SUPPLY AND DEMAND STUDY OF EMPLOYMENT IN INDONESIA THE CASE OF GRADUATES FROM VOCATION AND AGRICULTURE HIGH-SCHOOL

Rudi Wibowo*)

Abstrak

Permasalahan penting dan mendasar di Indonesia yang harus dipecahkan dalam tahun-tahun mendatang adalah masalah lapangan kerja dan penyerapannya. Keadaan pasar tenaga kerja di Indonesia dewasa ini menunjukkan bahwa: (a) terdapat sejumlah besar angkatan kerja dengan tingkat pendidikan yang relatif rendah, (b) setiap tahun sekitar 1,5-2 juta angkatan kerja baru memasuki pasar kerja, sebagian besar diantaranya adalah golongan usia muda dan putus sekolah, dan (c) keterbatasan kesempatan kerja disektor formal. Oleh karenanya, dalam jangka panjang sangat diperlukan perencanaan pendidikan yang berorientasi kepada pasar kerja. Salah satu aspek yang sangat berkaitan dengan hal tersebut adalah pendidikan yang bersifat kejuruan yang dirancang sesuai dengan perkembangan teknologi. Studi ini berusaha untuk memberikan gambaran proyeksi tentang isi permintaan dan penawaran tenaga kerja lulusan Sekolah Kejuruan Pertanian Tingkat Menengah Atas. Model pendekatan bersifat makro berlandaskan Tabel Input-Output yang digabungkan dengan koefisien-koefisien pendidikan dan lapangan kerja yang ada di Balitbang Depdikbud. Analisis dan pembahasan sampai pada kesimpulan bahwa jika asumsi tidak ada segmentasi pada pasar tenaga kerja, pada masa mendatang akan terdapat kelebihan penawaran tenaga kerja lulusan Sekolah Kejuruan Pertanian Menengah Atas. Sebaliknya, jika asumsi segmentasi pasar tenaga kerja dipenuhi secara sempurna, maka justru terdapat kelebihan permintaan tenaga kerja lulusan sekolah kejuruan tersebut. Hasil proyeksi hingga tahun 2000 memberi implikasi bahwa kebijaksanaan investasi di dalam peningkatan keberadaan Sekolah Kejuruan Pertanian Menengah Atas sangat mendukung laju percepatan kebutuhan tenaga kerja yang bersangkutan. Pekerjaan yang sangat penting untuk mendukung implikasi tersebut adalah penjabaran kebutuhan investasi pendidikan tersebut menurut pewilayahan dikaitkan dengan jangkauan permintaan terhadap tenaga kerja lulusan sekolah tersebut.

INTRODUCTION

The important and basic problem for Indonesia to resolve in the years to come is the problem of employment opportunity and labor force. In principle to have positive employment impact.

The present condition of the employment market in Indonesia is characterized by (a) a large size of low educated labor force, (b) every year about 1,5-2,0 million people enter into the employment market, most of them are youngsters and dropouts from schools, and (c) limited employment opportunity in the formal sector.

*) Socio-economic Department, Faculty of Agriculture, Jember University.

Within the period of on-going Pelita V, Indonesia's economy is expected to employ a large number of the labor force. For this, a relatively high education profile of labor force is desired.

Considering the above problem, it is essential for educational planning to be employment market oriented. On of the many aspects of addressing the problem relates to vocational education, which is planned in line with the advancing technology. True, educational planning for such vocational education needs higher investment compared with general education, yet the output is theoretically more relevant to business requirements and sectoral needs.

Linked the problem above, this study tries to describe the supply and demand projection for the graduates of the Vocational Agriculture High Schools (SKPMA) in the employment market.

Objective

This study has the objective of describing the pattern of supply and demand of the graduates of Vocational Agriculture High Schools (SPP and SMT/P) within the broad field of national interest, for the following purposes:

(a) give indicative and quantitative direction and guidance on matters of the demand for and supply of labor force graduated from the SKPMA in Pelita V (1989/1990-1993/1994), based on various employment opportunities feasible;

(b) give recommendations related to any possible gaps between the supply of and demand for labor force graduates from SKPMA in Pelita V and through year 2000.

