THE RATE OF RETURN TO INVESTMENT IN EDUCATION: A CASE STUDY OF POLYTECHNIC DIPLOMA GRADUATES

by

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ABSTRAK

Kajian ini bertujuan untuk mendapatkan kadar pulangan pelaburan dalam pendidikan dari aspek Teori Modal Insan. Objektif kajian ialah mengenalpasti jumlah kos dan jumlah keberuntungan yang terlibat dalam program pendidikan ini untuk pengiraan kadar pulangan pelaburan dalam pendidikan dari dua aspek; kadar pulangan pelaburan persendirian dan kadar pulangan pelaburan sosial. Dengan menjalankan Analisa Kos-Keberuntungan (Cost-Benefit Analysis) dengan menggunakan pendekatan 'Ingredients Method', Nilai Terbersih Semasa dicari dan seterusnya Kadar Pulangan Pelaburan diperoleh. Sampel kajian terdiri dari para graduan politeknik pada peringkat diploma dalam pengkhususan Kejuruteraan. Dengan mengaplikasikan teknik persampelan 'snowballing', seramai 292 responden telah berjaya diperoleh. Dapatan kajian mendapati bahawa kadar pulangan pelaburan pendidikan bagi graduan politeknik di peringkat diploma ialah 14.0 peratus bagi kadar pulangan persendirian manakala 13.0 peratus bagi kadar pulangan sosial. Manakala kadar pulangan bagi graduan politeknik yang bekerja di sektor swasta adalah 7 dan 8 peratus bagi kadar pulangan persendirian dan kadar pulangan sosial. Kadar pelaburan yang bagi graduan politeknik yang bekerja di sektor awam menunjukkan kadar pelaburan 5 dan 6 peratus bagi kadar pulangan persendirian dan kadar pulangan sosial. Kadar pelaburan bagi graduan politeknik perempuan menunjukkan kadar pulangan yang lebih baik berbanding dengan lelaki samada bagi kadar pulangan persendirian mahupun kadar pulangan sosial di antara 4 hingga 8 peratus. Secara amnya, berdasarkan dapatan kajian ini mendapati bahawa pelaburan pendidikan di politeknik pada peringkat diploma adalah memberangsangkan jika kadar pulangan persendirian ini dibandingkan dengan kadar faedah simpanan peribadi. Kesimpulan yang sama juga menunjukkan bahawa prospek pelaburan pendidikan di politeknik pada peringkat diploma masih memberangsangkan bagi tahun 2006.

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ABSTRACT

The research is to obtain for the rate of return to investment in education based on Human Capital Theory. The objective of this study is to estimate the total cost and the total benefit involved in polytechnic education system in order to count for the rate of return in two aspects; the private rate of return and the social rate of return to investment in education. By using the Cost-Benefit Analysis (CBA) streaming to the Ingredients Method, the Net Present Value (NPV) could be found and so is the Internal Rate of Return (IRR). The study samples are from the polytechnic diploma graduates majoring in engineering. By utilizing snowballing sampling technique, 292 respondents have successfully gathered. The findings showed that the rates of return to investment in education to polytechnic diploma graduates are 14.0 per cent for the private rates of return and 13.0 per cent for the social rates of return. Meanwhile, the rates of return for diploma polytechnic graduates who are working in the private sector are 7 and 8 per cent for the private rate and the social rate respectively. The rates of return for diploma graduates who are employed in the pulic sector showed that the rates are 5 and 6 per cent for the private rate and the social rate. The rates of return for female diploma polytechnic graduates are better than the male graduates either for the private or the social rate in between 4 to 8 per cent. Generally, the findings indicated that the investment in polytechnic diploma education is still viable and could be one of the favorable personal choices of investment. The findings proved that the return to investment in education for polytechnic diploma program is fairly attractive and socially profitable for 2006.

CHAPTER 1

INTRODUCTION

1.0 Introduction

It is common that development is directly associated with education. Developing nations believe that there is a positive correlation between development and education by relating development with economic growth and education with human resources. The economists believe that education and human resource development must be integrated in any strategy aimed at promoting economic development (Low & et. al., 1991; Mc Connell & et. al., 2006) and every country, without exception is committed to economic growth (Vaizey, 1967; Laitner, 2000).

Most economists and educationists agree that the educational system has an important role in supplying human resource for economic growth. Harbison (1964) and Abdul Rahim & et. al. (2005) view that human resource development as a process of increasing knowledge, skills and capacities of people in society. In economic terms, it is the accumulation of human capital and its effective investment that contributed to the economic development. Generally, a nation's economic growth depends largely upon its productive labor market generated from its human resource factor which is produced by quality educational system.

Most countries realize that quality educational system is an essential investment towards development through public budgetaries and development planning policies. In 2005 and 2006, Malaysia has spent 5.35 and 5.15 per cent of its Gross National Product (GNP) on education respectively (Ministry of Education, 2006). It is significant to note that the government development allocation for education and training has shown an increasing pattern over decades in Table 1.1 from the First Malaysia Plan until the Ninth Malaysia Plan (1966 – 2010). It is visible that higher and secondary educations are among major concentrations in education development in the Plans. The revised allocation of RM45.2 billion accounts for 25.0 per cent of the

total development allocation of the Ninth Plan indicates the precedence given by the government in its effort to achieve a knowledge-based economy through human resource development.

Lee (1983) states that education as a mean to upgrade society through present powerful and well-planned education. While, undertaking education is an investment where it incurs cost during the process rather than benefits that extends over lengthy future periods. These costs are expected for its larger potential return in the future (Mincer, 1962; Becker, 1958, 1964, 1966, 1975, 1993; Schultz, 1961, 1962, 1963, 1966).

The decision to invest in human capital is assumed to be a function of the expected cost of education, the expected benefits of education, and the expected time frame of benefits that will be received. Thus, a fully informed rational individual will make the decision to invest in additional education when there is foreseeable rate of return. The increased earnings following investments in education are the fundamental components of analysis for human capital theory.

