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Evaluation of the Implementation of Teacing Factory in SMK Cordova Margoyoso Pati Central Java

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ABSTRACT

This study aims to determine the suitability of the implementation of the Teaching Factory at SMK Cordova Margoyoso Pati, Central Java, using the CIPP evaluation model (Context, Input, Process, Product). The background of this research is the limited synchronization between school-based industrial learning and real industrial practices, which has led to a gap between students' competencies and industry needs. Initial observations found several problems such as inadequate facilities, limited involvement of industry partners, and a lack of systematic implementation guidelines for Teaching Factory. These issues have raised concerns regarding the effectiveness and sustainability of the program. This research uses a mixed-method approach with quantitative and qualitative methods conducted in an exploratory sequential manner. Data were collected through observation, interviews, questionnaires, and documentation during April–May 2024. Data validity was ensured through triangulation, as well as validity and reliability tests. The research subjects consisted of 30 students, 2 mentor teachers, and 1 school principal. The results show that the implementation of Teaching Factory at SMK Cordova Margoyoso in: 1) aspects of context, input, process, and product according to teachers and students are in the "very suitable" category. 2) accumulatively, these aspects fall into the "appropriate" category. However, several areas require further improvement, such as stronger collaboration with industry, regular updates to learning materials, and more structured evaluation procedures. Overall, the suitability of the Context, Input, Process, and Product aspects is in the appropriate category. Therefore, continuous improvement is necessary to optimize the quality and outcomes of the Teaching Factory implementation.

Keywords: Evaluation, CIPP Method, Teaching Factory, Vocational Education, Industrial Partnership

INTRODUCTION

Vocational education has emerged as a critical pillar for addressing global workforce challenges, particularly in developing economies undergoing industrial transformation [1][2][3]. Amid the Fourth Industrial Revolution, vocational education systems are urged to align with labor market demands that increasingly favor adaptive, skilled, and entrepreneurial individuals [4][5]. One of the most promising innovations in this realm is the Teaching Factory (TEFA), a pedagogical model that integrates production-based learning with real-world industrial settings [6][7]. TEFA has been championed in countries like Germany, Japan, and South Korea to bridge the gap between education and employment, emphasizing not only technical proficiency but also innovation, quality control, and customer-oriented production cycles [8]. However, despite its adoption in several regions, the localized implementation of TEFA in Southeast Asia, particularly in Indonesia, remains under-evaluated in terms of contextual effectiveness and its adaptation within the unique characteristics of the Indonesian vocational school ecosystem [9][10].

In Indonesia, the implementation of vocational education through vocational high school (SMK) plays a vital role in preparing youth for employment, especially amid high youth unemployment rates [11][12]. According to the Indonesian Central Statistics Agency (BPS), SMK graduates consistently show the highest unemployment rates across educational levels. This paradox reflects a structural mismatch between educational outputs and industrial needs, where graduates are deemed theoretically competent yet practically unready [13]. In response, the Ministry of Education introduced the TEFA model as a strategic measure to cultivate industry-ready graduates by simulating real production environments within schools. Nonetheless, the actual implementation of TEFA varies significantly across institutions, and there is limited evidence on whether these initiatives meet the intended objectives [14][15][16]. In this context, rigorous evaluation is needed to examine whether TEFA, as implemented in Indonesian SMKs, effectively supports skill acquisition, entrepreneurial capacity, and labor market integration [17].

A growing body of literature has explored the use of evaluation frameworks in vocational education, particularly the CIPP model (Context, Input, Process, Product), which offers a systematic approach to program evaluation. Studies in China, Thailand, and Malaysia have demonstrated the utility of CIPP in measuring the effectiveness of vocational programs in fostering employability and institutional alignment with industrial standards. However, few studies have critically applied the CIPP framework to evaluate TEFA in Indonesia. The limited scope of existing research also lacks a

comprehensive analysis of how institutional contexts, such as resource availability, teacher readiness, and industry engagement, influence the outcomes of TEFA. Moreover, most previous evaluations focus on output indicators without unpacking the formative aspects that contribute to the success or failure of TEFA programs. This research aims to fill that gap by applying the CIPP model to systematically evaluate TEFA implementation at one vocational school in Central Java, using a mixed-methods approach to capture both processual dynamics and stakeholder perceptions.

