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Teaching Factory Model for Increasing the Competency of Vocational Secondary Education Students in Indonesian Territory

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This study aims to obtain a picture of the success of teaching factory models in the Indonesian Region, particularly in the provinces of DKI Jakarta and Central Java, namely by exploring various success factors related to the implementation of the teaching factory model. The research method used Meta-Ethnography and Aiken's V formula to generate a list of generic and to measure the success of the teaching factory. The data obtained from twelve vocational high schools in Jakarta and Central Java Province with data 403 students. Research results based on data from Radar Chart can be analysed the potential of the vocational high school of Jakarta and Central Java Province in developing and evaluating teaching factory learning covering six dimensions, namely: teaching factory management applied in schools 70%, workshops/laboratories 85%, teaching factory learning patterns 80%, marketing/promotion of teaching factories 70%, service products 78%, human resources (productive teachers) 90% and industry relations have reached 75%. These statistics are also supported by the results of six-dimensional factor data processing; success which shows valid and reliable data. Model teaching factory in test and applied to several vocational high schools to support the acceptance and standardization of teaching factory models.

Key words: *Teaching factory, Vocational Education, A Specs in Human Resources, A Species of Partnership, and A Specs of Product.*

Introduction

Vocational education in Indonesia is entering a new phase. Presidential Instruction No. 9 of 2016 concerning the Revitalization of Vocational High Schools, which was followed by a memorandum of understanding between relevant ministries, seemed to be a rocket driving vocational education in this country. This Presidential Instruction is one part of the *Nawa Cita* (Nine government's program) program put forward by President Joko Widodo. The Vocational School Revitalization Program consists of improving school facilities and infrastructure as well as identification of curriculum content standards. This aligns with the needs of the industry, which will aim to prepare a mid-level skilled workforce.

In line with the *Nawa Cita* program, National Education, especially vocational education, is important to contribute to preparing skilled and highly competitive human resources. Vocational education has the aim of producing competent vocational high school graduates who are ready to come into the industrial world and have the ability to create jobs. The Directorate General of Primary and Secondary Education Management, argues that efforts to recruit vocational graduates in the world of work or industry can be done by (a) strengthening the adaptive ability which includes the ability of applied mathematics and applied science, (b) strengthening the ability of entrepreneurship, (c) strengthening the ability to use national and international languages, (d) strengthen basic ICT skills, (e) carrying out teaching factories (Directorate of PSMK, 2010). Learning activities in vocational schools put forward an approach based on the potential of real-life nature. This model allows the growth of creative schools in accordance with the potential advantages of the region. Its main characteristic is that the school lays a basic vision that students are intact personalities. One of the strategies undertaken by the Directorate General of PSMK to achieve these goals is by strengthening the adaptive capacity and developing vocational partnerships with industry in the form of teaching industry programs or also called teaching factories (Mohammad, 2009).

Literature Review

Teaching Factory

The teaching factory learning paradigm is based on its goal of effectively integrating educational, research and innovation activities into one single concept, involving industry and academia. Teaching factory learning focuses on industrial and academic integration through approaches to curriculum, teaching/training . The *teaching factory* concept is the basis for a new model of synergy between academia and industry. The *teaching factory* concept is the basis for a new model of synergy between academia and industry. The first lesson is " *factory-to classroom* " and *"academia-to industry* ". In " *factory-to-classroom* (industrial -

