

# Analysis of the Effectiveness of the Teaching Factory Implementation in Preparing Work Competence in Era 4.0

Marniati<sup>1\*</sup> Lutfiyah Hidayati<sup>2</sup> Peppy Mayasari<sup>3</sup>

<sup>1,2,3</sup>Universitas Negeri Surabaya - Indonesia.

\*Corresponding author Email: marniati@unesa.ac.id

## ABSTRACT

Industry 4.0 demands accuracy, speed and minimizes errors in production activities. The Garment Teaching Factory (TEFA) at Vocational School is a part of the activities in the industry where the implementation involves Vocational School, Industry, Teachers and Students. The research model uses quantitative explanatory. The study population is vocational schools that have Teaching Factorys. The research sample of 200 students from 10 vocational high schools in the “Gerbang Kertasiusila” area was determined by stratified random sampling. Data analysis includes descriptive analysis, the Explanatory Factor Analysis (EFA) model. The results of the study are: 1) the majority of teaching factory are active, but contributions as a means of learning are very limited; 2) the source of funding in school operations is relatively small; 3) most teaching factory programs can adjust curriculum programs, but have not utilized facilities and infrastructure and optimally; 4) teaching factory can increase students' knowledge and skills according to demand 4.0, but the number is still limited; 5) the quality of the production of men's clothing, and children's clothing according to standard 4.0, is quite high in demand and the selling price is standard, but the quality of women's clothing and packaging has not been maximized; 6) increase the welfare of school residents, and school income; and 7) most of the have teaching factory the trust of the community / industry.

**Keywords:** *teaching and learning activities, teaching factorys, vocational high schools*

## I. INTRODUCTION

Teaching Factory is a process of business activities carried out in schools in stages and continuously, a business venture in collaboration with several members of the community and industry in the school environment, by utilizing school resources and the environment in the form of business units (product services and services) that are professionally managed (Direktorat Pembinaan SMK, 2006). Usman (2001) School Teaching Factory as a business unit that is business oriented (profit oriented) produces goods, services and utilizes resources in the school including its environment.

Another opinion, according to Rahmiyati (1997), is that the school teaching factory is intended to provide services as a form of actualization of the dedication of educational institutions to the community. While Syahdiardin (2008) argues that the teaching factory is a replica of the industry formed in SMK, and is a business unit as a company in a small scope. Business and teaching factorys must be managed the same as a company, because the teaching factory is a start-up company formed at a vocational school. Businesses built in teaching factorys must be related to the expertise program developed at the Vocational School by considering the market potential that

exists in the school environment. The development of a teaching factory is an application of a model of opening a business industry in schools. The Implementation of School teaching factorys is still guided by the principle of operating a teaching factory that is adjusted to the conditions of the school environment that has business insight and educates entrepreneurship (a place for business learning practices for vocational students).

Benefits of teaching factory in the Vocational Secondary Education Monitoring and Evaluation Tool issued by the Directorate of Vocational Secondary Education in 1999, states that one indicator of the success of the teaching factory is to be able to utilize the output of the teaching factory for school / staff development, Dual System Education implementation, and welfare in schools. Benchmarks for the success of a teaching factory depend on the limited utilization of the results of the teaching factory. This implies that the use of teaching factory results is limited to helping the needs of school / staff development, PSG implementation, and school welfare. The benefits of the existing teaching factory in the school are not only limited to the results of the school company, but the existence of the Vocational High School teaching factory has many benefits.

According to Syahdiardin (2008) the benefits of the teaching factory associated with being in Vocational High School are as follows.

1. School / staff development
  - a) Part of the profit of the teaching factory for the school can be used as additional operational costs for the school.
  - b) Teachers and staff involved in the production process will continuously develop their skills according to the needs of the business world or the world of work.
  - c) Teachers and staff involved in managing the teaching factory will increase their managerial ability along with the development of the teaching factory business.
2. The place for implementing industrial work practices
  - a) Teaching factory is a business unit or company.
  - b) Management and production process of the teaching factory is carried out like a company in general.
  - c) So that the teaching factory can be used as a place to carry out industrial work practices.
3. Increasing the welfare of teachers, employees, and students
  - a) Teachers, employees, management students and workers in the teaching factory receive incentives (salary / wages) from the profits derived from the sale of goods / services from the teaching factory.
  - b) Teachers and employees of school cooperative members receive the remaining portion of their business results from the contribution of teaching factory profits to school cooperatives.
4. Increased cooperation with outside parties
  - a) The existence of the teaching factory can also be used as a forum for enhancing and fostering cooperation with outside parties, both individually and institutionally.
  - b) Institutions. The cooperation includes among others: utilizing outsiders as management supervisors partners, even as managers or teaching factory experts.
  - c) Involving outsiders as suppliers of raw materials or merchandise for the needs of the teaching factory.
  - d) Involving outsiders in developing business capital in the teaching factory. Outside parties can be positioned as creditors or investors of the teaching factory.
  - e) Invite outsiders as partners in the sale of products produced by the teaching factory.
5. Entrepreneur class partners
  - a) The government is currently enthusiastic about developing an entrepreneurial class.
  - b) Students who participate in entrepreneurship classes can be given guidance to the teaching factory. So that students in entrepreneurship classes can be more focused on their activities

