

Work Readiness of TVET Graduates in the Context of Industry 4.0

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Abstract—The rapid development in the Industry 4.0 era requires TVET graduates to have high capabilities and competitiveness in an effort to find work and maintain jobs in the global industrial market. In this regard, each individual is expected to have Work Readiness which includes readiness in terms of knowledge, skills, attitudes and competences. The focus of the research in this paper is to analyze the factors that affect Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education and to find out the efforts made to improve Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education. Based on the study, the factors that affect the work readiness of TVET graduates are influenced by ability factors, academic factors, behavioral factors and self-potential, innate/inherited factors. The findings of the study also illustrate that the TVET Institute is not yet optimal in preparing its students for post-graduate work readiness. The challenges of graduate work readiness can be handled effectively by HR professionals in partnership with three main stakeholders, namely the government, employers and industry through a dual system training program in the form of continuous professional development of teachers, the application of innovative new learning strategies, internship programs or industrial work practices.

Keywords—work readiness, TVET, Industry 4.0

I. INTRODUCTION

In the Industry 4.0 era, TVET graduates are required to have high capability and competitiveness in facing the challenges of the times and global job competition [1] amidst rapid developments in genetics, artificial intelligence, robotics, nanotechnology, 3D printing, and biotechnology [2]. In this regard, each individual is expected to have Work Readiness or Work Readiness in order to be able to adapt to the revolutionary changes of the industry [3].

In the 21st century, job skills are the most needed skills besides technical knowledge [4]. Work readiness is an important factor that can determine the quality of prospective graduates [5]. Vocational High School as an educational institution that prepares human resources needs to pay attention to factors that can improve work readiness. Several studies in Indonesia related to Work Readiness illustrate that Vocational High Schools are

not optimal in order to prepare post-graduate work readiness for their students [6].

According to research on SMK students in Probolinggo, it is stated that the job readiness of SMK graduates is influenced by experience which includes aspects of students' knowledge, attitudes and skills [7]. Other research states that the factors that affect the work readiness of vocational students are influenced by ability factors, academic factors, behavioral factors and self-potential, innate/inherited factors [8].

Research on graduate job readiness challenges in three Asia Pacific economies (Malaysia, Indonesia and Australia) states that graduate job readiness challenges can be handled effectively by HR professionals in partnership with three main stakeholders, namely government, employers and industry [9]. Many countries adopt a dual TVET system that allows young people to acquire not only technical and occupational skills, but broadly defined competencies that serve as the basis for career rewards and social rewards [10]. In addition, improving the quality of graduates produced by TVET can be done through improving the quality of TVET learning through continuous professional development of TVET teachers [11]. Fulfillment of the components of quality assurance in teaching and learning [12] and new, more innovative learning strategies to facilitate student personal development that support the development of useful skills for both employability and broader personal development [13]. One example via PBL in the TVET system [14] or through an internship program that is proven to have a significant effect on job readiness [15].

Research on Work Readiness in global studies has not specifically highlighted Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education. This kind of research needs to be done because it can provide information on the extent to which efforts have been made to improve the job readiness of Technology and Vocational Education graduates according to the context of industry 4.0. In addition, the findings obtained can be used as a research basis for the development of a Technology and Vocational Education curriculum that is in accordance with the context of Industry 4.0. The results can also be used in an effort to increase the link and match between the world of education and the world of industry.

Therefore, the purpose of this study is to analyze the factors that affect Work Readiness in the context of Industry 4.

II. RESEARCH METHODS

This paper is the result of a literature review from several scientific sources and research results that discuss Work Readiness in the context of Industry 4.0 SMK graduates. By identifying the factors that affect Work Readiness in the context of Industry 4.0 Technology and Vocational Education graduates and taking some examples from the efforts made by educational institutions in preparing their graduates' Work Readiness, this paper is intended to provide notes and input for improving Work Readiness in the context of Industry 4.0 graduates. SMK in the future.

