

ECONOMIC RETURNS TO INVESTMENT ON INFORMATICS POLYTECHNIC EDUCATION GRADUATES IN SOUTHWEST, NIGERIA

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Abstract

The study examined the economic returns to investment on informatics polytechnic education graduates in Southwest, Nigeria based on Human Capital Theory. This study calculated the total cost and the total benefit involved in polytechnic education system in order to count for the economic returns in two aspects; the direct private return and the direct social return to investment in education. The study adopted a descriptive research design of a survey type. Purposive sampling technique was used to sample three public Polytechnics in Southwest, Nigeria. The study samples were National Diploma (ND) and Higher National Diploma (HND) undergraduates, graduates, who filled the questionnaires tagged 'Questionnaire on Economic returns to investment in Polytechnics education (QERPE) and workers-Age-Education-Earning Questionnaire (WAEEQ) with reliability results of $r=0.76$ for PCEUQ and $r=0.77$ for WAEEQ. The two research questions raised were subjected to descriptive statistics while the one hypothesis generated was tested with the use of Oneway analysis of variance (ANOVA) at 0.05 alpha level. The findings revealed that an increasing private cost from average of ₦ 174,083.05; ₦ 198,000.50; ₦ 202,005.20; ₦ 300,090.10 ;and ₦ 325,000.56 in 2012;2013;2014;2015;and 2016 respectively Average earning profile for ND, the total cost for informatics education and Engineering had the highest with ₦ 3,598,845.18 and ₦ 3,402,512.74 respectively. While for HND, informatics education had the highest average earning with ₦53,351,129.28 followed by Agric. technology with ₦ 47,016,028.98. The study further revealed that significant difference does not exist among the means in the returns of polytechnic education graduates based on discipline Southwest, Nigeria. ($F(1,596) = F\text{-cal. } 0.056 > F\text{-val. } 963; p > 0.05$). Generally, the findings indicated that the investment in informatics polytechnic education is still more viable and could be one of the favourable personal choices of investment. The findings proved that the economic return to investment in education for polytechnic education is fairly attractive and socially profitable during the period of study and this presented sufficient evidence for recommendations that more effort should be put in place by government and individual to invest more in polytechnic education in Nigeria, and Government, institution and individual should come up with education policies that will enhance higher returns to polytechnic education to both the individual and the society as a whole.

Keywords: *Economic returns in investment, informatics education, direct social cost, direct private cost, polytechnic education, and human capital theory.*

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Introduction

The investment decision in human capital is assumed to be a function of the expected cost of education and the expected time frame of benefit 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 returns. The increased earnings following investment in education are the fundamental component of analysis for human capital. The rate of return to schooling is a powerful tool of educational decision making since it calculates how much the return from investment made.

At the individual level, education is important because it is a crucial determinant of individual earnings as well as the human development of a nation. At the broadest level, it is important due to the benefits resulting from increased education attainment to the society as a whole like reducing crime, raising more productive labour force, reducing corruption and raising the level of production (Saharawati, 2008).

The Industrial revolution in the 18th century reveals the strength attached to educating people in technical skills while the 20th and 21st century education highlighted the information education resulting from globalisation. This prompted most of the advanced countries to embark on massive education of their citizens on skills capable of bringing about technological advancement. The quest for developing countries in the mid-90s till date prompted most of the third world countries to establish technical colleges for a revival of technology. This situation led Nigeria to focus on technical education as harbinger of technological development which gave birth to the first higher institution in Nigeria, Yaba College of Technology that was established in 1932. Since then, the Federal and State Governments in Nigeria have embarked on the establishment of technical colleges and polytechnics (Oyetakin, 2010).

The Federal Government of Nigeria established the National Board for Technical Education by Act 9 of January 1977. In August, 1985 and January 1993 respectively, the Federal Government enacted Act 16 (Education (National Minimum Standards and Establishment of Institutions) Act) and Act 9 (Education (National Minimum Standards and Establishment of Institutions) (Amendment) Act). With these Acts, the functions of the Board were extended to include accreditation of academic programmes in all Technical and Vocational Education (TVE) institutions. Act No.9 of 1st January 1993 further empowered the Board to recommend the establishment of private Polytechnics and Monotechnics in Nigeria (National Board for Technical Education, NABTEB, 2015).

There are at present 110 approved tertiary technical institutions and 159 technical colleges under the purview of the Board with different types of ownership summarized in Table 1.

