



Industry Based Vocational Higher Education Management Model (IVHEMM) On Engineering

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Abstract - Industrial participation in an educational development remains low. This case caused by the absence of clear and detailed provisions of the Government about industrial involvement in the development of vocational higher education. There are several factors that influence the success of a cooperation program in vocational higher education with industry, such as : discrepancy of competency which is produced by higher education with the needs of industry, the lack of industry concern on education, the implementation of quality culture, the application of ICT technology, poor attitude of entrepreneurs, and the work of higher education which do not have commercial value. The research objective is to develop a vocational higher education management model on engineering industry. Preliminary studies conducted at several vocational universities namely Semarang State Polytechnic, ATMI Polytechnic, Bandung Manufacture Polytechnic, Ceper Manufacture Polytechnic and Academy of PIKA. The method of this research apply R & D (Research and Development) with the phases of conducting some preliminary research, developing and testing the product of vocational higher education management model research on engineering industry. Results of the research formulate vocational higher education management model on engineering and guidebooks. The novelty of this study is the importance of improving management performance in vocational higher education. The factors that influence the performance improvement of vocational education management are (1) the level of better industrial relations; (2) the application of quality culture in vocational higher education, (3) strategic technological adaptation to the environment, and (4) the improvement of the quality of education through the implementation of Total Quality Management Education.

Keywords - VHEM models, cooperation, industry, engineering

I. INTRODUCTION

Entering the free trade AEC (ASEAN Economic Community) in early 2016 and the APEC (Asia-Pacific Economic Cooperation) in 2020, Ministry of Research, Technology and Higher Education is designed to manage Human Resources, Institution, Resources, Research and Development and Innovation. The innovation process from upstream to downstream to ensure the availability of qualified human resources and a highly competent career ready. The availability of facilities and infrastructure of science and technology both in universities and research institutions are conducted to ensure that the universities and R & D institutions constantly improve the quality and relevance of research and development in order to be ready for down stream, or ready to be implemented.

The product of higher education in the form of quality of human resources and technological innovation still needs to be improved. Existing regulations are not parallel with an efforts to improve and accelerate the implementation of research results on industry. The biggest higher education institution advancement obstacle of innovation is the lack of entrepreneurial nature [1]. Commercialization of research results in universities in Indonesia is still low compared with other countries, even in Southeast Asia. Indonesia is considered as a country with the innovation index number 87 of 143 countries in the world in 2014 by the Global Innovation Index. This position is still under Singapore is ranked seventh, Malaysia ranked 33rd, Thailand 48th, and Vietnam 71st; despite being in higher rank than Brunei Darussalam which is ranked 88th, Philippines 100th, Cambodia 106th and Myanmar 140th. Kemenristekdikti (The Ministry of technology, research and higher education) encourage universities and industry cooperation through the Strengthening Higher Education Innovation (Program) in Industry in 2015. This is in order to build a business ecosystem that is conducive to the commercialization of higher education research results by the industry, and support the process to run smoothly; therefore Kemenristekdikti allocate funding grants for higher education institution and are required to partner with researchers at the Ministry of Government Institutions / Non-Government Organization and industry to generate innovation through the program of "Universities Innovation in Industry".



Funding is also a Kemenristekdikti policy instruments to contribute to economic growth and social welfare. The program aims to increase collaboration between ABG (Academic-Business-Government) within the framework of the commercialization of the results of research, development and engineering in Universities.

Universities in Indonesia are divided into scientific development based education (academic: University, Institute of, high school) and higher education based skill development (vocational: Polytechnic, Polman, ATMI). vocational higher education institutions have various departments which are further divided into two groups: engineering and commerce. Engineering consists of mechanical engineering department, civil engineering department, energy conversion engineering department, refrigeration engineering department, chemical engineering department, computer engineering department and informatics department, while, commerce consists of accounting department, business administration department and English department. Vocational institutions of higher education have a strategic role in the provision of competent workforce and industry professionals in the job market. Business and industry in effort to improve the efficiency and competitiveness require a workforce that is competent and professional. However, in reality there is still a gap or gaps between the needs of human resources in the industry with the human resources produced by the vocational higher education institution [6]. To produce competent graduates and professionals, it needs financial support. Limited financial support is surely difficult to achieve that goal. Active participation of the private sector (industry) is expected to realize improved quality of higher education institution graduates. Thus, universities, industry and government cooperation will be able to change the original human resources from burden to be assets of the country.

