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Evaluation of the Factory Implementation of the CIPP Method in Indonesian Vocational Education

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ABSTRACT

Education is a crucial component of human resource development. Education will impact the quality of graduates and serve as a standard for business and industry. However, due to the resulting disparities, education becomes a serious issue, resulting in a high unemployment rate. One of the initiatives to improve the quality of education, particularly vocational education, is the implementation of the teaching factory. This study's objective is to evaluate the implementation of a teaching factory in vocational education, specifically at Vocational High School 2 Klaten, for building majors. In this instance, the Directorate of Vocational High School Development evaluates the implementation of the teaching factory in the fields of expertise Building Modeling and Information Design (DPIB) and Building Concentration, Sanitation, and Maintenance (KGSP). In this study, context, input, process, and product (CIPP) were examined using a quantitative methodology known as purposeful sampling. According to the findings, the implementation of a teaching factory in vocational education remains insufficient due to a number of constraints, including a lack of human resources, infrastructure, and industry collaboration.

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1. INTRODUCTION

Since human resources and education are inextricably intertwined, a country's growth is heavily influenced by the improvement of its human resource quality, which is directly proportional to its level of education. Warju (2016) if human resources are plentiful, quality education will be produced, and vice versa (McGrath, 2012). Education is a system composed of interconnected, functionally interdependent components that collaborate to provide a high-quality education (Stavropoulos, Bikas, & Mourtzis, 2018).

Human resources may be a strategic factor to improve a education and skill of technology because good human resources can utilize other factors to improve the efficacy and efficiency of education. Consequently, an excellent education can be achieved by utilizing quality human resources. The pair Louw and Deacon (2020). In industrialized nations, the low quality of vocational school graduates affects the skilled labor productivity. Fewer graduates are being hired because the industrial world's trust is declining.

According to the World Economic Forum's (2017), which evaluates the quality of human resources, Indonesia ranks 65th out of 130 countries, placing it in the middle of the global ranking. Despite its central location, Indonesia's unemployment rate is high. According to the Central Bureau of Statistics (2020), as of February 2019, there were 6.82 million unemployed people in Indonesia. 8.92% of vocational high school graduates were unemployed, while 7.92% of high school diploma holders were unemployed. On the basis of these findings, it is possible to conclude that education is one of the factors that has a significant impact on Human Resources quality. A large number of unemployed vocational high school graduates demonstrates the need for reforms in Indonesia's educational implementation, particularly in the quality of human resources, so that vocational high school graduates can produce competent human resources in their respective fields (Sutarto, 2017).

Vocational high schools are required to develop students' soft and hard skills and to enhance the quality of the learning process, particularly in fields that can later be applied in the workplace (Lund & Karlsen, 2019). In addition, vocational high school must continue to evolve to accommodate changes in the industrial world (Directorate of Vocational High School Development, 2017). The school development process can be in the form of provision of adequate facilities and infrastructure as stated in Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 27 of 2021 concerning Standard of Facilities and Infrastructure for Vocational High Schools/Madrasah Aliyah Vocational Schools (SMK/MAK) (2021). In addition, the formation of an organizational structure and the provision of a good and qualified teaching staff are essential for the development of schools. It is anticipated that this will produce graduates with the skills and knowledge necessary to compete in the industrial world (Mavrikios, Georgoulias, & Chryssolouris, 2019).

Muhajir Efendi as Ministry of Education and Culture (2016), As the Indonesian government agency responsible for education, we seek to instill an entrepreneurial spirit in education. It is performed to enhance the caliber of human resources. Developing teaching factory learning is the program enacted to realize these objectives (Directorate of Vocational High School Development, 2017). The program aims to instill an entrepreneurial spirit in education and so that graduates from vocational high schools can compete in the industrial world (Triyono, 2015). Teaching factory is an effort to present real-world work in a school environment (Leal, Fleury, & Zancul, 2020; Ralph, Schwarz, & Stockinger, 2020). By enhancing practical skills needed to compete in the industrial world, teaching factories can help close the gap between vocational high schools and the workplace. (Johan & Harlan, 2014).

