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Teaching factory management during the Covid-19 pandemic

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ABSTRACT

This research aims to determine how the teaching factory at SMK SMTI Yogyakarta handled during Covid-19 pandemic. A descriptive qualitative case study approach was used as the method. Semi-structured interview techniques, observation, and documentation were used to collect data. The interviewed data was collected from 3 informants. This study used triangulation techniques to check the validity of the data. The triangulation technique in this study used source triangulation, which compares the interview results of 3 informants to check the compatibility of the information obtained, then analyzed using an interactive model from Milles and Huberman. The implementation of the teaching factory at SMK SMTI Yogyakarta aims to improve student competence so that students can adapt and become accustomed to conditions in the real industrial world under the teaching factory's objectives. Schools continue to work with the industry on the implementation of the teaching factory in order to achieve the teaching factory's goals, and SOP (Standard Operational Procedures) are tailored to SOP from industries related to established health protocols. The implementation of the teaching factory can be done by forming a BLUD at the school level, which will form a learning process that is centered on entrepreneurship, with the income generated from the production used as capital, especially for SMK SMTI Yogyakarta.

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INTRODUCTION

The Corona Virus Disease pandemic, also known as Covid-19, started in 2019 and was a global disaster that impacted every aspect of life. Covid-19 is a global disease outbreak that can potentially disrupt education systems around the world, especially in developing countries (Wajdi et al., 2020). The United Nations Educational, Scientific and Cultural Organization (UNESCO) also announced that the Covid-19 disease epidemic has now turned into a pandemic and has impacted the global education system (UNESCO, 2020). The entire educational system, examinations, and educational assessments have all been impacted by Covid-19 (Pujari & Shekatkar, 2020).

According to data from the Ministry of Health Republic of Indonesia (2021), reported cases of Covid-19 in Indonesia reached 1,410,134 cases as of March 13, 2021, prompting the Indonesian government to implement a micro-PPKM (Enforcement of Community Activity Restriction) policy in several districts and cities across Java-Bali through Ministerial Instruction No. 3 of 2021. To counter the spread of Covid-19, the Indonesian government has introduced a range of educational policies, including the closure of schools at all levels, from elementary to higher education.

Learning took place remotely or online during the one-year Covid-19 pandemic. This has a huge influence on students' mindsets and psychology. The Covid-19 pandemic has surpassed usual limits, posing a threat to human mental health, causing preparedness for preventive action (Tadesse & Muluye, 2020). Learning that was once done in a traditional classroom setting with direct contact between teachers and students must now be done online or virtually (Zhang, 2020). Online learning is a way to keep the education system running during the pandemic, but it can be a barrier in developing countries because many parents who follow their children to study at home have trouble accessing the internet.

Daniel's (2020) study shows that to increase the capacity to teach remotely, schools and colleges should take advantage of asynchronous learning, which works better in digital formats, and that to increase the capacity to teach remotely, schools and colleges should take advantage of asynchronous learning, which works best in digital formats. A number of tasks and jobs that position Covid-19 in a global context should be included besides subjects. Since 70 percent of learning in SMK is a practical activity, and the remaining 30 percent is an introductory theory, the transition from traditional learning to virtual learning has a major impact on implementing learning, especially practical learning in vocational high schools (Rismawati & Khairiati, 2020). This is a challenge in and of itself for SMK SMTI Yogyakarta, particularly in implementing the teaching factory program, which should be used as learning that refers to production-based standards and procedures in the industry and is carried out in an environment similar to that of industry (Hasanah & Malik, 2018). this cannot normally work because of this pandemic. Therefore, despite the lack of implementation, appropriate learning management is expected to ensure the achievement of learning objectives in schools during this Covid-19 pandemic.

Working for and with a group of people to accomplish desired goals efficiently and effectively is what management is all about (Gulati et al., 2016). Daft and Marcic (2019) define management as the effective and efficient accomplishment of organizational objectives by planning, organizing, leading, and controlling organizational resources. According to Rieley (2020), the field of education is currently grappling with these challenging circumstances. This situation demonstrates the immediate need for educational institutions to prepare and implement learning scenarios in the event of a pandemic. The management function of Terry (in Hasibuan, 2003) is divided into four elements, planning, organizing, actuating, and controlling. The first function is planning; Sukarna (2011) states that planning is used to choose alternatives, formulate goals, design strategies, arrange procedures, and determine what programs will be carried out in an organization.

