions that are crucial for in-depth analysis. First, does the study program offered at vocational schools (SMK) in the Bogor region align with the competency requirements of the labor market in the area? This question demands an empirical study to assess the level of alignment between the curriculum, learning materials, and the practical work experiences conducted at the school with the competencies required by the local industry and job sectors. Second, what are the actual characteristics of the competency needs in the Bogor region, covering both technical and non-technical aspects that serve as the minimum and outstanding standards for workers in the area? By answering these two questions, this research is expected to provide a clear and comprehensive picture of the vocational education condition in SMKs and its relevance to the labor market needs in Bogor.

The main objective of this study is to analyze, in detail and based on data, the level of alignment between SMK study programs and the competency needs of the labor market in the Bogor region. This study does not only view from the perspective of schools and curricula but also considers the perspectives of the industry and SMK alumni as key stakeholders in the labor market. With this comprehensive approach, the research results are expected to provide an accurate picture of how well SMKs in Bogor prepare competent and job-ready

graduates. Additionally, the research aims to identify specific competency needs that are relevant to the local industry conditions in Bogor. This is crucial for providing appropriate recommendations for the development of a region-based curriculum, allowing vocational education to be more adaptive to the dynamic changes and demands of the labor market..

The benefits of this research are highly strategic, especially for policymakers in education and curriculum development in Vocational High Schools (SMK). The findings of this study are expected to serve as a consideration in formulating vocational education policies that are more responsive and aligned with the actual needs of the labor market. Furthermore, this research is also beneficial for the industrial and business sectors as partners of schools in bridging the competency requirements of the workforce. With valid data and analysis, industries can play a more active role in determining the necessary competency standards and fostering closer collaboration with SMKs. Ultimately, these benefits will be felt by students and SMK graduates who receive more relevant and high-quality education and training, thus enabling them to compete in the job market.

In terms of the theoretical framework, this study uses the matching theory as the main conceptual foundation. Matching theory is a crucial conceptual framework in explaining how the education system, particularly vocational education such as Vocational High Schools (SMK), should be designed to optimally meet the demands of the labor market. This theory emphasizes that there is a direct relationship between the effectiveness

of education and the alignment of its curriculum with the competency requirements in the workforce. The core of matching theory is that the greater the alignment between the skills taught in educational institutions and the skills needed in the labor market, the greater the likelihood that graduates will be quickly and productively absorbed into the workforce (Lovász & Plummer, 2009). Conversely, any mismatch between the two will lead to various forms of inefficiency, in terms of economics, social outcomes, and human resources. This inefficiency may manifest as disguised unemployment, job placements that do not match the skills, and low labor productivity due to a lack of relevant competencies..

In the context of vocational education, as applied in Vocational High Schools (SMK), the application of the matching theory principle becomes crucial because the main goal of vocational education is to produce graduates who are job-ready and possess specific skills in line with the needs of the industrial world. If the SMK curriculum is not designed based on a deep understanding of the industry's needs, graduates will struggle to adapt to the workforce, even if they have completed their formal education well (Sobari et al., 2023). In this regard, matching theory provides a solid foundation for rethinking curriculum design approaches, learning strategies, and evaluation mechanisms within the vocational education system. This theory also implies the necessity of a close interaction between the educational sector and the industry so that the learning process in schools truly reflects the conditions and work demands in the field.

The concept of work competence is an inseparable element from this matching theory. Work competence refers to a set of knowledge, technical skills, and work attitudes that an individual must possess to carry out tasks and responsibilities effectively and efficiently in a specific work environment (Anam, 2018). This competence not only includes specific technical abilities that are practical, such as operating machinery or mastering certain software, but also encompasses non-technical aspects or soft skills such as communication, teamwork, initiative, and work ethics. Today's industries are not only seeking workers who are technically proficient but also individuals who have a positive work attitude and can adapt to complex and dynamic work environments. Therefore, vocational education in SMK must be designed not only to transfer technical knowledge and skills but also to shape work attitudes that support productivity and overall performance quality..

In relation to curriculum development, region-based curriculum emerges as a concrete implementation strategy for the integration of matching theory and the concept of job competencies (Anukunwathaka et al., 2020). This curriculum is designed with consideration of local economic potential, the dominant industrial structure in the area, and projections of specific labor force needs. For example, in areas with a concentration of the agricultural industry, vocational schools (SMK) can develop agribusiness programs focusing on modern agricultural technology, crop management, and agricultural product logistics distribution. On the other hand, in areas such as Bogor, which has

strength in the tourism and services sector, a curriculum emphasizing hospitality, service management, and cross-cultural communication skills would be more relevant. This approach allows vocational school curricula to become more contextual and adaptive to local dynamics, thus increasing the chances for graduates to be absorbed into the local labor market with competencies that are truly needed.

Furthermore, region-based curricula provide ample opportunities for collaboration between schools, local governments, and the industrial world (Facer & Thomas, 2012)(Nasir et al., 2023). In designing the curriculum, schools can conduct labor market needs analysis through discussion forums with industry representatives, study local labor trends, and evaluate alumni performance. Local governments, particularly the education or labor departments, can facilitate the development of curricula through regulations and local policies that support school flexibility and autonomy in adjusting their curricula. Meanwhile, the industrial sector can play a role in providing input on competency standards, offering internship placements, and directly participating in the evaluation and certification processes of student competencies. This collaboration creates a vocational education ecosystem that is responsive and oriented toward real labor market needs, ultimately helping to significantly reduce competency gaps..

Thus, the application of matching theory and the reinforcement of the concept of work competencies through a region-based curriculum is not only a theoretical approach, but also a practical strategy that can be effectively implemented in vocational education.