The rate of return to schooling is a powerful tool of educational decision making since it calculates how much the return from the investment made. For example, individuals can compare the rate of return with the rate of interest to decide whether it is a good investment, and society can weigh the social rate of return with other possible uses of funds.

The objective of the study is to provide new estimates of the private and social rate of return for polytechnic diploma graduates. Knowing the rate of return is valuable for several reasons. First, for an individual, information on the private rate of return is helpful in assessing whether it is efficient to opt for extra education. Second, for policy-makers with scarce resources to allocate between competing policies, the social rate of return to education provides an instrument in determining the relative value in providing extra funds for education. Third, the process of calculating the rate of return itself can

provide important information on the main determinants of the return to investment in education.

Table 1.1 Federal Government Development Allocations to Education and Training (RM Million)[1]

Program	1st MP	2nd MP	3rd MP	4th MP	5th MP	6th MP	7th MP	8th MP	9th MP[2]
Education	**-**	**558.4**	**1,815.8**	**3,483.2**	**5,621.7**	**6,982.1**	**17,542.6**	**37,922.0**	**40,356.5**
Pre-School	-	-	-	-	0	58.0	107.5	215.7	807.3
Primary Education	74.7	117.3	379.1	665.4	800.3	1,127.1	2,631.8	5,369.3	4,837.3
Secondary Education	232.1	198.3	521.5	818.2	1,764.6	1,909.0	5,317.5	8,748.1	6,792.8
Government & Government-aided Schools	na	na	na	na	1,011.4	1,475.4	3,853.7	7,931.2	5,549.1
Mara Junior Science Colleges	36.5	45.5	48.0	na	64.6	28.7	707.2	4,33.1	614.5
Technical & Vocational Schools				278.4	688.6	404.9	756.6	383.8	629.2
Higher Education	30.0	119.3	643.1	1,372.7	2,604.6	3,039.4	5,005.5	13,403.9	16,069.0
Teacher Education	31.9	9.0	112.1	149.0	229.0	155.6	332.5	1,368.1	577.7
Other Educational Support Programs		69.0	112.0	199.4	223.1	693.0	4,147.8	8,816.9	11,272.4
Training		**174.7**	**330.5**	**1,082.6**	**355.0**	**581.0**	**2,181.9**	**4,450.9**	**4,792.6**
Industrial Training	**35.6**	*	*	*	322.3	370.0	1,827.0	3,930.6	4,103.6
Commercial Training		*	*	*	8.0	14.0	71.2	158.6	179.5
Management Training		*	*	*	16.7	197.0	283.7	361.7	509.5
TOTAL	**440.8**	**733.1**	**2,146.3**	**4,565.8**	**5,976.7**	**7,563.1**	**19,724.5**	**42,372.9**	**45,149.1**

Note: [1] Based on the revised allocation.
[2]Based on the original allocation.
- Not available.
** Due to not clearly categorised, the figure is taken as in its original total.*
Source: Various Mid-Term Malaysia's Plans from 1st Malaysia Plan to 9th Malaysia Plan.

1.1 Malaysia Education and Training System

The Razak Report of 1956 and the Rahman Talib Report of 1960 had led to the very 'owned-Malaysia' school system which is currently in used (Appendix 1, 2 and 3). This evolution has forced the government or the public sector to borne the total cost of education. More recently, however, there has been a steady rise in private education, especially at the post-secondary and tertiary levels.

Generally, the curriculum is aimed to develop a trainable workforce with basic skills in spite of its objectives of nation building. It is designed to equip school-leavers with basic foundation in mathematics, communicative English proficiency, manipulative skills and science and technology which are also emphasized. The education system is guided by broader national objectives while skills training are primarily focused to meet immediate needs of the rapid changing economy. Nonetheless, the school curriculum is revised from time to time to keep pace with the changing national goals and aspirations of building a modern industrial economy.

Present technical education and skills training are classified into three categories which are the public training institutions, private training institutions and other training institutions. Public training institutions are supervised by a few ministries such as the Ministry of Human Resources (MoHR), the Ministry of Higher Education (MoHE), the Ministry of Youth and Sports (MoYS) and the Ministry of Entrepreneurship Development and Cooperative (MEDC). Demand for skilled labors is emphasized in The Third Outline Perspective Plan (OPP3) which reports that there will be a significantly high enrolment and output for diploma and certificate courses from local public training institutions from 1990 – 2010. In the Eighth Malaysia Plan, the enrolment for diploma and certificate levels from these institutions has amounted to 236,873 students while the output for the period of 2004 -2005 was 72,072 graduates.

Hence, education and training system are not only a basic social service but also must be effectively channeled to produce skilled and productive manpower technically. Concomitantly, the appropriate infrastructure of training facilities and institutions, training delivery systems and mechanisms as well as suitable educational programs in both public and private sectors are to meet global competitiveness and challenges in tandem with Vision 2020.

1.2 Problem Statement

During the education process, an individual incurs tuition costs and forgoes some income while society incurs the full cost of the education and any lost output while the individual is being educated. The benefit is a result of expected higher earnings during the individual's subsequent period in the workforce. The individual starts working and get paid for a job acquired. The benefits are gained after incurring some amount of costs earlier during the study period.

For a rationale individual, knowing the cost of education incurred during the study period is crucial as this involves how much money the individual is willing to spend. The decision of either opting for extra education or to enter the labor market early is presumably made by a rationale and well-informed individual by weighing the costs incurred during the study period and the benefits gained in the future employment.

There are tremendous studies of rate of return to investment in education done by researchers abroad concerning various levels of education. However, there are not many rates of return studies by local researchers especially in the area of polytechnic education. Many studies focus more on other tertiary level of education than diploma in polytechnics and the researcher feels that the groups of polytechnic graduates has to be given ample attention. Moreover, polytechnic education and its institution have started almost over forty years ago and are among well-established public higher institutions in Malaysia.