Vocational higher education institution graduates need to be equipped with the competencies required by industry. According to [1] competency requiring by industry is (1) the ability to provide solutions to problems based on scientific concepts (2) have skills to work in teams or groups; (3) Learn how to study effectively and efficiently (4) continuous improvement orientation not limited to a specific target, every target is reached will improved continuously (5) require an integrated knowledge interdisciplinary to find the solution of complex industry problems. Work is an interactive process with others and processing information actively; and (6) use of new technology (ICT) as an integral part of the learning process to provide solutions to industry problems. It is still rarely found in higher education institution. In higher education institution most students learn individually, value-oriented and graduation; and the use new technology (ICT) is an integral part of the learning process to provide solutions to industry problems. It is still rarely found in higher education institution. In higher education institution most students learn individually, mark and graduate orientation, and new technologies (ICT) application is still being the course name. Therefore, to produce competent and professional graduates, institutions of vocational higher Education need to establish cooperation partnerships with the industry environment.

Cooperation in building partnerships between institutions of vocational higher Education with Industry has been pioneered by Wardiman through the link and match program. In its implementation is still applied to the vocational level has not been to higher education institution. On the other hand, the development of human resources of vocational higher education institution in developed countries is a shared responsibility of the parties, namely Academic (vocational higher education institutions), Business (business / industry), Government (government), and the Community (community) is abbreviated with ABG_C. According to [4], suggests that the partnership between vocational and industrial higher education institutions can be classified in four ways: (1) Collaborative teaching and learning; (2) Collaborative research and development; (3) Collaboration business development; and (4) Collaborative development of society, industry, and region. Previous researches conducted by [2], [10]; stated mismatch between vocational education institutions and the needs of industry, impacting the difficulties in the industry. Technology in vocational education institutions lack or lagged behind the industry. Vocational education institution synergies with the industry as a necessity to utilize industrial capabilities have not been integrated. Furthermore [8] and [7] states that many developed countries such as Germany, Japan, and China develop vocational higher education to support the economy in the country. This provides the inspiration for the development of vocational education management model in Indonesia. Improving the quality of vocational higher education can not only be the responsibility of private / individual or institution alone, but must involve other parties, especially the industry and the government as policy maker.

The strategic value of the partnership between vocational universities and industries, among others: For vocational higher education institutions, (1) Expanding the knowledge and the development of science and technology; (2) improve the quality of teaching curriculum planning; (3) improve the quality of applied research; (4) increase cooperation in community development activities; (5) to obtain information about internships, recruiting prospective employees. For students, (1) Improve the motivation to learn; (2) Experience of working as an employee with guidance from industry practitioners;

(3) Develop responsibility and maturity with strengthening human-resource, problem solving skills, self-confidence, and self-discipline; (4) The opportunity to develop employment options, long-term planning or investment in the future; (5) Developing the skills of human relations through personal interaction in a work setting. For the industry, (1) as a promotional marketing company and the additional area; (2) providing manpower recruitment options as needed; (3) obtain a license to operate in the community; (4) Reducing the cost of education and training; (5) Provide an opportunity to assess the workers before it was decided to be hired as full employment. The aim of research to develop vocational higher education management model engineering industry based. Preliminary studies carried out on some vocational higher education institutions that Semarang State Polytechnic, ATMI Polytechnic, Bandung Manufacture Polytechnic, Ceper Manufacture Polytechnic and Academy of PIKA.

II. METHODS

This research utilizes R & D (Research and Development) study, referring to [3], and [9] is a method to conduct research, development and product testing research management model of industrial based higher education vocational - fields engineering.

III. RESULTS AND DISCUSSION

Partnership model of vocational higher education institutions with industry currently held in Semarang State Polytechnic, ATMI Polytechnic, Bandung Manufacture Polytechnic, Ceper Manufacture Polytechnic and Academy of PIKA. They have the same goal which is to improve industrial relations, strengthen institutional (capacity building), and increasing competitiveness. There are differences in the level of intensity of industrial relations among them. In ATMI Polytechnic Surakarta industry directly present in campus, thus, the intensity of industrial relations is higher than that of other vocational higher education institutions. Performance management and organization at the ATMI Polytechnic shows the average result is very good (3.16) [11], thus, it can be a bench mark for other vocational higher education institutions.

