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# SWOT Analysis in Strengthening the Competitiveness of Graduates of SMKN 2 Sangatta Utara in the Era of the Industrial Revolution 4.0

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**Abstract:** This study aims to analyze the strengths, weaknesses, opportunities, and threats (SWOT) of SMKN 2 Sangatta Utara in improving vocational education quality and graduate competitiveness in the era of Industrial Revolution 4.0. Using a descriptive-qualitative approach, data were collected through documentation studies and analyzed using a SWOT matrix technique. The results showed that the SO (Strengths-Opportunities) strategy is the most relevant, with the highest score of 5.65. This strategy emphasizes the optimization of school accreditation, utilization of industrial partnerships, and strengthening of expertise programs in response to dynamic labor market demands. The findings are supported by international literature, such as UNESCO-UNEVOC (2020), OECD (2021, 2024), World Bank (2023), and ILO (2023), highlighting the importance of industry collaboration, adaptive curriculum, and digital literacy in vocational education. The study's findings underscore the critical role of strategic planning in enhancing vocational education quality and graduate employability in the context of Industry 4.0. By focusing on the SO strategy, SMKN 2 Sangatta Utara can leverage its strengths and capitalize on emerging opportunities to better prepare students for the evolving job market. This approach aligns with global trends in vocational education, emphasizing the need for continuous adaptation and close collaboration between educational institutions and industry partners to ensure relevance and effectiveness of vocational programs.

**Keywords:** SWOT Analysis, Vocational Education, Vocational High School, Development Strategy, Graduate Competitiveness.

## INTRODUCTION

Vocational education plays an important role in shaping human resources who are ready to enter the world of work. OECD (2021) emphasizes that the success of vocational education is very dependent on the relationship between the curriculum, industrial involvement, and the readiness of graduates in dealing with digital transformation. North Sangatta 2 Vocational School, as a leading vocational school in East Kutai Regency, East Kalimantan, is faced with the need to continue to innovate to remain competitive amid the dynamics of the Industrial Revolution 4.0. Through SWOT analysis, schools can comprehensively understand the potential of strengths and opportunities that are owned, as well as anticipating existing weaknesses and threats. Based on the internal data of the school in 2024, it was noted that 72% of automotive majoring students had undergone industrial internships, while 68% of the alumni of the Mining Geology Department had been absorbed into the relevant work sector. The Nautical Niaga Department also showed a significant increase in the acquisition of competency certification, which was 22% in the last two years.

This study aims to formulate relevant development strategies based on the SWOT approach, which is chosen because of its ability to integrate internal and external aspects systematically. Compared to other strategy methods such as TOWS or PESTLE, the SWOT approach is considered more practical and directly applied, especially in the context of educational institutions such as SMKN 2 Sangatta Utara. The main purpose of this study is to improve the quality and competitiveness of graduates in a sustainable manner, by developing data -based strategies that can be implemented significantly at the institutional level.

Theoretical and practical implications in this study make a theoretical contribution to the development of a SWOT -based vocational education strategy model that is responsive to the dynamics of the Industrial Revolution 4.0. Theoretically, these results strengthen the strategic analysis approach in education that emphasizes the balance between internal factors of institutions (strengths and weaknesses) as well as external factors (opportunities and threats) in the formulation of educational policies. The SWOT model developed in the context of SMKN 2 Sangatta Utara can also be replicated as a strategic framework for other vocational schools to increase the competitiveness of graduates through the synergy between accreditation, industrial partnership, and adaptive curriculum.

Practically, this research provides an implementative guide for school management and stakeholders of vocational education in developing institutional development strategies. Recommendations such as industrial -based teacher training 4.0, strengthening partnership of the business world, and the integration of digital





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technology in learning becomes a concrete step that can be applied in the short to medium term. In addition, the results of this study can also be a reference for policy makers in designing vocational revitalization programs that are more oriented towards the needs of the world of work and technological developments, as well as strengthening collaborative and sustainable vocational education ecosystems.