to-classroom) learning" the concept of factory teaching aims to transfer the work environment to the classroom. Learning in the work environment will foster relevant learning experiences and can improve teachers' teaching objectives in order to improve teaching activities with knowledge industry standards The concept of teaching factory is found because of three things, namely: (1) Ordinary learning is not enough, (2) Student profits are derived from hands-on practical experience, and (3) team-based learning experiences involving students, staff instructors and industry participation enrich the educational process and provide tangible benefits for all parties (Chryssolouris, Mavrikios, & Rentzos, 2016). The concept of *teaching factory* -based learning so far has been carried out by industry-academia (one-to-one) has demonstrated and verified the possibility of bringing together industrial learning and the work environment so that students have realistic and relevant learning experiences. On the one hand, students can deepen their knowledge in certain topics and apply it in practice, where the theory of learning in schools combined with a production-based approach is synchronising the demands and standards of vocational education with industry. On the other hand, industry practitioners have the opportunity to interact with students' problem solving, talent, critical thinking and get ideas and solutions that might not have been considered during the industry-standard process (Chryssolouris, G., Mavri ikios, D., & Rentzos, L, 2016). The concept of learning-based *teaching factory* has so far held between the industry-academia (one way) show industry collaborative learning into learning programs in schools so that students have a learning experience that is realistic and relevant when entering the work environment, on the one hand, students can deepen their knowledge according to topics in the industry and apply it in practice in schools, where the theory of learning in schools is synchronised with a production-based approach according to vocational and industrial education standards. the industry has the opportunity to invest erection in problem-solving (*problem-solving*) of students, fostering the talents of students to think critically (critical thinking) and create ideas and solutions that will be developed during the learning process in accordance with industry standards (Chryssolouris et al., 2016). According to (Tvenge et al, 2018), in his research said that *teaching factory* aims to obtain knowledge for students to create learning that is adaptable/standardized according to industrial procedures. This helps students to be able to evaluate themselves in improving their learning by using technology. Activities in the teaching factory training phase so that teaching practised in industry can be transferred to school learning programs (knowledge transfer). Teaching factory-based learning adds individual reflection as a dimension in the cycle as part of the learning process. The intention is to evaluate the performance of students will provide an understanding of the knowledge, skills, and attitudes obtained from those obtained from learning in the industry. Briefing evaluation tools are very important in identifying areas to improve practice and optimise learning. Participants are students encouraged to explore emotions and questions, reflect, and give feedback to his friend each other. The purpose of teaching factory teaching is to provide training to move towards assimilation and accommodation to transfer learning towards the industrial revolution 4.0. In a study conducted by (Sintha and Fitriani, 2017), that the implementation of *teaching factory* and its implications for the competency of vocational students in DKI Jakarta Province Industrial Estate, that there are differences in student learning outcomes between before applying *teaching factory* and after being given a *teaching factory* learning model. The results show that on average after being given a *teaching factory* learning model of 27.82% higher than before being given a *teaching factory* learning model 13.63% thus, it can be concluded that the implementation and application of *teaching factory* has an impact on increasing student learning competency Vocational School in the DKI Jakarta Province Industrial Estate. The achievement of the quality value of teaching factory learning is 87.5%, namely: (a) the quality of human resources (students and teachers); (b) Ability to manage learning according to the *teaching factory* principle ; (c) Good personality competence; and (d) Professional, possessing extensive and in-depth learning material both in theory and practice. *Teaching Factory* is a learning production which is a framework for vocational education students in the future, has the potential to become a more efficient and effective learning approach if it is part of the educational context. *Teaching factory is* expected to improve students' skills in order to produce a product that is in line with industry standards (Tvenge, Martinsen, & Kolla, 2016).

The implementation of the concept of a teaching factory in a vocational school environment developing relevant work experience in the form of a factory as a place of learning. The didactical approach of industrial workshop learning means that "learning *factory* " consists of the words "learning" and "factory". The first element involves an educational approach to learning and teaching. The second element "factory" describes the industrial environment needed for vocational education related to the field of school studies (Gräßler, Taplick, & Yang, 2016). *Teaching factory* (production learning) aims to align manufacturing teaching and training standards with the needs of modern industrial practice. Both paradigm teaching (learning) and factory (factory/industry) consists of the infrastructure needed for efficient and effective learning even though the nature of learning is different. Studying in the industry depends on industrial-grade equipment, installed on academic sites, for the implementation of school curriculum education. On the other hand, industrial teaching aims to bring real industry practice into academic settings, relying on modern ICT technology to facilitate interaction and knowledge transfer. (Mavrikios, Sipsas, Smparounis, Rentzos & Chryssolouris, 2017). Teaching factory learning can improve soft skills and hard skills in students. The teaching factory-based learning concept focuses on real work in the industry according to industry needs. This improves competence and prepares students for future challenges. Therefore the school provides students with learning experience, skills and readiness to work according to operational standards of industrial work procedures (Davis et al. 2013). According to (Liebrecht et al., 2017), the competence of students that results from the teaching factory learning is their ability to use work system equipment, work ethics, work norms according to applicable industry standards. Teaching factory can improve the competence of students, by empowering job training (industrial training) to the industry for 3 months following the major taken. This gives results to students so that students can have an entrepreneurial spirit, create renewable products according to industry needs and can solve future industrial engineering problems (Baena, Guarin, Mora, Sauza, & Retat, 2017). The application of technology in teaching factories will also increase the integration of knowledge in schools with real production in the industry, so that it will create vocational engineers who already have the potential and skills that are qualified by industry standards facing industry 4.0 (D. Mourtzis, Vlachou, Dimitrakopoulos, & Zogopoulos, 2018). Approach to the problem of industry-based learning 4.0 is not only the application of theory in work practices, but creates innovation with renewable technology (Bauer, Brandl, Lock, & Reinhart, 2018). *Teaching factory* is the concept of transforming industrial learning into classes that creates synergies between vocational education and industry including knowledge, exchange of skills and experience possessed by industry experts to productive vocational teachers or vice versa. This has a positive impact on improving the competence of students in implementing teaching factory learning systems in the classroom (D. Mourtzis, Boli, Dimitrakopoulos, Zygomalas, & Koutoupes, 2018).

