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Enhancing Vocational Education for Agribusiness Competence in the Era of Industry 4.0: A Study on Improving Curriculum Relevance and Graduate Readiness in Agricultural Product Processing

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Abstract: The technological era of disruption 4.0, education plays an important role in preparing superior, skilled, professional, and competitive human resources. The Indonesian government must make comprehensive preparations, including improving quality education services that can produce graduates according to their fields of expertise. Vocational High School (SMK) focuses on developing students' ability to work in a particular field, adapt to the work environment, and see future job opportunities. In particular, the agribusiness expertise program for agricultural product processing in SMK has great potential to support the local economy and farmers' welfare. Evaluating the competency profile of SMK graduates in this field is crucial to ensure the curriculum's suitability with the job market's needs. This study aims to evaluate the profile of agribusiness competence in SMK, using data from the education curriculum, stakeholder perspectives, and the development of the agribusiness industry. The research method used is qualitative-quantitative, with data obtained through observation, interviews, and surveys at SMK Negeri 3 Tarakan, SMK Negeri 1 Nunukan, and several MSMEs in North Kalimantan. The results showed that several competence points had yet to be maximised in its application, such as quality management, food safety standards, and production process management. Factors that influence the suboptimal application of competencies include limited resources, facilities, and access to technology. This study recommends improving teaching staff qualifications, facilities and infrastructure, and access to technology to improve learning effectiveness. Thus, it is expected that vocational education in Indonesia can be more relevant and efficient in preparing graduates who are ready to face challenges and opportunities in the agribusiness sector of agricultural product processing.

Keywords: Agricultural Processing, Agribusiness Industry, Competency Profile Evaluation.

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Introduction

The technological era of disruption 4.0, education has an important role. Therefore, the Indonesian government is required to prepare, starting from infrastructure preparation to preparations for creating superior, skilled, professional and competitive human resources. One way can be taken to improve the quality of educational services to produce quality graduates according to their field of expertise(Haryanto and Helmi 2020). The field experience-based learning approach positively affects the quality of vocational education by increasing students' confidence and

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aligning their skills with industry needs (Green and Du Plessis 2023). According to the Directorate of PSMK, Vocational High School (SMK) is education at the secondary education level that prioritises the development of students' ability to be able to work in certain fields, adaptability in the work environment, seeing career opportunities and self-development in the future. The form of the educational unit is a vocational school, which is one of the vocational education institutions that has the task of preparing its students by equipping them with knowledge and skills to work by competencies and expertise programs, have adaptability and high competitiveness to have jobs(Syaddam and Hadriansa 2024). Vocational education in vocational schools prepares students for the world of work by developing practical skills according to industry needs and supporting the country's economy(Okolie, Nwosu, and Mlanga 2019). The public's expectation for vocational education is the quality of vocational school graduates who have competencies according to their field of expertise to be accepted in the business world and the industrial world (DUDI) or can develop it through entrepreneurship.

Education in Vocational Schools (SMK) has a strategic role in preparing the young generation to work, especially in the agricultural processing agribusiness sector. Agribusiness processing agricultural products has great potential to improve farmers' welfare, support the local economy, and provide consumer value-added products (Syahputra, Nugroho, and Hidayat 2021). Therefore, it is important to ensure that vocational school graduates in this field have relevant and adequate competencies to meet the increasingly complex job market demands. To ensure that this vocational education can make an optimal contribution to the development of the national agribusiness sector, evaluating the competency profile of vocational school graduates in agribusiness processing agricultural products is very important (Gemil et al. 2023), (Bahua 2016). This evaluation will determine how suitable the vocational school curriculum is to the needs of the world of work and the potential for improvements that can be made to improve the quality of graduates.

This study aims to evaluate the agribusiness competency profile taught in vocational schools in processing agricultural products. Using data from various sources, such as educational curriculum, stakeholder perspectives, and the progress of the agribusiness industry, this study is expected to provide a comprehensive picture of the extent to which vocational school graduates are prepared to face challenges and opportunities in the agribusiness job market. Thus, the results of this evaluation are expected to help build a more efficient and relevant education program and provide valuable input for related parties to improve the quality of vocational education in Indonesia, especially in agribusiness processing agricultural products. The main reason behind this writing is that there is still a lack of writing in scientific journals that discuss the evaluation of agribusiness competency profiles for agricultural product processing in vocational high schools(Mac Clay and Feeney 2019).