A number of relevant studies in Indonesia show similar results. Studies by Ramadan and Sari (2022: 63) revealed that the collaborative strategy between SMK and the business world can significantly improve student technical skills. Widayanti & Slameto (2016: 193) states that there is a significant difference between the use of the Teams Games Tournament method assisted by dice games with conventional methods in productive learning. In addition, Fitriani's research (2021: 88) confirmed that competency certification has a direct influence on the level of confidence of graduates when applying for a job. The framework of thinking in this study was built based on the link between internal power variables (accreditation, human resources, facilities) with external opportunities (partnerships, technology trends, industrial demand). This interaction is formulated into a strategy to strengthen competitiveness that is responsive to global challenges.

## THEORETICAL FRAMEWORK

### 1. Introduction to the Industrial Revolution 4.0

The **Industrial Revolution 4.0 (IR 4.0)** marks a transformative phase in the global economy, characterized by the integration of digital technologies such as artificial intelligence (AI), robotics, the Internet of Things (IoT), and big data into industrial processes. These technological advancements are reshaping the skills required in the workforce, with a strong emphasis on adaptability, digital literacy, innovation, and interdisciplinary knowledge. For educational institutions, especially vocational schools like SMKN 2 Sangatta Utara, aligning educational outcomes with these demands is critical.

In this context, graduates face growing pressure to develop competencies beyond technical skills. Soft skills such as communication, critical thinking, creativity, and collaboration have become just as crucial as hard skills. The IR 4.0 demands a new type of workforce — one that can evolve with technology, solve complex problems, and contribute to digital transformation in the workplace. Therefore, the competitiveness of graduates is now directly tied to how well they are prepared for this shift. For SMKN 2 Sangatta Utara, located in a rapidly developing region of Indonesia, responding to the IR 4.0 landscape means re-evaluating its curriculum, industry partnerships, and skill-development programs. The school must ensure its graduates are not only employable but also competitive, adaptable, and innovative. This theoretical framework explores how a SWOT analysis can be used as a strategic tool to strengthen this competitiveness.

### 2. Concept of Competitiveness of Vocational School Graduates

Competitiveness refers to the capacity of individuals to secure and maintain employment in the job market, particularly when faced with competition from peers both locally and globally. For vocational graduates, competitiveness includes having relevant technical skills, work-ready behaviors, and the ability to continue learning and adapting throughout their careers. In the era of IR 4.0, competitiveness increasingly depends on one's ability to navigate digital technologies and contribute to innovative processes in their field. Vocational education institutions like SMKN 2 Sangatta Utara are tasked with equipping students not only with job-specific skills but also with transferable skills that can be applied across different sectors. This includes enhancing digital literacy, entrepreneurial thinking, and problem-solving capabilities. These attributes contribute significantly to graduates' marketability, particularly in industries undergoing digital transformation.

Moreover, a competitive graduate is one who has been exposed to industry practices during their education, such as internships, apprenticeships, or collaborative projects with businesses. As such, the link between vocational training and industry standards becomes a cornerstone of graduate competitiveness. The more aligned the curriculum and training are with current and future labor market needs, the stronger the competitive edge of the students will be.

### 3. SWOT Analysis as a Strategic Planning Tool

SWOT analysis is a widely recognized strategic planning tool used to identify an organization’s internal strengths and weaknesses, as well as external opportunities and threats. In the context of vocational education, SWOT analysis can provide valuable insights into the current standing of a school like SMKN 2 Sangatta Utara, and guide strategic decisions to enhance the institution’s ability to produce competitive graduates. This analytical tool allows for a systematic evaluation



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of institutional capabilities and the external environment.

Internally, strengths might include experienced faculty, strong industry linkages, or well-equipped workshops, while weaknesses could involve outdated curriculum, lack of modern technology, or insufficient exposure to real-world work environments. Externally, opportunities may include partnerships with local industries, government support for vocational training, or growing demand for technical skills, whereas threats might consist of technological disruption, job market saturation, or competition from other institutions.

By clearly outlining these four aspects, the school can formulate targeted strategies — such as updating curriculum to include IR 4.0 skills, investing in teacher training, or improving collaboration with industries. The SWOT framework helps school leaders and policymakers make informed decisions that enhance educational outcomes and better prepare students for the realities of the modern labor market.