The second function is organizing, Organizing is the process of assembling and assigning the human, financial, physical, informational, and other resources needed to achieve goals; using resources to comply with predetermined goals is the root of planning (Bateman et al., 2020). According to Latif et al. (2018), the third role is actuating Movement is the basic understanding of the work they do, which contributes to predetermined goals, and offering inspiration, guidance, or direction, in order for them to understand and emerge a desire to work diligently and efficiently control is the last function of management. People can take actions or decisions to achieve their own needs rather than organizational goals if they lack control (Flamholtz, 1996).

The management of the teaching factory during the pandemic will be defined using these management functions in this study. One of the pandemic-affected educational institutions is SMK SMTI Yogyakarta, where the vocational high school (VHS) only opened the teaching factory building in 2020, but the building could not function optimally as it should for all SMK SMTI Yogyakarta students. The building is currently being used to produce GeNose. This Covid-19 detection method results from a partnership between VHS SMTI, Universitas Gadjah Mada, YPTI, and a consortium of five companies in the GeNose project. Students from SMK SMTI class XII majoring in mechanics carry out the development process, which is performed in compliance with health regulations.

This is used as a teaching factory operation in schools, with all the limitations that come with it. The concept of a teaching factory aims to transfer real production OR manufacturing into the classroom environment. A real-life production atmosphere needs to be used to improve the quality of the learning process with everyday industrial practice processes (Rentzos et al., 2014). Implementing a teaching factory is inextricably connected to the fundamental values it holds. According to

ATMI BizDEC (2015) quality, performance, creativity, and innovation are three basic teaching factory values that need to be learned in the learning process for students.

To achieve three basic teaching factory values, so it is needed management. According to Manalu et al. (2017), management in the teaching factory can be described in Table 1.

Table 1. Management Parameters

Parameter	Sub Parameter
Management	Financial planning
	Organizational structure and job description
	SOPs and workflows
	Leadership
	The impact of the Teaching Factory on institutions and the environment

Table 1 explains that teaching factory management includes financial planning, organizational structure, job descriptions, SOPs and workflows, leadership, and the influence of teaching factories on institutions and the environment. This study aims to examine teaching factory management at SMK SMTI Yogyakarta based on criteria published by Manalu et al. (2017). Therefore, this study aims to find out how the teaching factory was managed during the Covid-19 pandemic at SMK SMTI Yogyakarta, which at that time learning activities, especially practice, were limited.

RESEARCH METHOD

This research uses a descriptive qualitative with a case study approach. A case study is a form of qualitative research that aims to investigate a subject by collecting data using appropriate data collection techniques. This research analyzes the management with parameter teaching factory at SMK SMTI Yogyakarta. The subjects in this study were the vice-principal of the curriculum section, the coordinator of the teaching factory organizer, and representatives of staff from a consortium of companies that collaborated in the GeNose production process.

The subject is considered knowing information about the management of the teaching factory at SMK SMTI Yogyakarta. This study used structured interview techniques, observation, and documentation to collect data. Interview instructions, field notes, and documentation notes were used as tools. If the data has been tested for validity, it is declared valid. Validity testing can be done by using triangulation techniques. This technique is used in research to verify data from the same source using different techniques. In this research, technique triangulation was achieved by analyzing the suitability of data from interviews, documents, and observations.

This qualitative research data collection was carried out going forward during the research until the correct data was collected. According to Miles and Huberman (2009), the first step in data analysis in this study is data reduction. Researchers gather data through interviews, observations, and documentation, which is then summarized, selected according to the necessary data, and based on the research objectives. Making interview, area, and documentation notes from the data that has been selected and based on the research objectives is the second phase.

The notes were coded in order to organize the information and make it easier to analyze for researchers. Step three involves presenting the data as a summary or text after it has been coded. The fourth and final stage is verification or conclusion, in which the researcher will draw conclusions based on existing data and evidence gathered during the analysis. This conclusion addresses the questions raised by the problem formulation in this study.

RESULT AND DISCUSSION

Universitas Gadjah Mada (UGM) developed GeNose, a Covid-19 detection tool that was released in early 2021. GeNose uses an AI (artificial intelligence) technology to detect the Covid-19 virus by processing data from human breath collected in special bags. Since the demand for GeNose is growing, UGM is continuing to speed up the production process by collaborating with several

government and private agencies. The Ministry of Industry of the Republic of Indonesia and a private company have selected SMK SMTI Yogyakarta, an SMK under the auspices of the Ministry of Industry of the Republic of Indonesia, to collaborate in the production of GeNose. This GeNose development process took place in the SMK SMTI Yogyakarta teaching factory building, which was also used as a teaching factory activity. Because of the current pandemic's restricted mobility, a few students only carried out the teaching factory practical method and followed strict health protocols. GeNose production is being used as a teaching factory practice equivalent to industrial work practices that XII grade students should carry out but cannot due to the pandemic, so students continue to carry out practical tasks in a school setting. SMK SMTI Yogyakarta will equalize the importance of industrial work practice with the teaching factory practice of making GeNose because it follows Ministry of Education and Culture of the Republic of Indonesia guidelines, which state that schools may simplify the curriculum independent (Ministry of Education and Culture of the Republic of Indonesia, 2020).