This approach ensures that the educational process in vocational schools (SMK) aligns with the developments in the workforce, thus producing graduates who are not only job-ready but also capable of growing and contributing positively to various industrial sectors. In the long term, this approach will contribute to improving the quality of human resources at the national level, strengthening regional economic competitiveness, and achieving inclusive and sustainable development goals.

Various previous studies consistently highlight the urgency of analyzing the alignment between vocational school programs (SMK) and the needs of the workforce as a fundamental step to improve vocational education quality and increase the employment rate of SMK graduates. Research by Ali et al (2020) explicitly reveals that one of the main obstacles in the labor market is the mismatch between the SMK curriculum and the skill requirements that industries actually need (Ali et al., 2020). The study found that many vocational schools still use general curricula that are not responsive to the latest technological developments and work practices in the industrial sector, resulting in graduates often lacking adequate readiness when entering the workforce. A curriculum that is overly theoretical and lacks practical fieldwork is one of the factors exacerbating this condition, where students are not familiar with the tools, work procedures, and real work environments they will face after graduation..

Furthermore, research by Isma et al. (2023) reinforces the importance of a more adaptive and region-based curriculum approach as a strategy to

address the mismatch issues (Isma et al., 2023). This study suggests that each region should have the authority and flexibility to develop vocational school (SMK) curricula tailored to local characteristics, including economic potential, dominant industry profiles, and specific labor market needs. With a region-based curriculum, vocational schools will no longer be trapped in the application of a uniform, less relevant national curriculum but will be able to design study programs that are more practical and integrated with the real needs of the local industrial world. This approach is considered more effective in enhancing students' competencies in a contextual manner, making graduates more employable and more competitive both locally and nationally. The findings of Handayani et al. also show that schools that have implemented this approach tend to have higher graduate absorption rates and better industry satisfaction with their graduates' performance.

Additionally, the importance of collaboration and synergy between vocational schools (SMK) and the business or industrial world is increasingly emphasized in research by (Safitri & Sutadji, 2025). This study explains that a close and sustainable relationship between schools and the industrial world has a significant impact on the quality of graduates, both in terms of technical competencies and soft skills. This collaboration can take various forms, including joint curriculum development, high-quality internship programs, industrial teacher training, and the direct involvement of industry practitioners in the learning evaluation process and student competency certification. Prasetyo states that schools that establish

strategic partnerships with industries are able to produce graduates who are more relevant to labor market needs and are more quickly and easily absorbed into the workforce compared to schools that work exclusively or in isolation. Furthermore, this collaboration not only impacts students but also provides benefits for the schools and the industries themselves. Schools receive direct feedback from industry players to continuously improve the quality of education, while industries obtain a workforce that has been trained according to their standards and specific needs.

The literature provides a strong conceptual and empirical foundation for this study in exploring the factual conditions of vocational high schools (SMK) in the Bogor region, as well as assessing to what extent the study programs offered meet the local labor market's competency needs. Bogor, with its diverse industrial dynamics encompassing sectors such as services, tourism, agriculture, and light manufacturing, offers a rich context for research on the alignment between vocational education and the demands of the local job market. The findings from previous studies serve as a starting point to identify which aspects of the study programs require improvement or adjustment, and what strategies are most effective to implement in the local context. Therefore, this research not only aims to describe existing issues but also seeks to make a tangible contribution through policy recommendations that are applicable to the development of vocational education, based on regional needs more broadly.

METHOD

This research uses a mixed methods approach with an explanatory sequential design, where quantitative data is collected first to obtain a general overview of the alignment between the study programs of Vocational High Schools (SMK) and the competency needs of the workforce in the Bogor area. The aim is to gain a comprehensive understanding of the phenomenon under investigation, which is the alignment between the study programs in Vocational High Schools (SMK) and the competency needs of the workforce in the Bogor region. This approach is considered the most suitable as it captures measurable numerical dimensions through quantitative data while also exploring the meanings, perceptions, and in-depth experiences of the informants through qualitative data (Creswell & Creswell, 2018). Afterward, qualitative data collection is carried out to identify specific and in-depth competency needs based on the local industry conditions. This study was conducted in several SMKs and companies or industries that are partners in the Bogor area. The quantitative research is used to measure the degree of alignment between the competencies taught by SMKs and the competencies required by the local industries in the Bogor region, while the qualitative approach is employed to delve deeper into the narratives, arguments, and insights of educational and industrial stakeholders regarding the relevance of the curriculum and the reality of employment.

The selection of Bogor as the research location is based on several strategic considerations. Bogor is one of the buffer zones for the capital city, with very rapid industrial development, particularly in the fields of agribusiness,

tourism, light manufacturing, and services. Additionally, the number of vocational high schools (SMK) in this area is relatively high, both public and private, offering various vocational programs. The presence of industrial areas such as Gunung Putri, Cibinong, and Sentul highlights the importance of this region as a potential labor force hub. Therefore, it is crucial to examine the alignment between the competencies of SMK graduates and the workforce needs in these areas to ensure the effectiveness of vocational education in addressing the challenges of the local job market.

The research subjects consist of various stakeholders relevant to the topic of vocational education alignment. These include school principals and teachers from vocational high schools in Bogor, representatives from the business and industrial sectors (DUDI), and SMK alumni who have worked or are currently working in the formal sector. Principals and teachers are chosen because they are the main implementers of curriculum policies and possess an in-depth understanding of the objectives and content of vocational programs. Meanwhile, industry representatives serve as key sources for identifying actual competency needs and expectations for SMK graduates. Alumni are included as subjects because they can provide direct reflections on the connection between the training they received in SMK and the job demands they face in the workforce. By involving these four subject groups, the data collected will be richer and reflect a multi-perspective view, in accordance with the triangulation principle in social research.