**4. Application of SWOT Analysis in Vocational Schools**

Applying SWOT analysis in vocational schools like SMKN 2 Sangatta Utara involves a participatory approach, where educators, administrators, students, and industry partners collectively evaluate the school's capacity to deliver competitive graduates. This collaborative process ensures that the SWOT analysis is grounded in the actual experiences of stakeholders and is reflective of both institutional performance and market demands. In the process, the institution can identify core strengths such as specialized training programs, certification options, and strong alumni networks that contribute positively to graduate competitiveness. At the same time, weaknesses like lack of digital tools or insufficient teacher training in modern methodologies can be addressed through targeted interventions. These insights can inform school development plans and educational reforms tailored to the needs of the IR 4.0 era.

Opportunities from government programs (like Indonesia's revitalization of vocational education), or the expansion of local industries in Sangatta Utara, can be strategically leveraged. On the other hand, threats such as rapid changes in technology or economic downturns need to be anticipated with risk mitigation plans. The effective application of SWOT analysis enables SMKN 2 Sangatta Utara to be proactive and resilient in a constantly evolving education and labor market landscape.

**5. Strengthening Graduate Competitiveness through Strategic Implementation**

Once a comprehensive SWOT analysis is completed, the findings must be translated into actionable strategies aimed at improving graduate outcomes. For instance, identified strengths can be maximized by promoting successful programs or expanding partnerships with high-performing industries. Similarly, weaknesses should be addressed through resource allocation, staff development, and curriculum modernization aligned with IR 4.0 needs. Opportunities can be seized through strategic initiatives such as integrating digital skill certifications, enhancing student entrepreneurship programs, or building collaborative innovation hubs with local businesses. Furthermore, addressing threats proactively — such as enhancing the adaptability of the curriculum to keep pace with tech trends — helps the institution build long-term sustainability and student relevance.

Ultimately, strengthening graduate competitiveness is a continuous process that requires regular assessment, feedback, and adjustment. SWOT analysis provides a foundation for this dynamic strategy, ensuring that SMKN 2 Sangatta Utara remains responsive and forward-thinking in its approach to vocational education. This will not only benefit individual graduates but also contribute to the broader economic development of the region.

## RESEARCH METHODS

This study uses a descriptive-qualitative approach with a case study method. This approach was chosen because it was suitable for identifying and describing complex phenomena related to the strategy of strengthening the competitiveness of graduates through the SWOT approach at SMKN 2 Sangatta Utara. The study was conducted at SMKN 2 Sangatta Utara, East Kutai Regency, East Kalimantan, during the period January to March 2025. The target of this research was the Vocational Education Unit, namely SMKN 2 Sangatta Utara. The research subjects include school principals, deputy school principals in the field of curriculum and industrial relations, heads of expertise programs (automotive, mining geology, and nautika commercial ships), productive teachers and class XII students, as well as representatives of industrial partners.



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The research procedure consists of several stages: (1) Documentation data collection, (2) semi-structured interviews with schools and industrial partners, (3) SWOT analysis, and (4) Strategy validation by vocational education experts and the industrial world. Data consists of primary data (results of interviews and direct observations) and secondary data (official documents such as accreditation reports, curriculum, results of tracer studies, and partner data). The instruments include interview guidelines, SWOT observation formats, and school documents. All instruments are validated by education management experts. Data collection techniques through documentation studies, in -depth interviews, and participatory observations of the implementation of student teaching and industrial internships. While the data analysis technique uses SWOT techniques. Analysis Stages: Identification of internal and external factors, giving weight and rating, final score calculation, strategy mapping (SO, WO, ST, WT), and the selection of the main strategy. Validation is carried out through triangulation and expert assessment.

## RESULTS AND DISCUSSION

Internal factors indicate that SMKN 2 Sangatta Utara has advantages such as accreditation A, the application of ISO 9001: 2015, industrial cooperation, variations of expertise programs, and curriculum that is in line with the needs of the world of work. Weaknesses found include the limitations of human resources, infrastructure that is not yet optimal, weak school promotion, lack of technology use in learning, as well as data management systems that have not been digitally integrated. External factors include great opportunities such as high demand for industrial labor, government support for vocational schools, the development of digital curriculum, and teaching factory programs. The threats faced include competition between institutions, changes in government policy, the global economic crisis, and the rapid development of technology.