Research relevant to this title is found in a study by Lanuihsan entitled "Analysis of Competency Profiles of the Agribusiness Expertise Program for Industry-Based Agricultural Product Processing at Vocational Schools" (Haryanto and Helmi 2020). This study produces a work competency profile in the field of agribusiness processing of agricultural products needed by the business world/industry(Brenya et al. 2023). Based on the results of observations, interviews and questionnaires, work competency levels are then compiled according to the field of work(Wibowo et al. 2025). The work competency profile of the APHP skill program needed by the industry is classified into three types of jobs, namely Employee (labour), Production (production section), and Marketing (marketing section). Furthermore, each kind of job is mapped at a certain level according to the qualifications (level of ability) possessed by the employee/prospective employee. The school needs to develop and actualize itself to implement intensive programs, such as the SMK Revitalization program so that the competencies taught in schools can adjust to the competencies required in the business/industrial world. The teaching and learning process (PBM) must strive to pursue learning targets according to the level of competence required by the business/industrial world.

Method

This type of research is qualitative-quantitative. Research has been conducted at the Agricultural Vocational High School (SMK), with a focus on agribusiness expertise programs in agricultural and industrial product processing engaged in this field, namely SMK Negeri 3 Tarakan and SMK Negeri 1 Nunukan, as well as industry players (MSMEs) located in Tarakan City and Nunukan Regency, North Kalimantan, namely MSMEs Ar Raihan Tarakan, MSMEs Dapur Karima Nunukan, UD. An Nur Bakery Nunukan. This research was carried out for over three months, from June to September 2024. This research was conducted in the 2023/2024 academic year. Non-probability, or purposive, sampling is used to select research subjects (Sugiyono 2014). This study selected two vocational high schools (SMK) and three agribusiness business actors as samples. In this study, subjects were surveyed directly, interviewed, and documented. Data analysis in this study was carried out using the SPSS version 21.0 program. This includes

processing data from raw data into a form that is easier to understand and interpret. Data analysis is carried out in two stages: data analysis in the field and analysis of previous data. The Spearman test is a type of data analysis used.

Result and Discussion

The importance of introducing competency profiles in vocational education at vocational schools in the Agribusiness Program of Agricultural Product Processing in North Kalimantan Province is very large. This aligns with research that introducing the Agribusiness competency profile of Agricultural Product Processing in vocational schools is very important because it profoundly benefits students, industry, and the agricultural sector (Purnama et al. 2023), (Syahputra, Nugroho, and Hidayat 2021). The curriculum of the Agricultural Vocational School connects competencies with industrial needs, reflected in the certification of the Indonesian National Qualifications Framework. Introducing this competency profile allows schools to tailor their curriculum and teaching to industry needs. Integrating agribusiness competencies in agricultural product processing into the curriculum is expected to increase interest and improve the quality of education supporting the agricultural sector's progress. This competency profile is intended to equip students with the knowledge, skills, and attitudes necessary to become skilled workers responsive to technological changes. Implementing the competency profile in vocational schools will focus on Agribusiness of Agricultural Product Processing, ensuring that students have skills relevant to the agricultural industry, comprehensive knowledge of the agricultural product processing process, and a professional attitude in the work environment (Syafruddin and Darwis 2021). More than just a technical aspect, this competency profile also emphasizes work ethics and adaptability to technological developments. Through good implementation, this competency profile will likely produce competitive vocational school graduates who can make a significant contribution to the Agribusiness industry in North Kalimantan Province.

The description of the competency profile implemented in learning at the Agricultural Products Processing Agribusiness Vocational School in North Kalimantan province is divided into 8 (eight) sub-competencies according to the field of work. The following is presented as a table of competency aspects mentioned in the learning curriculum of Vocational High Schools, especially the Agricultural Vocational High School Agribusiness Skills Program.

Table 1. Learning Materials for Agricultural Vocational Agribusiness Schools Expertise Program in Agricultural Product Processing.

