



# Improving the Quality of Vocational Education in the 4.0 Industrial Revolution by using the Teaching Factory Approach

**Bella Cornelia Tjiptady<sup>1,\*</sup>, Yoto<sup>1</sup>, Tuwoso<sup>1</sup>**

<sup>1</sup>Vocational Education Program, Universitas Negeri Malang, Indonesia

\*Corresponding author : [tj\\_bella@yahoo.com](mailto:tj_bella@yahoo.com)

The development of the industrial revolution 4.0 allows each individual to improve the quality and optimisation of brain function. Education in vocational schools should be more innovative and creative, in responding to the challenges and opportunities of the implications of the industrial revolution 4.0. To solve this problem is having a model approach to a teaching factory. There are three teaching factory models, namely: the first model of schools to build mini replicas of industries that establish cooperation, so that students can learn to assemble and produce goods for industries that work together; the second model is the school building a teaching factory along with industry partners and teaching factories located inside and outside the school; and, the third model, the teaching factory, takes the form of a special collaboration class between industry partners and Vocational Schools so that students practice skills in two places, namely in laboratories in schools and in factories owned by industrial partners. Industrial assistance in the teaching factory will have an impact on participants through learning experiences in

real conditions so that they can help improve the quality of vocational education.

**Keywords:** Teaching factory, education quality, industrial revolution 4.0.

## 1. Introduction

Indonesia is currently in a condition of free competition in the ASEAN Economic Community (MEA) [1]. Indirectly the presence of MEA has led to a talent war that confronts SMK graduates competing freely with graduates ready to work from abroad. Competition for job seekers will be increasingly stringent and lead to increasingly narrow employment [2]. In addition, technological developments in the industrial revolution 4.0 today, have led to the occurrence of automation in almost all fields. The industrial revolution 4.0 combines technology and new approaches between the digital, physical, and biotechnology worlds that will fundamentally change the patterns of life and human interaction [3]. Organisations in the 4.0 industrial revolution need to form a responsive and agile employee structure in response to shifting volatile market conditions. It aims to enable an organisation to face global market conditions that often change. Changing global market conditions have an impact on the country of Indonesia, where Indonesia is currently a developing country [4].

The development of technology in the revolution industry 4.0 is very rapid. Progress in the education and industry sectors is a concern in facing the MEA free market competition. Therefore, quality human resources who are experts and skilled in their fields are needed to deal with developments that are happening so rapidly [5]. Skills that must be possessed in the 4.0 industrial revolution are based on four categories, namely as follows: each individual must be involved in certain ways of thinking, including knowing how to make decisions, have innovative and critical thinking, metacognition, and knowing how to solve problems; have good communication skills and can work together in a team; have sufficient knowledge, and have information technology literacy; and being a good citizen by participating in government,

demonstrating social responsibility that includes cultural awareness, competence, and always developing career-related skills [6].

At the beginning of 2016 in the MEA era, Indonesia was challenged to compete with nine other ASEAN countries, especially: Malaysia, Vietnam and Thailand. However, Indonesia is still considered not ready to face MEA competition in several ways, including the quality of competitiveness of human resources and the competitiveness of industrial products. Indonesia's competitiveness is still lagging behind Singapore, Malaysia and Thailand. The World Bank study states that the competitiveness of Indonesia's export products is still lagging behind other ASEAN countries, especially in relation to value-added export products [7].

Indonesia's readiness to face the MEA in the industrial revolution 4.0 is indeed important for maximum follow-up. The government needs to increase the quality of human resources. In addition to having good knowledge and mentality, vocational students also need to know the real atmosphere of life in the world of work. Therefore, in the SMK revitalisation program, the teaching factory is an effort to improve HR [8].

## **2. Vocational High Schools in the 4.0 Industrial Revolution**

The development of science and technology has brought enormous changes. The impact of technological development is indicated by the occurrence of industrialisation, as well as increasing the productivity of the industrial world in various aspects of the type of production. So that there is a change in technology transfer that requires preparation in education, management and production structures, that are appropriate for mastering technological processes and products.