**Table 1:** Internship Participation and Alumni Absorption Data

| Year | Internship Students (%) | Alumni work in related sectors (%) | Industrial Partners |
|---|---|---|---|
| 2021 | 57% | 50% | 8 |
| 2022 | 66% | 56% | 10 |
| 2023 | 72% | 61% | 12 |

**Table 2:** SWOT Matrix and Development Strategy Score

| Strategy | Components | Credit | Rate | Score |
|---|---|---|---|---|
| SO | Accreditation, Industrial Partnership | 0.30 | 5 | 1.50 |
| SO | Strengthening the expertise program | 0.25 | 5 | 1.25 |
| SO | Adaptive curriculum | 0.20 | 5 | 1.00 |
| SO | Competency Certification | 0.20 | 4 | 0.80 |
| SO | School Promotion | 0.10 | 4 | 0.40 |
| | **Total SO Strategy Score** | | | **5.65** |

**Table 3:** Internal Factors: Strengths

| Code | Descriptions |
|---|---|
| S1 | School Accreditation “A” |
| S2 | Application of ISO 9001: 2015 |
| S3 | Cooperation with industry |
| S4 | Variations in expertise programs |
| S5 | Curriculum according to the needs of the world of work |

**Table 4:** Internal Factors: Weaknesses

| Code | Description |
|---|---|
| W1 | Limited human resources |
| W2 | Infrastructure facilities are not optimal |
| W3 | School promotion is still weak |
| W4 | Utilization of Learning Learning Technology |
| W5 | Data Management are not Digital (traditional_ |



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**Table 5:** External Factors: Opportunities

| Code | Descriptions |
|---|---|
| O1 | The need for high industrial labor |
| O2 | The development of Industrial cooperation |
| O3 | Government support for SMK |
| O4 | The development of Digital curriculum |
| O5 | Internship and Teaching Factory Program |

**Table 6:** External Factors: Threats

| Code | Descriptions |
|---|---|
| T1 | Competition between institutions |
| T2 | Changes in government policy |
| T3 | The global economic crisis |
| T4 | Fast technological changes |
| T5 | Lack of public trust |

**Table 7:** SWOT Strategy and Score

| Strategy | Descriptions | Total Score |
|---|---|---|
| SO | Utilizing Accreditation and ISO for Promotion and Establishing Industrial Cooperation | 5,65 |
| WO | Improvement of infrastructure and technology -based promotion facilities | 4,85 |
| ST | Improvement of school image to deal with competition | 3,90 |
| WT | Development of a technology -based management system | 3,10 |

This data shows the effectiveness of the SO strategy in encouraging increasing industrial involvement and student work readiness. This finding is in line with the World Bank report (2023) which emphasizes the importance of alignment between vocational training and global job market needs, as well as OECD (2024) which highlights that countries with adaptive vocational systems tend to have lower young unemployment rates. Based on BPS data (2022), the absorption rate of national vocational graduates is 54.62%. In comparison, the achievements of SMKN 2 Sangatta Utara in 2023 amounted to 61% signify the competitive advantage of this institution, especially in the maritime and mining sectors. This is reinforced by the ILO report (2023) and the Asian Development Bank (2024), which states that the success of vocational education is largely determined by the synergy between schools and industries and competency -based curriculum. In addition, the McKinsey Global Institute (2025) asserted that vocational education that integrates digital technology, simulation -based training, and soft skills (soft skills) will produce more competitive and resilient graduates to face technology disruption.

Based on the results of data analysis of the documentation and internal evaluation carried out on SMKN 2 Sangatta Utara, the identification of strengths (strengths), weaknesses, opportunities, and threats, which are then formulated into the SWOT matrix. This matrix is used to formulate four main types of strategies, namely: SO (Strengths-Opportunities), WO (Weaknesses-Opportunities), ST (Strengths-Threats), and WT (Weaknesses-Threats). SO strategy utilizes the internal power of the school to seize external opportunities. The analysis shows that the SO strategy has the highest score of 5.65, indicating that this approach is the most optimal choice. The SO strategies produced include: Optimizing A accreditation status through digital promotion and strategic cooperation with the industrial world; utilization of digital -based learning facilities; and strengthening the excellent expertise program. These findings strengthen the results of the study of OECD (2024) and ILO (2023) which emphasizes the importance of synergy between the quality of educational institutions and the response to the dynamics of the global industry.