and the grants given to students are more controlled for their use in the implementation of entrepreneurial classes.

Vocational High Schools have a mission to prepare students to enter the workforce and develop an attitude of professionalism for independence, this ability can be realized if vocational students are truly trained to do work according to industry standards. This Vocational High School students must have practical experience through the business world / industrial world obtained by students through industrial work practices. In this regard, teaching factory can be used as a place to practice for vocational students to get a supply of competencies or expertise prior to internship.

School teaching factory can be used as a place of learning with the intention to: (1) gain the competence or professional expertise of vocational students who can only be obtained through direct employment in accordance with market opportunities; (2) is an effort to optimize the resources of Vocational High School in order to increase added value that can be utilized to support the implementation of education and improve the welfare of Vocational High School citizens; (3) support the smooth running of teaching and learning activities, and may not interfere with the teaching and learning process; (4) used as a vehicle for learning by doing for vocational students and or internships for graduates who have not worked, and (5) utilized as much as possible, supporting the implementation of teaching and learning processes and improving the welfare of school residents if they benefit in the implementation.

Teaching Factory objectives in accordance with Kepmendikbud Number: 0490 / U / 92, Chapter XIII, article 29 paragraph 2 concerning the holding of teaching factory, namely: (1) providing opportunities for students and teachers to do market-oriented practical work, (2) encouraging students and teachers in terms of developing economic and entrepreneurial insights, (3) obtaining additional funds for the administration of education, and (4) increasing the creativity of students and teachers. The purpose of this teaching factory is directed to 3 (three) aspects namely; pedagogical, economic and social aspects. The pedagogical aspect aims to improve entrepreneurial attitudes and staff services, receive feedback from the industrialists dynamically, interactively with the level of competence achieved, as well as the relevance of the quality of the training program being run, the economic aspect aims to support the operational costs of vocational schools in a programmed and systematic manner, and contribute to the training of teachers and students through the use of practical materials, and improve the welfare of school residents. The social aspect aims to open up employment opportunities and improve the skills of the younger generation, especially for the lower income layers of society.

Thus the objectives of holding a School teaching factory include: (a) a school teaching factory as an alternative to the "Pair Institution", (b) as a means of direct student work

practices; (c) provide opportunities for students and teachers to do market-oriented practical work; (d) increase the spirit of togetherness; (e) practice the courage to take calculated risks; (f) developing an independent and confident attitude in the implementation of student practice activities; (g) increase the creativity of students and teachers; (h) fostering professional / productive attitudes towards students and teachers; (i) to improve the quality of graduates in various aspects, especially in terms of knowledge and skills; (j) assist funding for maintenance, additional facilities and other education costs; (k) encourage students and teachers in economic and entrepreneurship development; (l) as a place for Dual System Education / Internship for students who do not get training places, and (m) adds to the welfare of teachers and school employees.

The learning process in the conventional education model is almost 100% in school and is entirely the responsibility of the school. Such a learning process results in a lack of student understanding of the reality of the real world of work. These problems can be solved by starting the development and application of Dual System Education.

The Dual System Education program is a program that involves many parties, and becomes a jointly owned program and joint responsibility between the Vocational School and the industry. The implementation of the Dual System Education program will not succeed without maximum support from the industry.

The industry plays an active role in developing competency standards that must be mastered by students, as well as teaching materials adapted to the curriculum in Vocational High School and developed according to the spectrum (competency standards and basic competencies of productive vocational), while testing and certification of skills based on the Indonesian National Qualification Framework. Thus Industry as one component in industrial work practice activities or the Dual System Education program plays an important role in practical learning. This is in accordance with the opinion of Sonhadji (2012: 165) which explains that Dual System Education (PSG) is a form of vocational education and training, which combines systematically and synchronously between educational programs in schools and the world of work.