Teaching factory can be a learning concept in actual circumstances to bridge the competency gap between schools' knowledge and industrial needs (Stavropoulos et al., 2018; Vijayan, Mork, & Giske, 2019). Teaching factory learning model has a very strong influence on student learning engagement (Prianto, Winardi, & Qomariyah, 2020). On the other hand, a teaching factory is a form of production / service-based learning that refers to standards and standard work procedures in the prevailing industrial atmosphere and culture (Directorate of Vocational High School Development, 2017).

Numerous vocational schools in Indonesia, where research is conducted, have adopted the teaching factory model. Since nearly two years, has utilized factory teaching and learning, especially in building majors, namely Building Modeling and Information Design (DPIB) and Building Construction, Sanitation, and Maintenance (KGSP). This study examines the parameters of the application of the teaching factory in order to determine the level attained based on the parameters of the teaching factory that have been implemented. Using the evaluation model, it is possible to determine how the teaching factory was implemented in the building department by examining the level of implementation of the teaching factory. Context, Input, Process, and Outcome is the employed evaluation model (CIPP). This study is intended to aid in the development of the teaching factory by shedding light on education and, specifically, the expansion of the teaching factory.

2. METHODS

This study uses qualitative research with the Context, Input, Process, and Product (CCIP) evaluation model. (Warju, 2016; Zhang et al., 2011). The CIPP evaluation model was developed by Stufflebeam (2000). This evaluation model is used as a research model because it examines four dimensions: the context dimension, the input dimension, the process dimension, and the result dimension. Each of these aspects of evaluating the teaching factory learning program has a specific objective. The CIPP evaluation method can assist in determining how to implement the teaching factory learning program.

This study assesses the implementation of the teaching factory at Vocational High School. The evaluation results are then adjusted to the level indicator or teaching factory level in accordance with the Teaching Factory Implementation guidebook published by the Directorate for the Advancement of Vocational High Schools (2017). The information was gathered via surveys, observations, and interviews with productive professors specializing in Building Modeling and Information Design (DPIB) and Building Construction, Sanitation, and Maintenance (BCSM). This allowed for the evaluation of the level attained as a result of the implementation of the teaching factory in the school (KGSP). The triangulation of sources and procedures was used as a data validity test method, and descriptive percentage analysis was used in this study. The required percentages are shown in Table 1.

Table 1. Descriptive Analysis Percentage Criteria

No	Percentage	Criteria
1.	81%-100%	Very high
2.	61%-80%	High
3.	41%-60%	Fair
4.	21%-40%	Low
5.	1%-20%	Very Low

(Sources: Riduwan, 2004)

3. FINDINGS AND DISCUSSION

3.1 Literatur Review

3.1.1 History of Teaching Factory

In the middle to late 20th century, speakers and authors arguing for reforms to the American public education system employed factory- or production- and business-oriented learning as an argumentative tool. When a writer uses the phrase generally, they are referring to characteristics of European education that emerged in the late 18th century and then the mid-19th century in North America, such as classrooms, efficiency, and an emphasis on producing results (Sackey, Bester, & Adams, 2017). In a speech delivered in September 1972, Howard Lamb coined the term "teaching factory" to describe K-12 education. In the 1920s, educational institutions utilized the teaching factory model to produce teachers for schools, according to Lamb in The Greenville News. Colleagues in his 1989 address regarding the teaching factory concept, Al Shanker, president of the American Teachers' Federation, stated, "From Information Factories to Learning and Teaching in Restructured Schools: The Revolution That Has Passed”. The teaching factory model does represent the premise that schools were initially created during the industrial revolution to prepare students for the future (Andersen, Brunoe,

& Nielsen, 2019; Stavropoulos et al., 2018). So industry-oriented learning prepares students to work in the industry.