CONCEPTUAL FRAMEWORK

Theoretically, Vocational Agriculture High School education (SPP and SMT/P) is geared to providing output (students) with the skill to enter into the labor market in a particular subsectors. In this case, based on the 19 employment categories, the SKPMA graduates are supposed to work in the following subsectors:

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(a) food crops agriculture, including:
   a.1. rice agriculture
   a.2. other staple crops agriculture
(b) livestock and livestock product
(c) fishery and fishery product
(d) estate crops/other agriculture
(e) non-oil processing industry (food, beverage and tobacco)

Based on the employment structure above, the pattern of demand for labor force is analyzed for the graduates of SKPMA.

Furthermore, the pattern of supply of labor force graduated from the SKPMA can be estimated from the number of graduates from the vocational schools, using statistical models to describe the trends.

MODELING APPROACH TO BE USED IN
SUPPLY AND DEMAND

The Modeling approach in the supply of and demand for SKPMA graduates used in this study is developed from macro model education and labor force. In this case, specific for the demand for employment, and Input-Output Table prepared by the Central Bureau of Statistics will be used. It will be integrated with the coefficients between education and the employment subsector available in the Agency for Research and Devleopment, Ministry of Education and Culture. The projection of supply and demand pattern will be analyzed for the whole period of Pelita V.

The main justification for the used of this methodology is the ability of the analysis to see the economic structure as a whole, so that intersectoral linkages can be accommodated in the analysis. This is considered realistic in line with the more and more complex economic development and higher intersectoral linkages.

Analytical Structure of the Pattern of Supply of Labor

The provision of labor force graduated from the SKPMA and the associated projection will be analyzed using the simple method based on the statistical aggregate of various vocational schools, both public and private. Some projection models will be used, in an attempt to find the most appropriate model for prediction, seen from the statistical point of view.

For the projection models of the supply of labor force graduated from SKPMA the following alternatives will be used.

(i) Linear function model

$$0_{(SKPMA)} = \beta_0 + \beta_1 t$$

where

$0_{(SKPMA)}$ = number of graduated of Vocational Agriculture High Schools

β_0 = Intercept

β_1 = slope

t = time/year

(ii) Non-Linear model (exponential)

$$0_{(SKPMA)} = \alpha_0 \, t^{\alpha_1}$$

where

$0_{(SKPMA)}$ = number of graduated of Vocational Agriculture High Schools

α_0 = Intercept

α_1 = elasticity of the growth of supply

t = time/year

The decision to select one of the alternative models to use in the supply of labor force graduates from SKPMA depend on the coefficient of determination of the respective models.

Analytical Structure of the Pattern of Demand for Labor

The demand for labor force graduated from the SKPMA and the associated projection will be analyzed based on integration between Input-Output analysis on the one hand, and the coefficient matrix between education and employment subsector based on the cooperative study between Bappneas-Depdikbud-Depnaker-CBS (1987/1988), particularly related to EOM (Education Occupation Matrices) and IOM (Industrial Occupation Matrices).

Projections of the demand for labor force graduated from the SKPMA is analyzed based on the Classifications of Employment in Indonesia (ISIC). The basis used in the projection of demand for employment is the rate of economic growth, as measured by sectoral growth of Gross Domestic Product (GDP), and total employment elasticity, as determined by an employment multiplier.

Disaggregation of the demand for labor force graduated from the SKPMA can be obtained from the proportional disaggregation of the total labor force graduated from the Vocational High Schools.

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Analytical Steps in the Demand for Labor:

(1) Projection of the growth of sectoral output based on ISIC in the period of Pelita V is carried out based on GDP analysis of Input-Output Table (classified into 19 sectors), which is projected using growth parameters of each ISIC sector, having been estimated in the report of the previous study. The result of these projections will be further used to estimate the sectoral demand for labor force based on Input-Output.

