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# The Implementation Evaluation of Teaching Factory Learning Model on APT Productive Learning at SMK Negeri 2 Subang

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***Abstract*—The purpose of the research was to evaluate the implementation of teaching factory on productive subject, particularly on Bottled Drinking Water (BDW) production. This research used CIPP (Context, Input, Process, and Product) evaluation model. The subjects of this research were all participants engaged in the implementation of teaching factory, such as the headmaster, the teaching factory manager, the quality control teacher, and the 12th grader students of Technological Processing Agricultural Product Major at the 2 Subang Vocational High School. The results of this study showed that (1) the implementation of teaching factory reviewed by context evaluation was 100% in accordance with the implemented rules. It is related with the school support and the teaching factory impact towards the institution, (2) the implementation of teaching factory reviewed by input evaluation was 50% in accordance with the implemented rules, the result revealed that learning preparation and schedule parameters needed some improvements, (3) the implementation of teaching factory reviewed by process evaluation was 53,8% in accordance with the implemented rules, the result revealed that quality control, MRC management, and corporate culture based learning parameters needed some improvements, (4) the implementation of teaching factory reviewed by product evaluation was 75% in accordance with the rules, the result showed that the implementation of teaching factory in learning process increased students' competences and skills. In addition, it also created great quality of bottled drinking water.**

***Keywords—teaching factory; bottled drinking water roduction; CIPP***

## I. INTRODUCTION

The nation future challenges in facing a globalization era particularly in the field of human resources require the development of Vocational High School (SMK) in Indonesia with 3 (three) principal objectives. Those are (1) a quality improvement of process and results of education, (2) an improvement of graduates' entrepreneurship skills, and (3) an improvement of cooperation with graduates users (industry, companies, local governments, and others). Construction Directorate of SMK is attempting to achieve those goals by launching a program of Teaching Factory as one of the learning models at SMK which can facilitate students to achieve the readiness to work in the corporate and industry field. SMK is expected to be a miniature of an industry world for students. Hence, it is expected that the subject materials and activities applied at SMK would become the reflections of a real industry.

An expertise group of Agricultural Processing Technology (APT) of SMK Negeri 2 Subang has successfully implemented a learning model of Teaching Factory by building five miniature industries, namely bottled drinking water (BDW), bread, tofu, frozen food, and juice. The Teaching Factory which will be evaluated in this research is a production of bottled drinking water (BDW). The production of BDW on APT Teaching Factory SMK Negeri 2 Subang is a superior miniature industry as it has been equipped with the standard equipment, has had the production process continuously carried out, and has had permanent consumers. In addition, BDW as an industry miniature in the teaching factory is able to become vehicle which implements some basic competences that should be mastered by the students.

The implementation of BDW teaching factory has been implemented more than two years without adequate evaluation. The evaluation should be conducted to measure the effectiveness of the implementation of the BDW production, particularly the evaluation that leads to the development of learning pattern. On the basis of this, it is necessary to do a thorough evaluation on learning process of teaching factory of BDW production to obtain comprehensive information so that it can be used to find the formulation of teaching factory which can be recommended for the implementation of further learning or for the teaching factory production of other products.

The implemetation standard of teaching factory learning model focuses on three elements, namely learners, teachers, and management. To assess the implementation of teaching factory, there are seven parameters that are set by the

institution of Technical and Vocational Education and Training (TVET) as a criteria assessment standard. The 7 parameters are [1]: (1) Management, (2) Laboratory, (3) Learning Patterns, (4) Marketing Campaign, (5) Product/Service, (6) Human Resources, and (7) Industrial Relations.

The achievement target of learning outcomes according to the teaching factory learning is the development of characters, hence the characters that are needed in the business and industry world. Besides having hard skills, the students are also expected to have soft skills, those are [1]: (a) motor skill, including the ability to socially interact, be familiar, be energetic, and be creative, (b) cognitive/knowledge, including the ability to understand, implement, analyze, develop the concept or scheme, and be innovative; (c) affective/attitude, including the ability to have an independent attitude, integration, and be intuitive.

Teaching Factory as a learning model is implemented in several stages. According to Martawajaya, the implementation of teaching factory learning model depicted by model of 6 Steps of Teaching Factory (TF6M) is started by an implementation preparation and continued by three main activities stages, those are: introduction, main stages, and evaluation [2]. Afterwards, Martawajaya stated that the concept of teaching factory is bringing an industrial climate to the school. The learning model of teaching factory implementation starts with compiling lesson plans (RPP) or syllabus (SAP) and arranging the learning schedule by blending the conventional schedule, the blocks systems, and the continues learning [3].

The purpose of this research was to evaluate the implementation of teaching factory learning model on bottled drinking water production from several components: (1) Context; (2) Input; (3) Process; and (4) Product as well as (5) giving recommendation of teaching factory model which was more able to improve students' competences (soft skills and hard skills) so that they would be more than ready to work in the business and industry world.