This study seeks to find the total cost and benefit for the three-year study period of polytechnic diploma graduates for 2006. Then the rates of return could be determined to find the 'profitability' value of taking up this extra education instead of joining the labor market early.

This research is not only to find the rates of return to investment in education for diploma polytechnics graduates but also to analyze the viability of the program as a whole. Specifically, the value of private rate of return will reflect how a better-informed

individual could make a rational decision making of pursuing additional education or end up being employed earlier. Generally, the value of the social rate of return of this study is to test the viability of such program against other competing uses of limited funds and resources for the government as well as for the society.

1.3 Significance of the Research

1.3.1 Education and Training in Malaysia

This study is to focus on the rate of return to investment in education with the emphasis on the public training program via polytechnic program in Malaysia (Appendix 4 to Appendix 7). The studies on rates of return among others are for SPM technical and academic school leavers by Abdul Samad (2004), diploma holders for engineering and business courses in private institutions (Ooi, 2004) and university and postgraduates (Lim, 2006). This study is hoped to give a complete picture of rates of return studies in Malaysia and thus could provide useful information not only to better inform decision makers on the output of students from the program but also to the students themselves, parents, the society and international investors as well.

This study is found to be significant as our previous Prime Minister has laid out the challenges and needs to be faced by our education and training system in his paper on Vision 2020:

> *"It is blindingly clear that the most important resource of any nation must be the talents, skills, creativity and will of its people. What we have between our ears, at our elbows and in our heart is much more important than what we have below our feet and around us. Our people are our ultimate resource. Without a doubt, in the 1990s and beyond, Malaysia must give the fullest emphasis to the development of the ultimate resource."*
> and
>
> "*The task of technical and vocational educator and trainers will be to provide the country with the necessary workforce to become a developed, industrialized country."*
>
> (The Way Forward, 1991)

Polytechnic is among the largest public educational institutions that produce skilled workers at diploma level. Skilled workers who are mostly the outcome of

Technical and Vocational Education and Training (TVET) system have placed the system under tremendous pressure since it is relatively new. In terms of the availability of relevant skilled labor, Malaysia was ranked 33rd among 47 countries in the World Competitiveness Yearbook 2000 (Government of Malaysia, 2005). Malaysia was ranked lower than Hong Kong (which is in the 31st place), Taiwan (18th place), India (12th place) and Singapore (8th place).

Malaysia is to be sufficient with its technical manpower to support its growth and future development as well as to continuously upgrade the education and skill levels of the work force. The work force has to be sensitive with the dynamic aspects of global technological innovation and product-driven competitiveness so that they are more secured. It is important to note that a more-educated, better-trained person is capable of supplying a larger amount of useful productive effort than one with less education and training (McConnell & et. al., 2006). Thus, continuous education, training and retraining will be crucial in keeping the work force fully employed.

Generally, this study is helpful in informing the policy makers, educators and administrative officers on the importance of preparing the youths with various backgrounds of curriculum content and maximizes their chances for a career success via skill building in which is acquired through formal education.

1.4 Rationale of the Research

1.4.1 Education and Training in Malaysia: Critical Issues and Problems

The government realizes that the nation is still in critical shortage of scientific and technical manpower as to be a knowledge-based country. It is reported in the Third Outline Perspective Plan (OPP3) that even though the overall level of educational attainment shows an improvement, the percentage of those with tertiary education in the labor force is still low with 17.5 per cent as shown in Table 1.2. If the enrolment of the age cohort of 17 – 23 years old of tertiary education is compared to other newly industrialized economies (NIEs), Malaysia is the 10th country in the rank as shown in

Appendix 8. The OPP3 also indicates that the enrolment in science and technology fields also signifies the critical situation faced by the manpower supply in these areas with total enrolment of students for these fields which only constitutes of 31 per cent in 1999 (Government of Malaysia, 2005).

Table 1.2 Educational Attainment of the Labor Force, 1990 – 2003 ('000 persons)

Level of Education	1990	%	2000	%	2003	%
Primary	2,380.2	33.8	2,607.9	27.4	2,252.1	22.7
Lower & Middle Secondary	4,042.1	57.4	5,571.8	58.7	5,631.8	55.0
Tertiary	619.7	8.8	1,319.3	13.9	1,791.9	17.5

Source: Government of Malaysia (2005).

The Plan indicates that the growth of the labor force is due to the increase in the size of the working-age population and in the labor force participation rate (LFPR) from 65.5 per cent in 2000 to 68.1 per cent in 2010. It is expected that the labor force will be better educated with the contribution of 35 per cent of them attaining the tertiary education as shown in Appendix 9.

Table 1.3 Employment by Sector, 2000-2010 ('000 persons)

Sector	*2000*	*%*	*2010*	*%*	*Average Annual Growth Rate (2000-2010)*	*Net Job Creation*	
						'000	**%**
Agriculture, Forestry, Livestock & Fishing	1,407.5	15.2	1,231.0	9.8	-1.3	-176.5	-5.3
Mining & Quarrying	41.2	0.4	41.8	0.3	0.1	0.6	0.0
Manufacturing	2,5583.3	27.6	3,833.3	30.4	4.1	1,275.0	38.2
Construction	755.0	8.1	1,012.4	8.0	3.0	257.4	7.7
Electricity, Gas & Water	75.0	0.8	99.2	0.8	2.8	24.2	0.7
Transport, Storage & Communications	461.6	5.0	669.7	5.3	3.8	208.1	6.2
Wholesale & Retail Trade, Hotels & Restaurants	1,584.2	17.1	2,159.7	17.1	3.1	575.5	17.2
Finance, Insurance, Real Estate & Business Services	508.7	5.5	775.9	6.2	4.3	267.2	8.0
Government Services	981.0	10.6	1,206.3	9.6	2.1	225.3	6.8
Other Services	898.7	9.7	1,582.0	12.5	5.8	683.3	20.5
Total	**9,271.2**	**100.0**	**12,611.3**	**100.0**	**3.1**	**3,340.1**	**100.0**

Source: Government of Malaysia (2005).