(2) Projection of the growth of sectoral employment based on ISIC classification in the period of Pelita V will be made through the analysis of the growth of employment available in the Economic. Input-Output Table of 1980 and 1985 published by the Central Bureau of Statistics, using expected sectoral employment (direct, indirect and induced employment) based on the 19 × 19 matrixes of the ISIC sectors.

The values of "employment multiplier" (ML) obtained in the above analysis will be used as the basis of determine the values of the sectoral growth coefficients within the Pelita V period, or the project demand for employment in the projection years.

The employment multiplier within the structure of Input-Output Analysis can be obtained from the Employment Linkage (EL):

[EL] = E [C] [n]

where :

[EL] = linkage factor of employment
[C]   = [1-A], Leontief inverse matrix
[n]   = employment vector coefficient, i.e. employment input estimated from employment per unit of out-put in each sector

In this way, employment multiplier (ML) in each sector of the economy can be calculated based on the formula:

[ML] = [EL] / [n]

By combining analytical step (1) with analytical step (2), the vector of estimates of the demand for sectoral employment (19 sectors) can be obtained for Pelita V.

(3) From the analytical step (2) above, the vector of estimates of demand for sectoral employment can be multiplied with the IOM matrix, so that the projected demand for employment for each field and type of profession can be estimated.

(4) As in the analytical step (3), the vector of estimates of the demand for employment obtained in (2) is multiplied with the EOM matrix, so that the projected demand for employment by educational and type of profession can be obtained.

(5) The projection of employment based on education and employment sectors can be obtained by multiplying the result of analytical step (3) with the result of this analytical step (4).

(6) Analytical step (5) can be disaggregated to separated the graduates from SKPMA (SPP. and SMT/P), that can be performed by the analysis of proportion, so that the projection of the demand for employment of the graduates of the SKPMA can be obtained in the period of Pelita V.

Scenario Analysis

In the analysis of the demand for employment of SKPMA graduates and the association projection, two types of scenario analysis are used, namely:

(1) **Scenario 1:**

Analysis of the demand for employment assuming there is no segmentation in the employment market.

(2) **Scenario 2:**

Analysis of the demand for employment assuming perfect segmentation in the employment market.

Data and Parameter Needed

Data and parameter needed to do the analysis and make projections of the pattern of demand for and supply of employment of the graduates from SKPMA include basic data and the results of the study have been implemented within the national/macro model, namely:

(1) Data Matrix of Indonesia's Input-Output Tables 1971-1980 and 1985 published by CBS, especially for the 19 sector categories.

(2) IOM and EOM practices, resulting from study carried out by the Agency for Research and Development, Ministry of Education and Culture (1988), and cooperative study between Bappenas-Depdikbud-Depnaker-CBS (1987/1988).

(3) Statistical data on education, especially vocational high school education (Dikmenjur) and agriculture vocational education (SPP) from Diklatluh, Ministry of Agriculture.

(4) Miscellaneous statistical data on yearly employment published.

THE RESULT OF ANALYSIS AND DISCUSSION

Analysis of the Pattern of Supply of Employment

The result of the analysis of the available labor force graduated from the SKPMA based on the two models is shown in Table 1.

Table 1.   Analysis of supply of labor force graduated from SKPMA based on linear and exponential models

Regression output model	Linear model	Exponential
Constant	4,871.94	9.12
Std Err of Y Est	1,154.32	0.11
R Squared	0.7674	0.8754
No. of Observations	10.00	10.00
Degrees of Freedom	8.00	8.00
X Coefficient(s)	652.00	0.38
Std Err of Coef.	127.09	0.05

The exponential model is considered better to use in the projection, because the value of the coefficient of determination is higher compared with linear model.

From the above argument, the supply of labor force graduated from the SKPMA can be estimated in Pelita V (1989-1993), and through year 2000, shown in Table 2.