Research Design Development Models VHEI-I

The study design VHEM-I model development is presented in Figure 1. Starting from the vision and mission of vocational higher education institutions, partnership programs in education / training, research, business development, and community service, contribution to industry relevant partners, to improve management performance and vocational higher education organization supported by managerial (relevance, academic atmosphere, internal management and organization, sustainability, and efficiency and productivity) and system IPPO (input, process, product, output).

The purpose of vocational higher education and industry needs interrelated need to be tied more closely to build a partnership between educational institutions and industry. Cooperation in building partnerships between industry and educational institutions will be a great strength to win the competition in the global market. With vocational higher education institutions as industry partners, the better results of educational products can be enjoyed by the industry to increase business profits. With the industry support the vocational higher education institutions will be able to tackle unemployment, increase motivation to learn, the latest science and technology adaptation, curriculum development, and research-based real needs.

Industry Based Vocational Higher Education Management Model

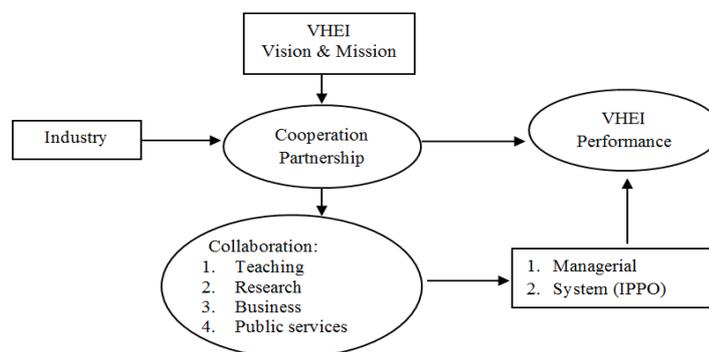


Figure 1: Research Design

Industry based vocational higher education management defined as a series of activities of planning, organizing, implementation and evaluation of vocational higher education institutions that collaborate with the industry to achieve improved performance management. Vocational higher education institutions as applied at the Polytechnic aims to prepare graduates who can be competent in corporate and industry. Human resource of vocational higher education institution / Polytechnic quality is a very important requirement to improve competitiveness. Therefore, the development of human resources vocational higher education institution / polytechnic becomes the joint responsibility of all stakeholders. Industry as an economic powerhouse in desperate need of qualified and certified Polytechnic Human resources partnerships with business / industry to reduce mismatches, the gap between the needs of human resources in the industry with the competence of human resources produced by vocational higher education institutions. Presumably, an effort to narrow the competence gap conducted to develop a partnership between vocational higher education institutions and industry.

The first phase of R & D research are preliminary studies, literature studies, field studies of implementation partnership program between vocational higher education institutions and industry in five (5) universities namely Semarang State Polytechnic, ATMI Polytechnic, Bandung Manufacture Polytechnic, Ceper Manufacture Polytechnic and Academy of PIKA..