## II. RESEARCH METHOD

### *A. Research Design*

Research design utilized in this study was an evaluative research design. In this study, the evaluation was conducted toward a program/ an activity of BDW production which used the learning model of teaching factory. The whole activities were conducted at SMK Negeri 2 Subang, particularly toward an APT expertise group. The model of evaluation used was a CIPP model. CIPP was a set of information which systematically summarized activities, characteristics, and output of program used by certain people. The CIPP was aimed at evaluating and decreasing the failure, increasing the level of effectiveness, and making the decision related with the program that would be conducted including its impact [4].

The CIPP model used in this study was the CIPP model in which the orientations of its process were the four CIPP components namely: (1) context evaluation, (2) input evaluation, (3) process evaluation, and (4) product evaluation. The CIPP evaluation was presented as a model of regulatory framework of teaching factory starting from planning, implementation and evaluation. The evaluation criteria for overall evaluation components tailored to the raw parameters set by the institution of TVET [1]. While the evaluation criteria for teaching activities was adapted to the syntax of 6 Steps of Teaching Factory (TF-6M) found by Martawajaya [2]. The implementation standard of teaching factory related with the BDW production used the criteria established by the decision of the Minister of Industry and Trade of the Republic of Indonesia Number 705/MPP/Kep/11/2003 about the requirements of industry engineering of the bottled drinking water and its trading.

The context evaluation component identified the needs of teaching factory and the institutions' needs against the teaching factory. The input evaluation component provided references of the teaching factory implementation preparation so that it would be in line with the standard. The process evaluation component monitored the teaching factory implementation and the procedural barriers occurred during the implementation, as well as identified the need for adjustments to the implementation of the teaching factory. The product evaluation component identified and assessed the results of the implementation of the teaching factory [5].

### *B. Research Participants*

The selected participants were participants involved in the implementation of teaching factory learning model. Participants involved in the study were: (1) one teacher of productive subject of results quality control basic of the agriculture and fisheries; (2) 19 students of grade XII APT who had learned teaching tactory in the production of bottled drinking water (BDW); (3) the implementing team of teaching factory; one teacher who became the person in charge in teaching factory especially in the production of bottled drinking water (BDW); (4) the principal as the holder of the policy and implementation of the teaching factory; (5) 15 consumers of bottled drinking water products produced by the teaching factory.

### *C. Data and Instruments*

Instruments used for data collection were (1) questionnaires, (2) interview, and (3) documentation. The questionnaires were used to obtain the data of context component (data from the school principal), input component (data from the person in charge of the teaching factory), process component (the data from one teacher and nineteen pupils) and product component (data from one person in charge of the teaching factory, 19 students who conducted the teaching factory and 15 consumers of BDW products, the results of the teaching factory). The interview was conducted to explore the data further after collecting data using the questionnaires. Respondents of the interview were the same as the respondents to the questionnaire. Documentation technique was done by collecting documents. List of documents that was collected included: (1) the recording of teaching factory financial transactions report; (2) the SOP of work performance; (3) the workflow of teaching factory; (4) the inventory of the equipment production; (5) the standard of tools usage; (6) the documents of K3 signs; (7) the lay out of production room; (8) the lesson plans and worksheets; (9) the documents of

marketing and promotions plan, and (10) the data of students' score.

### *D. Data Analysis*

The data and information collected in this study were analyzed by qualitative data analysis technique according to Miles dan Huberman [6]. Those were: (1) data reduction, (2) data presentation, (3) data analysis, and (4) conclusion.

## III. RESEARCH FINDINGS AND DISCUSSION

### *A. Context*

The evaluation results of **CONTEXT** component on the teaching factory learning of Bottled Drinking Water:

*1)* The effects of teaching factory implementation towards institution*:* (1) It was capable of realizing the vision and mission of the school in creating the school as a business centre. The business was completed by products or services produced by students in the teaching factory; (2) It was capable of realizing the vision and mission of the school in creating the graduates who had competencies required in the industry world. (3) It was capable of empowering potential; (4) The implementation of teaching factory was based on the discussion results between the school and the subject teachers regarding with the needs of students to achieve the competences.

*2) Environment*: (1) Technology Support. The school provided facilities with the latest technology, evidenced by the availability of the production tools that covered the all production needed; (2) Curriculum Support. In the application of the teaching factory concept, a special strategy to combine the rules in the national curriculum with the application of the teaching factory concept was needed. The school had not fully provided support as recommended. The school had been doing an adjustment by applying learning block system. The school continued to make improvements related with schedule and curriculum adjustment.

