The role of vocational education in science and technology development in the era of globalisation

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Abstract. Globalization refers to a condition by which a world becomes competitive. In such a world, people are urged to do a job properly since they will be the asset to advance their nation further; this is also to strengthen the nation’s capital markets. Both the formal and informal vocational education is proposed to produce well-capable and highly-competitive graduates. This is considered important as one effort to deal with some challenges as well as a rapid advance in science and technology in the globalized world. This present study aims at exploring the contribution of vocational education in response to the development of science and technology in the globalized world. Furthermore, this study is a development of a notion that the vocational education system is proposed as a solution to the highly-competitive situation and challenges due to the globalization. To put it simply, vocational education significantly contributes towards the development of science and technology in a globalized world and how to deal with the situation. Such an education system equips the student with skills needed to become a productive and professional individual. This is also to produce better and competitive human resources that are able to compete with other nations.

1. Introduction

Education is vital in producing high quality, competitive, and professional human resources as the future generation of a nation. In addition, education aims to support the nation’s development and maintain the sustainability of the progress in such a competitive and a more complex advancement of science and technology. These are the rationales of the importance of education in the current globalized world. Planning is required in addressing the development of science and technology as well as in producing high quality of human resource. This target can be achieved through education since it is the most efficient and applicable approach for people. It is also possible to produce human resources that are not only knowledgeable but also skillful. Having adequate understanding regarding science and technology as well as mastering a particular skill turn to be the rationale of the educational system evaluation all over the world including Indonesia. Indonesian government continuously work at their best to prepare high-quality resources as the nation’s next generation. This is because of the contribution of those people to developing their society, promoting prosperity, improving knowledge, skill, and capacity of people, boosting economic growth and alleviating poverty (Pasban, et al, 2016). Competent human resources serve as the asset of Indonesia in creating a sustainable development and competitive environment throughout the nation. These can only be achieved through a better education system. The atmosphere of competition in all sectors of the globalized world urges Indonesia to be able to get involved with such a situation and reach the top through a productive society. Therefore, the society, especially the further generation, is required to become knowledgeable and tech-savvy as this has been constituted in the 1945 Constitution. The proposed education system should refer to these purposes to enable the society dealing with the 21st century’s constant development of science and technology. It is also necessary to design an education system that can improve learners’ competence to survive in the globalized world. In other words, the good education system is able to create high-quality human resources in a competitive atmosphere of the globalization. The government is responsible for producing qualified human resources in developing the nation.
through designing an education system. This system, which refers to the vocational education system, aims to equip the individuals with skills and competitive spirit in business and industry sector.

2. Vocational Education

Vocational education is that part of education which integrates both the theory and practice or job training in related fields. Students are equipped with the knowledge from the regular class and the experience from the hands-on training in the sectors that the students enroll. The act number 20 of 2013 considering the national education system points out that vocational high school (Sekolah Menengah Kejuruan or SMK) is a secondary education program for preparing learners for a specific job. Although vocational education is considered as an equal program with the senior high school (Sekolah Menengah Atas or SMA), it has also a number of differences, such as (1) theory-oriented and hands-on-training-oriented, (2) decisions for existence and legitimacy, (3) focus on the content of the curriculum, (4) criteria of a successful learning, (5) aware of the development of a society, and (6) correlation with society in terms of the cooperation (Finch & Crankilton, 1982, p.12-13). The government keeps encouraging the secondary school graduates to continue their study to vocational school to equip the students with competence and skill in a particular field. This is based on the concept by Joyonegoro (1998) which explains that (1) Competent individuals are required for the development of a nation, (2) The globalized world is now becoming more competitive in every sector, (3) Technology development plays a significant role in the advancement of a nation, (4) Skilful individuals are likely to get a job and secure a better future. Vocational education is designed to prepare the youth to promote prosperity, to possess a particular skill, and to gain self-confidence as the citizen of Indonesia. The aim of such an education system is also to prepare the youth as a professional in his or her sector of business or industry. The influence of foreign investment which results in the establishment of new companies or jobs urged a program well-known as Small and Micro Enterprise (Usaha Kecil Menengah or UKM). This program contributes to the employment growth especially the non-wage earners (Nen, 2015). According to Tatiana et al. (2015), the graduates of the vocational school who do not go to college increase the number of the issue of unemployment around youth. Furthermore, Tatiana et al. (2015) proves that (1) there is a correlation between the number of unemployment issue and socio-economical aspect with the demographics of an area, (2) differentiating the regional-based approach regarding the employment policy which aims at alleviating the unemployment issue, and (3) vocational education plays a major role to solve the jobless people around youth.