Financial Administration

The school and five consortium companies manage the financial administration of the teaching factory at SMK SMTI Yogyakarta. The administration is the process of working with and through others to achieve objectives efficiently (Sergiovanni et al., 1987). According to Syarifudin (2005), financial administration is a collection of processes for managing finances and mobilizing relevant personnel. Financial management is governed by its own set of laws and policies within an institution. PT. Swayasa Prakarsa (part assembly, licensing, standards, QC/QA, and business), PT. Stechoq Robotika Indonesia (pneumatic section), PT. Yogya Presisi Teknikatama Industri (mechanical part), PT. Hikari Solusindo Sukses (electronics and sensors section), and PT. Nanosense Instrument Indonesia (electronics and sensors section) is among the (part of artificial intelligence, electronics, and after-sales).

The five companies are funding the production of GeNose, one of which is the SMK SMTI Yogyakarta production process. Interview data from three sources back this up.

> *"The GeNose production funds come from the partnership of five firms, which then formed a consortium and collaborated with SMTI. Our internal company manages financial administration such as buying raw materials, purchasing equipment, and student payroll" (ST).*

The informant's statement indicated that SMK SMTI Yogyakarta only prepared a place and human resources for the production of GeNose.

> *"Internal company parties carry out financial administration, so we only provide a report on the compatibility between attendance through signatures and fingerprint attendance for student's payroll purposes, because the company is in Sleman Regency, so the payroll is under the applicable regulations, which is 80% of the UMR amount Sleman Regency" (KT).*

Students not only get the knowledge and experience of internships in companies located in the school, but students also get rewards for their performance. In recent years, apprenticeships have become increasingly popular among vocational high schools, as it is considered an important component of education (Wilson & Beard, 2013).

> *"Regarding school revenue, during the 2015 teaching factory, schools never used the results of the teaching factory, so the aim for our pure teaching factory was to develop students' skills in order to be better equipped for the industrial world and world of business." (WK).*

This is also supported by a document of student attendance records for payroll. The interview results show that the teaching factory at SMK SMTI Yogyakarta during the pandemic was used as a forum for industrial work practice or On-The-Job Training (OJT) schools only facilitate the place (teaching factory building) and also coordinate students. Two learning pathways, school-based VET (Vocational Education and Training) with on-the-job learning periods (currently via a training agreement) and apprenticeship training, cannot be considered as parallel (Rintala & Nokelainen, 2020). So, both must be carried out between apprenticeship practices and also learning practices in schools. The GeNose production process at SMK SMTI Yogyakarta is used as a teaching factory,

OJT, or industrial work practices during this Covid-19 pandemic, and students could not practice industry work outside.

Organizational Structure and Job Description

The structure of the organization matters in achieving the objectives of an organization. This correlates with Liao et al. (2011), who believe that organizational structure is valuable for directing individual behavior through shared values, norms, and objectives. Organizational structure can be defined as a mechanism that connects and coordinates individuals within their framework, roles, powers, and powers in an organization (Kanten et al., 2015). SMK SMTI Yogyakarta formed a special team to manage GeNose's teaching facility. This team comprised the managing director, the supervisor of the department of mechanics, the instructor of mechanics as manufacturing assistants, and other teachers who supervised the department of administration. The structure and job description can be seen in Figure 1.

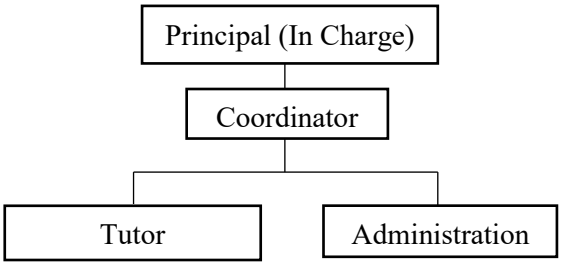

Figure 1. Teaching Organizational Structure Factory of SMK SMTI Yogyakarta

The organizational structure of the Teaching Factory at SMK SMTI Yogyakarta (Figure 1) is a functional organizational structure. It is an organizational design that unites positions into units based on skills, expertise, and resources in organizations that perform as functional units (Samah et al., 2019). The organizational structure in the teaching factory must also be clearly compiled with a description of the work of each member. It compiles the existing organizational structure at school to achieve the goals of school programs that have been designed so that the program can run effectively and efficiently (Nurmalasari & Syah, 2019). Job descriptions at the teaching factory of SMK SMTI Yogyakarta can be seen in Table 2.