In addition, it is expected that the demand for workers in Malaysia will increase at an average rate of 3.1 per cent per year with the expected rapid Gross Domestic Product (GDP) growth from 2001 to 2010 to suit with an increase in employment from 9.3 million in 2000 to 12.61 million in 2010 as shown in Table 1.3. Thus, the demand of workers is "averagely" matched with the supply of the expected labor force in 2010 of 12.94 million.

Manufacturing sector is the largest sector of the skilled labors that shows a slower employment growth due to the improved capital-labor ratio and efficiency in the production process. The growth in this sector will grow at the average of 4.1 per cent per annum, increasing from 2.6 million in 2000 to 3.8 million in 2010. This will constitute 38.2 per cent of total employment generated in 2010. The demand will focus more on the highly skilled labor as the sector move towards higher value-added products and capital intensity. Thus, from 2005 to 2010, Malaysia has to generate sufficient skilled labor force to support its expected fast-growing pace of the economy.

In occupational composition view, it is reported in OPP3 that the nation's growth and development of the economy will be stimulated by the knowledge-based industries in all sectors especially in manufacturing and services. This is believed to draw some changes in the pattern of the demand for manpower.

Professional, technical, administrative and managerial workers categories will be the fastest growing occupations as shown in Table 1.4. These categories will account for 32.2 per cent of the new jobs created during the period. Table 1.5 shows that 137,240 engineers and 331,700 engineering assistants from chemical, mechanical, electrical and electronics fields will be needed (Government of Malaysia, 2005). It is suffice to say that the demand for technical manpower to support the country's high-technology growth is seen as critical and crucial.

Table 1.5 shows that in the employment by the selected occupation, technical manpower are mostly denoted by engineering assistants which is in great demand in 2010. The calculated stock of labor force for technical manpower in 2000 is 139,066

assistant engineers with the highest net increase. The output is estimated at 296,658 of assistant engineers during the period of 2001 to 2010.

Table 1.4 Occupational Structure, 2000-2010 ('000 persons)

Occupational Group	*2000*	*%*	*2010*	*%*	*Net increase 2001-2010 ('000)*	*%*	*Average Annual Growth Rate (%) 2001-2010*
Professional & Technical Workers	1,019.9	*11.0*	1,790.8	*14.2*	770.9	*23.1*	*5.8*
Administrative & Managerial Workers	389.4	*4.2*	693.6	*5.5*	304.2	*9.1*	*5.9*
Clerical & Related Workers	1,029.1	*11.1*	1,412.5	*11.2*	383.4	*11.5*	*3.2*
Sales Workers	1,019.7	*11.0*	1,526.0	*12.1*	506.3	*15.2*	*4.1*
Services Workers	1,094.0	*11.8*	1,589.0	*12.6*	495.0	*14.8*	*3.8*
Agricultural, Animal Husbandry & Forestry Workers, Fishermen & Hunters	1,678.1	*18.1*	2,055.6	*16.3*	377.5	*11.3*	*2.1*
Production & Related Workers	3,041.0	*32.8*	3,543.8	*28.1*	502.8	*15.0*	*1.5*
Total	**9,271.2**	***100.0***	**12,611.3**	***100.0***	**3,340.1**	***100.0***	***3.1***

Source: Government of Malaysia (2005).

It was estimated that about 27,000 diploma holders have been supplied per annum for 2001-2005. This semi-skilled category comprised mostly of technicians and supervisors. The supply of these process workers of technical manpower at certificate level was at 20,000 per annum between 2001 and 2005 (also in Table 1.6) (Ministry of Human Resources, 1995).

According to Dr. Fong Chan Onn at ASLI Conference, he asserted that the demand for knowledge-workers comprised of just over 40 per cent of the 65,000 workers employed in approximately 700 projects which worth RM17 billion that had been approved by MIDA in 1999. (Skilled workers, as determined by MIDA, refer to factory workers who have received formal training either on the job or in an institution.) The 40 per cent estimate is based on the existing production economy and 80 per cent based on OECD countries for new jobs that require k-workers. Malaysia's future k-workers demand is between these two figures (www.epu.gov.my).

It is implied that the needs for semi-skilled technical manpower that is fluid and flexible enough to respond to the dynamic technology and markets in a globalised economy is crucial. It is also critical for the government to make sure that education and training system is able to effectively monitor and quickly respond to market signals in determining Malaysia's continuous competitiveness.

Table 1.5 Employment by Selected Occupation, 2000-2010 ('000 persons)

Occupation	*Stock 2000*	*Employment 2010*	*Net Increase*	*Output (2001-2010)*	
				Public	*Private*
Engineers	**64,376**	**201,615**	**137,239**	**122,651**	**6,967**
Civil	18,828	33,411	14,583	25,008	-
Electrical & Electronics	19,149	64,974	45,825	38,858	6967
Mechanical	14,620	45,887	31,267	32,255	-
Chemical	2,888	29,418	26,530	26,530	-
Others	8,891	27,925	19,034	n.a	n.a
Engineering Assistants	**139,066**	**470,810**	**331,744**	**296,658**	**36,067**
Civil	23,436	100,233	76,797	65,728	11,069
Electrical & Electronics	59,412	194,922	135,510	110,512	24,998
Mechanical	45,473	137,661	92,188	102,104	-
Chemical	1,703	14,074	12,371	18,314	-
Others	9,042	23,920	14,878	n.a	n.a
Medical & Health Professionals	**21,270**	**45,878**	**24,068**	**11,748**	**12,860**
Medical Officers, Physicians & Surgeons	16,468	35,514	19,046	8,105	10,941
Dental Surgeons	2,001	5,073	3,072	1,393	1,679
Pharmacists	2,801	5,291	2,490	2,250	240
Allied Health Professionals	**45,052**	**147,405**	**102,353**	**55,907**	**46,446**
Physiotherapists & Occupational Therapists	413	3,947	3,534	1,490	2,044
Radiographers	645	2,307	1,662	1,225	437
Medical & Lab. Me. Assts	7,334	20,422	13,088	9,952	3,136
Dental Paramedics & Auxiliary	3,537	8,191	4,654	3,819	835
Pharmaceutical Assts.	2,205	5,796	3,591	1,195	2,396
Nurses	29,369	101,366	71,997	36,729	35,268
School Teachers	**298,083**	**369,756**	**71,673**	**67,911**	**0**
Pre-School	34,271	61,911	27,640		-
Primary School	154,920	177,599	22,679	38,941[1]	-
Secondary School	108,892	130,246	21,354	28,970	-

Note: [1] Output include both pre-school and primary school teachers.
Source: Government of Malaysia (2005).