Table 2.   Supply projection of the labor force graduated from SKPMA in the period of Pelita V (1989-1993), an through year 2000

Projection	Supply of labor force (head)
1989	23,724
1990	23,488
1991	24,214
1992	24,905
1993	25,567
1994	26,310
1995	27,021
1996	27,331
1997	28,442
1998	29,152
1999	29,802
2000	30,573

Analysis of the Pattern of Demand for Employment

(1) Projection of Sectoral GDP Growth

Projection of sectoral GDP based on ISIC in the period of Pelita V using GDP data from the Analysis of Indonesia's Input-Output Table of 1985 (19 sectors classification) is presented in Table 3.

Table 3. Gross domestic product of Indonesia based on ISIC 19 sectors in 1985 and the associated rate of growth.

Sector	GDP 1985 (billion rupiahs)	Growth (%)
Rice	7,141.00	2.90
Other staples	7,469.00	2.90
Other crops	5,318.00	5.00
Livestock and products	4,874.00	4.70
Forestry	1,612.00	5.00
Fishery	2,133.00	5.00
Mining and quarrying	16,727.00	0.35
Food and beverage industry	16,514.00	7.13
Other industry	20,741.00	7.13
Oil refinery	10,638.00	0.35
Electricity, gas and drinking water	1,803.00	0.42
Construction	17,857.00	2.76
Trade	13,813.00	5.98
Restaurant and hotel	5,794.00	6.55
Transportation and communication	10,201.00	3.01
Monetary institution	8,099.00	1.96
Government and defense	6,375.00	6.55
Services	9,262.00	6.55
Other activities	53.00	6.55

Source: Computed from the Indonesia's Input-Output Table of 1985. For the rate of growth of GDP the data are taken from Budiono, *et al.* (1987) and Repelita V Agriculture.

(2) Projection of the Growth of Sector Employment

Analysis of the growth of sectoral employment based on ISIC classification in the period of Pelita V using Indonesia's Input-Output Table in 1980 and 1985 yield the expected values of sectoral employment (direct, indirect and induced), which used to obtain employment multiplier variable (ML). The result of the analysis is shown in the Appendix.

From the obtained values the coefficient of sectoral employment based on the 19 sector of ISIC can be determined. Further on, parameter values of the

Table 4. The growth of Gross Domestic Product of Indonesia based on ISIC 19 sectors in Pelita V (1989-1993), in billion rupiahs

Sector	GDP 1989	GDP 1990	GDP 1991	GDP 1992	GDP 1993
– Rice	7,347.83	7,554.91	7,761.99	7,969.08	8,176.16
– Other staples	7,685.69	7,902.30	8,118.90	8,335.50	8,552.11
– Other crops	5,583.61	5,849.50	6,115.38	6,381.27	6,647.16
– Livestock and products	5,102.58	5,331.64	5,650.69	5,789.75	6,018.80
– Forestry	1,692.71	1,773.32	1,853.92	1,934.53	2,015.14
– Fishery	2,239.59	2,346.24	2,452.88	2,559.53	2,666.18
– Minning and quarrying	16,784.91	16,842.62	16,900.33	16,958.04	17,015.75
– Food & beverage industry	17,691.18	18,868.00	20,044.81	21,221.62	22,398.44
– Other industry	22,218.90	23,696.89	25,174.89	26,652.89	28,130.88
– Oil refinery	10,674.52	10,711.22	10,747.92	10,784.62	10,821.32
– Electricity, gas and drinking water	1,810.28	1,817.94	1,825.59	1,833.25	1,840.91
– Construction	18,349.78	18,842.70	19,335.62	19,828.54	20,321.46
– Trade	14,639.59	15,465.77	16,291.95	17,118.13	17,944.31
– Restaurant and hotel	6,173.16	6,552.81	6,932.46	7,312.11	7,691.76
– Transportation and communication	10,508.13	10,815.38	11,122.63	11,429.88	11,737.13
– Monetary institution	8,258.12	8,417.11	8,576.10	8,735.08	8,894.07
– Government and defense	6,792.75	7,210.51	7,628.26	8,046.01	8,463.77
– Services	9,868.92	10,475.86	11,082.80	11,689.74	12,296.68
– Other activities	56.84	60.34	63.84	67.34	70.83

estimated coefficient of employment in Pelita V can be used as the basis for the estimation of the size of sectoral employment in Pelita V, using the projected GDP growth estimated earlier.