### *B. Input*

The evaluation results of **INPUT** component on the teaching factory learning of Bottled Drinking Water:

*1) Management*: (1) Financial Administration. Conditions in the field indicated that the transaction logging reports were completely available with documents as the evidence. The documents that were available at the school including the recording reports of capital changes, the recording reports of raw material production procurement, the recording reports of production equipment procurement and maintenance, and the recording reports of product sales results; (2) Organizational Structures and Job desk. Organizational structures and job desks for the teaching factory were available but had not been enforced properly. Some people from the implementing team of the teaching factory had not understood or not been able to maximize their duties as noted in the job desks; (3) SOP of Performance and Workflow. The SOP of performance and workflow was available in the teaching factory of BDW product;

*2) Laboratory:* (1) Equipment. The production equipment was complete and complied with the standard of Bottled Drinking Water industry. The school provided equipment which complied with the standard of the industry, a water holding tank for the rest of the processing was even available as well. The available equipment fulfilled 1:1 ratio among students with the tools; (2) Management of Tools Usage. The standard of the raw tools usage was available on the production room wall. This condition had been in accordance with the specified standard. However, in practice, the placement of the tools usage standard on the wall had not been able to provide an ease of access for students to see and read the standard of tools usage; (3) Rooms. The school had its own production rooms for teaching factory of the BDW product, namely BDW production room, BDW packaging room, and wash basin. The school had not had any laboratory for supervising the quality of BDW product; (4) The completeness of OHS. The school had provided supporting components of OHS on BDW teaching factory such as OHS signs, a light fire extinguishers (APAR), first aid box, and self protective tools; (5) Laboratory Lay Out. The room lay out of teaching factory of BDW production was not available.

*3) Learning patterns:* (1) Lesson Plans and Worksheets. Subject teachers had arranged the lesson plans before conducting the learning process, however the arranged lesson plans did not apply industry culture and had not included the teaching factory concept. The school and the teachers did not provide worksheets that could be supplementary material for the teaching factory learning; (2) Practical Materials. The raw materials for BDW product were complete, sufficient, and easily obtainable.

*4) Marketing and promotions:* (1) Marketing and Promotions Plan. The teaching factory implementing team, particularly BDW production division did not make any marketing and promotions plan; (2) Communication Media for Teaching Factory. The school or the teaching factory implementing team, particularly the BDW production division did not provide particular contact person for the consumers related with product demand or product critics and suggestion; (3) Sample Product. Sample product of BDW was available. The product was not used either as the promotion media or the learning material.

*5) Product:* (1) The schedule of Production Time. The scheduling was conducted by blocks system. The implementation of the block system was conducted through a rotation system of production room use and practical activity implementation. The teaching factory of BDW production was sustainably conducted.

*6) Human resources:* (1) Teaching Factory Competences: Teachers: (a) Pedagogical competences had been owned by the teachers or instructors, (b) Personality competences were still lacking, (c) The teacher had not been made as a role model by the students, (d) Social competences had been

owned by the teachers or instructors, (e) Professional competences were good enough. One of the two teachers had a work experience in industry so that it became a main provision in the teaching factory. Another teacher had not experienced working in industry; (2) The Conformity Number of Human Resources to Run the Teaching Factory. Human Resources to run the teaching factory were in compliance with the standard provisions. Those were one instructor supervising 10 students for the practical activity and one teacher teaching a maximum of 36 students in the classroom.

*C. Process*

The evaluation results of **PROCESS** component on the teaching factory learning of Bottled Drinking Water.

*1) Learning patterns:* (1) Entrepreneurship. Marketing activities conducted in the teaching factory of BDW product was an implementation of entrepreneurship subject. The entrepreneurship subject was executed integratedly in teaching factory; (2) Teacher/Instructor Activities. Learning activities referred to the activities which implemented understanding and skills in generating products through practice; (3) (a) Teacher/Instructor Activities. Learning activities referred to the activities which implemented understanding and skills in generating products through practice changing school management into industry management, the stage of communication practice by considering communication theory, and the stage of order analysis practice. Stage 1, the changing of school management into industry management, was not conducted by involving students, yet it was conducted by teachers and school. Stage 2, communication practice by considering communication theory, was not conducted in the implementation of teaching factory. Similar activity was conducted in the teachers briefing regarding with the overall teaching factory implementation. Stage 3, order analysis practice, was conducted in the teaching factory implementation, (b) Main Activities. The main activities were divided into: introduction stages and main stages. Introduction stages consisted of three steps, those were (step 1) accepting order, (step 2) analyzing order, and (step 3) stating the readiness to do the order. Main stages contained of three steps, those were (step 4) doing the order, (step 5) doing quality control, (step 6) giving the order to the order giver [2]. Step 1 and 2 were merged, conducted with a name of production preparation. Step 3, stating the readiness of doing the order was not conducted in the teaching factory implementation at school as the implementation of production was not order oriented. Step 3, order analysis practice, was changed by production activity analysis practice. Step 4 was doing the order or the production activity. Step 5 was doing quality control. The activities conducted by students were matching product numbers, product and product physically safety. Nevertheless, the activity of quality control in terms of physics-chemistry and microbiology quality, was not conducted. Closing Stage/ Evaluation was conducted in the implementation of teaching factory. The activities conducted by the teacher were evaluating results, process and program of learning. The students did not do test after every production had done, but they did the test while the mid test and psychomotor test while the competence test; (c) Corporate Culture–Based Teaching Factory. BDW production teaching factory had not been corporate culture oriented.