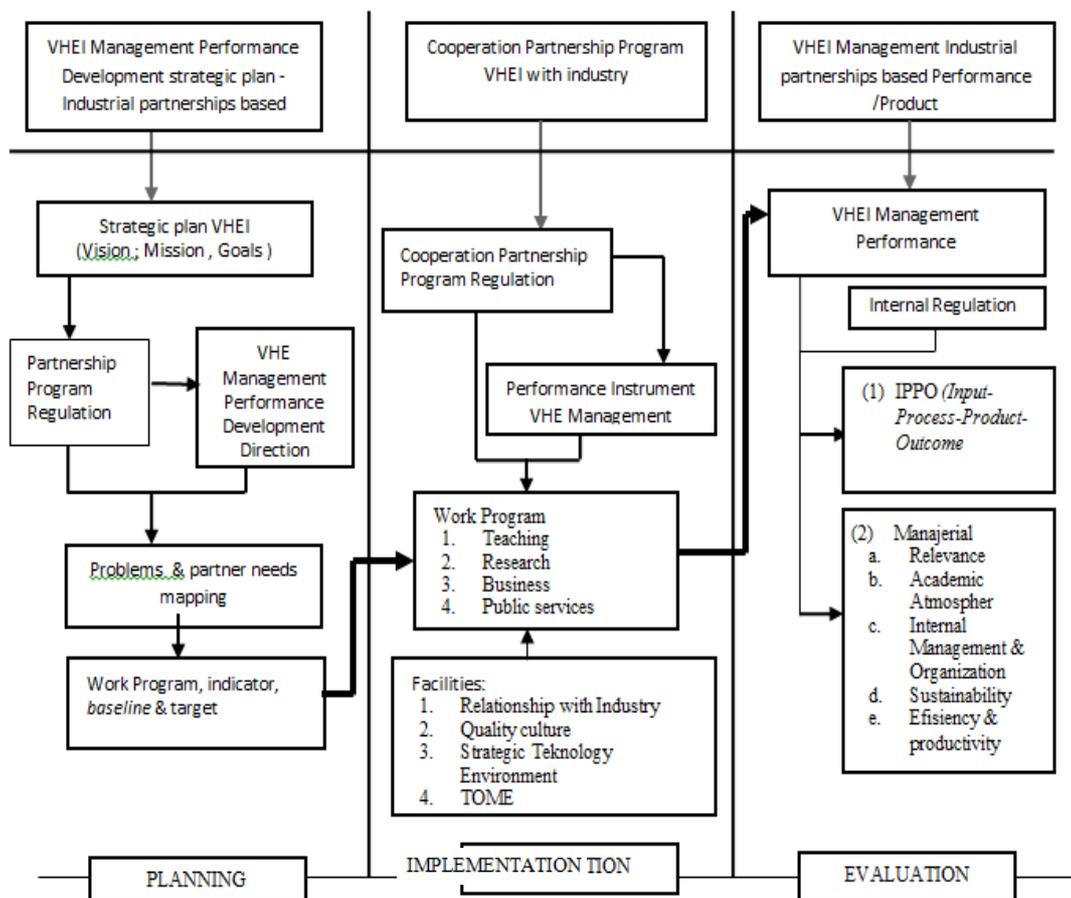


Figure 2: Industries Based Vocational Higher Education Institution Model

The second phase of research and development based on factual findings partnership model of vocational higher education institutions and industry is focus group discussion (FGD) between academics and industry experts to gain improvements that drafted a conceptual model.



The third phase is evaluation and improvements by experts of education management to produce high-end models of industry based higher vocational education management industry are schematically presented in Figure 1. The model presented by realizing management functions, planning, implementation, and evaluation.

Planning of Industry Based Vocational Higher Education Management

A process that involves the efforts made connecting the self-evaluation (base line), specify the destination (target), strategy formulation, and develop an action plan to achieve the goals set. (1) Mapping the problems and analyze partnerships need VHE-I, by setting goals and objectives of VHE partnership program with industry, i.e.: a) The quality of learning with practical work in industry, industry internships, lecture guest lecturers industry to strengthen innovation capacity b) The quality of science and technology institutions, through collaborative research with industry to produce scientific work based on industry demand; c) Relevance, quality, and quantity of the resources of science and technology through the development of joint industrial business; d) The relevance and productivity of research and development through community service program; (2) Formulate strategies to achieve the goals and objectives based on the vision, mission, goals and strategic plan of VHE, regulatory partnership program, and the direction of development of management performance VHE. (3) Design the necessary plans covering 4 W + 1H resources included, the schedule (when), location (where) and method (how) to integrate and coordinate activities (what), (4) Set a work program, indicators, baselines and targets achievement of VHE-I cooperation.

Implementation of Industry Based Vocational Higher Education Management

A process involves organizing people/equipment and implementing activities to achieve goals. The organization includes the division of labor, the allocation of required resources, organizational structure, selection, assignment and delegation. The implementation of the activities through the process of leading, instructing, explaining, nurture, guide, motivate, and mobilize resources for achieving the goals and objectives of cooperative partnerships between vocational higher education institution with industry. (1) Implementation of vocational higher education institution partnership programs with the industry, based on the results of the planning and regulatory cooperation program VHE-I has been determined. (2) Implementation cooperation programs VHE-I in the field of education and training. (3) Organization and implementation partnership program VHE-I in the form of joint research (4) Implementation partnership program VHE-I in the field of business development (5) Implementation partnership program VHE-I in the field of community service

Evaluation of Industry Based Vocational Higher Education Management

A process involves attempts to monitor, oversee, supervise and control and ensuring the whole range of activities that have been planned, organized and implemented to run in accordance with the target goals and objectives set even if there are some changes and adjustments that occur. (1) Evaluating the achievement of goals and objectives based on indicators of performance against targets set (2) Take a step of clarification and correction of irregularities which may be found (3) Establish policies to develop strategies and tactics alternative handle various problems that occur.