Further on, the vector of estimates of the demand for sectoral employment is multiplied by the IOM and EOM matrices (IOM) matrix × (EOM) matrix = ([EIM] matrix), resulting in the description of the demand projection for employment by sector and education. Specific for the estimation of employment of labor force graduated from SKPMA, the values of the coefficient matrices are disaggregated to obtain the coefficient for SKPMA. In this case it is assumed that the proportion of SKPMA graduates with respect to total Vocational High Schools is equal to the proportion of graduate population in 1986.

The result of the analysis of demand for employment of SKPMA graduates in Pelita V is presented in Table 5 and 6.

Table 5. The result of the analysis of employment projection of the Vocational Agriculture High Schools in Pelita V (1989-1993), and through year 2000, by sector of employment, scenario 1

Projection year	The demand for employment of SKPMA by graduates					
	TNP	NAK	KAN	BUN	IND	TOTAL
1989	3,498	161	113	434	2,206	6,412
1990	3,719	168	119	465	2,250	6,721
1991	3,968	176	125	498	2,290	7,057
1992	4,254	183	132	533	2,327	7,429
1993	4,588	191	138	569	2,362	7,848
1994	4,987	199	145	608	2,393	8,332
1995	5,478	207	152	648	2,423	8,908
1996	6,103	215	158	691	2,450	9,617
1997	6,934	222	165	736	2,475	10,532
1998	8,109	230	173	784	2,499	11,798
1999	9,923	238	180	835	2,522	13,698
2000	13,141	246	187	889	2,543	17,006

Note: TNP = Food crop (sector 01 and 02)
     NAK = Livestock subsector
     KAK = Fishery subsector
     BUN = Estate crop subsector
     IND = Non-oil industry subsector

Table 6. The result of the analysis of employment projection of the Vocational Agriculture High Schools in Pelita V (1989-1993), and through year 2000, by sector of employment, scenario 2

Projection year	The demand for employment of SKPMA by graduates					
	TNP	NAK	KAN	BUN	IND	TOTAL
1989	34,886	1,597	1,120	4,322	21,999	63,924
1990	37,086	1,673	1,182	4,635	22,437	67,013
1991	39,571	1,749	1,245	4,965	22,838	70,368
1992	42,421	1,825	1,309	5,311	23,207	74,073
1993	45,753	1,902	1,375	5,674	23,548	78,252
1994	49,736	1,979	1,441	6,057	23,863	83,076
1995	51,502	2,052	1,508	6,461	24,156	85,684
1996	57,162	2,132	1,576	6,887	24,429	92,189
1997	69,147	2,212	1,646	7,338	24,683	105,027
1998	80,867	2,292	1,716	7,816	24,920	117,611
1999	98,957	2,372	1,788	8,322	25,143	138,581
2000	131,053	2,442	1,861	8,860	25,353	169,578

Note: TNP = Food crop (sector 01 and 02)
     NAK = Livestock subsector
     KAK = Fishery subsector
     BUN = Estate crop subsector
     IND = Non-oil industry subsector

Table 5 shows that without segmentation in the employment market (Scenario 1) the pattern of the demand for employment of SKPMA graduates is relatively low, namely between 6412 up to 7848 in Pelita V, and 17,006 by the year 2000. These demand figures are lower than with the projected supply (Table 2) number of graduates of SKPMA in Pelita V and through the year 2000.

The result of the analysis shown in Table 6 suggest that relatively high employment pattern when market segmentation of the demand for SKPMA graduates is assumed to be perfect (Scenario 2), meaning that there will be an excess demand. Excess demand means that the number of graduates of SKPMA should be increased to meet the higher demand in Pelita V and through the year 2000.