Specifically, the study seeks to answer the following research questions: (1) To what extent does the implementation of TEFA at SMK Cordova align with its institutional goals and labor market needs (Context)? (2) What are the adequacy and readiness of inputs such as facilities, curricula, and human resources (Input)? (3) How effectively are TEFA activities implemented and managed (Process)? (4) What outcomes have been achieved in terms of student skills, entrepreneurial initiatives, and product quality (Product)? By answering these questions, the study aims to generate actionable recommendations for policymakers, school leaders, and vocational educators to enhance the implementation and impact of TEFA programs in Indonesia and beyond.

RESEARCH METHOD

The type of research used in this study is evaluation research of the CIPP (Context, Input, Process, and Product) model with a mixed methods research approach in the form of quantitative and qualitative methods research approaches located at SMK Cordova Margoyoso Pati Central Java. research time April 17, 2024 - May 17, 2024. Data collection in this study used observation, interview, questionnaire and documentation methods. The instrument lattice is in the table 1 - table 3.

Table 1. Observation instrument grid

Aspect	Indicator	Question Item
Context	Vision and Mission of SMK Cordova Margoyoso Pati Central Java	1
Input	Teacing Factory Location	2
Process	eacing Factory Schedule & Teacing Factory Marketing	3,4
Product	Teacing Factory Product Results and Prices	5,6

Table 2. Teacher questionnaire CIPP aspects

Indicator	Question Item
Aspect Context	
Conformity of the implementation of teaching factory with SMK's Vision & Mission	1
The suitability of the implementation of Teaching Factory with government policies	2
The suitability of the teaching factory's implementation demands and conditions in the communit	3,4
The suitability of integrating the commercial and industrial sectors with the teaching factory	5
Aspect input	
Completeness of workshop facilities	6, 7
Completeness of supporting factors	8
Preparation for the implementation of teaching factory	9
Conformity of teaching factory implementation with System Operational Standards	10, 11
Aspects of theory and production room facilities: - With laboratory facilities	12, 13

- Availability of tools and materials	
Aspect Process	
Management of teaching factory implementation in vocational high schools	14
Teacher handling of product problems	15, 16
Timing of teaching factory implementation	17
Room arrangement for the implementation of teaching factory	18, 19
Student attendance in teaching factory learning	20
Implementation of Quality Control (QC)	21
Aspect Product	
Feasibility of selling products resulting from the implementation of teaching factory	22, 23
Product performance of teaching factory results	24, 25
Amount	25

Table 3. Student questionnaire CIPP aspects

Indicator	Question Item
Aspect Context	
Product Results from Teaching Factory	1
Target Marketing to consumers	2, 3
Aspect Input	
Ability of the mentor teacher	4
Preparation of teaching factory implementation	5
Schedule conformity with the implementation of teaching factory	6
Aspects of theory and production room facilities Available laboratory facilities Availability of tools and materials Availability of Standard Operating System (SOP) references	7, 8, 9
Aspect Process	
Supervisor's ability to manage teaching factory learning activities	10, 11
Room arrangement for teaching factory implementation	12
The ability of accompanying teachers and facilitating students in the Quality Control (QC) activities	13, 14
Kegiatan *Quality Control* (QC)	15
Aspect Procuct	
Feasibility of selling products resulting from the implementation of teaching factory	16, 17
Product performance of teaching factory products	18, 19
Amount	19

The validity of this data includes Triangulation, Validity Test and Reliability Test. Respondents of this study can be seen in table 4.

Table 4. Questionnaire respondents

Subyek	Amount
Students	30
Teaching factory mentor teacher	2

The data analysis technique used is descriptive analysis.

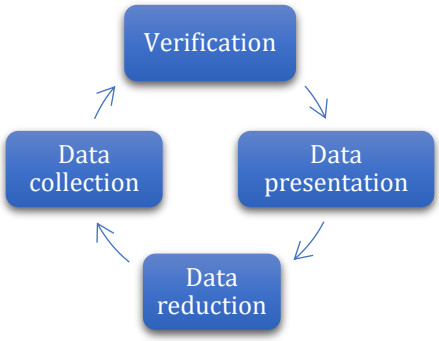

Figure 1. Descriptive analysis process

RESULT AND DISCUSSION

The presentation of research findings obtained from questionnaire instruments, interviews, observations, and documentation at SMK Cordova Margoyoso.

Aspect Context

Indicators contained in these aspects include (1) the vision and mission of Teaching Factory's application in Vocational High Schools; (2) The demands of the workplace; (3) the suitability of the implementation of Teaching Factory with Government policies.