Table 2. Job Description Teaching Factory at SMK SMTI Yogyakarta

Position	Job Description
Principal (In charge)	1. Signed an MOU with related companies 2. Making policies related to the teaching factory 3. Create a teaching factory team and determine the duties and functions of each member
Coordinator	1. Responsible for all production implementation processes 2. Coordinate with industry and school principals regarding production developments 3. Perform control related to the technical implementation of production
Tutor	1. Absent student attendance list 2. Helping students if there are barriers in the production process 3. Coordinate with the teaching factory coordinator regarding production implementation 4. Recording daily production activities
Administration	1. Make a recap of student attendance for payroll purposes 2. Preparing reports based on regular production activity records and inventory reports. 3. Recapitulating the sum of incoming products and raw materials to be distributed

The job description is a description or explanation of the job in accordance with the position of the position set earlier (Mondy & Martocchio, 2016). Therefore, many organizations work hard to ensure that the job description they have is useful for effectiveness and productivity in achieving organizational goals (Raju & Banerjee, 2017). Standard operating procedures are planned in advance to draw up guidelines to be carried out and measures according to the location and nature of events in an emergency (ATMI BizDEC, 2015). The job description in Table 2 contains the main tasks and functions of each position that must be carried out to achieve the Teaching Factory's goals at SMK SMTI Yogyakarta.

SOP and Work Flow

Standard operating procedures (SOP) are instructions for operating procedures that comply with established requirements. These guidelines are used to ensure that all behavior and equipment usage is carried out properly, allowing operations to operate effectively and efficiently (Tambunan, 2013). SOP is a written policy, procedure, and standard for production, marketing, management required for the organization's success (Balcı, 2005).

At SMK SMTI Yogyakarta, the teaching factory is currently being introduced using SOPs and workflows that have been customized to the pandemic's conditions. As specified in the Decree of the Four Ministers (2021) regarding guidelines for implementing learning during a pandemic, SOPs must follow government health protocols. Implementing (wearing masks, washing hands, keeping the distance, staying away from the crowd, and reducing mobility), restricting the number of students' learning, and controlling the distance between students during practice are all health guidelines that must be followed. The findings of interviews and documents relevant to the SOP teaching factory support this:

> *"There are two kinds of SOP for teaching factory here. The first is SOP for the production process and for administration, compiled together with the principal and industry, and the teaching factory team."*

Many educational institutions have tried to bring their educational practices closer to the industry and the concept of teaching factories using SOP with industry standards (Tisch et al., 2013).

> *"We already have SOPs ourselves, then we submit them to school. In this pandemic situation, of course, we adjust our SOPs to strict health protocols" (ST).*

SOP teaching factory at SMK SMTI Yogyakarta uses SOPs from related companies. Then it is reviewed and adjusted to the existing conditions in the school. Reopening the school after social restrictions became another challenge by using the new standards operating procedures (Pokhrel & Chhetri, 2021).

Leadership

Since the principal is the school's leader, school leadership is mostly associated with school principals; however, everybody has a leadership spirit, including teachers and school staff. Many types of research on educational leadership have been performed not only by school principals but also by teachers. In terms of problem-solving, decision-making, and effective action, the context of educational leadership, has become incredibly complicated (Chukowry, 2018).

Teacher leadership is the teacher's ability to influence, direct, and guide students in the learning process, both inside and outside the classroom (Supardi, 2013). Teacher leadership through delegation of responsibilities can meet the demands of 21st-century education (Shah, 2017). In this study, teacher leadership refers more to the ability of teachers who are part of the teaching factory team to direct and guide students in the implementation of the GeNose production process and coordinate with related industry parties. This was confirmed by interviews:

> *"The principal delegates authority, forming a teaching factory team, administering the Memorandum of Understanding, and managing all aspects of the teaching factory's growth. We have assigned the remaining tasks to the relevant team" (WK).*

Delegation can be defined as the transfer of centralized administrative tasks to organizations. With delegates, centralized administration will divert decision-making and responsibility (Balcı, 2005). A delegation is a form of decentralization. Decentralization refers to the delegation of authority to decisions and duties themselves to those who actually do (Şahin, 2018).