The population in this study consists of students, teachers, and industry practitioners directly related to vocational school study programs in Bogor. The quantitative sample was selected using purposive sampling or stratified random sampling techniques to represent each group of respondents, with a total of approximately 120 respondents consisting of 25 alumni, 40 teachers, 30 school principals, and 25 industry practitioners. Meanwhile, the qualitative sample was purposively selected from respondents who provided significant answers in the quantitative phase or key informants from schools and industries, totaling 10-15 people.

Data collection was conducted through three main techniques: questionnaires, in-depth interviews, and document studies. The questionnaire technique was used to gather quantitative information from teachers, school principals, and vocational school alumni. This instrument was designed to measure the level of perception regarding the alignment between the curriculum and the competencies required in the workforce, using a five-point Likert scale ranging from "strongly disagree" to "strongly agree." The questionnaire includes important indicators such as the alignment of teaching materials, technical skills taught, mastery of industrial technology, as well as soft skills like communication and teamwork. Additionally, there is a section in the questionnaire asking respondents to identify additional competencies deemed important but not yet covered in the vocational school curriculum.

In-depth interviews were conducted with industry

representatives and some school principals to further explore their views on the relationship between vocational education and the needs of the labor market. A semi-structured interview guide was used in these interviews, allowing flexibility in exploring information while still adhering to the key questions framework. The semi-structured approach was chosen so that the interviewer could adjust the questions according to the context of the answers given by the informants and allow for the exploration of themes that emerged spontaneously during the interview (Mulyana et al., 2024).

The document study complemented the previous data collection techniques by reviewing relevant documents such as vocational school program curricula, Lesson Plan (RPP), employment data from the Bogor Department of Manpower, and available vocational school tracer study reports. The purpose of this technique is to obtain written evidence that can be used as the basis for data triangulation and strengthening of the analysis results.

The research instrument was developed based on a literature review and content validity testing by vocational education experts and labor market analysts. The questionnaire instrument was structured into several main sections: respondent identity, perceptions of curriculum alignment, and suggestions for improvement. The initial validation was carried out through a focus group discussion (FGD) with vocational school teachers and representatives from the industry and the business world (DUDI), while the instrument trial was conducted in non-sample vocational schools in the Bogor area to avoid bias. The trial results were

then analyzed using Cronbach's Alpha reliability coefficient, with a value greater than 0.7 indicating that the instrument was sufficiently reliable (Sugiyono, 2019). The interview guide was developed by outlining key themes and open-ended questions that allowed for in-depth exploration. This instrument was tested through a pilot interview with an industry informant to ensure the clarity and relevance of the questions.

Data analysis in this study was conducted in parallel between quantitative and qualitative data, in accordance with the principles of the mixed methods approach. The quantitative data were analyzed using descriptive statistics such as mean and percentage to determine the overall alignment level of the study programs, as well as inferential analysis such as t-tests or ANOVA to examine the differences in perceptions across respondent groups. This analysis was performed using statistical software like SPSS. The results were then used to conduct a gap analysis, which involved comparing the competencies taught in vocational schools (measured based on curriculum documents and teacher perceptions) with the competencies required by industry (based on industry questionnaires and interviews). The larger the gap between the two, the lower the level of program alignment. This technique is very useful in identifying specific areas that need improvement within vocational education programs (Zainuddin & Perera, 2019).

Meanwhile, the qualitative data from the interviews were analyzed using coding techniques and thematic analysis. The initial step involved verbatim transcription of all interview

results. Subsequently, an open coding process was conducted to identify preliminary themes, which were then categorized into main themes and subthemes based on patterns and similarities in meaning. This process was supported by qualitative analysis software such as NVivo to ensure the accuracy and clarity of the categories formed. Some anticipated themes included: limitations in infrastructure, the lack of curriculum synchronization with the industry, and the need to strengthen digital skills. This analysis produced a deep thematic narrative regarding the issues and expectations of stakeholders towards vocational education.

Data triangulation was conducted to enhance the validity of the research findings. Data from questionnaires, interviews, and documentation were compared and synthesized to obtain a comprehensive picture of the alignment between vocational high school study programs and the needs of the labor market. The triangulation strategy used was source and method triangulation, which involved comparing results from various data collection techniques and different types of respondents. The results of this triangulation will be used in the final interpretation phase in the discussion chapter.

RESULT and DICUSSION

Table 1. Respondent Demographic Distribution

Respondent Category	Total	Male	Female	Age 20-30	Age 31-45	Age >45	Experience < 5 years
School Principals	30	20	10	0	10	20	5
Vocational Program Teachers	40	15	25	5	30	5	15
Alumni	25	14	11	25	0	0	15
Industry Representatives	25	18	7	2	10	13	5

Respondent Profile

In this study, data were collected from a group of respondents who are directly involved or have a deep understanding of vocational education programs in vocational high schools (SMKs) and the dynamics of labor market needs in the Bogor region. The total number of respondents was 120, consisting of four main groups: school principals, vocational program teachers, SMK alumni, and representatives from the industrial sector who are partners or have relationships with SMKs in the context of workforce provision.