The initiative applies a teaching factory to develop the learning experience of students in the industry through an active learning approach to the curriculum of several vocational programs that are implemented in vocational secondary education. This learning shows the performance of both school stakeholders and students in developing skills, knowledge gained from training in industry (Felipe Baenaa, Alvaro Guarina, Julian Moraa, Joel Sauzab, Sebastian Retatc, 2017). The implementation of vocational education and training runs according to their respective programs, both on the other side of the world of work/industry and vocational schools. The industry often complains that the quality of the workforce (graduates) has not met the demands of expertise (competency) expected. Symptoms of *"mismatch"* like this eventually gave birth to graduates *"underqualified* (Cunningham, Dawes and Bennet, 2017). Teaching factory (TEFA) learning objectives are usually directed at three taxonomic regions, namely the cognitive, affective and psychomotor areas (Hamalik, 2008). Students have confidence that teaching factory learning to produce an industrial product that is following industry standards will increase their competence in the era of industrial technology 4.0 (Reining, Kauffeld, & Herrmann, 2019). The concept of teaching factory has a very big influence on society and the economy (Hennig et al., 2019). Teaching Factory is also the basis of a learning approach based on industry standards, combining the experience of industrial work program into the world "education " especially vocational education. (Grube, Malik, & Bilberg, 2019). Teaching Factory learning applications to provide relevant impacts and changes in the ability of learners in the innovation of learning through job training in the industry (Mavrikios, Georgoulias, & Chryssolouris, 2019).

Research Methods

The research method used to identify the success factors of the teaching factory based learning design was qualitative and quantitative methods. In the previous section, researchers have identified the list of success factors (CSF) using the Meta-Ethnography approach. As explained in the methodology section that the input at this stage is in the form of a list of success factors (CSF) that have been generated (from the synthesis process) and then validated to determine the significance (importance) of each success factor (CSF). The expected results at this stage were success factors that already have good validity (good content validity) and internal consistency (internal reliability). Content validity is an expert judgment based on quantitative evidence so that content validity is an expert opinion about how important or relevant a construct is in an instrument. Thus, content validity is measured through expert judgment, not by the researcher himself (Sugiono, 2009). At this stage, the questionnaire was designed and distributed to several experts to evaluate and assess the importance of each success factor through experts' judgment. In other words, some experts were asked for their level of agreement whether each success factor (CSF) of teaching factory implementation was per expert opinion until the agreement was reached. The questionnaire instrument was designed using a Likert scale of 1-5 in which 1 (highly inappropriate), 2 (not suitable), 3 (less suitable), 4 (appropriate) and 5 (very appropriate).

In this study, the content validity and homogeneity reliability of the agreement of the experts on each item which was in the form of a successful factory teaching factor were tested with the Aiken approach. As previously mentioned, the content validity was estimated through testing the appropriateness or relevance of the test content through rational analysis by a competent panel or expert judgment. The validity test was based on calculations by the Aiken method, namely by calculating the content-validity coefficient based on the results of an assessment of the panel of as n = 403 respondents (students) in Public Vocational High School, DKI Jakarta and Central Java Province on a success factor item of 30 statements on a Likert scale, within rated scale = 1-5, which assessed the extent to which the item success factor represented the measured construct. The quality of the teaching factory framework questionnaire as the basis for indicators of the success of teaching factory implementation in vocational high school in DKI Jakarta and Central Java Province, which consisted 30 items of statements presented. The value of the content-validity coefficient resulted in each item of instrument characteristics make Delphi technic. The research was done at twelve locations of public and private vocational schools in DKI Jakarta and Central Java, namely: SMKN-26, SMKN-27, SMKN-30, SMKN-4 Rorotan, SMKN-57 and SMK Muhammadiyah 4, DKI Jakarta Province while SMK in Central Java province is SMKN-4 Surakarta, SMKN-7 Semarang, SMKN-1 Temanggung, SMKN-2 Kendal, SMK PGRI-1 Kudus, SMK Muhammadiyah-1 Sukoharjo. Lokasi penelitian berjumlah 12 lokasi SMK Negeri dan Swasta di Provinsi DKI Jakarta dan Jawa Tengah, yaitu: SMKN-26, SMKN-27, SMKN-30, SMKN-4