No.	Aspects of Competency	Competency Items	Item No.
1	Basics of Handling Agricultural Products	Understand the characteristics, physical properties, and other properties of various agricultural products, such as fruits, vegetables, grains, and other processed products.	1
		Understand the processes and techniques required to properly handle agricultural materials, including picking, storage, packaging, and transportation.	2
		Able to recognize signs of damage or contamination in agricultural materials and take the necessary steps to maintain their quality and safety.	3
		Understand the applicable regulations and standards in handling agricultural products, including sanitary regulations, labelling, and international trade regulations.	4
		Know the proper food safety practices to prevent contamination and the spread of diseases through agricultural products.	5
2	The Basics of Agricultural Product Processing	Understand the various methods and techniques used to process agricultural products, such as drying, fermentation, milling, and refining.	6
		Master the practical skills necessary to carry out the processing process appropriately, including using appropriate equipment and machinery.	7
		Able to supervise the processing process to ensure the final product meets the set quality and safety standards.	8
3		Understand the regulations and standards that apply in the processing of agricultural	9

No.	Aspects of Competency	Competency Items	Item No.
		products, including sanitary regulations, labelling, and trade regulations.	
		Able to identify and address issues that may arise during the processing process, such as technical or product safety issues.	10
		Understand the quality standards for agricultural products, including the parameters used to assess product quality.	11
		Mastering the measurement and testing techniques necessary to assess the quality of agricultural products, such as measuring moisture content, nutrient content, or the presence of contaminants	12
	Basis for ControlQuality of Agricultural Products	Able to carefully control the production process to ensure that the product meets the set quality standards.	13
		Understand the regulations and standards related to quality control of agricultural products and ensure that production operations follow applicable regulations.	14
		Ability to manage and supervise the entire production process of processing plant products, including planning, procurement of raw materials, processing, and packaging	15
4	Production Processing Vegetable Products	Skills to ensure the optimal quality of vegetable product processing results involve an in-depth understanding of quality parameters, quality control, and continuous improvement in the production process.	16
5	Production of Animal Products Processing	Managing the supply chain from raw material selection to final product distribution, including procurement, storage, processing, and distribution.	17
		Skills in implementing strict food quality and safety standards in production, including sanitary supervision, animal health monitoring, and product quality control.	18
		Knowing in-depth about the plantation and herbal commodities, including their types, characteristics, growth cycles, and economic value.	19
		Master the processing techniques necessary to properly process plantation and herbal commodities, including drying, extraction, and fermentation.	20
6	Production and Processing of Plantation Commodities and Herbs	Understand and implement applicable regulations and standards of sanitation, food safety, and labelling in the production and processing of plantation and herbal commodities	21
		Develop practical skills in the use of processing equipment and machinery and expertise in managing production processes efficiently and safely.	22
		Have the ability to innovate in the development of new products from the plantation and herbal commodities, as well as apply creative ideas in the processing process to increase product-added value	23
		Identifying the risk of food contamination	24
		Implement strict sanitation protocols.	25
7	Food Safety, Storage, Warehousing	Efficiently manage inventory, including monitoring expiration dates, stock rotation, and selecting the right storage locations	26
		Implement proper emergency evacuation procedures.	27
8	Entrepreneurship	Plan innovative business	28

No.	Aspects of Competency	Competency Items	Item No.
		ideas.	
		Analyze the market thoroughly.	29
		Manage finances efficiently.	30
		Market products effectively.	31
		Developing innovative, creative solutions.	32
		Apply Strong Communication skills in Marketing Products or Services	33
		Developing a Sustainable Network of Partnerships and Business Relationships	34

Infrastructure and learning media consisting of eight aspects of competence are divided into 34 items owned by schools. The graph presented shows the competencies taught by the Vocational High School curriculum in resource capabilities, facilities, and vocational

Sub-Competencies Based on Job Field

The Agribusiness Program in Agricultural Product Processing at Vocational School offers more specific competencies directly related to the work that students will undertake. This sub-competency is essential to help students become skilled professionals in agribusiness processing agricultural products. By developing relevant skills, knowledge, and attitudes, students will be ready to compete and contribute to the world of the agricultural industry(Nurdayati et al. 2024). In the Agribusiness Skills Program for Agricultural Product Processing at SMK, several sub-competencies are the focus of learning. The following is an in-depth description of each sub-competency taught, as well as findings from an industrial competency needs survey conducted by the author that shows its relevance to the industrial world (Teacher Interviews and Researcher Data Processing, 2024):