1. The suitability of the teaching factory at SMK Cordova Margoyoso in terms of context

Context evaluation is analyzing needs. The question that arises from this context is "what's needed?". Context evaluation's objective is to determine whether the established priorities and goals can satisfy

the group's demands targeted by the institution. Based on the results of interviews and observations of the implementation of the teacing factory at SMK Cordova Margoyoso, the vision and mission of the school, government policies and the world of business and industry are in accordance and running well, it is only a matter of improving or fixing the implementation of the dudi which must be improved according to the Ministry of Education and Culture so that the teacing factory program is running well.

2. The suitability of teaching factory at SMK Cordova Margoyoso in terms of context aspect from the Teacher Questionnaire

This component data was obtained from the results of a questionnaire given to 2 respondents (teachers). The questionnaire has 5 questions which can be obtained from the results that the average price (mean) is 18.5; the median value is 18.5; the most obtained value (mode) is 17. The data has a standard deviation (standard deviation) of 2.121, a minimum value of 20, a maximum value of 20.

Table 5. Data frequency of teacher context aspect

No	Interval	Category	Frequency
1	5 – 9	Not suitable	0
2	10 – 11,5	Less suitable	0
3	12,5 – 14	Suitable	0
4	15 - 20	Very Suitable	2
Amount			2

The visual model of the distribution of scores from the table 5 above can be seen in the picture 2 below.

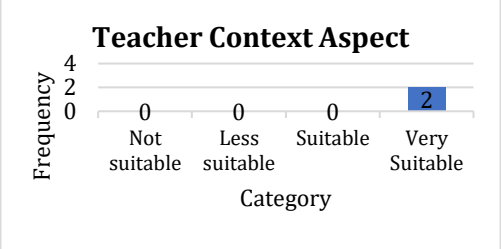

Figure 2. Teacher context aspect chart

This is in line with what is explained by the Ministry of Education and Culture which contains that the teaching factory must underlie in order to run, one of which is the vision and mission of the school [18]. Teachers need to be aware of challenges and climate change in order to improve quality on their own and sustainably through training students to think critically [19].

3. The suitability of teaching factory at SMK Cordova Margoyoso in terms of context from the student questionnaire

This component data was obtained from the results of a questionnaire given to 30 respondents (students). The questionnaire has 3 questions with the results that the average price (mean) is 11.9; the middle value (median) is 12; the most obtained value (mode) is 11. The data has a standard deviation of 1.213, a minimum value of 14, a maximum value of 9.

Table 6. Data frequecy of context aspect of students

No	Interval	Category	Frequency
1	3 – 5	Not suitable	0
2	6 – 6,8	Less suitable	0
3	7,8 – 8,6	Suitable	3
4	9,60 - 14	Very Suitable	27
Amount			30

The visual model of the distribution of scores from the table above can be seen in the picture 3.

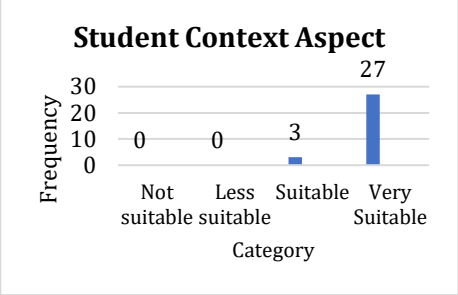

Figure 3. Graph of context aspect of students

This is in line with what was stated by Zahra Pitaloka Prasloranti which contains an overall evaluation of the context component which can be seen from three parameters measured including the vision and mission of the implementation of teaching factory in Vocational High Schools, the needs of the world of work, and the suitability of the implementation of teaching factory with government policies [20]. With that, students have competence and professionalism and insight in the field of motorcycle engineering so that they can practice skills and make decisions about the career they will choose [21].

Aspect Input

Indicators contained in these aspects include (1) the completeness of workshop facilities; (2) the suitability of the implementation of Teaching Factory with System Operational Standards (SOP); (3) aspects of theory and production space facilities.

1. **The suitability of teaching factory at SMK Cordova Margoyoso in terms of inputs**

Input evaluation includes personal analysis of the use of available resources as well as alternative strategies that need to be considered in order to achieve the objectives of the ongoing program.

Based on the results of interviews and observations of the implementation of the teacing factory at SMK Cordova Margoyoso, this is the completeness of the facilities, the suitability of the SOP standards, the theory and practicum room facilities have been running well, just the teacing factory supervisor teacher emphasizes students to use the sop and distinguishes between the practicum and theory rooms so that the teacing factory program runs better and is structured as recommended by the government.