Table 1.6 Output of Skilled and Semi-Skilled Manpower by Course, 2000-2005
(persons)

Course	2001			2005			Average Annual Growth Rate (%) 2001-2005	
	Public	**Private**	**Total**	**Public**	**Private**	**Total**	**Public**	**Private**
Engineering	17,254	9,730	26,984	28,965	17,337	50,272	*6.7*	*31.6*
Mechanical	9,468	2,232	11,700	18,648	4,866	23,514	*32.7*	*37.16*
Electrical	7,364	7,378	14,742	9,685	12,221	25,875	*13.6*	*24.7*
Civil	422	120	542	632	250	882	*19.9*	*35.1*
Building Trades	1,966	547	2,513	2,600	1,200	3,800	*13.9*	*37.4*
Information & Comm. Technology	784	7,520	8,304	2,167	11,844	11,541	*46.9*	*22.3*
Others	2,864	92	3,792	3,674	2,730	4,904	*12.4*	*93.5*
Skills Upgrading	2,893	n.a	2,893	4,651	n.a	4,651	*23.3*	*n.a*
Total	**25,761**	**18,725**	**44,486**	**42,057**	**33,111**	**75,168**	***21.18***	***40.25***

Source: Mid-Term Review of the 8th Malaysia Plan, 2001-2005.

1.5 Research Objectives

The general objective is to estimate the return to investment for polytechnic diploma graduates. This is derived by calculating for the cost incurred and the benefits gained by the graduates. Knowing the costs and the benefits for the graduate leads to estimating the private rate of return (PRR) and knowing the costs and benefits for the society is trivial in estimating the social rate of return (SRR). Specifically, the objectives are:

a) to estimate and analyze the total cost study of the polytechnic diploma graduates;

b) to estimate and analyze the amount of benefits of the polytechnic diploma graduates;

c) to estimate and analyze the net present value of the total cost and the benefits for the polytechnic diploma graduates;

d) to analyze how the rate of return changes based on different assumptions of

e) discount rates;

f) to estimate the Internal Rates of Return (IRR);

g) to estimate and analyze the private and social rate of return for polytechnic diploma graduates on male graduates and female graduates;

h) to estimate and analyze the private and social rate of return for polytechnic diploma graduates of engineering field and

i) to estimate and analyze the private and social rate of return for polytechnic diploma graduates who are currently working either in public or private sector.

1.6 Research Questions

This study is to find the rates of return to investment in education for polytechnic diploma training program. This study questioned specifically on the rates of return to investment for polytechnic diploma graduates. Currently, there are 20 polytechnics in Malaysia. Enrolments and graduates from polytechnics have shown significant

increase over time. What are the importance of this institution to our nation's economic plan for development and future growth? Why the government invests heavily in polytechnics? What are the factors that contribute to the decision made by students and parents to further studying in polytechnics? The most important question is what are the returns to polytechnics diploma graduates?

The research questions are:

a) What are the direct private costs for polytechnic diploma graduates?

b) What are the forgone earnings for polytechnic diploma graduates?

c) What are the direct benefits of polytechnic diploma graduates?

d) What are the average tax deductions applicable to polytechnic diploma graduates?

e) What is the present amount of costs for polytechnic diploma graduates?

f) What is the present amount of benefits of polytechnic diploma graduates?

g) What are the relationships between the IRR and the discount rates?

h) What are the private rates and the social rates of return for male polytechnic diploma graduates?

i) What are the private rates and the social rates of return for female polytechnic diploma graduates?

j) What are the private rates and the social rates of return for polytechnic diploma graduates in engineering field?

k) What are the private rates and the social rates of return for polytechnic diploma graduates working in the public sector or the private sector?

1.7 Conceptual Framework

Figure 1.1 shows a design framework in a diagrammatic concept from Table 1.7. The design framework and the tabilized framework are similar conceptually. The conceptual framework highlights the details of how this study will be conducted analytically; by finding the cost and the benefit of the polytechnic diploma graduates.

The sum of the foregone earnings and the out-of-pocket costs is Mr. A's investment in diploma education. As shown in Figure 1.1, Mr. A's earnings do not immediately equate Mr. B's since Mr. B has been receiving informal training during the time. It is also possible that Mr. A's diploma education commands a higher earning than Mr. B as soon as Mr. A's enters the labor force. After Mr. A enters the labor force for sometime, his earnings exceeds Mr. B's and remains higher for the rest of his working life. The difference in the area lying below Mr. A's profile and the area above Mr. B's to the right of the intersecting point is the gross return on diploma education.