1. Competencies related to the characteristics and processing of agricultural materials (Points 1, 6, 7, 20, 22) include an in-depth understanding of the physical and chemical properties of different agricultural materials and processing techniques such as drying, fermentation, milling, and refining. Students will be taught how to manage the processing process appropriately, use appropriate equipment and machinery, and apply efficient methods to improve the quality and efficiency of production.
2. Competencies that focus on handling agricultural materials and product quality (Points 2, 3, 8, 10, 24) include handling techniques such as picking, storage, packaging, transportation, and recognizing signs of damage or contamination. Students will be trained to supervise the processing process, handle technical or product safety issues that may arise during the production process, and and contamination risks to maintain product quality and safety.
3. Competencies related to industry regulations and standards (Points 4, 9, 14, 18, 21, 25) include understanding sanitation regulations, labelling, international trade, and food safety standards. Students will learn the importance of complying with these regulations to ensure product quality and safety and implementing strict sanitation protocols to prevent contamination.
4. Competencies related to quality control and quality standards (Points 11, 12, 13, 16) include an understanding of applicable quality standards, measurement and quality testing techniques, and production process control to ensure consistency in product quality. Students will learn how to implement continuous improvement in production processes to meet industry standards.
5. Competencies in production process management and management (Items 15, 17, 26, 27) include skills in managing the entire series of production processes from planning to distribution, including inventory management and emergency evacuation procedures. Students will be trained to manage the supply chain effectively and efficiently to avoid waste and ensure the availability of quality products.
6. Competencies related to innovation, market analysis, and marketing (Items 28, 29, 30, 31, 32, 33, 34) include the ability to develop innovative business ideas, analyze markets, manage finances, and market products effectively. Students will be taught to develop creative solutions in facing industry challenges, build a sustainable network of partnerships, and maintain strong relationships with customers and business partners.

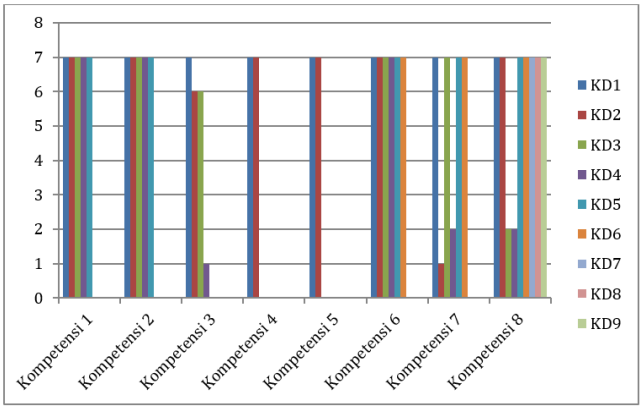

Figure 1. Graphic Work Competency Items of Agribusiness Expertise Program Agricultural Product Processing Taught at Vocational Schools.

Tabel 2: Classification of Work Competency Profiles in the Agribusiness Field of Agricultural Product Processing

No.	Job Type		
1	*Employee*	Level I	Able to understand the basics of the processing process of agricultural products. Able to operate simple equipment. Comply with occupational safety and health procedures.
		Level II	All Level I Competencies Improve operational skills and work efficiency. Understand the role of individuals in the production chain of agricultural products. Participate in efforts to improve the production process.
2	*Production*	Level I	Understand the basic principles of agricultural product production. Able to operate production equipment. Comply with safety and sanitation procedures.
		Level II	Manage and execute basic operations in the production process. Understand the principles of product quality control. Coordinating the tasks of the production team. Ensure compliance with safety standards and regulations.
		Level III	All Level I Competencies Carry out production planning. Develop strategies to improve production efficiency. Lead training to improve production skills. Identify and address complex production issues. Comply with product quality and safety standards. Able to operate production tools and machines. Evaluate the effectiveness of quality control.
3	*Marketing*	Level II	All Level I Competencies + Level II Competencies Manage the entire production process effectively. Make strategic decisions to improve quality and efficiency. Developing and implementing innovations in the production process.
		Level III	Identify opportunities for automation and efficiency of food production. Identify opportunities for automation and efficiency of food production. Conduct market research to identify new trends and opportunities. Identify and respond to potential threats to agricultural products.
		Level I	Basic understanding of the market and consumer behaviour. Have skills in product promotion through simple media. Have the ability to interact with customers effectively. Understand consumer needs and underlying market trends.
		Level II	All Level I competencies Planning and executing marketing strategies. Have skills in market analysis and pricing. Drafting and managing marketing budgets. Planning and executing product marketing campaigns. Identify new marketing opportunities. Drafting and managing marketing budgets.
		Level III	All Level I Competencies + Competencies Level II Developing partnerships with suppliers and distributors.