"We coordinate with the accompanying teachers regularly" (ST).

Coordination is part of achieving the organization's objectives because coordination is joint work that is done effectively and efficiently (Salvato et al., 2017).

"There is a teaching factory supervisor drawn from one of the productive mechanics instructors, and a companion teacher who accompanies the students in the development process" (KT).

In management, it includes leadership in the management function, according to Allen (in Manullang, 2015), which is referred to as leading. This leading function includes decision-making, coordination, and communication with related parties, encouraging subordinates, and directing and guiding subordinates to achieve the desired goals (Manullang, 2015). Leadership includes command and coordination activities (Conkright, 2015).

Teaching factory Impact on Institutions and the Environment

This research is included in the control management function in managing the impact aspect. There must be control over the impact of the teaching factory so that the operating process has an impact on both the organization and the environment. Control is a management function in which managers at all levels of an organization are responsible for their roles in achieving organizational objectives (Čambalíková & Misun, 2017). Employee development and continuous improvement can be used to exert control (Schraeder et al., 2014). Employee development and promoting continuous improvement in this research, namely the development of student competencies through teaching factory activities and continuous improvement related to student career development.

"Our students can continue to do industrial work practices at school or outside of school. If they practiced outside of school, the school would substitute them with other students for the GeNose manufacturing process at the teaching factory" (KT).

Control activities in this study also include the impacts of implementing the teaching factory, both for SMK SMTI Yogyakarta and the environment (industry). This is supported by the results of interviews from interviewees:

"Of course, the impact of the teaching factory is to improve student's skills. This teaching project brings the industry to schools; students learn to accord to the norms and procedures in the actual industry" (KT).

Through teaching factory learning, students learn to develop the necessary strategic skills to readily enter the workforce and live in society through the development of personal qualities (honest, disciplined, independent, creative, achievement motivation, and good work ethic), become independent students, interpersonal relationships, cooperation, creative thinking, decision making, and problem-solving (Lucyana et al., 2017).

"The impact of the teaching facility was sole because of students' needs in relation to school income from the teaching factory until now schools were not focused on it. The corporation, therefore, pays no rent for the house or the like, only the students' payroll. I don't believe there would be any negative effects as the GeNose waste generated is also not liquid waste like a hand sanitizer. The waste is only the waste of cables that can be recycled" (WK).

SMK SMTI Yogyakarta prioritizes enhancing students' competency in accordance with the purpose of the teaching factory. Until this time, the school was never oriented to the profit from implementing the teaching factory.

"As an industry working with SMTI, we will benefit from this project as our demand continues to grow. We can now produce 300 a day, so this partnership with SMTI is very beneficial" (ST).

The impact of the teaching factory at SMK SMTI on schools and the environment (industry) is positive. This teaching factory serves as a forum for students' competence in schools because the teaching factory aims to bring a real production/manufacturing atmosphere into classroom learning. Real-life production sites have been used for teaching purposes to improve teaching activities with knowledge, which are in the process of daily industrial practice (Chryssolouris et al., 2016). teaching factory at SMK SMT also serves as a valuable resource for the environment (industry) in achieving GeNose needs.

CONCLUSION

SMK SMTI Yogyakarta is currently using the momentum of this pandemic by collaborating in the production process of GeNose, a Covid-19 detection tool whose demand is increasing. The collaboration was carried out with five consortium companies so that the school formed a teaching factory team to organize the production process, starting from arranging student schedules, student attendance for payroll, and coordination with industry. This teaching factory is used as an industrial practice carried out in schools to get work wages under applicable regulations. Until now, schools have not been oriented towards turning the teaching factory into a BLUD (Regional Public Service Agency) at the school level. The teaching factory implementation at SMK SMTI Yogyakarta is solely for improving the student competence so that students can adapt and get used to conditions in the real industrial world under the objectives of the teaching factory. The preparation of SOPs is adjusted to SOPs from related industries, which are of course guided by existing health protocols, and schools continue to coordinate regarding the development of the teaching factory with the industries involved so that implementing the teaching factory runs in accordance with the objectives previously set.

Because of this study, several suggestions for the SMK SMTI Yogyakarta, associated industry parties, and researchers have emerged. According to the Ministry of Education and Culture of the Rupublic of Indonesia, implementing a teaching factory can be created by forming a BLUD at the school level, which will establish a learning process centered on entrepreneurship, with the revenue generated from the production results being used as capital for the SMK itself. SMK SMTI Yogyakarta may undertake research into the future development of teaching factories in order for later schools to create BLUD at the school level, with the proceeds being used to cover additional school operational costs.

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