3.1.2 Vocational High School Revitalization

Through Presidential Instruction No. 9 of 2016 regarding the Revitalization of Vocational High Schools for the purpose of enhancing the quality and competitiveness of Indonesian human resources, which was issued on September 9, 2016. It was explained that the purpose of the vocational high school revitalization program is to restructure and recondition the vocational high school as a whole, beginning with learning, environment, facilities, industrial partnerships, and school administration, in order to improve graduate competence in order to increase graduates' absorption into the world of work and business (McGrath, 2012; Suharno, Pambudi, & Harjanto, 2020). Teachers are not able to develop practical assessment tools in accordance with the curriculum set by the government (Martubi, Sofyan, & Munadi, 2022). Following the mandate of Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, educational revitalization is a more careful, persistent, and accountable effort to achieve national education development objectives.

The establishment of the teaching factory program as a hub for student creativity and innovation is one of the four pillars of effective learning innovation (Ministry of Education and Culture, 2016). It is expected that teaching factory learning will produce graduates who are competent in the industrial world. In accordance with Article 15 of the Law of the Republic of Indonesia Number 20 of 2003, vocational education must prepare students to work in specific fields. Factory teaching is an industry-based learning model, meaning that the SMK learning concept refers to applicable business and industrial standards and procedures and is implemented in accordance with actual industrial conditions (Tisch et al.. According to the Directorate of Vocational High School Development (2017), implementing a teaching factory in the educational process of vocational high schools is possible in a variety of existing expertise fields.

3.1.3 The Concept of Teaching Factory in Vocational High Schools

The implementation of the teaching factory is divided into four models that are very useful for SMK mapping implementation. Implementing this teaching factory is related to vocational high school preparedness (Directorate of Vocational High School Development, 2015). Some of the teaching factory models are:

a. The Dual System, which represents industrial work practices, is the first model. This paradigm is a form of enterprise-based training or experience-based training for vocational education in the workplace.
b. The second paradigm is competency-based training (CBT) or competency-based training. This model is an instructional method that emphasizes the development and improvement of students' skills and knowledge in accordance with employment requirements. The objective of these evaluations is to ensure that each student has acquired the skills and knowledge necessary for each competence unit studied. The third model, referred to as Production-Based Education and Training (PBET). The model is an approach to learning based on production. Students' existing competence must be bolstered, and their skills must be ensured, by providing instruction in the production of actual goods required in the workplace (industry and society).
c. The fourth model, the teaching factory, is an industry-based learning concept (products and services) that utilizes the synergy between schools and business to produce graduates who are market-ready.

Based on the Teaching Factory Implementation guide book from the Directorate of Vocational High School Development (2017), when implementing the teaching factory program, a vocational high school must adhere to the following fundamental principles. (1) the integration of work experience into the vocational high school curriculum; (2) all human resources, equipment, and materials are arranged and planned to carry out the production process or service to produce goods or services; (3) there is a combination of competency learning; (4) vocational high school students must participate in production-based learning.

3.1.4 Teaching Factory Development Level

Based on the Teaching Factory Implementation guide book from the Directorate of Vocational High School Development (2017), There are seven levels in the development of the teaching factory, namely:

a. Pra Teaching Factory Level 1-Competency Based Training (CBT)
The objective of the first level is to equip and strengthen students' understanding prior to practice. The focus of basic technical knowledge includes: all learning methods include basic knowledge and skills from a competency program; basic knowledge and skills, including procedures for using and maintaining machines, and making products with specific machines and methods; and a competency-based assessment system based on the taught standards.
b. Pra Teaching Factory Level 2-Competency Based Training (CBT)
The second level focuses on work planning, which consists of the following: Students can apply basic understanding and skills acquired at level 1 through the use of practical skills; Students are required to design the steps necessary to create a product.
c. Teaching Factory Level 3-Production Based Education and Training (PBET)
The third level focuses on competence-based work demands that include: the application of this level requires a sense of quality, i.e., student work based on objective standards or quality standards specified in the competence; the products at this level have no economic value but are solely based on established competency standards or for educational purposes only.
d. Teaching Factory Level 4-Production Based Education and Training (PBET)
The fourth level focuses on the application of competencies, an emphasis on efficiency, and the satisfaction of internal needs, which includes: practical activities at this level are not only based on a sense of quality, but also on a sense of efficiency, taking into account work culture in the global industry; the products produced must not only be aesthetically pleasing, but also be correct, neat, and have economic value or be marketable; and because the practice is based on a sense of competence, the products produced must be correct.
e. Teaching Factory Level 5 - Product Innovation
The focus of the fifth level has been on the application of competencies, with an emphasis on innovation to meet external needs: Learning models at this level include a sense of creativity and innovation in addition to a sense of quality and efficiency; a sense of creativity and innovation is the capacity to solve problems, generate innovation, and recognize new opportunities; This level also considers maintenance, repair, and calibration (MRC) requirements for equipment used in production; Considering industrial behavior, it necessitates group collaboration skills; As yet another form of innovation in the learning process, job sheets at this level have been transformed from an academic to a more productive function.
f. Teaching Factory Level 6-Mass Production
The sixth level focuses on competency applications, emphasizing process management or production and mass production or which includes: production activities are not only practical activities of students, but also repeat orders or to meet the market, where production activities are carried out in bulk; this level of job sheet is not significant enough to be developed in schools; 3) this level of job sheet is not significant enough to be developed in schools.
g. Teaching Factory Level 7-Mass Production
It focuses on competency application, sales, and customized product (product flexibility) at the final level, which includes: This level job sheet is not significant enough to be developed in schools; job sheets at levels 6 and 7 have resulted in the establishment of a technopark, which includes consulting and trading activities.

3.2 Context Evaluation in Teaching Factory

The objective of context evaluation is to establish how closely the parameter indicators correspond to the implementation of the teaching factory. Based on the published Teaching Factory Implementation Guidebook of Directorate of Vocational High School Development (2017), the teaching factory parameter is composed of numerous sub-parameters. The evaluation context consists of the following sub-criteria: leadership, equipment, equipment governance, space, the Medical Research Council (MRC), practice space, and motivation. The percentage score results for each sub-parameter are based on the evaluation of the teaching factory's execution context, as depicted in Figure 1.

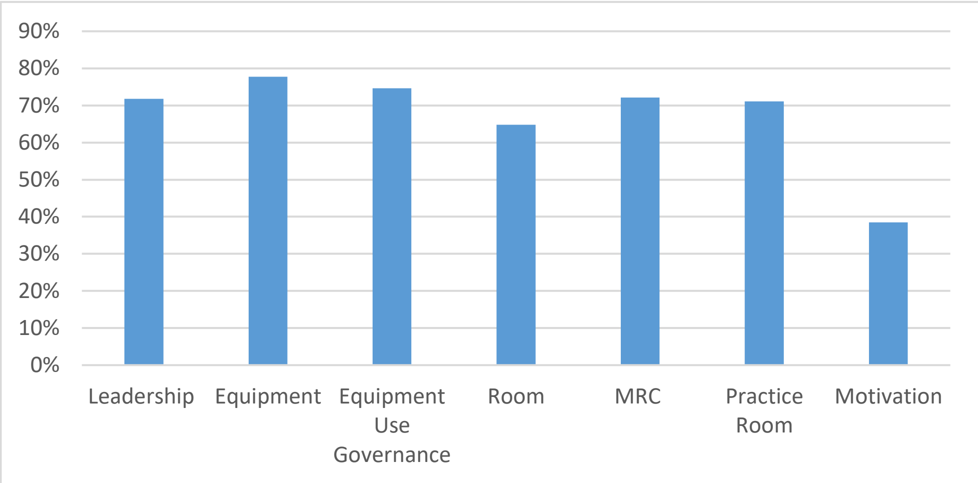

Figure 1. The results of the context evaluation in the implementation of the teaching factory on each of its sub-parameters

