Advances in Social Science, Education and Humanities Research, volume 299
5th UPI International Conference on Technical and Vocational Education and Training (ICTVET 2018)

The Structural Models of the Determinant Variables that Influence the Productivity of Vocational Education

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***Abstract*—This study aims to obtain a model relationship determinant factors that affect the productivity of vocational education. Data collection is done by using instruments that have been tested for validity and reliability. The study population is a graduate of vocational education in West Sumatra. Sampling technique using simple random sampling, with data source of research include 290 respondents graduate vocational education from Universitas Negeri Padang, Politeknik Negeri Padang and Politeknik Pertanian Negeri Payakumbuh. Data were analyzed by asymptotic covariance matrix estimation through structural model with LISREL 8.80. The result of the research reveals as follows: there are factors that have a positive and significant effect on the productivity of vocational education, namely: (a) managerial leadership has a direct effect, and indirectly influences through academic atmosphere, lecturer competence, learning system and learning process; (b) the academic atmosphere has an indirect effect through lecturer competence, learning system and learning process; (c) lecturer competence has an indirect effect through learning system and learning process; (d) the learning system has an indirect effect through the learning process; (e) learning process have direct effect, while managerial leadership and learning process together can explain vocational education productivity equal to 45,8% and the remaining 44.2% influenced by other variables outside the model.**

Keywords—productivity of vocational education; managerial leadership, academic lecturer competence; learning system; learning process

I. INTRODUCTION

The tertiary education sector in Indonesia accommodates around 3,5 million students and graduates around 600 thousand graduates from various levels per year, most of them (above 90%) are in undergraduate academic education programs and vocational education programs. Some of these graduates have been able to seize the job market both at home and abroad. In addition, there are graduates who are able to conduct further studies at various well-known universities abroad, but in general the quality of graduates in this sector is inadequate. This can be seen for example from the Central Statistics Agency's data which shows that the open unemployment rate for college graduates (diploma and undergraduate) in 2017 reached 541 thousand people. Meanwhile, there was a situation where the labor seekers complained about the difficulty of finding workers with the qualifications and competencies they wanted. This shows that even though the number of graduates has been over productive, there is still a lack of quality. While in terms of quality management of internal organizations, most universities still face various problems, including low productivity figures. Productivity figures indicate the level of internal efficiency of universities in Indonesia, which averages 12%.

If it is assumed that every year new students receive a constant amount, then ideally the percentage above is around 25%. These data indicate that the efficiency and productivity of most universities still do not meet expectations. Therefore, universities still need continuous efforts to be able to improve the efficiency and productivity of education implementation so that as a whole can overcome the problems of national capacity. Vocational education in a number of specialized knowledge fields, prepared as a ready-made workforce, has been pursued by the Government to develop and develop it by making small investments from government funds and foreign loans/grants. But in its implementation there are still many that need to be improved both in the number and quality of graduates.

Productivity means the comparison between the results obtained (output) and the overall resources used (input), which are related to productive mental attitudes, including attitudes: spirit, motivational, disciplined, creative, innovative, dynamic, professional and soulful struggle. The level of productivity

achieved is an indicator of efficiency and economic progress for the size of a nation, industry and educational program [1,2]. If it is assumed that every year new students receive a constant amount, then ideally the percentage above is around 25%. These data indicate that the efficiency and productivity of most universities still do not meet expectations. Therefore, universities still need continuous efforts to be able to improve the efficiency and productivity of education implementation so that as a whole can overcome the problems of national capacity. Vocational education in a number of specialized knowledge fields, prepared as a ready-made workforce, has been pursued by the Government to develop and develop it by making small investments from government funds and foreign loans / grants. But in its implementation there are still many that need to be improved both in the number and quality of graduates [3,4].

Productivity in higher education according to the National Association of State Universities and Land Grant Colleges (NASULGC), the American Association of State Colleges and Universities (AASCU), and the American Association of Community Colleges (AACC) that educate The Joint Commission on Accountability Reporting (JCAR), productivity higher education focuses on: (1) the level of full-time employment after completion of the program or study in college; (2) graduation rates, student failure and transfer rates; and (3) income level [5-7].

The manifestation of mental attitude appears in various activities, including the following: (1) relating to oneself can be done through increased knowledge, skills, discipline, independent efforts and work harmony; (2) related to work, can be done through good management and work methods, cost savings, punctuality, systems and more sophisticated technology.

Based on the above description, it can be understood that productivity includes efficiency, effectiveness and quality. Efficiency is output oriented so that it can be concluded that productivity is the effectiveness of producing output divided by the effectiveness of the use of inputs. In this case individual productivity is a comparison of output effectiveness (achievement of maximum performance), with the efficiency of one input (labor) which includes quantity, quality in a certain time unit.