Rorotan, SMKN-57 dan SMK Muhammadiyah 4 Provinsi DKI Jakarta sedangkan SMK di Provinsi Jawa Tengah adalah SMKN-4 Surakarta, SMKN-7 Semarang, SMKN-1 Temanggung, SMKN-2 Kendal, SMK PGRI-1 Kudus, SMK Muhammadiyah-1 Sukoharjo.

Results and Discussion

In this study, the content validity and Reliability of Success Factors Based on Expert Judgment of Students in 12 Vocational High School DKI Jakarta and Central Java Province of the agreement of the experts on each item which was in the form of a successful factory teaching factor were tested with the Aiken approach. As previously mentioned, the content validity was estimated through testing the appropriateness or relevance of the test content through rational analysis by a competent panel or expert judgment. The validity test was based on calculations by the Aiken's V formula, namely by calculating the content-validity coefficient based on the results of an assessment of the panel of as n = 187 respondents (students) in Vocational High School, DKI Jakarta Province on a success factor item of 30 statements on a Likert scale, within rated scale = 1-5, which assessed the extent to which the item success factor represented the measured construct. The quality of the teaching factory framework questionnaire as the basis for indicators of the success of teaching factory implementation in public vocational high school in DKI Jakarta Province, which consisted 30 items of statements presented in table 1 below. The value of the content-validity coefficient resulted in each item of instrument characteristics. All 189 students filled out the questionnaire that had been distributed. The first step was calculating the content-validity coefficient for each item of the success factor using the given Aiken's V formula so that it was obtained as presented in Table 1. All 46 experts filled out the distributed questionnaire, even at in this questionnaire some experts add or propose additional success factors. Nevertheless, the added success factor has been accommodated by the existing success factor. Table 1 presented the results of the content-validity coefficient calculation obtained in this first step. Based on the standard significance of content validity (V), for 201 students (rater) and 5 categories (Likert scale), the minimum value of the content validity (V) significant coefficient was $r_{count} > r_{table}$.

In the first stage, measure the level of validity of an item and to determine whether an item is suitable for use or not. In determining whether a successful item factor is feasible or not, a significance coefficient correlation test at the 0.05 significance level is usually carried out, meaning that an item is considered valid if the value of $r_{count} > r_{table}$. By using the formula df = N-2, then the r_{table} is obtained df = 201-2 = 189, the location of $r_{table} = 0.142$. From the results of the above calculations, it can be explained that the value of $r_{count} > r_{table}$ based on the 0.05 significance test. The result of data processing shows that all items success factors are **valid** as many as 30 items, due to $r_{count} > r_{table}$. In other words, it can be concluded that all 30 items have *good content validity* and *good internal homogeneity*. The instrument that has been developed can be used to retrieve field data empirically.

Table 1: Results of Content-Validity and Reliability of Sub-Characteristics Instrument of Students in Vocational High School DKI Jakarta and Java Provincy

No	*Item* *Successful Factors of a Teaching Factory*	V Coefficient	H Coefficient	Sig
1	I got the work experience from Business and Industrial World that supports teaching factory learning	0,603	0,917	0,000
2	I got training/workshops /seminars from Business and Industrial World that support the achievement of competences	0,629	0,916	0,000
3	I actively participated in the training held by Business and Industrial World	0,674	0,915	0,000
4	I can develop entrepreneurship potential through teaching factory learning	0,507	0,918	0,000
5	I understand the theory of managing teaching factory learning	0,591	0,917	0,000
6	I understand the principles of teaching factory learning	0,532	0,918	0,000
7	I find it easier to understand the materials when they are practised directly in the TEFA repair service unit based on the procedures and standards of working at the actual Business and Industrial World	0,386	0,920	0,000
8	I created an industrial work atmosphere in learning	0,438	0,919	0,000
9	I apply technology in the industry in learning	0,486	0,918	0,000
10	I apply industrial work culture in learning	0,497	0,918	0,000
11	I have an extraordinary work ethic	0,556	0,917	0,000
12	I have a high sense of responsibility in completing work given by the teacher or Business and Industrial World	0,501	0,918	0,000
13	I have unlimited self-confidence.	0,468	0,919	0,000
14	I understand, obey and teach social norms	0,393	0,920	0,000
15	I maintain good communication with Business and Industrial World	0,537	0,918	0,000