The context evaluation findings for the deployment of this teaching factory are broken down into numerous subparameters. Leadership parameters received a score of 71.8 percent, equipment received a score of 78 percent, equipment usage management received a score of 75 percent, space received a score of 65 percent, MRC received a score of 72 percent, the practice room received a score of 71 percent, and motivation received a score of 38 percent. Based on the average value of these sub-parameters, the percentage value is 67%. Based on the reference criterion for descriptive analysis, this value is evaluated as excellent. Based on these findings, the evaluation of the environment for the implementation of the teaching factory was successful. It corresponds to level 4 of the implementation of the teaching factory. The attainment of level 4 in the implementation of this teaching factory demonstrates that has adopted a work culture based on the industrial world, that the products are of high quality, that they have marketability, and that the practice is production-based. This finding is consistent with (Ali et al., 2015; Prasetyo et al., 2021) which state that leadership has an effect on work culture.

3.2.1 Input Evaluation in Teaching Factory

The evaluation of input performed aims to regulate decisions, identify current sources, alternatives to be pursued, and formulate plans and strategies to meet the needs of the teaching factory. Based on the Teaching Factory Implementation Guidebook published by the Directorate of Vocational High School Development (2017), the parameters of a teaching factory may be separated into various sub-parameters. This input is evaluated based on its financial administration, organizational structure and job desk, performance and workflow SOPs, environment, teaching activities, marketing and promotion plans, communication media, brochures/flyers/media, market reach, person in charge, competence teaching factory, and number and suitability of human resources. Figure 2 depicts the proportion of each sub-parameter in the evaluation of inputs in the execution of the teaching factory, as determined by the data collected.

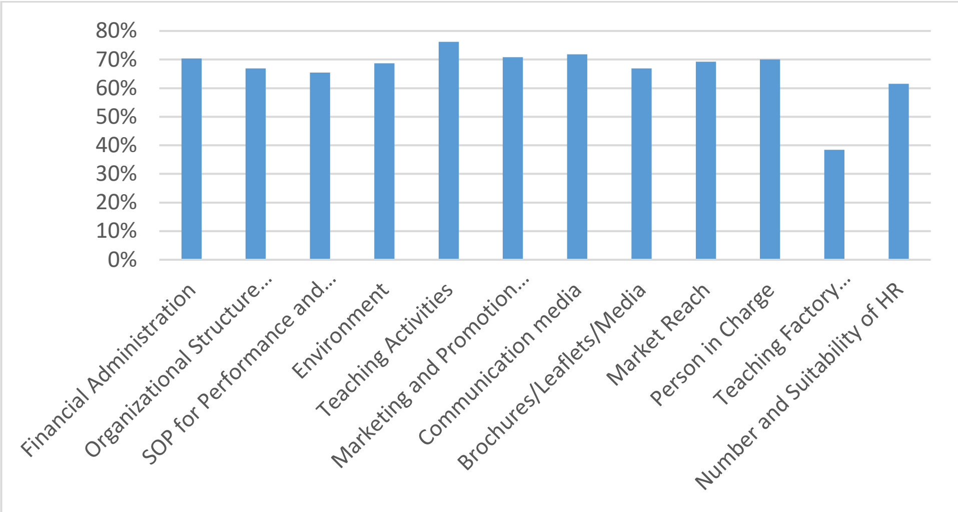

Figure 2. The results of the evaluation of inputs in the implementation of the teaching factory on each of its sub-parameters

Numerous sub-parameters are used to categorize the study's findings regarding the evaluation of inputs for the execution of this teaching factory. According to Figure 2, the financial administration parameters received a 70% value, organizational structure and job desk received a 67% value, SOP of performance and workflow received a 65% value, environment received a 69% value, teaching activities received a 76% value, marketing and promotion plan received a 71% value, and communication media received a 72% value. The metrics for brochures/flyers/media were 67%, 69% for market coverage, 70% for the person in charge, 38% for the teaching factory's competence, and 62% for the quantity and suitability of human resources. The average percentage value of these sub-parameters was 66%. Based on the reference criterion for descriptive analysis, this value is evaluated as excellent. Based on these results, the evaluation of the teaching factory implementation input was successful and corresponds to level 4 in the teaching factory implementation. The level 4 achievement in the implementation of this teaching factory indicates that has adopted an industrial work culture, the goods are good, they have selling power, and the practice is production-based. According to the findings of this study, organizational management is linked to work culture (Giatman, 2017; Ingelsson et al., 2018). Improving work culture requires good organizational management.