No.	Job Type	
		Understand market trends and changes in consumer behaviour. Develop a long-term marketing strategy.

Data from research results on 2024.

Categorization Based on the Results of the Industrial Competency Needs Survey

Based on the results of the industrial competency needs survey, grouping is a method to categorize the competencies needed in the industry. The survey results reflect the actual needs of the industry and prove that the competencies taught at vocational schools are in accordance with the needs of the industry. This research is significant in education because it helps to improve the relationship between competencies taught in vocational schools and the needs of the industry. This is an important step in improving the workforce quality needed to drive economic growth and achieve sustainable development goals. In addition, the survey results also revealed relevant findings from the perspective of Micro, Small and Medium Enterprises (MSMEs) (Rachmawati 2021).

The findings from the survey at Ar Raihan Tarakan MSMEs show that in addition to technical skills in processing agricultural products, the industry also needs employees with good communication skills to interact with customers and business partners. This is related to Competency Item 1: "Understanding the characteristics, physical properties, and other properties of different types of agricultural materials." In addition, the survey also revealed that time management skills and accuracy in meeting production deadlines are key to improving operational efficiency, which is related to Competency Item 3: "Understand the processes and techniques required to handle agricultural materials well, including picking, storage, packaging, and transportation."

Further findings from the survey in Ar Raihan Tarakan MSMEs emphasized the importance of employee creativity in producing innovative products that meet the growing market's needs. This relates to Competency Item 5: "Able to recognize signs of damage or contamination in agricultural materials and take the necessary steps to maintain their quality and safety." In addition, the findings from Dapur Karima Nunukan MSMEs highlight the importance of adaptability to dynamic changes in the work environment in facing daily production challenges, which is related to Competency Item 10: "Understanding regulations and standards related to quality control of agricultural products, as well as ensuring that production operations are in accordance with applicable regulations."

At UD An-Nur Bakery Nunukan, a survey shows that employees who collaborate and work as a team can increase productivity and operational effectiveness. This relates to Competency Item 14: "Able to manage the supply chain from raw material selection to final product distribution, including procurement, storage, processing, and distribution." In addition, effective leadership skills in directing production teams are essential and relevant to Competency Item 17: "Efficiently manage inventory, including monitoring expiration dates, stock rotation, and selecting appropriate storage locations."

The survey results also show that the ability to adapt to new technologies and implement innovations can help improve operational efficiency at UD An-Nur Bakery Nunukan, which can be linked to Competency Item 20: "Understanding the quality standards applicable to agricultural products, including the parameters used to assess product quality." Employees who can manage stress and work under pressure are also important in improving operational efficiency, as related to Competency Item 29: "Apply strong communication skills in marketing a product or service." Another finding emphasizes the importance of adapting to rapid changes in the industry and learning continuously, which is relevant to Competency Item 31: "Develop a network of sustainable partnerships and business relationships.

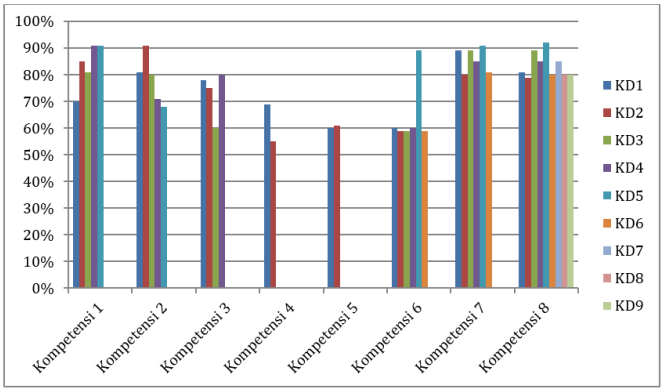

Figure 2. Graphic percentage of Work Competency Items Required by the World Business/Industry.