2. **The suitability of Teaching Factory at SMK Cordova Margoyoso in terms of input aspects from the Teacher Questionnaire**

This component data was obtained from the results of a questionnaire given to 2 respondents (teachers). The questionnaire

has 8 questions which can be obtained from the results that the average price (mean) is 32; the median value is 32; the most obtained value (mode) is 31. The data has a standard deviation of 1.414, a minimum value of 33, a maximum value of 31.

Table 7. Data frequency of teacher input aspect

No	Interval	Category	Frequency
1	8 – 15	Not suitable	0
2	16 – 19,1	Less suitable	0
3	20,1 – 23,2	Suitable	0
4	24,2 – 33	Very Suitable	2
Amount			2

The visual model of the distribution of scores from the table 7 above can be seen in the the picture 4 below.

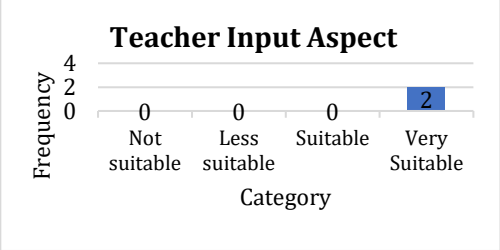

Figure 4. Teacher input aspect chart

This is in line with what is stated by Zaenal Ambia and Sulaeman Deni Ramdani, which contains supporting infrastructure facilities, indicating that the role of infrastructure facilities is very influential in improving student competence considering that the indicators in the aspect of infrastructure facilities are [7]. With adequate infrastructure, students can gain knowledge and skills, so that they have a systematic, rational, and critical mindset towards the problems faced and are able to compete in today's global era [22].

3. The suitability of Teaching Factory at SMK Cordova Margoyoso in terms of input aspects from student questionnaires

This component data was obtained from the results of a questionnaire given to 30 respondents (students). The questionnaire has 6 questions, the results of which show that the average price (mean) is 22.83; the median value is 23; the most obtained value (mode) is 21. The data has a standard deviation of 2.305, a minimum value of 27, a maximum value of 18.

Table 8. Data frequency of student input aspects

No	Interval	Category	Frequency
1	6 – 11	Not suitable	0
2	12 – 14,5	Less suitable	0
3	15,5 – 18	Suitable	4
4	19 – 27	Very Suitable	26
Amount			30

The visual model of the distribution of scores from the table 8 can be seen in the the picture 5 below.

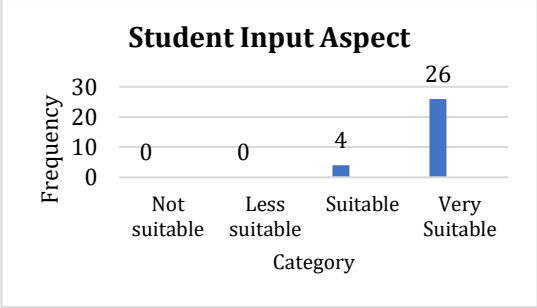

Figure 5. Student input aspect chart

This is in line with what is stated by Monica Pratiwi, Ridwan and Waskito which

contains the input aspects of the implementation of Teaching Factory in this study related to the elements of the implementation of Teaching factory which is divided into 3 variables, namely the completeness of workshop facilities, the suitability of the implementation of teaching factory with Standard Operating Procedure (SOP), and aspects of the theory and production room facilities [23]. When everything in the soup is running and the practicum room is fulfilled so that students can practice their competence [24].

Aspect Process

Indicators contained in these aspects include (1) timing of Teaching Factory implementation; and (2) implementation of Quality Control (QC).

1. **The suitability of Teaching Factory at SMK Cordova Margoyoso in terms of process aspect**

process evaluation is an evaluation that is designed and applied to the practical implementation of activities. Program implementation is called "process evaluation", so the question that arises is "what is being done?". Based on the results of interviews and observations of the implementation of the teacing factory at SMK Cordova Margoyoso, the timing of the implementation of the Teaching Factory and the implementation of Quality Control has been running smoothly, such as the time that has been scheduled both from events or products in the form of consumer orders and for QC it is also good because checking is carried out every day and before being marketed.