A. Search and Selection Procedure

The focus of the studies and studies applied in this paper is intended to reveal and analyze the results of research related to Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education. Analysis of the study was carried out on the factors that affect Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education and to find out how to improve Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education. The topic of the literature review was taken from papers published in the range of 2015 to 2021 with the search keywords "work readiness of graduate, job readiness, readiness 4.0, and career readiness,".

Journal of Educational and Economic Research, Journal of Economic Education, Procedia Economics and Finance, International Journal of Fashion Design, Technology and Education, Journal of Vocational Education. The results obtained were 31 articles and from the articles obtained were then analyzed and coded using a spreadsheet program.

B. Analysis and Coding Scheme

The structure of the analysis and coding of articles on Work Readiness in the context of Industry 4.0 includes: Paper code, Source (author, year of publication, place of study, publisher), Research objectives, Research methods (research approaches, data collection, analysis methods), Basic Finding (research results) and findings).

Coding will make it easier for researchers to uncover challenges related to Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education in several countries, the factors that affect Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education and to find out how efforts are made to improve Work Readiness in the context of Industry 4.0 graduates Technology and Vocational Education. The researcher's conclusion on the literature review emerged from the results of questions and understanding of article analysis. An example of a literature review spreadsheet model is shown in Table I.

TABLE I. SPREADSHEET MODEL LITERATURE REVIEW

Paper Code	Source	Research Purpose	Method	Findings
WR 001	Ebil, S., Othman, N., Nor, H. N. H. M., Ahmad, M. H., Mujah, O., & Keh, C. W. (2017). Brunei TVET transformation: The development of the Institute of Brunei Technical Education's two key surveys. <i>TVET@ Asia: The Online Journal for Technical and Vocational Education and Training in Asia</i> , 8, 1-15.	This study aims to assess students' survey work readiness in terms of experience, world of work insight and vocational competence through work skills with subjects of SMK students in Probolinggo.	Survey	Job readiness of SMK graduates is influenced by experience
WR 002	Amornvuthivorn, K. (2016). Public-private partnerships (PPPs) in Technical Vocational Education and Training (TVET): Lessons learned from Singapore and USA and implications for public management in Thailand. <i>Journal of Public and Private Management</i> , 23(1), 91-91.	a review of the research literature on public-private partnerships (PPPs) in education and technical vocational training in Singapore and the United States, two countries selected for their highly successful programs in this domain.	Literature review, roundtable discussions, and in-depth interviews	The main recommendations obtained from this research include strengthening government leadership and practitioners, decentralization and empowerment of local actors, active involvement of private stakeholders, long-term strategic planning and implementation of human resource development in line with national social and industrial master plans, and instilling a policy culture and evidence-based practice

III. RESULTS

Based on a review of 31 articles that have been reviewed by researchers regarding the job readiness of Technological and Vocational Education graduates according to the context of IR 4.0, in this section of the findings the researcher divides into two main parts, namely: (a) Factors that affect Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education and (b) efforts to improve Work Readiness in the context of Industry 4.0 graduates Technology and Vocational Education.

A. Factors that Affect the Work Readiness of Technological and Vocational Education Graduates

Work readiness is an important factor that can determine the quality of prospective graduates [5]. Vocational High School as an educational institution that prepares human resources needs to pay attention to factors that can improve work readiness.

A study that aims to determine the factors that influence job readiness of students in Uganda in general reveals that emotional intelligence (EI) and psychological capital (PsyCap) strongly predict job readiness [16]. Several studies describe in detail the

factors that affect student work readiness. These factors are influenced by ability factors, academic factors, behavioral factors and self-potential, innate/inherited factors. The ability factor is the strongest factor affecting the work readiness of vocational students. This factor consists of learning achievement, level of intelligence, practical experience, discipline, expectancy to enter the world of work [8]. Several other factors that play a dominant role in shaping job readiness include self-regulation [5], learning motivation, independence, discipline [17], external practical experience, vocational guidance, and expectations of entering the workforce [18]. There is a positive and significant influence between industrial work practice experience, world of work information and work motivation on students' work readiness, both partially and simultaneously [19]. This is in line with research which states that the higher the motivation to enter the world of work, the higher the readiness to work [20]. According to research on SMK students in Probolinggo, it is stated that the job readiness of SMK graduates is influenced by experience which includes aspects of students' knowledge, attitudes and skills [7]. This is in line with the results of research which confirms that internship experience has a direct effect on job readiness [21].