16	I have extensive and in-depth knowledge about the subject matter provided according to Business and Industrial World standards	0,624	0,916	0,000
17	I have practical skills according to my subjects	0,431	0,919	0,000
18	I get the guidance and tutor from the teachers in accordance with the competencies they teach	0,564	0,918	0,000
19	I am passionate about exploring to create and develop products	0,543	0,918	0,000
20	Teaching Factory as a solution to overcome problems that arise during the learning process	0,652	0,916	0,000
21	Business and Industrial World provides contributions that adjust to the teaching factory learning design of the school	0,567	0,917	0,000
22	Business and Industrial World provides training for instructors	0,583	0,917	0,000
23	Business and Industrial World provides training for students	0,615	0,917	0,000
24	Business and Industrial World provides training for school managers.	0,335	0,921	0,000
25	Business and Industrial World helps to provide HR/instructor facilities	0,458	0,919	0,000
26	Business and Industrial World helps provide infrastructure facilities	0,377	0,920	0,000
27	Business and Industrial World helps provide learning resource facilities.	0,403	0,919	0,000
28	Schools actively offer cooperation with Business and Industrial World	0,393	0,920	0,000
29	Having collaboration involving more than 1 Business and Industrial World	0,466	0,919	0,000
30	The production process is carried out at school	0,454	0,919	0,000

Average score results of first stage assessment of teaching factory evaluation model using the following Delphi technique.

Table 2: Expert judgment on the teaching factory model

No	Aspect Assessment	Average Score
1	Objectivity Teaching Factory learning material	3.95
2	Objectivity Learning Teaching Factory Model guide	3.85
3	Objectivity of data collection instruments	3.88
4	Practicality of teaching factory implementation measurement instruments	3.85
5	Practicality of teaching factory learning materials	3.85
6	Practicality of Model teaching factory Implementation Guide	3.80
7	Economical use of time	3.87
8	Economical in cost usage	3.90
9	Economical in energy use	3.88
	Average Score Total	3.87

Based on the results in table 2, researchers can aim to develop a teaching pattern to provide reinforcement teaching factory learning techniques that are desirable to use the Delphi technique as a research procedure in data collection. The Expert judgment response analysis of the questionnaire showed that experts expressed a positive level of opinion in support of the strengthening of the teaching factory's high-point model (X = 3.85 or higher). Expert feedback shows the average score of 5 for the suitability of each aspect of the assessment. Thus, the model of teaching factory strengthening after the Delphi technique, stated that the application of model teaching factory is suitable for application of future teaching factory implementation.

Average score results of the first stage on the readability of quality instruments and cultural arts learning skills are as follows:

Table 3: Assessment results of Model Teaching Factory guidelines

No	Aspect Assessment	Average Score
1	Clarity of teaching Factory learning criteria	3.90
2	Clarity Formulation of learning objectives	3.95
3	Clarity of formulation of learning materials	3.98
4	Learning materials Coverage	3.85
5	Clarity of learning Design	4.00
6	Clarity of learning Models	3.97
7	Clarity of educational role	4.00
8	Clarity Instrument Assessment	3.88
9	Clarity of valuation criteria	3.97
10	The external clarity of learning	3.89

11	An easy-to-understand statement formulation	3.98
12	Clear word usage and sentences	3.88
	Average Score Total	3.94

When consulted with assessment standards in the implementation of the teaching factory model, the average total score is at intervals greater than 3.4-4.00 including a good or decent category so that the teaching factory model can be used with some improvements. To get a better model, the instrument is still done repair. As such, before the instrument in the trial at the second stage of the small-scale trial, the first repairs were made referring to the recommendations given by the validator. The improvement refers to 5 recommendations by the validators on a small scale in the feasibility test or the clarity of application of the teaching factory model guidance on vocational education students in the province of DKI Jakarta and Central Java (McDermott et al, 2004). The teaching factory Model is validated in terms of objectivity, practicality and efficiency. Model teaching factory or Clarity Guide Model teaching factory that involved in the development of the first Test stage by the experts (teachers) consisting of 24 people, namely 12 teachers coordinator of Teaching factory field, 12 Teachers productive teaching field Factory. The assessment uses the Linkert scale, with the lowest score 1 and the highest score 5. The teaching factory Model is validated in terms of objectivity, practicality and efficiency.