The sampling was purposively conducted to ensure the representation and quality of information from each respondent category. School principals and teachers were selected from both public and private SMKs in the Bogor region, considering the distribution of available expertise programs. Alumni included those who graduated within the last 3 to 5 years, allowing for an understanding of how the education they received aligns with the current labor market. Meanwhile, respondents from the industrial sector included HRD managers, production supervisors, and business owners in the manufacturing, agribusiness, and services sectors. The demographic distribution of the respondents is presented in the following table.:

Total	120	67	53	32	50	38	40
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Source: Processed research data

Based on the table above, it can be seen that the majority of school principals and representatives from the industrial sector are individuals with more than 10 years of work experience, indicating a high level of involvement and in-depth knowledge in their respective fields. The teachers of the study program have a balanced distribution in terms of experience, reflecting the dynamics of updates in vocational education. Meanwhile, the alumni respondents represent a younger age group who have just entered the workforce, making their perspectives crucial in assessing the effectiveness of vocational education.

Based on the results of the validity and reliability tests using SPSS 22, it was found that all instruments for the variable of the alignment between vocational school study programs and the needs of the workforce are valid, with correlation values (r_{hit}) greater than the table value (r_{table}) of 0.1793, ranging from 0.242 to 0.681. The reliability test also showed a value of 0.7, which is greater than the threshold of 0.7 for Cronbach's alpha. Meanwhile, the validity of the instrument for the variable of regional-based workforce competency needs was declared valid, with calculated values ranging from 0.362 to 0.610, all greater than 0.1793, and also found to be reliable with a value of 0.726, which is greater than 0.7

Level of Study Program Alignment

The results of the distributed questionnaire show variations in the alignment between study programs in vocational schools (SMK) and the competency requirements of the labor market in the Bogor region. Respondents were asked to assess the level of alignment on a Likert scale from 1 to 5, where 1 means "strongly disagree" and 5 means "strongly agree." The coefficient for variable X is 0.666 with a standard error of 0.084, indicating that every increase of one unit in variable X (SMK study program) will increase the labor market competency requirement score by 0.666 units. Furthermore, the standardized coefficient (Beta) for X is 0.588, indicating that variable X has a significant effect on variable Y. This coefficient also suggests that changes in the SMK study programs can significantly influence the competencies required in the labor market. From the t-test results, the t-value for variable X is 7.896 with a significance value of 0.000, which means that variable X has a highly significant effect on variable Y at a significance level of 0.05. This indicates that the alignment of SMK study programs with the labor market competencies in Bogor is statistically significant. These analysis results demonstrate a significant alignment between the study programs taught in SMKs and the competency requirements of the labor market in the Bogor region.

Table 2. Results of Study Program Alignment Test with Labor Market Competencies

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	19.957	3.187		6.261	.000		
X	.666	.084	.588	7.896	.000	1.000	1.000

a. Dependent Variable: Y

Source: Processed research data by SPSS Competency Needs Based on the Bogor Region

The Bogor region has unique economic and industrial characteristics, which results in specific workforce competency needs. Based on surveys and interviews with local industry players, it was found that the primary competency requirements in this area are greatly influenced by several key sectors such as manufacturing, agriculture and agribusiness, tourism, and the rapidly growing service sector in recent years.

The manufacturing sector in Bogor, which includes the automotive, electronics, and food processing industries, requires specific and up-to-date technical competencies. The most needed technical skills include the ability to operate CNC machines, industrial control software programming, understanding of production techniques and machine maintenance, as well as mastery of industrial safety standards. Additionally, industry players emphasize the importance of digital skills, such as the use of design software and computer-based production management, which have increasingly become standards in modern production processes.

In the agribusiness sector, the required competencies include knowledge of efficient and

environmentally friendly cultivation techniques, supply chain management of agricultural products, and the ability to process agricultural products into value-added items. This aligns with Bogor's character as an area with significant agribusiness potential, including horticulture and food crops. The service sector, particularly tourism and hospitality, has also experienced significant growth, requiring a workforce with competencies in customer service, event management, foreign languages, and information technology to support digital services in the industry. Stakeholders from the service sector emphasize the importance of soft skills such as effective communication, adaptability, and professionalism as key factors for success in a service-based work environment.

Based on quantitative data gathered from industry respondent questionnaires, the competencies most frequently mentioned and considered important in the Bogor region are as follows: machine technical skills (72%), mastery of digital technology (68%), problem-solving ability (60%), interpersonal communication (55%), and time management (50%). This indicates a need for competencies that are not only technical but also soft skills that support work effectiveness, as shown in the table below.

Table 2. Competency Needs Based on the Bogor Region

Competency	Description	Percentage (%)	Main Industry Sector
Machine Technical Skills	Skills in operating, maintaining, and repairing CNC machines	72	Manufacturing, Automotive, Electronics
Mastery of Digital Technology	Skills in operating computer-based software and production systems	68	Manufacturing, Services, Information Technology
Problem-Solving Skills	Skills in identifying problems and finding practical solutions	60	All sectors
Interpersonal Communication	Skills in effective communication, teamwork, and interaction	55	Services, Tourism, Hospitality, Industry
Time Management	Skills in managing tasks and priorities efficiently	50	All sectors
Agribusiness Competency	Skills in efficient agricultural practices, product management, and post-harvest processing	45	Agribusiness, Agriculture
Work Ethic and Discipline	Professional attitude, responsibility, punctuality, and discipline in the workplace	40	All sectors
Foreign Language Proficiency	Proficiency in foreign languages to enhance interpersonal communication	35	Manufacturing, Services, Export/Import
Teamwork	Skills in working effectively as part of a team across different functions	60	All sectors

Creativity and Initiative	Ability to generate innovative ideas and demonstrate proactive problem-solving	38	Manufacturing, Services, Information Technology
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Source: Data collected from questionnaires and interviews with stakeholders in the Bogor region, 2024

In-depth interviews with HRD managers from several companies revealed a shift in the required competencies, moving beyond merely mastering hard skills to more holistic competencies, including teamwork, initiative, and creativity in problem-solving. They also pointed out that vocational school graduates are often ill-prepared in these areas, as the focus of learning in schools is still predominantly on technical aspects, with insufficient emphasis on soft skills development.