One measure of the real rate of adjustment toward specialization on the labor force was done in 1987 by Bappenas, Depdikbud, Depnaker and CBS. From 1985 data, it was determined that the rate of segmentation or adjustment of the labor force to specialization was 11.5 percent for that year. Taking 11.5 as an annual rate and projecting it forward the following demand for employment of vocational technical graduates appears. This projection would suggest that perfect segmentation could occur as early as 1994.

Table 7. The result of analysis of employment projection of the Vocational Agriculture High Schools in Pelita V (1989-1993), and through year 2000, according to real segmentation of labor market

Projection year	The demand for employment of SKPMA by graduates					
	TNP	NAK	KAN	BUN	IND	TOTAL
1989	15,699	719	504	1,945	9,000	28,766
1990	20,861	941	665	2,607	12,621	37,695
1991	26,710	1,181	840	3,351	15,416	47,498
1992	33,407	1,437	1,031	4,182	18,276	58,332
1993	41,178	1,712	1,238	5,107	21,193	70,427
1994	49,736	1,979	1,441	6,057	23,863	83,076
1995	51,502	2,057	1,508	6,461	24,156	85,684
1996	57,162	2,135	1,576	6,887	24,429	92,189
1997	69,147	2,213	1,646	7,338	24,683	105,027
1998	80,867	2,292	1,716	7,816	24,920	117,611
1999	98,957	2,371	1,788	8,322	25,143	136,581
2000	131,053	2,451	1,861	8,860	25,353	169,578

Note: TNP = Food crop (sector 01 and 02)
   NAK = Livestock subsector
   KAK = Fishery subsector
   BUN = Estate crop subsector
   IND = Non-oil industry subsector

CONCLUSION, POLICY IMPLICATION AND SUGGESTION

From the result of the analysis and the discussion above, assuming no segmentation in the employment market, it appears the excess supply of SKPMA graduates if predicted to occur in Pelita V. Conversely, assuming perfect segmentation of the employment market, excess demand is predicted to occur, real adjustment of the labor market to greater specialization will be in the direction of perfect segmentation which should occur sometime in Repelita VI.

From this situation it is obvious that to enhance employment of the graduates of the SKPMA, a set of policies is needed, both in the government as well as in the private sector, to ensure segmentation in the labor force. Such Policies included the need to create job placement facilities in the formal manpower sector and encourage practices aimed at hiring the most qualified person for the job. In this way, employment opportunities generated will be fully enjoyed by those people who have the relevant vocational/technical skills. Without this policy, the pressure to promote the growth of employment of the SKPMA graduates will remain weak, unable to maintain full employment.

Policy suggestion to promote the growth of employment of the vocation and agriculture graduates are:

(a) formal labor market, should be effectively to promote a specify labor supply of vocation and agriculture high school graduates.

(b) small scale industries or government services should be follow the principle "the right man on the right job".

(c) the curricula of the vocation and agriculture high schooll should be pressure on working ability of the student, e.g. they have ability to self efforts.

In that way, employment opportunities generated will be fully enjoyed by those having the appropriate skill in agreement with the skill obtained in the respective vocational schools.

REFERENCES

Bappenas, Depdikbud, Depnaker and CBS. 1987. Studi Mengenai Kesesuaian Antara Suplai dan Kebutuhan Tenaga Kerja (Persiapan Penyusunan Repelita V).

Budiono. 1988. Menjelang Pembangunan Jangka Panjang Duapuluh Lima Tahun Kedua, 1993-2018. Pusat Informatika, Balitbang Depdikbud.

CBS. 1985. Indonesia's Input-Output Table 1980.

CBS. 1989. Indonesia's Input-Output Table 1985.

Ministry of Agriculture. 1988. Repelita V Pertanian.

Pusat Informatika, Balitbang Depdikbud. 1988. Aplikasi Model Proyeksi Pendidikan dan Tenaga Kerja Tingkat Nasional.