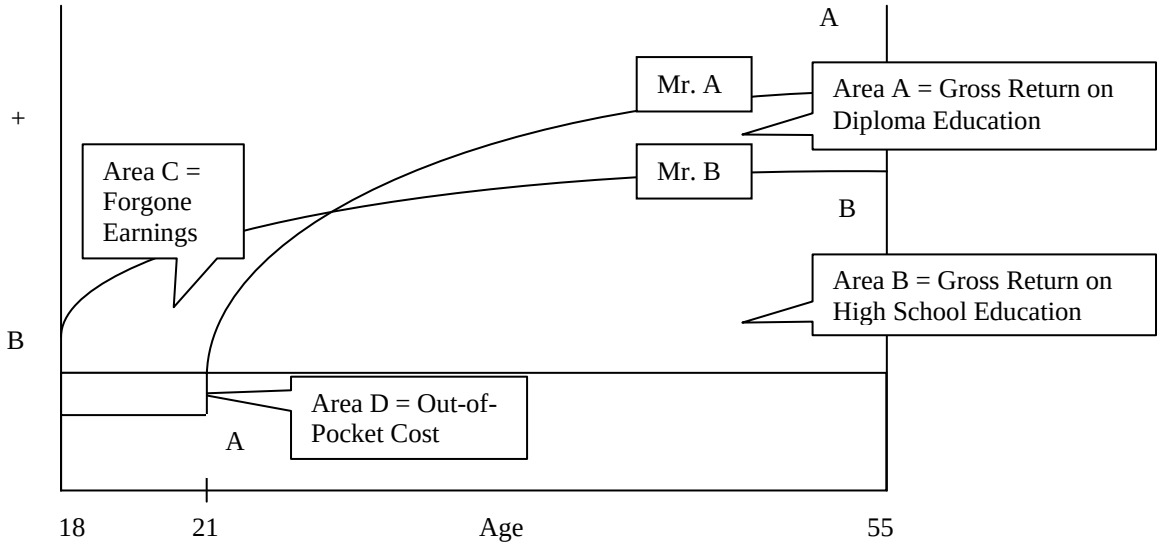


Figure 1.1 Age-income Profile for High School and Diploma Graduates

AA = Income profile for Mr. A when entering work after diploma education
BB = Income profile for Mr. B when entering work after high school education
Area A = Gross return on High School Education
Area B = Gross return on Diploma Education
Area C = Foregone earnings
Area D = Out-of-pocket costs

There are two principal methods of deciding from the age-earning profiles in Figure 1.1, whether investment in diploma level is economically productive. If Mr. A can obtain a loan to finance his education at a known interest rate, both costs and gross returns can be discounted back to age 18 at this interest rate in order to calculate the present value of the investment at that age. In choosing between the two investments programs, an individual who seeks to maximize the economic return on his investment will choose the program with the highest present value. An investment

program might consist of entering the labor market after graduating from high school or after completing three years of diploma education instead.

Rationally, the decision is based on the cost comparison (areas C and D) with benefits (area A or B). However, the costs and benefits associated with investing in additional education accrue at different points in time means that money expanded and received at different points in time are of different values. This requires that these costs and benefits be compared in terms of a common point in time, such as the present. It is crucial to determine the net present value discounted value until the age of 18, or by taking both the present time and future costs and also the present and future benefits of an additional education (McConnell & et. al., 2006). The net present value (NPV) formula is:

$$V = \sum_i \frac{YA_i - YB_i}{(1+r)^i - 18}$$

where:

V	*= is the present value at age 18*
r	*= is the interest rate*
YA (YB)	*= is the earnings or cost in a particular year for Mr. A (or Mr. B)*
i	*= is age*

The sufficient condition for using the NPV analysis is that the investment in diploma education will be economically advantageous if, and only if, the net present value, *V* is positive or greater than zero (Low & et. al., 1991; McConnell & et. al., 2006). Tsang (1988, 1994) noted that the cost-benefit comparison in education is used to assess the external efficiency of education and it has received a conceivable treatment over the period of years across countries theoretically as well as methodologically (Psacharopoulos & Woodhall, 1985; Psacharopoulos, 1973, 1981, 1987, 1993; Psacharopoulos & Patrinos, 2002). The cost-benefit studies compare educational benefits with its educational costs (Becker, 1964; Mincer, 1974; Schultz, 1962). This will lead to the private rates of return and the social rates of return.

1.7.1 The Design Model

Table 1.7 shows a conceptual framework of how this study will be conducted. It starts with determining respondents of diploma graduates from polytechnics against the high school graduates. The main purpose is to find the cost during the study period of high school and diploma graduates. However, this study is able to conduct the survey for the diploma graduates while the cost data from high school graduates are obtained from past studies and official documents.

The cost that needs to be estimated is the out-of-pocket cost that encompasses the forgone earnings. The forgone earnings are estimated from high school graduates earnings data that enrolled in the labor market three years earlier than the diploma graduates. This is referred to as the opportunity cost for diploma graduates for taking on additional education instead of working at age 18 to 20. This covers the direct cost or the private cost by students and the parents while they are studying in polytechnics. The public cost is also to be calculated for in terms of institutional cost from the administrators of the polytechnics.

After obtaining the costs and the benefits, the net present value of costs and benefits is estimated. This is important as the costs occurred earlier in the investment period while the benefits stretched far in the future and has to be predicted. The predicted stream of income of high school and diploma graduates needed to be valued in its real term of net present value. This leads to applying the stream of future income to a set of discount rates and to find a discount rate that equates the net present value to zero. Then, this discount rate is known as the internal rates of return.

From here, the study uses two decision criteria of net present value decision rule and the internal rates of return decision rule. Both rules guide to the rational investment decision for individuals, parents, societies and the government as well.