These findings indicate the need for adjustments and strengthening of vocational programs to ensure graduates are not only technically competent but also capable of quickly adapting and being productive in the dynamic world of work. Therefore, curriculum updates tailored to the needs of the Bogor region must systematically incorporate soft skills development components.

Results of Stakeholder Interviews

In-depth interviews conducted with key stakeholders, including school principals, program study teachers, and industry representatives, provided a richer understanding of the gaps and competency needs of vocational school graduates in Bogor. From these interviews, several important insights emerged that reinforce the quantitative data presented. One school principal stated, **"We are indeed making great efforts to align our programs with industry needs, but the limitations of**

facilities and teacher training remain the main obstacles. The national curriculum does not fully accommodate local needs, so we have to make partial adjustments ourselves. Internships, as a bridge to the industrial world, are not yet optimal because the school and industry schedules are often not synchronized" (Principal of SMK Negeri, Bogor, May 2024).

Program study teachers also shared their challenges in keeping up with the evolving competency needs. One mechanical engineering teacher said, **"We need regular training so that we can update our materials and teaching methods. The industrial world is changing rapidly, especially in terms of digital technology and the latest machinery. If teachers do not receive guidance, how can we equip students with relevant competencies?"** (Mechanical Engineering Teacher at a Private Vocational School, Bogor, May 2024).

From the industrial side, an informant offered constructive criticism regarding the readiness of vocational school graduates. A HRD manager at an electronics manufacturing company stated, **"Vocational school graduates who enter our company do possess basic technical skills, but they often lack soft skills such as communication and teamwork. They also still require significant additional training to keep up with the technology we use. Mental preparedness and professionalism also need to be further developed"** (HRD

Manager at an Electronics Company, Bogor, April 2024).

Furthermore, an interview with a business owner in the agribusiness sector added, **"Vocational school students we accept for internships usually understand agricultural theory, but when applied in the field, they still struggle with time management and problem-solving. We hope that schools can provide more intensive soft skills training so that they are not only technically skilled but also resilient in facing work challenges"** (Agribusiness Business Owner, Bogor, April 2024).

These interview results emphasize that while there is awareness of the importance of aligning study programs with labor market needs, implementation on the ground still faces several structural and resource challenges. This indicates the need for closer collaboration between schools, the industrial sector, and the government to improve vocational education quality based on regional needs.

Gap Analysis

The results of the gap analysis between the curriculum of Vocational High Schools (SMK) in the Bogor area and the needs of the workforce reveal several significant discrepancies, particularly in terms of digital technology proficiency and the development of soft skills. Although the SMK curriculum has included information technology subjects, the scope of this material is still limited to basic operations of common software such as word processors, spreadsheets, and presentation applications. This does not align with the demands of the modern industry, which requires more advanced digital technology skills, such as basic programming, digital data

management, and the use of specialized industrial software (Pratama & Hasan, 2024). Research by Handayani (2024) emphasizes that the digital transformation in the manufacturing and service sectors demands a workforce proficient in advanced information technology in order to adapt and compete effectively (Handayani, 2024).

In the context of learning in SMK, digital technology proficiency is still far from ideal. According to a survey conducted, only about 35% of graduates feel confident with their digital technology skills when entering the workforce. In contrast, the industry expects graduates to be able to immediately be productive and independent in using digital technology as part of the production and service processes (Miladiah et al., 2021). This indicates the need for a curriculum update that is more responsive to technological advancements, so that graduates can meet the evolving expectations of the workforce.

In addition to technical aspects, gaps were also found in the development of soft skills, particularly in effective communication, teamwork, and problem-solving abilities. A study by (Cahyono & Gunawan, 2024), emphasizes the importance of soft skills in today's workplace, where interpersonal interactions and critical thinking abilities are decisive factors for employee success. Survey data from this research also indicates that more than 60% of industry representatives believe that SMK graduates lack these skills. This is exacerbated by the insufficient application of experiential learning that allows students to apply theory in real-life contexts, as well as the lack of

adequate interpersonal training during their education.

Effective communication skills are a key asset in a work environment that requires cross-functional collaboration and interaction with various stakeholders. However, the learning model in vocational high schools (SMK), which tends to focus on individual mastery of theoretical material, makes students less accustomed to communicating in a practical and contextual manner (Maftuhah & Ikhwannuddin, 2024). Similarly, teamwork skills, which are essential soft skills, have not been sufficiently addressed in the learning process. This results in graduates facing difficulties in adapting to work environments that demand coordination and active collaboration among team members (Amin, 2017).

Problem-solving skills also remain an area that SMK graduates struggle with. Overly theoretical and structured learning, which does not allow room for creativity and initiative development, leaves students inadequately prepared to face dynamic and challenging work situations (Bereiter & Scardamalia, 2003) (Humam & Hanif, 2025). According to (Rahmadani et al., 2023), the development of critical thinking and problem-solving skills should be a primary focus in vocational education so that graduates can offer innovative solutions in the industrial world.

In addition to technical competencies and soft skills, this research also identifies gaps in the mental preparedness and professional attitudes of SMK graduates. Many industry players complain about the low work ethic, discipline, and sense of responsibility exhibited by new

graduates. Professional attitudes such as time discipline, honesty, and initiative in completing tasks are crucial for career continuity and advancement, but these aspects still need improvement (Amanto, 2011). Weak professional attitudes can lower productivity and lead to disharmony in the work environment, ultimately diminishing the reputation of SMK graduates (Maloni et al., 2019).