2. **The suitability of Teaching Factory at SMK Cordova Margoyoso in terms of process aspects from the teacher questionnaire**

The data for this component was obtained from the results of a questionnaire given to 2 respondents (teachers). The questionnaire has 6 questions. The results can be obtained that the average price (mean) is 22.5; the middle value (median) is 25.5; the most obtained value (mode) is 22. The data has a standard deviation (standard deviation) of 0.707, a minimum value of 23, a maximum value of 22.

Table 9. Data frequency of process aspec of teacher

No	Interval	Category	Frequency
1	6 – 11	Not suitable	0
2	12 – 13,5	Less suitable	0
3	14,5 – 16	Suitable	0
4	17 – 23	Very Suitable	2
Amount			2

The visual model of the distribution of scores from the table 9 can be seen in the the picture 6 below.

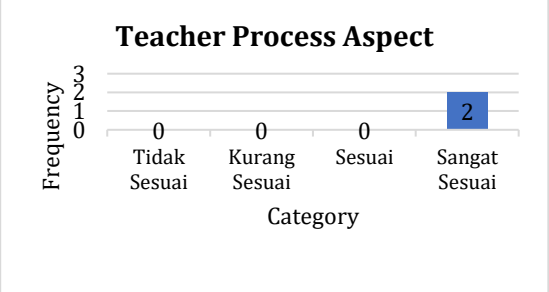

Figure 6. Teacher process aspect chart

This is in line with what is stated by Suyitno, which involves the management of

implementation time in the teaching factory which will produce quality control [25]. At the time of checking the goods and time fulfil the requirements so that it becomes satisfaction for consumers who come [26].

3. The suitability of Teaching Factory at SMK Cordova Margoyoso in terms of process aspects from student questionnaires

This component data was obtained from the results of a questionnaire given to 30 respondents (students). The questionnaire has 5 questions which obtained the results that the average price (mean) is 19.4; the middle value (median) is 20; the most obtained value (mode) is 20. The data has a standard deviation of 1.922, a minimum value of 24, a maximum value of 16.

Table 10. Frequency data of student process aspects

No	Interval	Category	Frequency
1	5 – 13,5	Not suitable	0
2	14,5 – 16,6	Less suitable	2
3	17,6 – 19,7	Suitable	13
4	20,7 – 24	Very Suitable	15
Amount			30

The visual model of the distribution of scores from the table 10 can be seen in the the picture 7 below.

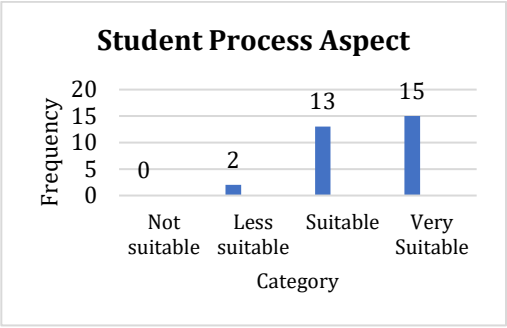

Figure 7. Student process aspect chart

This is in line with what is stated by Hanif Prasojo and Sudiyatno which contains indicators contained in the Process aspect, namely the timing of the implementation of the teaching factory; and the implementation of Quality Control [27]. Vocational education will be effective if it trains individuals directly and specifically in the habits of mind and manipulative habits needed in the work itself in the sense that when students must be involved the implementation of QC will be maximized [28].

Aspect product

Indicators contained in this aspect are products produced either goods or services.

1. The suitability of Teaching Factory at SMK Cordova Margoyoso in terms of product aspect

The final evaluation component, product evaluation, identifies the product, whether planned for the short or long term. Which raises the question "did it's success?". From what is produced by the teaching factory of SMK Cordova in the form of goods and services, the goods can be sold to consumers when someone orders and the services are opened when there is an event.

2. The suitability of the Teaching Factory at SMK Cordova Margoyoso in terms of product aspects from the teacher questionnaire

This component data was obtained from the results of a questionnaire given to 2 respondents (teachers). The questionnaire

has 7 questions which can be obtained results that the average price (mean) is 28.5; the middle value (median) is 28.5; the most obtained value (mode) is 27. The data has a standard deviation (standard deviation) of 2.121, a minimum value of 30, a maximum value of 27.

Table 11. Data frequency of teacher's product aspect

No	Interval	Category	Frequency
1	7 – 13	Not suitable	0
2	14 – 16,7	Less suitable	0
3	17,7 – 21,4	Suitable	0
4	21,4 – 30	Very Suitable	2
Amount			2

A visual model of the distribution of scores from the table 11 can be seen in the the picture 8 below.