Table 1.7 The Design Model of the Conceptual Framework

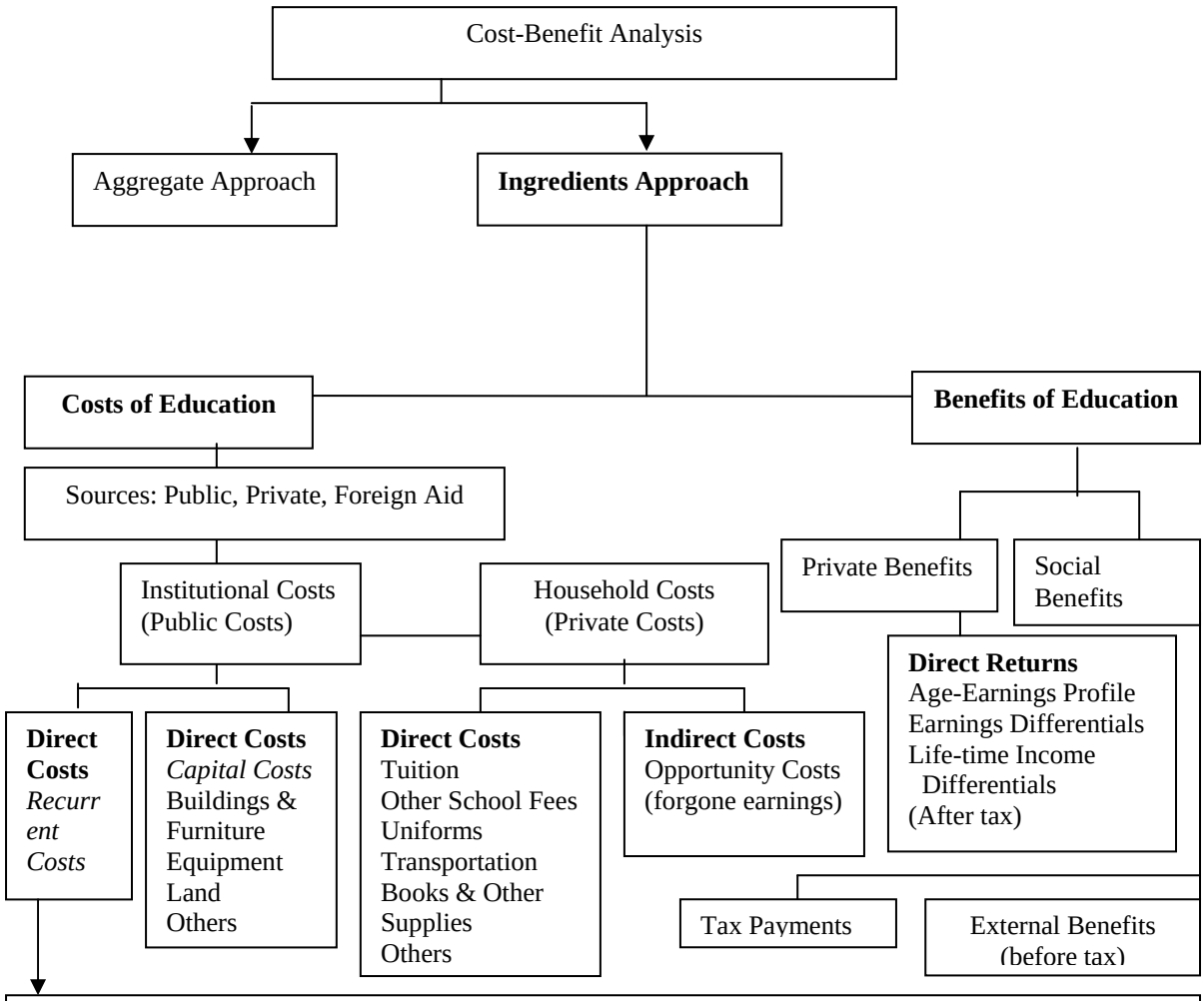
HIGH SCHOOL GRADUATES				DIPLOMA GRADUATES			
Age	Duration for Cost	Duration for Benefit	Years of Working Experience	Age	Duration for Cost	Duration for Benefit	Years of Working Experience
13	Out-Of-Pocket Cost		0	13	Out-Of-Pocket Cost		0
14			0	14			0
15			0	15			0
16			0	16			0
17			0	17			0
18		In Future Value	1	18	Forgone Earnings	Study Yr 1	0
19			2	19		Study Yr 2	0
20			3	20		Study Yr 3	0
21			4	21		In Future Value	1
22			5	22			2
23			6	23			3
24			7	24			4
25			8	25			5
26			9	26			6
27			10	27			7
28			11	28			8
29			12	29			9
30			13	30			10
31			14	31			11
32			15	32			12
33			16	33			13
34			17	34			14
35			18	35			15
36			19	36			16
37			20	37			17
38			21	38			18
39			22	39			19
40			23	40			20
41			24	41			21
42			25	42			22
43			26	43			23
44			27	44			24
45			28	45			25
46			29	46			26
47			30	47			27
48			31	48			28
49			32	49			29
50			33	50			30
51			34	51			31
52			35	52			32
53			36	53			33
54			37	54			34
55			38	55			35
Retirement	Total Cost (S)	Predicted Total Benefit (X)	Marginal Cost and Benefit (HSL)	Retirement	Total Cost (T)	Predicted Total Benefit (Y)	Marginal Cost and Benefit (Dip)

1.8 Framework of Analysis

In view of the analytical framework in Figure 1.2, cost analysis is important in informing educational decision makers about the efficiency of educational limited resources allocation (Tsang, 1988, 1994). This study applies the Cost-Benefit Analysis (CBA) as the framework of analysis. The important part of the analytical framework is the estimation of costs and the benefits of education using CBA in determining the rates of return.

In estimating the costs of educational programs, methodologies used in analyzing the costs are known as aggregate approach and ingredients approach (Levin, 1995). The aggregate approach is a method of estimating the unit costs of a program by using the existing government budgetary data and this method is found very problematic when the factor of precision level of estimation is to be taken into consideration (Tsang, 1988). This could be solved by employing the ingredients approach. The ingredients approach is a disaggregated approach based on individual inputs or resources (ingredients) used in the production of an educational program (Levin, 1995; Tsang, 1988).

Next, this study determines the costs of education or 'opportunity costs' which are defined as the economic value of the resources used in the production of the program in terms of its worth in its best alternative use (Tsang, 1988, 1994; Levin, 1995). The three sources of costs of education are the public resources (public costs or institutional costs), private resources (private costs) and foreign aid. Public costs or institutional costs consist of recurrent costs and capital costs of an educational program. These two costs are the direct costs of the public costs while the indirect public cost is the opportunity cost (Tsang, 1988, 1994).



Adapted and modified from Mishan (1977, 1988, 1993); Tsang (1988, 1994); Levin (1995).