From the description above, it can be stated that the productivity of educational institutions / universities is different from the results of the production of objects or services that are easily calculated or measured. The productivity of educational institutions/universities is related to how to produce graduates both quantitatively and qualitatively according to the needs of society, the times and the development of science, technology and art. Productivity in education is related to the whole process of planning, structuring and utilizing resources to realize the goals of education effectively and efficiently.

States that educational productivity includes the following three functions: (1) the Administrative Production Function, which is a managerial function related to various services for the needs of students and teaching staff. Inputs identified include the existence of learning equipment, rooms, books and educator qualifications that enable the achievement of effective education; (2) the Psychologist's Production Function, which is a behavioral function whose output refers to a service function that can change students' behavior in intellectual abilities, social abilities, emotional abilities and spiritual abilities; (3) the Economic Production Function, which is an economic function whose output is identified as a graduate who has high competence so that when working can earn high income exceeding the education costs incurred. The description shows that vocational education productivity can be viewed from an administrative, psychological and economic perspective [6,8].

The Joint Commission on Accountability Reporting (JCAR), in the development of accountability and productivity in higher education focuses on: (1) the level of full-time employment after completion of the program or study in college; (2) graduation rates, student failure and transfer rates; (3) student expenses (distinguished between those paid by students and those actually incurred by educational institutions); (4) lecturer activities [5,9,10].

Some elements that determine educational productivity include leadership of school principals, educators/ teachers, infrastructure, students and other supporting elements. Especially for educators/teaching staff play an important role in the productivity of educational institutions, depending on various things that are interconnected, among others, with educators, infrastructure, leaders, students, rules and other elements [11-13]. The research with the sample consisted of 200 teacher's selected using proportional random sampling technique. Questionnaire, interviews and documentation methods are used for collecting data. For analyzing the data, the research used structural equation modeling (SEM). Findings of this research show that School Productivity in SMKN of business-management field is influenced by the process quality, teachers' competencies, school organizational culture, education financial, leadership and the role of the school committee. Impact of independent variables on the school productivity was 73%, while 27% or the rest is influenced by other factors. The dominance variable that influences the productivity is the quality process [1,14].

This research is motivated by the absence of empirical data/ information about the models of determinant factors that affect the productivity of vocational education comprehensively. This study aims to reveal the factor model of diploma productivity and vocational variables that affect the productivity of vocational education. In detail, the objectives of this study are: (1) to make a model of factors that influence the productivity of vocational diploma education; (2) identify the effect of factors influencing the productivity of vocational education.

II. METHOD

A. Population and Sample

The population in this study are students who have graduated from various majors from vocational education: Universitas Negeri Padang, Politeknik Negeri Padang and Politeknik Pertanian Negeri Payakumbuh consisting of various majors: Mechanical Engineering, Civil Engineering, Automotive Engineering, Electronics Engineering, Electrical Engineering, Informatics Engineering and Agricultural

Technology. The sample used consisted of 290 vocational graduates from the three of universities.

B. Research Variable

Structural models of factors that affect vocational diploma 3 productivity are models that illustrate the relationship between management leadership, lecturer competence, academic climate, learning systems, learning processes and diploma 3 educational education productivity. This model describes the relationship between independent (exogenous) and dependent (endogenous) variables. The independent variable is managerial leadership. While the dependent variable is, academic atmosphere, lecturer system competency, learning process and educational productivity. Educational productivity is assessed through quality of graduates, management quality, internal efficiency, external efficiency and income.

C. Data Collection

Instrument Technique Data collection techniques in this study were carried out with a survey using a questionnaire/instrument. The instrument was compiled using a Likert scale model with five alternative answers, including: never, almost never, sometimes, almost always and always weighing 1,2,3,4 and 5 respectively.

D. Data Analysis Techniques

The analysis technique used is confirmatory factor analysis (CFA) and structural equation model with LISREL 8.80. Factors and indicators that play a role in the productivity of vocational education are summarized in Table 1.