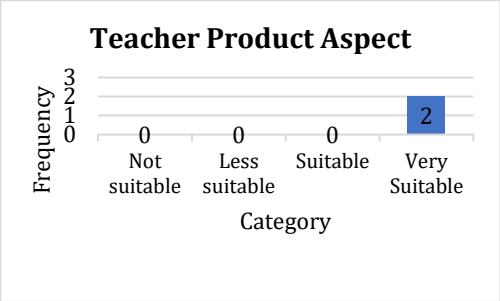

Figure 8. Teacher product aspect chart

The visual model of the distribution of scores from the table 11 above can be seen in the graph below [20]. In the goods or services produced are able to be useful in the community which has selling power [29].

3. The suitability of Teaching Factory at SMK Cordova Margoyoso in terms of product aspects from student questionnaires

This component data is obtained from the results of a questionnaire given to 30 respondents (students). The questionnaire has 4 questions which can be obtained results that the average price (mean) is 15.3; the middle value (median) is 15.5; the most obtained value (mode) is 16. The data has a tandard deviation (standard deviation) of 2.056, a minimum value of 19, a maximum value of 12.

Table 12. Student product aspect data frequency

No	Interval	Category	Frequency
1	4 – 7	Not suitable	0
2	8 – 9,5	Less suitable	0
3	10,5 – 13	Suitable	9
4	14 – 19	Very Suitable	21
Amount			30

A visual model of the distribution of scores from the table 12 can be seen in the the picture 9 below.

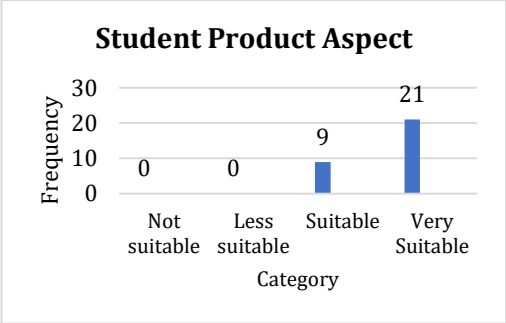

Figure 9. Teacher product aspect chart

This is in line with the Ministry of Education and Culture which explains that through The teaching factory method creates high-quality, be absorbed and accepted by the community, in the sense that it is in accordance with the product aspect [18]. This statement is in keeping with the

goals and objectives of smk which prepares pupils to develop self-sufficient, productive individuals who can occupy open positions in industrial world as workers [30].

CONCLUSION

Based on the analysis and discussion of this research, it can be concluded that:

1. Implementation of Teaching Factory in terms of context with teacher respondents in the very appropriate category while student respondents in the appropriate category. For the suitability of the Teaching Factory in the vision and mission, the suitability of government policies and the suitability of the dudi has been running well, it just needs to be improved in learning.
2. Implementation of Teaching Factory in terms of input aspects with teacher respondents in the very suitable category while student respondents in the very suitable category. For the suitability of the Teaching Factory in the facility, it is appropriate to be seen in the workshop which is already in the complete category, for the SOP standard it meets and the suitability of the practicum facilities is not suitable, it should be separated between the Teaching Factory and practicum places so that it can be maximized.
3. implementation of Teaching Factory in terms of process aspects with teacher respondents in the very appropriate category while student respondents in the appropriate category. For the suitability of Teaching Factory in the suitability of time management and Quality Control is appropriate from the time in implementing Teaching Factory also involves student.
4. Implementation of Teaching Factory in terms of input aspects with teacher respondents in the very appropriate category while student respondents in the very appropriate category. The results of the product are goods and services, for goods, namely table chairs made from holo materials supplies from sperpat and for services there is a motorcycle service and washing.
5. The implementation of Teaching Factory at Cordova Vocational High School Pati Central Java from the aspects of context, input, process, and product is categorized as appropriate.

REFERENCES

[1] S. Billett, *Vocational Education: Purposes, Traditions and Prospects*. Dordrecht: Springer, 2011. doi: 10.1007/978-94-007-1954-5.

[2] M. Pavlova, *Technology and Vocational Education for Sustainable Development*. Queensland: Springer Science Business Media B.V., 2009.