Table 1
Technical and Vocational Institution in Nigeria

Institution Type	Ownership			Total
	Federal	State	Private	
Polytechnics	21	38	15	74
Monotechnics	23	2	2	27
Colleges of health Tech	9	40	1	50
Other Specialized Ins.	13	-	3	16
IEIs and VEIs			71	71
Technical Colleges	19	110	3	132
Total	85	190	95	370

Source: National Board for Technical Education, 2015

Polytechnic education is regarded as one of the highest levels of tertiary institutions in Nigeria. The Polytechnics award Higher National Diploma (HND) and National Diploma (ND) in different fields of study such as science, environmental, management for the overall development of manpower training and development. The Polytechnics and Colleges of Technology are essentially for the production of middle level technical manpower needed for industrial and technological development of the country (Asibeluo, 2015). Thus, Toby (2000), as cited by Imonigie and Omozuaawo (2007) emphasized that technical education is important to the nation as a whole because it contributes to our national economic welfare, social mobility and national security. Thus, employers and the general public tend to relegate polytechnic graduates in favour of university graduates to the extent that, it had begun to affect our technological development/ advancement with respect to the roles of the various cadres of technical personnel in our technological growth.

Polytechnic education in Nigeria embraces various fields of studies from which informatics education is a specialized area or sub field of informatics which involves the training of students on computer applications, systems and network that support research in and delivery of education but practically addresses the intersection of information science and technology in support of teaching and learning.

It is common that recent development is directly associated with informatics 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 and every country, without exception is committed to economic growth (Laitner, 2000). Thus, the economists believe that education and human resource development must be integrated in any strategy aimed at promoting economic development, and every country, without exception is committed to economic growth.

Returns to Investment on Informatics Polytechnic Education Graduates

Human capital is a factor with a significant impact on economic growth and development, although human capital may be invested in many different ways, such as work experience and on-the-job training. Formal education provides a pragmatic approach to human capital development. From a human capital theory's perspective, education, in general, may be defined as "the investment of current resources (the opportunity cost of the time involved as well as the direct costs) in exchange for future returns" (Harmon, 2003).

Investments in education provide evidence supporting the positive effects of these investments on human capital development, productivity, and growth. Harmon (2003), after a detailed surveying of the available literature on human capital and investment, concluded that formal education is a major factor in improving human capital. Furthermore, Barro and Lee (2001) also concluded that human capital particularly that, which is attained through education, has been emphasized as a critical determinant of economic progress. Investments in education produce benefits at many levels and this emphasized the social benefits of investments in education and observed the monetary and non-monetary benefits of these investments.

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 in informatics education with the rate of

interest to decide whether it is a good investment or not, and society can weigh the social rate of return with other possible use of funds. According to Duflo (2001), the effects of education on private income, contended that every additional year of formal education accounts for 6 to 10 percent increase in earnings. Furthermore, Sherman’s report on the costs of child poverty, prepared for the Children’s Defense stated that, on average, each year of education increases a worker’s hourly wages by 10 percent. This percentage return to investments in education is consistent with the results of studies on returns to education conducted from the 1970s to as recently (Patrinos & Psacharopoulos, 2010). The earnings premium associated with additional education can be thought of as a 'rate of return' on that educational investment so, one can say that “return” on the human capital (productive investment) can be derived from how much these “education” and “on the job training” can earn in the market. Other than monetary returns, there are non-monetary returns to education and work experience. Education and work experience also affects the level of enjoyment from job and probability of being unemployed. Moreover, education and work experience guide individuals to make better decisions about health, marriage, and parenting (Aina, Oyetakin, & Oshun, 2010).

The benefits to investments in education are broad, and many times difficult to quantify. These benefits might involve, apart from the social, non-monetary ones, benefits such as wages offered, wages received, and employment. Measuring returns to investments in education estimate the benefits of increased education at both the individual and the national levels. The benefits of increased education at the individual level are known as private rates of return to education, and the benefits of increased education at the national level are known as social rates return to education. More specifically, private returns to education refer to the individual’s benefits from investing in education, whereas social returns refer to the large scale benefits of such investments. Social returns also take into consideration the direct costs of schooling incurred by institutions or governments (Ricardo, 2011).

When calculating private and social rates of return to education based on educational level and income, attention is generally given to individual income tax payment. Because income taxes are a cost to the individual but not to society as a whole, income should be measured after payment of income taxes when the private rate of return is estimated and before payment of income taxes when the social (economic) rate of return is estimated (Perkins, 2001).

Table 2, exemplifies the main components of the social and private rates of return. As can be seen, the social benefits and costs include a private component and a component from firms and society. The private and social rates of returns are calculated from the private costs and benefits.

Table 2
Rates of Return to Education

Private Benefits	+	benefits accruing To firms and Society	+	Social Benefit
				-
Private Costs	+	Costs incurred By firms and Society	=	Social Costs
Private Rate of Return				Social Rate of Return

Source: London Economic on Rates of return to various types of investment and training, (2005)

Statement of the Problem

Initially, expansion of educational institution led to an increase in the supply of educated and skilled labour force that was readily absorbed into the private and public sectors. There is a perceived discrimination of the polytechnics graduates via employment, salary and returns to cost of educating the polytechnic graduates in Nigeria.

It has become a serious problem as the economy cannot absorb the highly educated. Hence, the employability of other graduates and polytechnic education graduates particularly those who specialize in informatics education who were trained with huge capital outlay and what the government and private individuals get in returns from such investment necessitate a comprehensive analysis to really determine if the ends justify the means.