*2) Laboratory:* (1) Management of Tools Usage. The standard of raw tools usage was available on the wall of the room, so that the students were able to access the standard of the tools usage and apply the management of the usage optimally, even though its implementation was still constrained by the inappropriate placement of that tools usage standard; (2) Management of MRC (Maintanance, Repair and Calibration). The activities of MRC was not planned and conducted based on the schedule; (3) The Application of OHS. Students had been capable of applying OHS well.

*3) Marketing and promotion:* (1) Marketing and Promotions. Marketing activities had not had a clear market target; (2) Communication Media for Teaching Factory. Product demand was only managed through the teachers or coming directly to the place of production. Product: (1) Product for internal needs. Production activities had been sustainably done; (2) Quality Control. Quality control activities were not done.

*4) Human Resources:* (1) Motivation. During the implementation of teaching factory, there were 70% of students who stated that the teachers were able to motivate; (2) Team Work. Students had been able to cooperate in groups during the implementation of teaching factory.

*5) Industrial relation:* Forms of Cooperation. The form of cooperation between the school and the industry was still limited to working practices and graduates' recruitment. The industry had not provided any investment yet to the teaching factory.

*D. Product*

The evaluation results of **PRODUCT** component on the Teaching Factory learning of Bottled Drinking Water.

*1) Teaching factory competences:* Students: (1) Students' cognitive ability improved and students were able to reach the minimum set criteria after the application of teaching factory learning model; (2) Students' psychomotor ability was not sufficient to fulfill the needs required by industry. It occurred because during the teaching factory implementation, there were still input component parameter that was not available and process component parameter that was not done optimally even was not done at all; (3) Sense of responsibility, commitment, and work ethic of students after experiencing teaching factory learning increased and well formed.

*2) Market acceptability:* Market acceptability for the BDW (Bottled Drinking Water) product teaching factory showed a good result. The BDW produced could be accepted well by consumers without any complaint. It was indicated by the sustainable demand from consumers/ market.

*3) Quality:* The quality of BDW produced was: colorless (clear), odorless, and flavorless. The BDW produced had halal certification. It was suggested to do the test of physics-chemistry and microbes periodically to guarantee the quality of the product.

*4) Product innovation/ diversification:* (1) During the implementation of BDW teaching factory, there was no any innovation or diversification in any form.

## IV. CONCLUSION

The implementation of teaching factory learning model in terms of context component reached 100% of the evaluation criteria set forth. This was demonstrated by the achievement of the whole sub parameters measured. In terms of input components, the conducted study reached a percentage of 50% of a defined evaluation criteria and required an improvement in the sub parameter of the organizational structure and jobdesks, the rooms, the lab layout, the lesson plans and worksheets, the marketing and promotions as well as the competences of the teacher to teaching factory. Based on process component, the implementation reached 53.8% of the stipulated evaluation criteria and needed for an improvement in the sub parameter of corporate culture based - teaching factory implementation, management of MRC on tools, implementation of marketing and promotions, quality control activities and industrial relations. Lastly in terms of product component, it reached 75% of the evaluation criteria set out and needed a repairment on the sub parameter of innovation and product diversification.

Based on the aformentioned conclusions, there are several things that can be recommended, those are: (1) at the time of the preparation of the study, it is necessary to consider the scheduling and the arrangement of appropriate lesson plans for teaching factory; (2) at the time of the preparation of facilities, it is significant to note the completeness of appropriate industry standard tools and management of MRC (Maintenance, Repair, and Calibration) at regular intervals; (3) On the preparation of human resources, it is important to consider the competences of the teachers who implemented the teaching factory; (4) on the implementation, it is necessary to consider the corporate culture based – teaching factory; (5) related with the product of the teaching factory results, it is needed to note the conformity of quality with the standards and the periodically quality control; (6) optimizing the relations with industry is substantial to help the learning process through the transfer of science and technology, the investment by the industry, and the activities of the project work.; (7) the sustainable evaluation of the teaching factory implementation by schools is highly considerable to ensure the passage of the whole process of the teaching factory, monitor the potentials, barriers, and basic needs for the implementation of teaching factory in the future.

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