The challenges that must be faced in the industrial revolution 4.0 are as follows: reliability and stability of production machines; information technology security issues; lack of adequate skills in digital literacy, technology literacy, human literacy, and entrepreneurship; reluctance to change by stakeholders; and the loss of many jobs because it changed to automation [9, 10]. The competencies that must be possessed by vocational graduates should be in accordance with the aim of conducting vocational education, namely to prepare mid-level skilled workers in certain fields of expertise in accordance with the needs in the industry.

Vocational education is also directed at increasing the independence of individuals in entrepreneurship in accordance with their competencies [11, 12]. The realisation of the follow-up of the Vocational School towards the challenges of industry 4.0 is the realisation of vocational education by carrying out a revitalisation that includes all components of learning in Vocational Schools. Revitalisation includes learning systems that include: character education and appropriate curriculum, media and learning materials based on information technology and communication and entrepreneurship.

### **3. Teaching Factory Learning Approach Models**

The Teaching factory is a concept that a realistic work environment and learning can bring learning experiences that are relevant to the industrial world [13]. The concept of a teaching factory is to bring the atmosphere of industrial learning to the atmosphere of classroom learning. This is done through good collaboration between Vocational High Schools and DU / DI [14]. Vocational students who get industry-based learning will know all the processes that occur in the industry, so that they will know how to create a product innovation that will be produced. In addition to training students to get to know life in the world of work, the factory teaching approach model can also improve student competence in productive subjects. Student competency increases after they used the teaching factory. Therefore, the importance of the teaching factory is applied improve quality of vocational education in the era 4.0 [15, 16].

Teaching factories are grouped into three models, namely: 1) the first model is when a school provides space for its industrial partners to build a teaching factory in a local institution. It can be said that the school builds mini replicas of industries that establish cooperation, where students learn to assemble and produce goods for industries that work together; 2) The second model, namely the school building is a teaching factory along with industry partners and the teaching factory is located inside and outside the school. The principle of this model is that the teaching factory operates as a business unit that is separate from the Vocational School and the management of factory teaching is different from the Vocational School. This model is more focused on the needs of vocational programs; and 3) The third model takes the form of a special collaboration class between industrial partners and a vocational school so that students practice skills in two places, namely in laboratories in schools and in factories owned by industrial partners [8].

#### **4. Method**

This research is a concept that uses data collection and literacy methods, related to improving the quality of vocational education by using the teaching factory approach. The conceptual paper is a paper that produces a new theoretical perspective, proposes innovative or new procedures or techniques, discusses warm professional issues, conveys the author's position on a professional issue, or expresses a reaction or response to the publication of the previous article.

#### **5. Conclusion**

The revolution 4.0 allows each individual to further improve quality and optimize brain function. Organisations in the 4.0 industrial revolution need to form individuals who are responsive and agile in response to shifting market conditions. It aims to enable an organisation to face global market conditions that often change. Education in Vocational Schools must be able to innovate and be creative in responding to the challenges and opportunities of the implications of the 4.0 industrial revolution. The solution to this problem is by having a model approach to a teaching factory. Industrial assistance to the teaching factory will have an impact on participants through learning experiences in real conditions, so as to improve the quality of education.

There are three models of teaching factories, namely the first model of schools is to build mini replicas of industries that establish cooperation, where students learn to assemble and produce goods for industries that work together. The second model is the school building as a teaching factory along with industry partners and teaching factories located inside and outside the school. The third model, the teaching factory, takes the form of a special collaboration class between industrial partners and a vocational school so that students practice skills in two places, namely in laboratories in schools and in factories owned by industrial partners.

#### **6. Suggestions**

Management of the teaching factory approach model is an important part of the process to increase quality of vocational education, therefore Vocational Schools must professionally implement and manage the approach model to increase the quality of vocational education in the 4.0 industrial revolution.



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