TABLE I. FACTORS AND INDICATORS

No.	Variables	Indicators
1.	Managerial Leadership (Manlead)	1. X1 : Idealized Influence. 2. X2 : Inspirational Motivation. 3. X3 : Intelectual Stimulation. 4. X4 : Individualized Consideration
2	Academic atmosphere (Atmosac)	1.Y1 : Physical Environment 2 Y2 : Academic Environmen 3 Y3 : Learning Environment.
3	Competency of Lecturers (Lectcomp)	1.Y4 : Pedagogic Competence. 2 Y5 : Professional Competence. 3 Y6 : Personality Competence. 4 Y7 : Social Competence.
4	Learning System (Teachsys)	1.Y8 : Learner-focused 2.Y9 : Work-focused 3.Y10 : Attribute-focused.
5	Learning Process (Process)	1.Y11: Data quality and information 2. Y12: Curriculum quality 3.Y13: Quality of Learning 4.Y14: Quality of Resources.
6	Productivity (Product)	1.Y15: Quality of graduates. 2.Y16: Quality of management 3.Y17: Internal efficiency. 4.Y18: External efficiency. 5.Y19: Income.

III. RESULTS AND DISCUSSION

A. Analysis of Causal Relationships

Causal relationship on structural equations of the determinant variables that influence the productivity of vocational education with LISREL 8.80, can be seen in Figure 1 and Figure 2, then performed a model suitability test analysis.

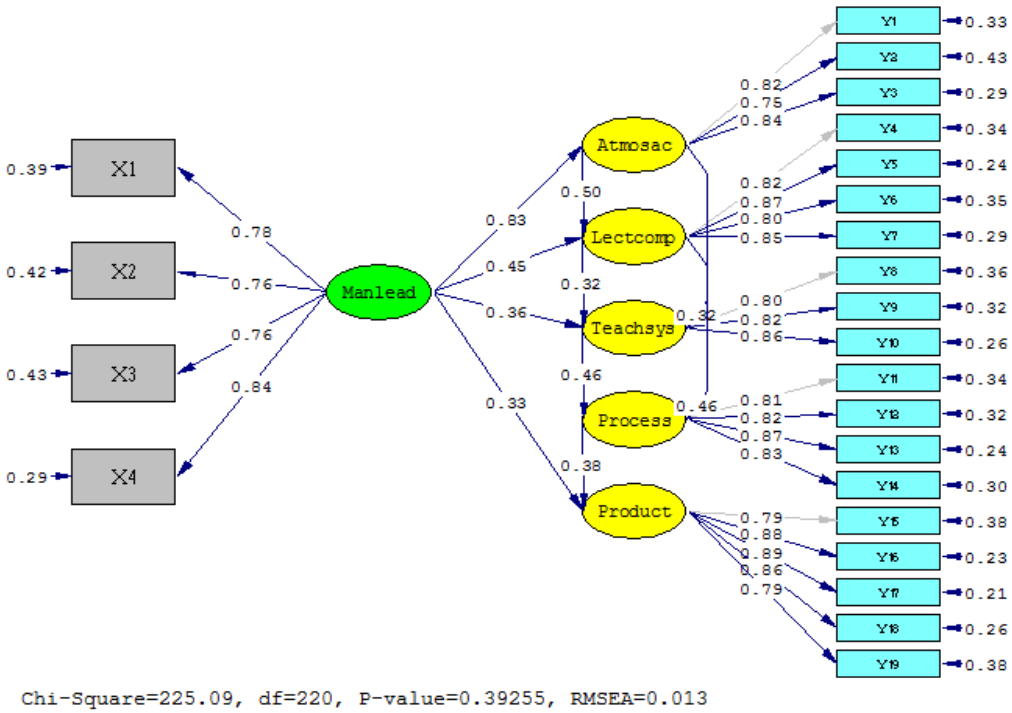

Fig. 1. Vocational education productivity of structural mode (standardied solution).