From a curriculum perspective, the gap analysis also reveals that several subjects within the SMK curriculum are less relevant to the needs of the local industry in Bogor. Learning materials that are too focused on theory and lack practical application make students less prepared with real-world work experience before graduation. As explained by (Darmawan et al., 2024), fieldwork experience is an essential element in vocational education that helps students develop skills and prepare for the real work environment. However, the implementation of fieldwork in several SMKs is still not optimal due to limited partnerships with industry and a lack of supporting facilities.

This gap highlights the need for curriculum reform, not only in adjusting content but also in learning methods. Project-based learning (PBL) models have been widely recognized as an effective approach to integrating theory and practice while simultaneously developing soft skills (Leal Filho et al., 2016). This approach provides students with opportunities to work on real-world projects that are relevant to the needs of the workforce, allowing them to learn actively and contextually. Moreover, intensive collaboration between SMKs and industry in curriculum development and teacher

training is key to the success of adaptive and responsive vocational education (McGrath, 2012)(Muhammad Zaki Raihansyah, Rangga Vania Abqari, Moh. Hisyam Alwafy, Mohammad Bachrul Syafa'at, 2014).

Overall, these findings suggest that closing the existing competency gaps requires a comprehensive effort that includes curriculum updates, teacher capacity-building, strengthening partnerships with the industry, and the implementation of innovative teaching methods. By doing so, SMKs can optimally fulfill their role in preparing a skilled, competitive workforce capable of adapting to the rapid changes in the industrial world, particularly in the Bogor area, which continues to experience economic and industrial growth.

Interpretation of Findings

The results of this study reveal that the level of alignment between vocational school programs (SMK) and the competency needs of the labor market in the Bogor area is highly variable. This indicates that not all study programs available in SMK optimally meet the competencies expected by the industrial sector in the region. In general, several study programs demonstrate a relatively good relevance and connection to labor market demands, particularly those related to the fields of engineering and technology. These programs have successfully adjusted their learning materials to keep pace with technological developments and the specific needs of the local industry, ensuring that graduates possess the competencies required and can be immediately absorbed into the workforce. However, on the other hand, there are a number of programs that

have not been able to adequately meet these demands. Particularly in the fields of service and business, there are still gaps in terms of updating learning materials and developing student competencies in accordance with the dynamic needs of the labor market. This has led to a significant competency gap between what is taught in schools and the competencies required by the labor market.

The competency gap identified in this study is primarily seen in three main areas: highly specific technical competencies, soft skills such as communication, teamwork, and adaptability, and the students' ability to keep up with the rapidly changing and evolving technological advancements. These technological changes present a major challenge for vocational schools, as they require swift and relevant updates to the curriculum to ensure that graduates are not left behind. In the context of the Bogor region, the diverse nature of industries, ranging from manufacturing to small and medium-sized enterprises (SMEs), makes the competency needs highly varied. This condition further strengthens the misalignment between the existing study programs and the actual demands of the labor market. These findings are consistent with the theory of matching education and the labor market proposed by (Rodokanakis, 2021), where alignment between education and labor market needs is crucial for improving the absorption of graduates into the workforce. If vocational education cannot meet these needs, the chances of graduates being absorbed into the industry will be increasingly limited.

The mismatch between the learning materials provided in Vocational High

Schools (SMKs) and the competency needs of the local labor market is closely related to the limitations of resources available at these schools. One of the main challenges often faced is the inadequacy of learning facilities. Many SMKs, particularly in the Bogor area, are not equipped with modern technology and practical laboratories that align with current industrial developments. This situation undoubtedly affects the effectiveness of the learning process, especially for study programs that require practical skills and mastery of the latest technology. Limited facilities result in students only acquiring a general theoretical understanding without gaining in-depth hands-on experience. As a result, SMK graduates are less prepared to face the challenges of the real-world job market, where they are expected to operate sophisticated equipment and adapt to modern working methods.

In addition, the quality of teaching staff is also an important factor that influences the relevance of competencies produced by SMKs. In many cases, teachers in SMKs still lack direct experience in the industrial world, causing the material taught to be often theoretical and disconnected from the practical realities in the field. Teachers who lack industry knowledge and work experience find it difficult to provide applicable, innovative, and relevant lessons that meet labor market needs. This affects students' ability to develop both technical competencies and soft skills required in the workforce. Conversely, teachers with strong industry backgrounds are better able to bridge theory and practice, linking the learning material to real-world situations faced in the workplace, and providing students with deeper, more

contextual understanding. Therefore, the qualifications and industrial experience of teaching staff are crucial factors that must be considered in efforts to improve the quality of vocational education in SMKs.

The condition of limited resources is not only a technical issue but also an important indicator for policymakers that more serious attention is needed in the revision and development of the SMK curriculum. The curriculum should be responsive to the constantly changing and dynamic labor market demands, especially by considering the unique industrial characteristics of the Bogor area. Curriculum changes should also be accompanied by the enhancement of resource quality, such as the modernization of facilities and continuous training for teachers to ensure they are up to date with technological advancements and the latest industry trends. Thus, SMKs can become educational institutions that produce graduates who are ready to work, highly competent, and in line with the demands of the job market.

Improving the quality of resources in SMKs is a strategic step that cannot be compromised. Without adequate facilities and competent teaching staff with industrial experience, the competency gap between SMK graduates and labor market needs will persist. Therefore, collaboration between schools, government, and the industrial sector is crucial to support the provision of these resources. The local government, particularly in Bogor, should play an active role in facilitating the improvement of infrastructure and human resources in SMKs, while industries can contribute through training, internships, and the provision of practical equipment. Only with such

an integrated approach can vocational education in SMKs transform to become more effective and relevant, ensuring that graduates are truly capable of meeting the needs of the local labor market and contributing to regional economic development.