[3] A. B. N. R. Putra, T. T. Kiong, A. D. Rahmawati, E. Sutadji, N. Ulfatin, and M. S. Subandi, “Virtual Simulation Learning Based on AR with Sawing

Machine Design to Improve and Evaluate the Special Skill for Vocational Education in the COVID-19 Pandemic Era," in *International Conference on Information Technology and Education*, Universitas Negeri Malang, Faculty of Engineering, Malang, Indonesia: Institute of Electrical and Electronics Engineers Inc., 2022, pp. 298–304. doi: 10.1109/ICITE54466.2022.9759550.

[4] F. Mutohhari, M. B. Triyono, P. Sudira, M. Nurtanto, and N. Kholifah, "The role of entrepreneurial personality mediation and technological competencies moderation in determining entrepreneurial intentions in vocational education," *J. Tech. Educ. Train.*, vol. 15, no. 1, pp. 128–141, 2023, doi: 10.30880/jtet.2023.15.01.012.

[5] A. Lutfarida Agustin and A. Grummy Wailanduw, "Evaluasi Program Teaching Factory Pada Program Keahlian Teknik Dan Bisnis Sepeda Motor Di SMK Negeri 2 Surabaya," *J. Pendidik. Tek. Mesin*, vol. 9, no. 1, pp. 151–157, 2019.

[6] M. Fawaid *et al.*, "Entrepreneurial intentions of vocational education students in indonesia: PLS-SEM approach," *J. Tech. Educ. Train.*, vol. 14, no. 2, pp. 91–105, 2022, doi: 10.30880/jtet.2022.14.02.009.

[7] Zaenal Ambia and Sulaeman Deni Ramdani, "Teaching Factory On Improving Student Competency In Banten," *VANOS J. Mech. Eng. Educ.*, vol. 153, no. 2, pp. 153–164, Dec. 2017.

[8] L. Clark and C. Winch, *Vocational Education : International Approaches, Developments and Systems*. New York: Routledge, 2007.

[9] D. Nurmalasari and D. R. Swaramarinda, "Can TEFA (teaching factory) be realized with a creative economy, appropriate learning model and ICT in Indonesia?," in *International Business Information Management Association Conference*, Universitas Negeri Jakarta, Jl. Rawamangun Muka, Jakarta, Indonesia: International Business Information Management Association, IBIMA, 2018, pp. 7148–7155.

[10] I. FD, P. Pardjono, M. B. Triyono, and A. D. Minghat, "Indonesian Teaching Factory : The Recent Breakthrough in Education at Vocational High Schools Vocational Education in Indonesia," *Indones. J. Civ. Eng. Educ.*, vol. 10, no. 1, pp. 57–67, 2024.

[11] R. Kurniawan, A. Jaedun, F. Mutohhari, and W. M. Kusuma, "The absorption of vocational education graduates in the automotive sector in

the industrial world," *J. Educ. Technol.*, vol. 5, no. 3, pp. 482–490, 2021, doi: 10.23887/jet.v5i3.35365.

[12] D. R. S. Cahyani and N. Miyono, "Evaluasi Program Teaching Factory dalam Membentuk Budaya Mutu di SMK," *J. Inov. Pembelajaran di Sekol.*, vol. 5, no. 1, pp. 062–070, 2024, doi: 10.51874/jips.v5i1.221.

[13] S. Sutiman, H. Sofyan, S. Soenarto, F. Mutohhari, and M. Nurtanto, "Students' career decision-making during online learning: The mediating roles of self-efficacy in vocational education," *Eur. J. Educ. Res.*, vol. 11, no. 3, pp. 1669–1682, 2022, doi: 10.12973/eu-jer.11.3.1669.

[14] F. Mutohhari, S. Sutiman, M. Nurtanto, N. Kholifah, and A. Samsudin, "Difficulties in implementing of 21st century skills competence in vocational education learning, Indonesia," *Int. J. Eval. Res. Educ.*, vol. 10, no. 4, pp. 1229–1236, 2021.

[15] P. B. P. Aryana, N. K. Widiartini, and N. M. S. Mertasari, "Evaluasi Pelaksanaan Teaching Factory," *J. Penelit. dan Eval. Pendidik.*, vol. 13, no. 2, pp. 122–138, 2023.

[16] A. R. Rukmana, A. Rahmawati, J. S. Murni, and V. H. Adzani, "Evaluasi Program Bantuan Pelaksanaan Teaching Factory di SMK Jakarta Pusat 1," *Aksara J. Ilmu Pendidik. Nonform.*, vol. 7, no. 3, p. 959, 2021, doi: 10.37905/aksara.7.3.959-966.2021.