The competencies that have been outlined mostly highlight hard skills; however, in the context of our interviews, it was found that soft skills are also a crucial factor that workers must have. The study results confirm that other additional competencies desired by the industry based on their field of work include extra knowledge and training outside the classroom environment, recognition of skills from professional

institutions, adequate interpersonal skills, and good intrapersonal skills.

The demand for basic and special skills in the chosen field indicates that the world of work requires employability skills from prospective workers. Employability skills (Anwarudin et al. 2020) refer to the ability to manage work attitudes and behaviour that align with the expectations of the industry or the world of work.

To improve the competence of vocational school graduates to compete in the job market, training is needed by industry needs and competency certification for graduates. Steps: Competency tests and international certifications are urgently needed to ensure the quality of vocational school graduates. This certification program includes foreign language skills training, mastery of information and communication technology (ICT) that meets global standards, and competency improvement training in their respective fields of work. Every student needs to understand entrepreneurship and crafts to provide added value to students.

Furthermore, the level of relevance between the aspects of competence taught in vocational schools and the needs of the industry can be tested through in-depth analysis. This is important to ensure that the vocational education curriculum aligns with the demands of the industrial world.

Table 3. Results of the Spearman Correlation Test

	Fase Gerak	Rf Spot-1		
Spearman's rho	SMK	Correlation Coefficient	1000	-0.171
		Sig. (2-tailed)	.	0.298
		N	39	39
	Industry	Correlation Coefficient	-0.171	1000
		Sig. (2-tailed)	0.298	.
		N	39	39

The correlation between the competencies applied in the Agribusiness Expertise Program for Agricultural Product Processing (APHP) in Vocational High Schools (SMK) and the competencies needed by the industrial or business world is 0.298. In interpreting the correlation coefficient r, 0.298 indicates a "weak" relationship level. These findings indicate a less strong relationship between the competency aspects taught at the APHP Expertise Program Vocational School and the work competencies needed by the industrial or business worlds.

Scientific relevance has a very important role because it is a determining factor for the existence of an educational institution (Ruskandi, Pratama, and Asri 2021). An educational institution is considered relevant if its curriculum is based on the limitations of the educational system owned by the institution. The availability of curriculum or syllabus guides vocational schools in preparing Learning Program Plans (RPP) and teaching materials. However, to prepare a lesson plan for an expertise program or expertise competence, vocational schools need to be able to identify the needs of the expertise program and the resources it already has.

Discussion

Identify Competency Items That Are Still Not Optimal

Competency Items 12, 13, 26, and 28: The description of these competency items reflects the ability to identify and address technical and safety issues that may arise in the processing of agricultural products. However, the findings show that implementing these competency items has yet to be maximized in the learning process at vocational schools. This indicates the need to improve a more practical and industry-integrated approach to learning to ensure students truly understand and can overcome real challenges in the field.

Competency Items 14, 33, and 34: These items highlight the importance of understanding quality standards, quality control, and food safety in the processing of agricultural products. However, the findings show that implementing these competency items still needs to be improved in vocational schools. This signals the need for improvements in teaching that integrate an understanding of regulations and industry standards in the curriculum so that students can be ready to enter the world of work with an adequate understanding.

Competency Item 28: This competency item emphasizes the ability to manage and supervise the entire production process of agricultural product processing, including planning, procurement of raw materials, processing, and packaging. However, the survey results show that implementing this competency item still needs to be improved in vocational schools. Therefore, improvements are needed in practical learning that are more focused on aspects of production process management to prepare students with skills appropriate to the industry's demands.