The results of the study related to Presidential Instruction No. 9 of 2016 concerning Revitalization Vocational High School, Tri Dharma University Tinggi as well as the desire of the industry, gained some aspects Teaching Factory which associated with sustainability in improving the competence of learners as in table 3.

Table 3: Application of Teaching Factory

No	Application of *Teaching Factory*
	Government
1	The government provides guidance services / services to vocational schools
2	The government provides capital assistance to implement the teaching factory model
3	The government provides assistance to school principals and productive teaching factory teachers
4	The government provides Coaching / Training of productive teaching factory teachers and students
5	The government provides Marketing Access
6	The government provides Technology Assistance
7	The government provides information assistance
	Higher Education / Academics
8	Colleges / universities provide guidance / consulting services
9	Colleges / universities provide Assistance

10	Colleges / universities provide Coaching / Training
11	Colleges / universities facilitate Marketing Access
12	Colleges / universities provide information assistance
	Business and industry (DU-DI)
13	Business and industry players (DU-DI) provide guidance / consulting services
14	Business and industry (DU-DI) provides Coaching / Training
15	Business and industry (DU-DI) facilitates Marketing Access
16	Business and industrial actors (DU-DI) provide capital assistance
17	Business and industry (DU-DI) provide technology assistance
18	Business and industrial actors (DU-DI) provide information assistance
19	Business and industry actors (DU-DI) provide employment in accordance with the skills possessed by students
20	Business and industry players (DU-DI) make LSP certification for those who take the Job Training Program (Prakerin)

Source: processed data

Based on the data from Radar Chart can be analysed the potential of the vocational high school of Jakarta and Central Java Province in developing and evaluating teaching factory learning covering six dimensions, namely: teaching factory management applied in schools (70%), workshops/laboratories (85%), teaching factory learning patterns (80%), marketing/promotion of teaching factories (70%), service products 78%, human resources (productive teachers) 90% and industry relations have reached 75%. This is also supported by the results of six-dimensional factor data processing, and success shows valid and reliable data. Model teaching factory in test and applied to several vocational high schools to support the acceptance and standardisation of teaching factory models.

Conclusion

In this study, the content validity and Reliability of Success Factors Based on Expert Judgment of Students in 12 Vocational High School DKI Jakarta and Central Java Province of the agreement of the experts on each item which was in the form of a successful factory teaching factor were tested with the Aiken approach. The value of the content-validity coefficient resulted in each item of instrument characteristics. Based on the standard significance of content validity (V), for 201 students (rater) and five categories (Likert scale), the minimum value of the content validity (V) significant coefficient was $r_{count} > r_{table}$. Continuous collaboration between schools and DU / DI is always supported and protected by the Ministry of Industry, the Ministry of Education and Culture, the Directorate of PSMK, the Department of Industry and the local Education Office. The Expert judgment response analysis of the questionnaire showed that experts expressed a positive level of opinion in support of the strengthening of the teaching factory's high-point model (X = 3.85 or higher).

Expert feedback shows the average score of 5 for the suitability of each aspect of the assessment. Thus, the model of teaching factory strengthening after the Delphi technique, stated that the application of model teaching factory is suitable for application of future teaching factory implementation. Based on the data from Radar Chart can be analysed the potential of the vocational high school of Jakarta and Central Java Province in developing and evaluating teaching factory learning covering six dimensions, namely: teaching factory management applied in schools (70%), workshops/laboratories (85%), teaching factory learning patterns (80%), marketing/promotion of teaching factories (70%), service products 78%, human resources (productive teachers) 90% and industry relations have reached 75%. This is also supported by the results of six-dimensional factor data processing, success shows valid and reliable data. Model teaching factory in test and applied to several vocational high schools to support the acceptance and standardisation of teaching factory models.

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