[17] S. Sulistyanto, F. Mutohhari, A. Kurniawan, and D. Ratnawati, "Kebutuhan kompetensi dalam pasar tenaga kerja di era revolusi industri 4.0 bagi siswa SMK," *J. Taman Vokasi*, vol. 9, no. 1, pp. 1–13, 2021, doi: 10.30738/jtv.v9i1.7742.

[18] Direktorat Pembinaan Sekolah Menengah Kejuruan, *Tatakelola Pelaksanaan Teaching Factory*. Jakarta, 2017.

[19] Muhammad Nurtanto, Herminarto Sofyan, Rabiman, and Moh Fawaid, "Problem Based Learning (PBL) in Industry 4.0: Improving Learning Quality through Character-Based Literacy Learning and Life Career Skill (LL-LCS)," *J. Phys. Conf. Ser.*, vol. 1573, no. 1, pp. 0–10, 2020, doi: 10.1088/1742-6596/1573/1/012006.

[20] Zahra Pitaloka Prasloranti, "Evaluasi Pelaksanaan Model Pembelajaran Teaching Factory Di Smkn 1 Cibadak Evaluation Learning Model of Teaching Factory Implementation at Smkn 1 Cibadak," *J. Edufortech*, vol. 6, pp. 121–133, 2021.

[21] A. Khaharsyah, "The Development of Android-Based Learning Media for Light Vehicle Engineering Skill

Students of SMKNegeri 2 Pengasih," *J. Phys. Conf. Ser.*, vol. 1273, no. 1, 2019, doi: 10.1088/1742-6596/1273/1/012007.

[22] N. A. Handoyono and R. Rabiman, "Development of android-based learning application in EFI materials for vocational schools," in *Journal of Physics: Conference Series*, 2020, pp. 1–8. doi: 10.1088/1742-6596/1456/1/012050.

[23] Monica Pratiwi, Ridwan, and Waskito, "Evaluasi Teaching Factory Model Cipp," *J. Imiah Pendidik. dan Pembelajaran*, vol. 3, no. 3, pp. 1–8, Oct. 2019.

[24] Imran, Marji, H. Suswanto, and B. P. Adhikari, "The influence of Teaching Factory (TEFA) implementation and work readiness on vocational high school students' future job perspectives," *J. Pendidik. Vokasi*, vol. 14, no. 1, pp. 86–96, 2024, doi: 10.21831/jpv.v14i1.66796.

[25] Suyitno, "Investigation of Teaching Factory (TEFA) Implementation in Vocational Education," *VANOS J. Mech. Eng. Educ.*, vol. 34, no. 1, pp. 34–43, May 2022.

[26] Nur Dwi Marga Putra and W. Suyanto, "Implementasi Teaching Factory Kompetensi Keahlian TBSM Di SMK Ma'Arif 1 Wates," *J. Pendidik. Vokasi Tek. Otomotif*, vol. 4, no. 1, pp. 57–68, 2021.

[27] H. Prasojo, "Evaluasi Pelaksanaan Program Teaching Factory pada Program Keahlian Teknik Pemesinan," *J. Pendidik. Vokasional Tek. Mesin*, vol. 7, no. 3, pp. 203–210, 2019.

[28] Nurcholish Arifin Handoyono, Rabiman, and Y. Kristovan, "Eksperimentasi Model Contextual Teaching and Learning untuk Mata Kuliah Pekerjaan Dasar Otomotif," *J. Din. Vokasional Tek. Mesin*, vol. 5, no. 1, pp. 76–82, 2020, doi: 10.21831/dinamika.v5i1.30998.

[29] S. Firdaus, F. D. Mulyawan, and M. Fajriana, "Pengaruh Teaching Factory Terhadap Kreatifitas, Kompetensi, serta Inovasi Siswa Sekolah Menengah Kejuruan," *J. Inov. Kurikulum*, vol. 18, no. 1, pp. 95–103, 2021, doi: 10.17509/jik.v18i1.42672.

[30] Aldian Ryandika, Rabiman, and Sigit Purnomo, "Pengembangan Modul Pembelajaran Mata Pelajaran Pengecatan Bodi Pada SMK Program Keahlian Teknik Bodi Otomotif," *J. Pendidik. Vokasi Otomotif*, vol. 6, no. 2, pp. 29–38, 2024, doi: 10.21831/jpvo.v6i2.70529.