The Influence of Resources and Teaching Staff on the Implementation of Competencies

In the context of this study, the influence of resources and teaching staff on the application of competencies is crucial to consider. The findings show that seven competency items could be more optimal in their application in Vocational High Schools with the agribusiness expertise program in agricultural product processing. These competency items include points 12, 13, 14, 26, 28, 33, and 34, with points 14, 26, 28, 33, and 34 showing a suboptimal application level.

This statement is related to the influence of resources and teaching staff. More resources, both in quantity and quality, can affect a school's ability to provide effective education. Teaching staff who lack a deep understanding or skills in agribusiness processing of agricultural products may need help to transfer knowledge and skills to students optimally. Lack of facilities and infrastructure, such as inadequate laboratories or incomplete equipment, can also limit a school's ability to provide an appropriate learning environment.

This statement is supported by the finding that alternative solutions to improve the application of competencies involve the effectiveness of the learning system and the learning programs that are currently being implemented. In addition, efforts are needed to improve the quality of human resources, both through improving the qualifications of teaching staff and empowerment in terms of facilities and infrastructure. Through these actions, it is hoped that Vocational High Schools with agribusiness expertise programs in agricultural product processing can be more effective in preparing students to enter the world of work.

The Effect of Lack of Facilities and Infrastructure on the Implementation of Competencies

The lack of facilities and infrastructure significantly influences the application of competencies in the context of Vocational High Schools with agribusiness expertise programs in agricultural product processing. The findings stated that seven competency items could have been more optimal in their application in the institution. These competency items, especially points 14, 26, 28, 33, and 34, show a suboptimal application level.

The lack of facilities and infrastructure can hinder the learning process and the development of students' skills. The lack of laboratories or inadequate equipment can limit students' ability to practice the concepts taught. In addition, inadequate facilities can also reduce students' interest and motivation to learn, as they cannot experience an adequate and enjoyable learning experience.

The finding strengthens this statement that one of the recommended alternative solutions is to improve facilities and infrastructure. Schools can create a more effective and enjoyable learning environment by improving the quality of facilities, including laboratories and practical equipment. Through this action, the application of competencies in the agribusiness expertise program for agricultural product processing in Vocational High Schools can be significantly improved.

Lack of Access to Technology and Learning Tools

Lack of access to technology and learning tools is a critical factor affecting the implementation of competencies in Vocational High Schools with agribusiness expertise programs in agricultural product processing. From the study results, seven competency items, especially points 14, 26, 28, 33, and 34, experience obstacles in their implementation, directly related to limited access to technology and learning tools.

Limited access to technology can affect the effectiveness of teaching, learning, and assessing student competencies. Competency items that require understanding and application of technology, such as processing techniques or quality standards using specialized software, may not be taught and assessed optimally.

The importance of technology in supporting learning today is becoming increasingly clear, and lack of access can be a major obstacle to achieving desired learning outcomes. The finding reinforces this statement that one of the recommended solutions is to increase access to technology and learning tools. In this way, schools can improve the quality of learning and ensure that students can better master the competency items.

Conclusion

Based on the research results, several competency items were found that could have been more optimal in their application in Vocational High Schools (SMK) with the Agribusiness Skills Program for Agricultural Processing. The findings show that implementing competency items still needs to be improved, especially in points 12, 13, 26, 28, 33, and 34. This shows an urgent need to improve a more practical and integrated learning approach with the industrial world. There is also a need for improvements in teaching that integrate an understanding of regulations and industry standards in the curriculum to ensure that students are truly ready for the workforce.

The influence of resources and teaching staff on applying competencies is an important aspect that needs to be considered. The findings show that the quality of human resources, especially teaching staff who need more in-depth understanding or skills in

Agribusiness Processing of Agricultural Products, can directly affect the application of competencies. The need for more facilities and infrastructure, such as inadequate laboratories or incomplete equipment, is also an obstacle to providing an effective learning environment. Therefore, improving educational infrastructure and improving the qualifications of human resources are important steps to increase the application of competencies in vocational schools.

Recommended follow-ups include improving human resources qualifications, educational infrastructure, and concrete efforts to address the obstacles found. Through developing the qualifications of teaching staff, improving educational infrastructure, and increasing access to technology and learning tools, vocational schools can be more effective in preparing students to enter the world of work. Thus, awareness of the importance of investment in vocational education needs to be increased to improve the education system and the quality of human resources.

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