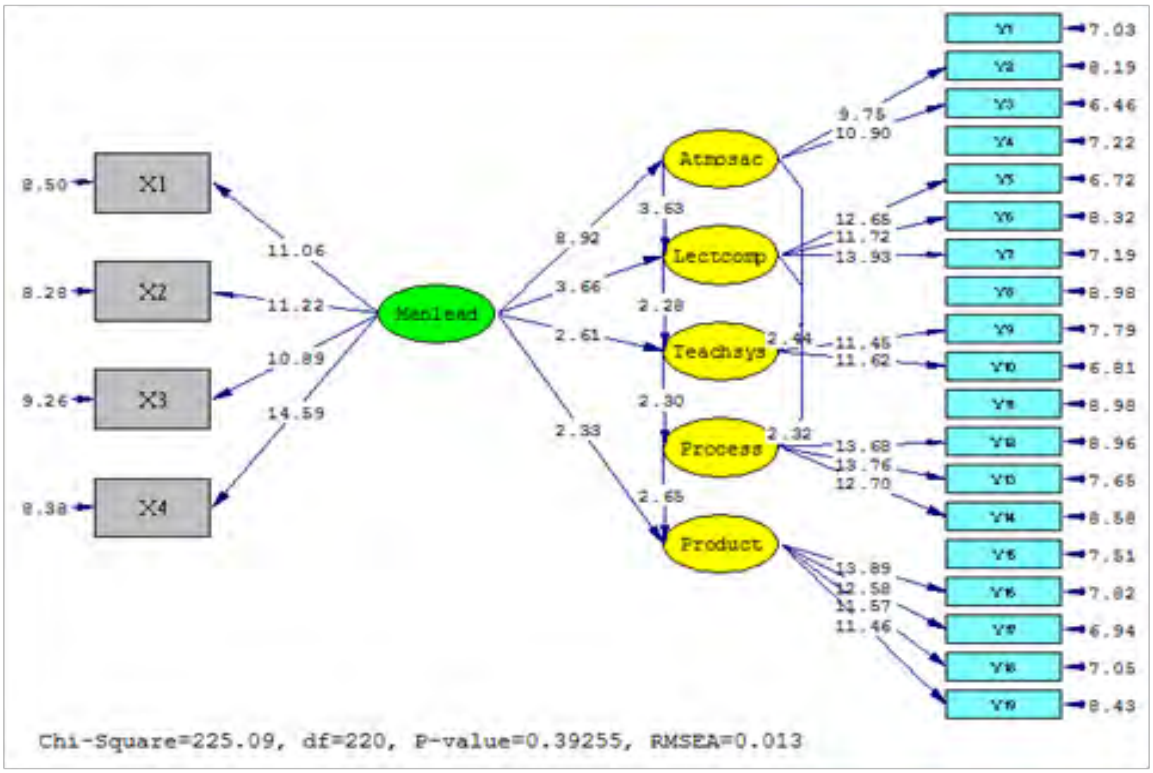

Fig. 2. Vocational education productivity of structural model (t-value).

Atmosac = 0.835*Manlead, Errorvar.= 0.303 , Rý = 0.697 (1)
(0.0936) (0.0741)
8.916 4.093

Lectcomp = 0.496*Atmosac + 0.449*Manlead, Errorvar.= 0.181 , Rý = 0.819 (2)
(0.137) (0.123) (0.0420)
3.632 3.662 4.300

Teachsys =0.321*Atmosac+0.322*Lectcomp+0.358*Manlead,Errorvar.= 0.0942,Rý = 0.906 (3)
(0.132) (0.141) (0.137) (0.0461)
2.438 2.280 2.611 2.043

Process = 0.461*Lectcomp + 0.456*Teachsys, Errorvar.= 0.197 , Rý = 0.803 (4)
(0.199) (0.198) (0.0473)
2.316 2.300 4.169

Product = 0.379*Process + 0.332*Manlead, Errorvar.= 0.542 , Rý = 0.458 (5)
(0.143) (0.142) (0.106)
2.655 2.335 5.141

Fig. 3. Structural equation.

The structural equation for the factors of vocational education productivity is shown on the figure 3 above.

Direct and indirect effects on the productivity of vocational education by factors analyzed are observed based on the output In the structural equation (1) , the t-value of the Manlead coefficient is 8.916 (>1.96), which means that the Manlead coefficient (trajectory coefficient from Manlead to Atmosac) is 0.835 is positive and significant.

In structural equation (2), the t-value of the Atmosac coefficient is 3.632 (>1.96) and the t-value of Manlead is 3.662 (>1.96). This means the Atmosac coefficient (Atmosac trajectory coefficient to Lectcomp), of 0.496 is positive and

significant, and the Manlead coefficient (coefficient of trajectory of Manlead to Lectcomp) that is equal to 0.449 is positive and significant.

Structural equation (3), the t-value of the Atmosac coefficient is 3.321 (> 1.96), and the t-value of the Lectcomp coefficient is 2.280, and the Manlead coefficient is 2.611 (>1.96). This means that the Atmosac (Atmosac to Teachsys coefficient) coefficient of 0.321 is positive and significant, so the Lectcomp coefficient (Lectcomp to Teachsys trajectory coefficient) 0.322 is positive and significant, and also the Manlead coefficient (Manlead to Teachsys trajectory coefficient) 0.358 is positive and significant

Structural equation (4), the t-value of the Lectcomp coefficient is 2,316 (>1,96), and the t-value of the Teachsys coefficient is 2,300 (>1,96), meaning the coefficient of Lectcomp (the trajectory coefficient of Lectcomp to Process) is 0.461 is positive and significant and the Teachsys coefficient (trajectory coefficient of Teaches to Process) of 0.456 is also positive and significant.