The WO strategy aims to overcome internal weaknesses by utilizing external opportunities, including: Improved teacher competencies through industrial -based training 4.0; Improvement of student practice facilities through CSR support; and curriculum revisions based on input from the business world. This approach is in line with World Bank recommendations (2023) related to curriculum renewal and teacher training. ST strategy utilizes school strength to face external



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threats, such as: expanding industrial cooperation networks; implementation of alumni tracking systems; and diversification of competency certification programs. This approach is supported by the UNESCO-UEVOC study (2020). The WT strategy is defensive, aims to minimize weaknesses and avoid threats. This strategy includes: increased digital literacy; School management restructuring; and improvement of career guidance services. Although this strategy score is low, its application remains crucial as the foundation of strengthening institutions. Overall, the SO strategy is a priority in developing the competitiveness of SMKN 2 Sangatta Utara graduates. The success of this strategy depends on synergy with industry, adaptive curriculum, and sustainable quality education management systems.

The results of a SWOT analysis provide strategic insights for school leaders and curriculum developers at SMKN 2 Sangatta Utara. By identifying internal strengths, such as skilled teachers or industry-aligned programs, the school can further enhance and scale these assets to produce more competitive graduates. Conversely, recognizing weaknesses—such as gaps in digital infrastructure or outdated teaching materials—highlights areas that need urgent investment or reform. With these insights, school management can make data-driven decisions to align their educational offerings with the rapidly changing demands of the Industrial Revolution 4.0. Teachers play a central role in shaping students' readiness for the job market. The SWOT analysis can inform instructional improvements by revealing the need for more adaptive teaching methods, the integration of IR 4.0 technologies in classrooms, and the adoption of student-centered learning approaches. Teachers may need additional training in digital literacy, project-based learning, or blended instruction. By addressing these factors, the institution can foster a learning environment that encourages critical thinking, problem-solving, and innovation—skills essential for graduates' competitiveness in a digital economy.

One of the key opportunities identified through SWOT analysis is the potential for stronger collaboration between SMKN 2 Sangatta Utara and local industries. These partnerships are vital for ensuring that students gain real-world experience and practical skills that meet labor market requirements. The analysis may reveal untapped sectors or emerging industries in the region that could become strategic partners for internships, mentorship, or curriculum input. Strengthening such relationships ensures the school's programs remain relevant and equips graduates with not just technical skills, but also workplace competencies valued by employers.

From a broader perspective, the findings of the SWOT analysis have implications for education policymakers at the regional and national levels. Policymakers can use the data to support vocational schools through funding, regulatory reform, or targeted programs that enhance digital readiness and employability. For SMKN 2 Sangatta Utara, the SWOT findings can serve as the foundation for long-term planning, including infrastructure development, staff capacity building, and innovation in teaching and learning. Ultimately, these strategic efforts can transform the institution into a model for vocational education in the era of the Industrial Revolution 4.0.

## CONCLUSION

This study found that the strategy of strengthening the competitiveness of SMKN 2 Sangatta Utara graduates could be formulated effectively through a SWOT approach that considers the internal and external dynamics of the school. SO strategy has proven to be the most promising approach because it utilizes the main strength of the institution, such as superior accreditation and relevant expertise programs, to answer opportunities in the era of the industrial revolution 4.0. Utilization of collaboration with the industrial world, strengthening digital-based learning, and increasing the relevance of the curriculum into strategic elements that can encourage the competitiveness of graduates in a sustainable manner. This finding enriches the discourse of vocational education in Indonesia by providing an adaptive strategy model of global challenges and based on the real conditions of the education unit.

As a suggestion, this research recommends the need to strengthen collaborative policies between schools and the business world on a broader scale and the development of a sustainable evaluation system to measure the effectiveness of the implemented strategies. For further researchers, it is advisable to explore similar approaches to various types of vocational education units in different regions in order to strengthen the validity of external findings and develop vocational education policies that are more contextual and inclusive.



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