The problem with learning is usually closely related to effectiveness with a comparison between the level of achievement of objectives with plans that have been prepared previously. Thomas 1999 in Mulyasa (2009: 173) said that the effectiveness of learning in relation to productivity is based on three dimensions:

1. The administrator production function; This function reviews school productivity in terms of administrative output, namely how much and how good the services can be provided in an educational process, both by teachers, principals, and other interested parties.
2. The psychologist's production function; This function looks at productivity in terms of outputs, changes in behavior that occur in students by looking at the values obtained by students as a picture of academic achievement that has been achieved in a certain learning period at school.

3. The economic's production function; This function sees school productivity in terms of economic output related to the financing of educator services in schools. This includes the "price" of the services provided (sacrifice or cost) and the "earnings" incurred by the service or is called "increasing return value".

From the conclusions above, business activities undertaken to achieve the goals of effective success, both oriented towards shared interests and groups are an organized business structure. According to Thoha (in Jans, 2014) revealed that "an activity that is effective if there is a three-dimensional interaction, namely: the technical dimension, the concept dimension and the human dimension". The statement relates to the ongoing mechanism in collaboration between an organization and a group of people who work together to achieve a desired goal.

According to Emerson (in Handyaningrat, 1990: 16) "effectivity is a measure in terms of attaining prescribed goals or objectives" which means effectiveness is a measurement in the sense of achieving a predetermined goal or goal. So it can be concluded that effectiveness is an activity that is measured by the size of the match between the objectives to be achieved and the results ". Cahyono (in Jans, 2014) provides an understanding that effectiveness is the ability of every level of human and non-human work that gives birth to a maximum result that is used in accordance with the expected goals ".

Based on various sources above, in general effectiveness can refer to the results achieved or seen from the achievement of a goal. In other words, the assessment of effectiveness must be related to the problem of means and objectives as expressed by Bernard (in Gibson, 1997: 11), that effectiveness is the achievement of agreed targets or joint efforts, which shows the level of achievement of targets that indicate the level of effectiveness.

An activity can be said to be effective if the activity is successfully carried out properly. If the goals or objectives have been achieved in accordance with previously planned can be called effective. This is related to the implementation of the Teaching Factory in preparing the competency of paper in eras 4.0.

## **II. METHOD**

This research is intended to test the effectiveness of the implementation of the teaching factory in preparing work competencies in Vocational High Schools. Based on the objectives to be achieved, this research when viewed from the nature of the results of the relationship between variables including explanatory research (Explanatory), namely research intended to explain the position of the variable under study and the influence of one variable with another variable (Sugiono; 2005).

The approach used is a survey, which is an approach by taking a sample from one population using a questionnaire as a primary data collector. To obtain factual information and facts or phenomenon exploration, and in general the unit of analysis is individuals (Singari-bun & Efendy, Ed;

1995). So in this study the unit of analysis is the individual students of the Vocational Middle School in East Java. The approach is based on practical activities in which this model implements learning that directly involves students in the production of goods or services. It is expected to have a quality that is suitable for sale and accepted by consumers. The method used is a quantitative approach, the data analysis technique used is exploratory factor analysis (EFA) to determine the effectiveness of the implementation of the teaching factory.

**III. RESULTS**

The Teaching Factory consists of 3 measurable indicators of 11 items with a 1-4 Likert scale. The average value of more than 3 illustrates that there is a tendency that students can follow the implementation of the teaching factory well. Based on the lowest average values, the things that need to be improved are the ability to make plans for women's clothing (UP1.1), finish in accordance with the time specified in men's clothing (UP2.2), and be able to make a broken model in children's clothing ( UP3.3).

**Table 1. Descriptive Statistics of Teaching Factory Variables**

Indicator	Item	Range	Std. Deviation
Woman wear	UP1.1	3.18	0.608
	UP1.2	3.23	0.597
	UP1.3	3.46	0.560
Man's wear	UP2.1	3.41	0.585
	UP2.2	3.09	0.618
	UP2.3	3.21	0.575
	UP2.4	3.47	0.517
Children wear	UP3.1	3.41	0.571
	UP3.2	3.20	0.571
	UP3.3	3.13	0.549
	UP3.4	3.40	0.579