3.2.2 Process Evaluation in Teaching Factory

The purpose of this process evaluation is to determine whether or not industrial practice programs are executed adequately. Based on the Teaching Factory Implementation Guidebook published by the Directorate of Vocational High School Development (2017), the parameters of this teaching factory may be broken down into numerous sub-parameters. Sub-criteria for evaluation include lesson plans (RPP)/task sheets, practical materials, training implementers, entrepreneurship, corporate culture, market acceptability, delivery, quality, quality control, and collaboration. Based on the collected data, Figure 3 depicts the percentage value for each sub-parameter in the process evaluation of the teaching factory implementation.

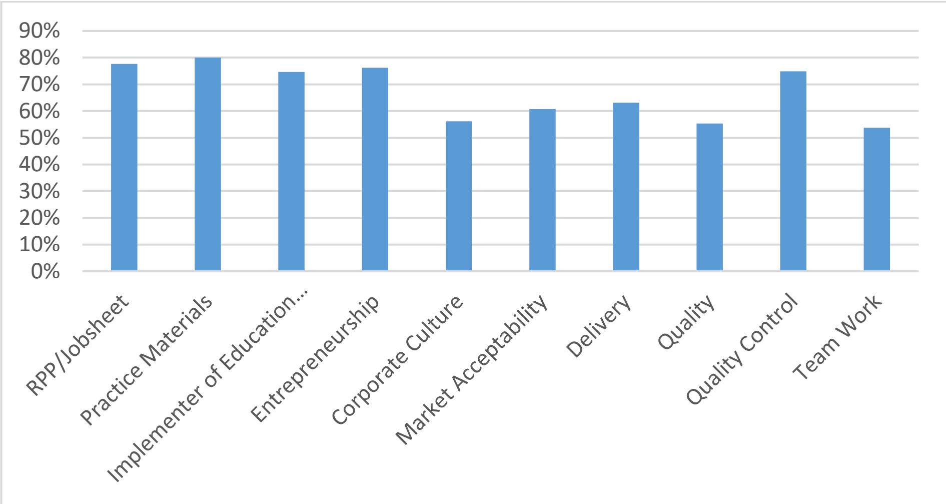

Figure 3. The results of the evaluation process in the implementation of the teaching factory on each of its sub-parameters

Based on figure 3, the research findings on the evaluation of the process for implementing this teaching factory are divided into several sub-parameters, with the RPP/job sheet parameter receiving 78%, practice materials receiving 80%, training implementers receiving 75%, entrepreneurship receiving 76%, corporate culture receiving 56%, and market acceptance receiving 6%. The parameter for delivery was 63%, the parameter for quality was 55%, the parameter for quality control was 75%, and the parameter for teamwork was 54%. The average of these sub-parameters was 67.27 percent. Based on the reference criterion for descriptive analysis, this value is evaluated as excellent. The assessment procedure of the teaching factory implementation was successful based on these findings. It corresponds to level 4 of the implementation of the teaching factory. The achievement of level 4 in the implementation of this teaching factory indicates that the competence of the resulting product is conscious of quality, time, and cost, application focus on competence, and emphasis on efficiency for meeting internal needs, but has also begun to adapt to meet external demands in the service sector, which in practice already refers to the work culture in the business and industrial worlds. According to the findings, learning is related to workplace culture (Bendassolli, 2017; Ranz, 2017). That requires continuous learning to improve work culture

3.2.3 Product Evaluation in Teaching Factory

This study's product evaluation seeks to quantify the level of success achieved in the final stages of implementing the teaching factory. Based on the Teaching Factory Implementation guide book from the Directorate of Vocational High School Development (2017), the parameters for establishing the teaching factory can be further subdivided. The sub-parameters of product evaluation include the impact of the teaching factory on institutions, practice bases, products for internal use, innovation, forms of cooperation, project work, and technology transfer. Figure 4 illustrates the percentage value of each sub-parameter in the product evaluation of the teaching factory implementation based on the received data.