B. Efforts to Improve Work Readiness in the Context of Industry 4.0 Graduates of Technology and Vocational Education

The demands of changing the workforce in the era of the industrial revolution 4.0 are a fundamental challenge for Technical Vocational Education and Training (TVET) to quickly and efficiently meet the needs of changing skills. Several studies address the challenges that some countries face in preparing graduates in terms of their job readiness skills.

Research examining the work readiness competencies of Australian HE and vocational education (VE) graduates states that Australia's VE and HE sectors do not adequately prepare graduates in terms of their job readiness skills. The results of the study point to the deteriorating condition of the Australian graduate labor market and emphasize that an integrated approach is urgently needed from all stakeholders to facilitate the transition and reduce the time required from graduation to employment [22].

In Germany there are still young people with inadequate math skills experiencing significant difficulties in securing training positions in the dual system, and furthermore, they often enroll in the pre-vocational programs of the transitional system. However, stable and valid measurement results show that, on average, math competence does not change over 1 year [23].

The results of the study of characteristics regarding student experience imply that the two VET pathways, school-based VET and apprenticeship training, have significant differences. Based on experiential learning, it seems that apprenticeship training and school-based VET in Finland cannot be considered as parallel or interchangeable routes. This should be recognized as recent vocational senior secondary education reforms aim to promote a flexible combination of school-based and work-based pathways [24].

Research providing an overview of the challenges of graduate job readiness in Malaysia proves that the country's thriving domestic manufacturing, agriculture and services sectors characterized by low wages, low skills and low productivity work with harsh working conditions and limited career development opportunities. unattractive to local residents, especially graduates, and mostly filled by migrant workers [25].

Studies examining the relationship between workforce and technology education for a skilled workforce show that Brazil is significantly behind in the digital industry, human resources, and research behind all other BRICS countries (Russia, India, China and South Africa) in terms of innovation [26].

A paper discussing the curriculum of one TVET program in Nigeria provides an analytical review that the curriculum pays less attention to practice-based courses that provide programmatic skills than theory-based courses and that none of the courses in the program curriculum directly teach good attitudes and traits. As a result, Nigerian TVET graduates are not equipped with the job skills required by the industry, ultimately they are not ready to enter the workforce [4].

In Guyana, the effectiveness of TVET is limited in part by the lack of information and labor market funding, inadequate information communication technology skills and infrastructure [27]. Not much different from conditions in other countries, in Indonesia The Central Bureau of Statistics released data that the unemployment rate in Indonesia is still relatively high and is dominated by vocational education graduates. This is presumably because at here is a substantial discrepancy between TVET and industry needs, for example limited human resources, facilities and infrastructure that do not meet standards, lack of cooperation with industry, curriculum that is not in accordance with work needs and weak work culture on campus [28]. The development of vocational education since 2008 related to the change in the ratio between high school and vocational schools from 70%:30% to 30%:70% poses its own challenges. The establishment of new schools is not matched with a feasibility study, making it difficult for graduates to get jobs. Some of the challenges faced are inadequate facilities, teachers and industrial support [29]. Challenges in developing the teaching and learning process of vocational high schools in Indonesia are also very important, especially related to technological developments when the country is faced with demands for quality labor needed to face the 2015 ASEAN Economic Community (AEC) free trade era, but the existing conditions are still faced with the constraints of providing practical materials and equipment in accordance with the latest developments [30].