The implications of this research finding have a significant impact on the development of the curriculum for Vocational High Schools (SMK) in the Bogor area. The findings, which indicate a gap between the competencies taught at SMKs and the needs of the local labor market, emphasize that the current curriculum is not entirely effective in addressing the demands of a labor market that is becoming increasingly dynamic and specific to regional characteristics. Therefore, the development of the SMK curriculum must be carried out with a more contextual and adaptive approach, not only referring to national standards but also considering the needs and potential of the industries in Bogor. A regionally-oriented curriculum should integrate technical competencies tailored to the type and character of local industries so that SMK graduates have relevant skills that can be directly accepted by the local labor market.

The development of this region-based curriculum requires a collaborative and participatory approach, where various stakeholders, including schools, industries, local governments, and professional associations, are actively involved in its formulation. The involvement of the industrial sector is crucial, as they are the ones who best understand the competencies required by the workforce. Local governments also play an essential role in providing policy and regulatory support that facilitates the

integration of industrial needs and vocational education. Through this synergy, the resulting curriculum will not only meet the national competency standards but also be more applicable, relevant, and capable of addressing the real challenges of the labor market in the Bogor area. This approach is known as regional-based curriculum development, which emphasizes the importance of the local context in educational planning.

In addition to technical competencies, strengthening soft skills is another critical aspect of SMK curriculum development. The modern labor market requires graduates to possess not only technical skills but also effective communication abilities, teamwork, flexibility, and the capacity to adapt to rapidly changing digital technologies. Soft skills are key to graduates' success in facing the dynamics and complexities of today's work environment. According to (Singh, 2012), soft skills such as interpersonal skills and digital literacy are among the essential competencies needed by the modern workforce. Without these, SMK graduates will face significant barriers in contributing effectively to the workforce. Therefore, the curriculum developed must include learning strategies that systematically enhance these soft skills, integrated with technical competencies, so that SMK graduates are not only technically proficient but also possess the character and social skills that support their success in the professional world.

Overall, the implications of these findings highlight the need for reform and innovation in the development of SMK curricula in Bogor. This curriculum should not be merely normative and uniform, but also flexible

and adaptive to the specific needs of the region. This approach will allow SMKs to be more responsive in providing competent and work-ready graduates while also strengthening the synergy between education and industry, which is a key factor in the success of vocational education. In this way, the curriculum developed will not merely be a formal document but will truly become a strategic instrument capable of driving improvements in the quality of education and the competitiveness of SMK graduates at both the regional and national levels.

Relation to Literature

The discussion of the findings in this study needs to be connected with existing literature and previous research to provide a broader perspective and strengthen the argumentation. A previous study by (Arifudin S.T., 2019), which examined the alignment of vocational school programs with labor market needs in West Java, found a significant competency gap, particularly in the fields of information technology and business management. This finding is consistent with the results of this study, which indicates the need for an enhanced relevance of the curriculum in relation to technological advancements and labor market dynamics. Additionally, research by M. Sobari and D. Wahyudin (2023) emphasizes the importance of involving the industry in the development of vocational school curricula to ensure that graduates' competencies are directly applicable in the workplace, in line with vocational education theory that stresses the close relationship between vocational education and industry (Sobari et al., 2023).

In the context of competence theory, this study refers to the concept

proposed by Spencer and Spencer (1993), who divided competencies into technical competencies and behavioral competencies (Kou et al., 2013). The findings of this research reinforce the understanding that both types of competencies must be developed in a balanced manner in vocational education to achieve optimal alignment with labor market needs. Several literatures also highlight the role of the regional context as an important factor in competency development, where the curriculum must be adapted to the economic, social, and cultural characteristics of the local area to provide maximum benefits to graduates.

Furthermore, literature from (Ali et al., 2020) stresses that the main challenge of vocational education in developing countries is the mismatch between the competencies taught and the demands of the labor market. This is particularly relevant to the Bogor area, which is a developing region with diverse industrial sectors. This study reveals that factors such as the lack of collaboration between vocational schools and industries, limited practical facilities, and insufficient teacher training are major barriers to achieving optimal alignment. Therefore, these findings not only provide empirical confirmation of previous literature but also expand the understanding by adding the specific regional context of Bogor.

Factors Affecting the Relevance of Study Programs

A deeper analysis of the factors influencing the alignment of study programs with the competency requirements of the labor market in the Bogor region reveals the impact of various internal and external factors.

The most dominant internal factor is the curriculum used by Vocational High Schools (SMK). The existing curriculum is still oriented toward national standards, which tend to be general and have not fully accommodated the specific needs of the Bogor region. Additionally, school resources are also an important factor, especially regarding the availability of adequate learning facilities and teachers with the necessary competence and experience in the fields they teach. This study found that the majority of SMK teachers in Bogor still lack direct industry experience, making it difficult to provide applicable and contextual learning for students.

External factors play a crucial role in determining the relevance of study programs to the competency needs of the labor market, particularly in the context of the Bogor region. One of the main external factors is the condition of the local industry, which is characterized by great diversity. Bogor is an area with vast economic potential, encompassing various sectors such as manufacturing, agribusiness, and services. This diversity in industrial sectors requires study programs in educational institutions, especially Vocational High Schools (SMKs), to be adaptive and flexible in designing curricula and developing competencies. Each industrial sector demands different skills and expertise, so the study programs must be able to accommodate these specific needs, ensuring that graduates can easily adapt and meet the demands of the labor market in their surroundings.