Structural Equation (5), the t-value of the Process coefficient is 2.655 (>1.96), and the t-value of the Manlead coefficient is 2.335 (>1.96), which shows the process coefficient (coefficient of Process to Product trajectory) amounting to 0.667 is positive and significant. Likewise the Lectcomp coefficient (the trajectory coefficient of Lectcomp to Product) of 0.667 is positive and significant. From equation (5) it also shows that managerial leadership and learning process together can explain vocational education productivity equal to 45,8% and the remaining 44.2% influenced by other variables outside the model.

B. Factors that Influence Education Productivity

Factors influencing education productivity both directly (direct effect) and indirect effect through intervening variables are managerial leadership, academic culture, academic atmosphere, lecturer competence, and quality of learning.

1) The effect of leadership on educational productivity: It turns out that there is a direct and indirect effect of leadership on educational productivity, namely through the academic atmosphere, learning system, learning process and lecturer competence of 0.307. The effect is positive and significant (because the t-value is 2.605 >1.96). So that it can be said that the effect of managerial leadership on educational productivity is direct and indirect (indirect effect) through the role of intervening variables in academic culture, academic atmosphere, learning process and lecturer competence and amounting to 0.307. The conclusion is in accordance with Gun and Caglaya stated in his research with respondents consisting of 216 lecturers in higher education in the Southwest Mississippi [15]. The conclusion obtained is: the impact of indirect transformational leadership (indirect effect) affects the productivity of education [15]. The same research was also carried out [16], with respondents from 37 educational institutions in the United States, it was concluded that the leadership style positively and significantly impacts educational productivity. Leigh and Mead [17] in his research on 81 higher education institutions in Atlanta, suggested that there was an indirect relationship between leadership and educational productivity. Guy in his study of 195 lecturer respondents from universities in Ohio, concluded that there was a significant influence between leadership and academic atmosphere together on educational productivity [3].

2) The effect of the academic atmosphere on educational productivity: The effect of the academic atmosphere on educational productivity shows that the total effect is equal to indirect effect, this indicates that there is no direct effect of the academic atmosphere on educational productivity, but there is an indirect effect of 0.270 through lecturer competence. The effect is positive and significant (because t-value is 2,184>1,96). These findings are consistent with the results of a study conducted by Long, et al. who examined 21 colleges in California with respondents consisting of students, lecturers and parents, covering the dimensions of the physical environment, academic environment, learning environment and disciplinary environment, revealing that the atmosphere Academics that are strengthened through environmental discipline and interaction between lecturers have a significant effect on educational productivity [18]. This conclusion is also supported by the results of research conducted by Bektas et.al. about the academic atmosphere in improving school productivity [19].

3) Effect of lecturer competence on educational productivity: There is an indirect effect (indirect effect) by lecturer competence of 0.230, through the learning process. The effect is positive and significant (because the value of t 2.072 >1.96). This conclusion is supported by Hatsfield [20], who examined the impact of lecturer competence on student competencies in universities in Malaysia. Respondents consisted of 260 students at various universities in Malaysia, concluding that lecturer competency had a positive and significant impact on the success and productivity of education.

4) Effect of learning systems on educational productivity: Learning systems have an indirect effect on educational productivity. The direct effect is positive and sigmifikan (because the value of t is 2.754> 1.96) and the amount of 0.273. Learning quality can explain the significant indirect effect on education productivity by 0.444 or 44.4%. and the remaining 55.6% is influenced by other variables outside the model. The fact of the results of this study is in accordance with the results of research conducted by Jet, et al. [21] from 125 respondents from the State Polytechnic Diploma III Diploma III. The results of the study concluded that at Politeknik Negeri Bandung (Polban) education productivity was positively and significantly influenced by the learning system.

5) Effect of learning processes on educational productivity: The learning process has a direct effect on educational productivity. The direct effect is positive and sigmifikan (because the value of t is 2.655 > 1.96). and the amount is 0,379. Indrajid and Djokopranoto [14] in his

research which revealed that the four indicators are valid and reliable in measuring the learning process, these facts are in line with those revealed in this study.

IV. CONCLUSION

Based on the previous discussion can be concluded as follows: (a) managerial leadership has a direct effect, and indirect effect through academic atmosphere, lecturer competence, learning system and learning process; (b) the academic atmosphere has an indirect effect through lecturer competence, learning systems and learning processes; (c) the competence of lecturers has an indirect effect through the learning system and the learning process; (d) the learning system has an indirect effect through the learning process; (e) the learning process has a direct effect while managerial leadership and the joint learning process are able to explain the productivity of vocational education by 45.8% and the remaining 44.2% is influenced by other variables outside the model.

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