Figure 1.2: Cost-Benefit Analysis Framework

Figure 1.2 shows that the recurring costs constitute of personnel and non-personnel salaries, fringe benefits, allowances, bonuses and other costs such as the costs of textbooks, teaching aids, supplies, utilities, scholarship, students welfare and

regular maintenance as well as minor and major repairs which occur within one year or less. For capital costs, there are the costs of non-recurring costs which usually associated with operating costs for more than a year such as the costs of buildings and furniture, equipment, land and others.

The private resources consist of household costs or private costs. They are subdivided into the direct costs of the private costs and the indirect costs of the private costs. The costs of tuition attended, school fees, uniforms bought, transportation fees, books and other supplies used and other related material costs incurred by students and parents are the direct costs while the indirect costs are the earnings forgone by the individuals that they might receive in the future by staying at school. The private costs are important because they constitute a significant part of the real cost of education and they can affect the demand of schooling (Tsang, 1988, 1994) but unfortunately most of the data on private costs are lacking in most developing countries and thus insufficient for estimating the social costs of education (Tsang, 1988).

The cost of an educational input is often expressed in terms of its total costs to indicate the total value of real resources devoted to it. But in many situations, unit costs are more meaningful for evaluative purposes. For Tsang (1988), a unit cost of education is the cost of an education unit. For this study, cost per graduate or "effective" cost of education is the gap between cost per pupil enrolled and cost per graduate which is relevant for manpower-planning purposes as it relates to school completers and is chosen by Tsang (1988) as the appropriate unit cost of education. He admits that the cost estimation will be sometimes hampered by the lack of information about the number of graduates (by level of education, type of program and type of school).

In finding benefits of education, there are two major types of benefits which are private and social benefits. Private benefits are direct monetary returns an individual received such as an income. While indirect returns to an individual from education are the non-monetary benefits such as the ability to fill the tax forms and others (Cohn,

1979). The direct social benefits are through tax payments from individuals while the indirect social benefits among others are the externalities effects (Cohn, 1979) such as lesser crime rates.

Once again, the cost-benefit studies in education are based on the rates of return approach to evaluate educational investment and on the human capital theory regarding the economic benefits of education. The profitability of education can be measured by comparing the benefits of education in terms of additional lifetime earnings to the costs of education (Becker, 1964; Mincer, 1974; Schultz, 1961). The private rates of return to education is to compare the benefits of education to an individual with the costs of education to an individual; it will inform private decisions on the educational investment while the social rates of return to education compare the benefits of education to society with the costs of education to society; it will guide public policies concerning educational investment (Tsang, 1988).

1.9 Limitations of the Study

There are a few factors of limitations that contribute to this study such as:

a) The precision of the information is important to get a meaningful research. There are many internal factors involved for some respondents to reveal the 'truth' of the information needed. The question on salary shows that most respondents are just 'estimating' their salaries by giving the round-up figures. It is a sensitive factor that respondents tend to increase or decrease their actual income. In order to overcome this problem, income is regressed so that it is more flexible and reliable.

b) The district factor is another limitation to this study. Differences in district areas affect the personal view of whether his income is 'higher', 'lower' or at 'average' level of his expected salary. For respondents living in urban areas, they tend to assume that their current salary is 'lower' than their job expectations as compared to those living in suburban areas. Cost and standard of living are believed to be the issues.

c) Time and past memories factors are clearly shown in most responses. This shows uncertaintiness in responding to the exact figures of earnings in the first job. The same situation occurs when respondents are asked about their age in the first job. Respondents tend to use estimation in their responses. The issue of the inflation where it could increase the price of goods and this will make the real value of income to decrease, while holding other factors constant (McConnell & et. al., 2006).

d) Ability, talent and chances factors (also known as Alpha Factors) shows that the income received by the respondent is not solely based on education but also on other economic factors such as demand and supply of the program for a particular job field. Others such as motivation and ability are also to contribute to increment in income especially for those in sales and marketing. So, it is hard to conclude whether an income received is solely due to education or other factors.

e) External factor such as the chances in education is among factors affecting the estimation of the rates of return. This factor is calculated based on cost borne by the government and society itself. One significant uncalculated factor in education is the cost of public amenities such as public library, safety, TV/Radio and also of physical costs.

f) The most critical part of this study is analyzing the responses. It is crucial to carefully interprete the responses as some data are very sensitive especially in calculating the IRR. If the responses are wrongly estimated, the analysis will deviate and jeopardize the study.

g) The cost incurred during the research is relatively high. The researcher has to travel far to reach possible people and places to get help, respondents and information.

1.10 The Delimitations

Generally, this study does not focus on the alpha Cronbach factor. The study concentrates on public sector respondents as public sector incorporates more on ability

and uniformed payscale rather than the private sector. Thus, the delimitations among others are:

a) respondents are targeted to polytechnics graduates in the northern region.

b) the scope of terms and definitions used is restricted to education and training on the technical and vocational technical education and training (TVET).

c) overestimation could happen as the term of 'higher education' itself marks blurry gap in definition. For instance, "of the education and training requirement for jobs in the professional, technical, administrative and managerial category" (unanimous in UNESCO, 1977).

d) The category should have 11 years of basic education and/or training.

1.11 Definition of Terminologies

1.11.1 The Rates of Return to Investment in Education

According to Mishan (1977, 1988, 1993) and Tsang (1988, 1994), the rate of return to investment in education is a measure of the future net economic pay off to an individual or society of increasing the amount of education taken. As a measure of profitability, the rate is equivalent to the interest paid on savings or the rate of return to investing in any other form of capital requiring a stream of investment over time and an income return over time.

The rate of return is found by setting the discount rate of costs and benefits over time equal to zero and solving for the implicit discount rate, r,

$$0 = \sum \frac{B_i}{(1+r)^i} - \sum \frac{C_i}{(1+r)^i} \qquad (1)$$

where

C = what the individual spends for education or other costs incurred
B = the additional income or other benefits the individual gains from the education (usually positive)
i = rate of return
r = interest rate