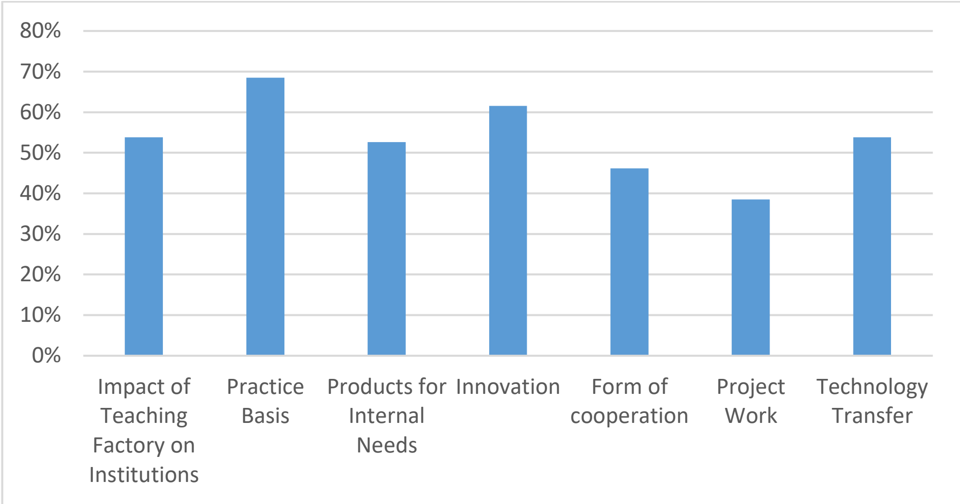

Figure 4. The results of product evaluation in the implementation of the teaching factory on each of its sub-parameters

Based on figure 4, the evaluation of the teaching factory context is broken down into several sub-parameters, with the impact of the teaching factory on the institution receiving a value of 54%, the practice basis receiving a value of 69%, products for internal needs receiving a value of 53%, innovation receiving a value of 62%, form 46% cooperation, 38% project work, and 54% technology transfer. The average percentage value of these sub-parameter results was 53.55 percent. Using reference criteria for descriptive analysis, this value is determined to be adequate. Based on these results, the assessment procedure for the implementation of the teaching factory has been properly completed. It corresponds to level 4 of the implementation of the teaching factory. The achievement of level 4 in the implementation of the teaching factory demonstrates that Vocational High School 2 Klaten has adopted a work culture based on the industrial world, that its products are of high quality and sell well, and that its practices are production-based. According to these findings, the product is relevant to industrial work culture (Nham et al., 2014; Ozer & Zhang, 2022). The resulting product is closely related to the work culture carried out in the industry.

4. CONCLUSION

The Ministry of Education and Culture, which is responsible for education in Indonesia, aspires to improve graduation rates and instill an entrepreneurial spirit in students. It is conducted in an effort to improve the caliber of human resources. The program chosen to meet these objectives is the development of teaching factory learning. This research was conducted where the teaching factory model has been implemented. That has led to two years of teaching factory learning in the construction department, specifically in Building Modeling and Information Design (DPIB) and Building Construction, Sanitation, and Maintenance (KGSP). Nonetheless, the implementation of the teaching factory is currently not proceeding smoothly due to limitations such as limited equipment in laboratory workshops, the impact of curriculum development, a lack of support from school stakeholders, and a lack of human resources and industrial cooperation. Government and industry participation is necessary for the development of factory management instruction in schools.

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