Productive and skilled employers, once they get involved with the competitive work environment, are expected to produce brilliant ideas and high quality and competitive goods. Possessing such traits is possible to solve the problems of being jobless since all the companies seek only those who are competent, eager, and knowledgeable regarding the work environment. Individuals with the characteristics mentioned are also required to take the risk to run their private business, provide jobs for other people, and promote a mindset of being an independent and productive person. Professionals are obliged to accomplish their work efficiently. This is based on their discipline, the acknowledgment from the society, and the codes of conduct that act as the standard operating procedure, or SOP in short, of their job. Professional employees possess the following characteristics of the 21st century human resources, namely (a) Critical-Thinking and Problem-Solving Skills, (b) Communication and Collaboration Skills, (c) Critical-Thinking and Problem-Solving Skills, (d) Communication and Collaboration Skills, (e) Creativity and Innovation Skills, (f) Information and Communications Technology Literacy, (g) Contextual Learning Skills, (h) Information and Media Literacy Skills (Rahdiyanta, 2014). Rahdiyanta further classifies the characteristics that represent the 21st century individual, e.g., (a) Leadership, (b) Personal Responsibility, (c) Ethics, (d) People Skills, (e) Adaptability, (f) Self-Direction, (g) Accountability, (h) Social Responsibility, (i) Personal Productivity.
3. The Development of Science and Technology
The constant, uncontrollable development of science and technology has been shifted towards a negative situation in which the advancement becomes threatening, such as the misuse of the recent science and technology for the purpose of war. By that, implementing the four tenets of learning is effective to tackle the issue. These involve (1) learn to know, (2) learn to work, (3) learn to live and to develop, and (4) learn to be individuals in their truest sense. These paradigms of education are expected to be able to cope with the issues regarding the rapid advancement of science and technology which is being more complex currently. On the other hand, the development of science and technology brings good to people in every sector including education. Some examples of the contribution of science and technology to the field of education are (1) The emergence of electronic media can help people distributing information and knowledge. In other words, teachers are not the only one who can disseminate information to others. (2) The emergence of new learning methods and model which ease teachers and students during the class. Through the help of technology, the teachers can design new learning strategies that can help them transfer the knowledge to their students. As a result, the students will have no problems to process the information, (3) Technology provides a new learning method, namely e-learning, in addition to the current mode of delivery. There are four major components of cloud-technology-based and social-media-based learning which also turn to be the challenge in implementing these models. Those are (1) The tenets of learning model, challenge-based learning through cloud technology and social media, (2) The aims of the instructional model; to develop managerial information skill, (3) Challenge based learning by implementing the internet technology and social media consists of the preparatory stage prior to designing the learning components and instructional, (4) The assessment involves data examination regarding the information management skill from three components, e.g., information search, library skills, and resource evaluation (Yoosomboon, 2014). In response to the development of science and technology, promoting a better education system to prepare the students for success in their work and therefore become a competitive advantage for the organization.

4. Globalization
According to Kopweh (as cited in Saeed, 2015), globalization is the integration of culture, economy, and politics among the nations. Globalization is a condition in which a global market competition between every nation urges competitive and high-quality goods; this requires the support from human resources. Globalization brings challenges to the education sector which Kurniawan (1999) further classifies these into four, such as (1) improving the productivity of the nation for a sustainable development, (2) conducting an extensive and in-depth research on the transformation of the social structures within a society, the shift from the traditional to modern society, and how its impact on the development and quality improvement of human resources, (3) competition that becomes stiffer; this refers to efforts in promoting the competitive environment and producing creative products as the results of the findings, concepts, and skills in science and technology, (4) the emergence of new movements regarding science and technology that replace the development of the economic and politic sector. During the recent four decades, globalization has been significantly influencing the world of integration of economy in all nations. Moreover, it is revealed that the economy of advanced and developed countries was improving with the ratio of the market on the gross domestic product (Produk Domestik Bruto or PDB) 50 percent in 1970 to 2009 (Mazumder, 2017). In response to globalization, every nation is responsible for designing a concept for the youth through a better education system. The governments must, however, support the educational development program since this is also the part of their responsibilities. However, the authority of a nation depends on the capital which Borneo (as cited in Mazumder, 2017) states. Further, Borneo (as cited in Mazumder, 2017) argues that the capacity of a nation is determined by the integration of individuals, finance, and resources. In other words, the role of a nation regarding the authority of policy is essential to prepare competent and
professional individuals for the sustainable development of the nation. This also leads to a competitive nation.

5. Conclusion
Vocational education refers to a concept of integrating hands-on job training or practice in the regular class to prepare competent and professional individuals. The development of science and technology is considered as a solution to the issue around the development of education and globalization in the society which later brings challenges to the people. The challenges involve (1) conducting an extensive and in-depth research on the transformation of the social structures of a society, (2) improving the productivity of the nation for a sustainable development, (3) the emergence of new movements regarding science and technology, and (4) competition that becomes stiffer in the globalized world.

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