IV. CONCLUSION

Partnerships between vocational higher education institutions with the goal of increasing the intensity of industry relationships, institutional strengthening (capacity building), and increasing competitiveness. The novelty in this study on improving the performance of the management and organization of vocational higher education through factors (1) the better level of industrial relations; (2) the application of quality culture in vocational higher education institutions, (3) strategic technological adaptation to the environment, and (4) improvement of the quality of education through the implementation of Total Quality Education Management.

Industry based vocational higher education management model is a series of planning, organizing, implementation and evaluation of vocational higher education institutions that involve industry collaboration in the field of education and training, research, business development, and community service to achieve the educational goals effectively and efficiently. Achieving the goals of vocational higher education institutions partnership with industry evaluated through performance improvement and educational organizations with management, system-Process-Input-Output Product, and Managerial (relevance, academic atmosphere, internal management and organization, sustainability, and efficiency & productivity).



SUGGESTION

It needs wider dissemination of the importance of improving the performance management of vocational higher education institutions in order to obtain the trust and support of the business / industry in the partnership program. Government support for industry collaboration partnership with educational institutions is necessary in the form of healthy policy for the industry. It needs to empower the results of the final project or thesis students according to the needs of industry.

ACKNOWLEDGMENT

I am sending my gratitude to my promoter, Prof. Dr. Rasdi Eko Siswoyo, M.Sc., Prof. Dr. DYP Sugiharto, M.Pd. Kons., And Prof. Dr. Totok Sumaryanto, M.Pd. Thanks also, to the Director and staff of Semarang State Polytechnic, ATMI Polytechnic, Bandung Manufacture Polytechnic, Ceper Manufacture Polytechnic and Academy of PIKA with the permission and support during my research. I would also like to thank Dr. Ir. Hadiwaratama, M.Sc., Founder of Polytechnic, for information on vocational higher education. I would like to thank you also for DRPM Kemenristekdikti and P3M POLINES for funding support in my research.

REFERENCES

- [1]. Nasir, Mohamad (2015), *Sambutan Forum Rapat Koordinasi Iptek Tahun 2015*, delivered at Agustus 4, 2015, downloaded from Kemenristekdikti website.
- [2]. Anatan, Lina (2008), *Kolaborasi Universitas-Industri: Tinjauan Konseptual Mekanisme Transfer Pengetahuan Dari Universitas Ke Industri*, Jurnal Manajemen, Vol.8, No.1, November 2008.
- [3]. Borg, W. R. & Gall, M. D. (2003). *Educational research, An Introduction* (7th edition). New York & London: Longman.
- [4]. Garrick, J., Ghan, A., Lai, J., (2004) *University-industry partnerships: implication for industrial training, opportunities for new knowledge*, Journal of European Industrial Training, 28 (2-4), 329-338.
- [5]. Gaspersz, Vincent (2002), *Penerapan Total Quality Management in Education (TQME) pada Perguruan Tinggi di Indonesia: Suatu Upaya untuk Memenuhi Kebutuhan Sistem Industri Modern*, down loaded from: www.oocities.org/hadiy_00/tqm-pt.doc
- [6]. Hasanah, Uswatun. (2010), *Kemitraan Antara Dunia Industri Dan Pendidikan Dalam Pengembangan SDM- PTK*, International Seminar, ISSN 1907-2066. APTEKINDO.
- [7]. Hidayat, Sidiq Syamsul (2013), *Ceramah ilmiah Dies Natalis Politeknik Negeri Semarang*.
- [8]. Ismet P. Ilyas (2012), *Productionn-Based Education (PBE): The Future Perspective of Education on Manufaktur ing Excellent*, 10th Triple Helix Conference 2012, Procedia - Social and Behavioral Sciences 52 (2012) 5 – 14.
- [9]. Samsudi (2006). *Pengembangan Model Pembelajaran Program Produktif Sekolah Menengah Kejuruan: Studi Model Preskriptif dengan Penerapan Learning Guide pada Program Keahlian Teknik Mekanik Otomotif*. Doctor Dissertation on Post graduate Program UPI Bandung: not published.
- [10]. Siswanto, Budi Tri (2011), *Pengembangan Model Penyelenggaraan Work-Based Learning Pada Pendidikan Vokasi Diploma III Otomotif*, dissertation, downloaded from: staff.uny.ac.id/, on October 15, 2013
- [11]. Suharto (2014), *Factors Affecting Management Performance Of Industry Based Vocational Education*. Engineering International Conference 2014, Proceeding, ISSN : 2355–3456. September 3rd, 2014, Semarang, Indonesia.