**Table 2. Measures of Sampling Adequacy and Communities of Teaching Factory EFA Results**

Item	Measures of Sampling Community after extraction Adequacy (MSA)	
UP1.1	0.777	0.652
UP1.2	0.881	0.574
UP1.3	0.852	0.537
UP2.1	0.832	0.602
UP2.2	0.830	0.634
UP2.3	0.803	0.642
UP2.4	0.903	0.502
UP3.1	0.805	0.686
UP3.2	0.777	0.714
UP3.3	0.827	0.580
UP3.4	0.807	0.528

KMO = 0.828; Fit model = 50%

The EFA results for the Teaching Factory by 50% the correlation coefficient changes with an absolute difference of more than 0.05, so that the level of suitability of the model on this result is 50%. Other matches are measured from KMO value = 0.828 (more than 0.5), MSA coefficient for each item in the range of 0.777 - 0.903 (more than 0.5) and communality per item after extraction into three components in the range 0.502 - 0.714 (more from 0.5).

The results of exploratory factor analysis (EFA) from 11 Teaching Factory explanatory items were extracted into 3

components with a cumulative total variance of 60.47%. The main explanation of the teaching factory is in the first component with a contribution of 38.69%. The first component consists of: the ability to plan children's clothing materials (UP2.1), make materials planning and men's clothing prices (UP2.1), calculate the selling price of children's clothing (UP2.4), be able to work with the media (UP1.3 ) and finishing packing (labels) on men's clothing (UP2.4).

**Table 3. Teaching Factory Exploratory Factor Analysis Results**

Item	Component		
	1	2	3
UP3.1	0.819		
UP2.1	0.699		
UP3.4	0.698		
UP1.3	0.646		
UP2.4	0.607		
UP2.3		0.758	
UP3.3		0.740	
UP1.2		0.676	
UP1.1			0.787
UP3.2			0.769
UP2.2			0.701
Nilai Eigen	4.26	1.31	1.08
Varian Total (%)	38.69	11.92	9.85
Kumulatif Varian Total (%)	38.69	50.62	60.47
Alpha Cronbach			
Composite Reliability	0.824	0.769	0.797
Average Variance Extracted	0.486	0.526	0.567

The second component consists of 3 items which contributed 11.92% in explaining the teaching factory. This component consists of: the ability to press men's clothing (UP2.3), make broken patterns according to the model (UP.3.) And calculate the length of time to work on women's clothing (UP1.2). While the third component with a contribution of 9.85% consists of: being able to plan women's clothing (UP1.1), make a standard size pattern on children's clothing (UP3.2) and work according to the time specified in men's clothing (UP2.2).

The EFA results for work readiness are divided into two stages. In the first stage there are two items with communality after extraction not reaching 0.50 which is

like doing difficult tasks (KK2.1 = 0.451) and optimistic goals are achieved (KK3.1 = 0.459). Both of these items were removed in the analysis and carried out calculations in the second stage and extracted into three components. Extraction of this model has a fit model of 53%, ie as much as 53% of the correlation coefficient changes with an absolute difference of more than 0.05, other matches are measured from the value of KMO = 0.767 (more than 0.5), the MSA coefficient for each item in a range of 0.589 - 0.803 (more than 0.5) and communality per item after extraction into three components in the range of 0.615 - 0.745 (more than 0.5).

**Table 4. Average Difference Test Results**

Variable	Teaching Factory Group N	Range	t	p	
Teaching Factory	Pure	320	36.30	2.175	0.030
	extracurricular	20	34.35		

The pure implementation of the Teaching Factory as in accredited schools A or B has a higher average (36.30) and is significantly different ( $p < 0.05$ ) with schools that do so as part of extracurricular activities (34.35).

**IV. CONCLUSION**

1. Effectiveness of the implementation of the teaching factory in the industrial clothing / fabrication / garment business unit with effective proportions, including good. Overall business learning practices in the teaching factory for vocational students in the Boutique Clothing expertise program in East Java are included in both categories. The superiority of business learning practices in the teaching factory

- lies in the industrial clothing / confection / garment business unit.
2. The weakness of business learning practices in the teaching factory lies in the Custom-made /Atelier business unit. Learning practices in business units that are individual competencies and productive skills are preferred over those that are managerial skills.

3. Most Teaching Factorys are active, but contributions as a learning tool are very limited.
4. Teaching factory's can increase students knowledge and skills according to demand 4.0, but the number is still limited.
5. The quality of men's clothing production, and children's clothing according to standard 4.0, is quite high in demand and the selling price is standard, but the quality of women's clothing and packaging has not been maximized
6. Increasing the welfare of school residents, and school income; and
7. Most of the results of the Teaching Factory get the public / industry trust.

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