Reality on the ground shows a gap between the competencies taught in SMKs and the needs of the industry. One of the causes of this gap is the

suboptimal communication and collaboration between schools and the industrial world. This limited cooperation results in a lack of direct information and input from the business and industrial sectors, which is essential in designing relevant and applicable curricula. As a result, the competencies of SMK graduates do not always align with the actual needs in the labor market, which could potentially lead to educated unemployment or a mismatch of competencies when entering the workforce. Therefore, it is important to strengthen the synergy between educational institutions and the industrial world through internship programs, joint training, and regular consultation forums that can enhance the quality and relevance of learning.

The role of regional government policies is also a highly influential external factor in guiding the development of region-based vocational education. Local governments have the authority and responsibility to formulate and implement policies that support the alignment between education and the needs of the local industry. However, in practice, policies related to the development of vocational education in Bogor still need strengthening, both in terms of regulation and implementation on the ground. Inconsistent policies and the lack of sustainable support have caused various curriculum development initiatives and quality improvement efforts to struggle to achieve optimal results. By strengthening policies and their consistent implementation, local governments can provide clear direction for the development of study programs that align with regional characteristics and competency needs,

so vocational education can truly become a key driver in developing local human resources.

Another important external factor is the rapid development of technology. Innovation and technological advancements bring significant changes across various industrial sectors, causing relevant competencies to quickly become outdated. This condition demands that the curriculum applied in vocational high schools (SMK) be regularly updated to keep up with the dynamic needs of competencies in the workforce. In addition, teachers need to receive continuous training and development to effectively master and teach the latest technologies. This challenge becomes even more complex when SMK faces limited access to modern technological facilities and adequate resources. These limitations restrict the school's ability to provide students with real and relevant learning experiences, which can ultimately affect the quality of graduates and their competitiveness in the job market. Therefore, the provision of technological facilities, the enhancement of teacher competencies, and partnerships with industries that have the latest technologies must be key priorities in addressing these challenges.

External factors such as industry conditions, local government policies, and technological developments are crucial to determining the success of study programs in producing competent and job-ready graduates. Collaborative efforts between schools, the industrial world, and local governments are necessary to create an adaptive, responsive vocational education ecosystem based on regional needs. Thus, vocational education can

play a strategic role in supporting regional development by providing a skilled workforce that meets both local and national labor market demands

Based on the results and discussion above, several recommendations can be proposed to improve the alignment of vocational school programs with the competency needs of the labor market in the Bogor region. First, it is crucial to develop a curriculum that is based on regional needs by involving various stakeholders, especially local industries. This curriculum approach must be dynamic and flexible, allowing for rapid updates in line with changes in labor market demands. The region-based curriculum should also emphasize strengthening technical competencies as well as soft skills such as communication, teamwork, and problem-solving abilities, which are highly needed in the modern workplace.

Second, collaboration between vocational schools and industries should be enhanced through various programs such as internships, teacher training in industries, provision of practice facilities by industries, and direct involvement in curriculum development. This partnership will provide dual benefits, offering students real work experience while also improving the quality of learning in schools. Additionally, this partnership could open direct pathways for graduates into the workforce, thereby reducing unemployment rates.

Third, regional vocational education policies should receive serious attention from local governments. The government should provide support in the form of budgets, regulations, and facilitation of coordination between educational

institutions and industries. Clear and integrated policies will strengthen the implementation of region-based curricula and ensure the sustainability of vocational programs.

This study has several limitations that should be noted to provide context in interpreting the results. First, the scope of the study is limited to the Bogor region, so the results may not be fully generalizable to other areas with different industrial and socio-economic characteristics. Second, the data collection methods, which involve questionnaires and interviews, may be influenced by the subjectivity of the respondents, particularly in assessing the alignment between the competencies taught and the needs of the workforce. Third, this study has not fully explored the impact of macro factors, such as national policies or global trends, which also contribute to the alignment of study programs. These limitations open up opportunities for more comprehensive research with a broader scope, a more diverse set of data collection methods, and a deeper analysis of external factors.

Based on the limitations and findings, future research should focus on expanding and deepening the scope of the study. It is recommended that future studies conduct comparative research between different regions in Indonesia to gain a national perspective on the alignment of vocational school programs with the needs of the workforce. In addition, future research could employ longitudinal methods to observe the dynamics of competency alignment over time.

Further studies could also specifically explore the role of digital technology and innovation in the vocational learning process, as well as

their impact on competency alignment. Focusing on a macro analysis of vocational education policies would be highly useful for identifying barriers and opportunities in the development of regionally-based curricula at a national level. In-depth research on the effectiveness of partnerships between vocational schools and industry would also be crucial in ensuring optimal synergy in producing competent, job-ready graduates

CONCLUSION

The research findings indicate that although several study programs in vocational schools (SMK) already align well with industry needs, particularly in sectors such as manufacturing and technology, many other study programs still lack relevance to the rapidly evolving industry. Specifically, the technical skills taught in some study programs are still limited to basic materials that do not fully reflect the standards and demands of the more modern industrial world. Additionally, soft skills competencies such as communication, teamwork, and adaptability, which are highly essential in the workplace, are still not taught in depth within the SMK curriculum. This shortcoming potentially hampers graduates' readiness to face the challenges of the dynamic labor market.

This study identifies that one of the main causes of this mismatch is the lack of close collaboration between schools and the business/industry world (DUDI). This suboptimal partnership has resulted in the existing study programs in SMK not fully meeting the actual field needs, both in terms of teaching materials and the practical experience required by students.

Another factor that exacerbates this gap is the limited practical training facilities

and the lack of ongoing teacher training focused on the latest industrial skills.

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