Technical Vocational Education and Training (TVET) faces great demands globally due to high unemployment rates and the quest for technological development, industrialization and economic growth. For TVET to achieve its goal of enabling learners to pursue ever-changing standards of living in a rapidly evolving world of technology and create jobs for sustainable living, it must be strengthened through public-private partnerships as governments cannot undertake such a huge task alone [31]. Research on graduate job readiness challenges in

three Asia Pacific economies (Malaysia, Indonesia and Australia) states that graduate job readiness challenges can be handled effectively by HR professionals in partnership with three main stakeholders, namely government, employers and industry [9]. Regarding the partnership between government, business and industry, it is examined in a paper which calls it PPP (Public-Private Partnership) in TVET. The paper suggests that PPP should be encouraged, for example, through the sharing of tools and equipment between educational institutions and the TVET industry with the aim of ensuring that students keep abreast of developments in the world of work [31]. Research on Thailand's efforts to strengthen Technical Vocational Education and Training (TVET) also provides key recommendations which include strengthening government leadership and practitioners, decentralization and empowerment of local actors, active involvement of private stakeholders, long-term strategic planning and implementation of aligned human resource development with national social and industrial master plans, and instilling a culture of evidence-based policy and practice [32].

Many countries have implemented a dual TVET training system. The system formed is a partnership that brings together educational institutions, government entities, and companies in partnership to improve TVET. The dual system means that job training takes place in two interrelated locations, the educational institution and the workplace. Schools and companies share responsibility for providing technical and vocational education. Dual education aims to adapt dynamically changing economic demands to the skill profile of those graduating from educational institutions. For the most part, dual education systems allow young people to acquire not only technical and occupational skills, but broadly defined competencies that serve as the basis for career rewards and social rewards [10]. Through Dual System Training, employers must evaluate the level of job skills acquired by graduates who have gone through the Dual System Training and then employers are asked to identify the job skills required to meet the demands of work in the Fourth Industrial Revolution. This is a step taken to ensure that graduates are equipped with the job skills needed for the future [2]. One example of the realization of activities from the dual training system is the business world providing opportunities for students to practice industrial work. Through industrial work practices, students are expected to be able to increase their confidence and improve their experience [21]. Therefore, the role of educational institutions is to develop broader student attributes and skills in addition to subject knowledge and academic skills together with the government and industry to improve the employability of graduates [33].

Improving the quality of graduates produced by TVET can be done through improving the quality of TVET learning. This can be done through continuous professional development of TVET teachers in increasing the use of the five pedagogical guiding principles in practice which includes demonstration learning, problem-based learning, seeing students as knowing, active learning, and asking questions [11]. In addition to the continuous professional development program for TVET teachers, a study also stated that improving the quality of

teaching and learning can improve the knowledge, skills and competencies of graduates if the components of quality assurance in teaching and learning are met such as adequate human resources and materials, staff development/professionals, and the use of technology in learning [12].

The study which aimed to conduct a thorough review of the vocational education curriculum offered at one of the institutions in Hong Kong stated that new, more innovative learning strategies should be introduced inside and outside classroom activities to facilitate students' personal development that supports the development of useful skills for both eligibility broader work and personal development [13]. One of the efforts to provide positive implications for quality TVET graduate outcomes is through PBL in the TVET system, as applied in Nigeria because it can enable the integration of theory and practice, motivate learning, increase student self-efficacy, enable students to build their own learning, improve graduate competencies, and graduate employability [14]. In a study, it was also stated that the internship program has been shown to have a significant effect on job readiness and self-efficacy [15].

IV. DISCUSSION AND CONCLUSION

The aim of this paper is to present a review of studies focusing on Work Readiness Context Industry 4.0 graduates of Technological and vocational education. The analysis of the study emphasizes: (a) Factors that affect Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education and (b) efforts to improve Work Readiness in the context of Industry 4.0 graduates of Technology and Vocational Education.

Based on the study, the factors that affect the work readiness of TVET graduates are influenced by ability factors, academic factors, behavioral factors and self-potential, innate/inherited factors. The findings of the study also illustrate that the TVET Institute is not yet optimal in preparing its students for post-graduate work readiness. The challenges of graduate work readiness can be handled effectively by HR professionals in partnership with three main stakeholders, namely the government, employers and industry through a dual system training program in the form of continuous professional development of teachers, the application of innovative new learning strategies, internship programs or industrial work practices.

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