There are a large number of studies of rate of return to investment in education done by researchers such as Alani 1988 and Samuel 1990 concerning various levels of education. However, there are a few studies on economic rates of return to polytechnic informatics education. Many studies focus more on other tertiary levels of education than polytechnics and the researcher feels that these groups of polytechnic graduates has to be given ample attention.

Purpose of the Study

The general objective is to estimate the economic return to investment of informatics polytechnic graduates in Southwest Nigeria from 2012 to 2016 with the following specific objectives:

- (1) Calculate both social and private costs of informatics polytechnic education graduates in Southwest Nigeria from 2012 to 2016.
- (2) Calculate social and private returns to investment of informatics education polytechnic graduates Southwest Nigeria from 2012 to 2016.

Research Questions

The study intends to find answers to the following questions raised:

- (1) Is there any difference in the social and private cost for informatics polytechnic education in Southwest Nigeria from 2012 to 2016?
- (2) Is informatics education in polytechnic more profitable than other programmes of polytechnic education in Southwest Nigeria from 2012 to 2016?

Research Hypotheses

The hypotheses that guide the study are:

Ho1. There is no significant difference in the returns of polytechnic education graduates based on discipline Ondo State.

H.o 2. There is no significant difference between the direct private cost of educating male and female Polytechnic graduates in Ondo State.

Methodology

Research Design

This study adopted the descriptive research design of a survey type. This is because the study analyzed the economic rate of returns to investment in informatics polytechnic education from 2012 to 2016 using a set of questionnaires as a source of collection of primary data and secondary data from the public polytechnics sampled.

Population of the Study

The targeted population for the study consisted of 12,000 full time students of three public polytechnics in Southwest Nigeria, namely Federal Polytechnic, Ado, Ado-Ekiti, Rufus Giwa Polytechnics, Owo in Ondo State and Lagos State Polytechnic, Ikorodu, Lagos state which have National Diploma and Higher National Diploma programmes. The workers in the public sector of the states where the schools are located such as civil servant, paramilitary personnel, staff of the sampled institutions were used.

Sample and Sampling Techniques

The students' sample consisted of the 30% of the total students' population was taken and this constituted 3,600 students from 5 faculties of the three polytechnics. A sample of 1,200 from each polytechnic was drawn from the various faculties through stratified random sampling technique. The sample constituted 2,400 national diploma students and 1,200 higher national diploma students.

Workers sample were drawn from the five areas of discipline namely Business studies, Engineering, Environmental, Science, Agriculture technology, and Informatics. With 300 for ND and 300 for HND holders from the public sectors in Southwest Nigeria through purposive sampling technique with the purpose of obtaining information on their level of education and annual earnings.

Research Instruments

Three sets of questionnaires were developed by the researchers. The questionnaire tagged 'Questionnaire on Economic returns to investment in Polytechnics education (QERIFE). They were:

1. A structured questionnaire (fill-in-the-gap) tagged the Private cost of Polytechnic Education Questionnaire (PCPEQ) was used to collect data on the private cost of polytechnic education from the students in the various departments of the three polytechnics.
2. A structured questionnaire (fill-in-the-gap) tagged the Social Cost of Polytechnic Education Questionnaire (SCPEQ) was used to collect data on the social cost of polytechnic education such as: the institution's funds, institution's expenditures, staff salaries and allowances, and other expenditures.
3. A structured questionnaire tagged the Workers-Age-Education-Earning Questionnaire (WAEEQ) was used to collect data on the private benefit of polytechnic education from workers with polytechnic qualifications and are employed in the public sector in the three states where polytechnics were sampled.

Validity and Reliability of the Instruments

The research instruments were validated using both face and content validities. Attempt was made to ensure that the instruments adequately cover all the relevant dimensions of the topic of the study that are implied by the research questions and hypotheses

The instruments (PCUEQ, SCUEQ and WAEEQ) were subjected to a pilot survey before their actual administration using a polytechnic outside the sampled institutions. The coefficient of reliability were also determined by correlating the overall scores obtained from each of the sampled group of respondents on the first and second occasions by using Pearson Product Coefficient at 0.05 level of significance of different. The results are $r=0.76$ for PCEUQ and $r=0.77$ for WAEEQ which sufficiently proved that the instruments were highly reliable.

Results

The computation entails a preliminary analysis of private costs by each of the sampled students from 2012 to 2016 across colleges and polytechnics on each of the cost carrying items by students such as tuition, feeding, clothing, transportation, books and stationery, student union levies and consumables. The stream of these cost items were summarized per students sampled of which the average per annum across the years under study. The average crude costs were adjusted for alpha coefficient of 0.67 and this provides reasonable evidence for the refined cost used.

In calculating the social cost, the audited account on income and expenditure of each polytechnic was sought. The average between 2012 and 2016 released by the various institutions bursary were compared to arrive at the Social Unit Cost with reference to only the expended amount on students in each of the polytechnics. Various categories of workers in public services were used and salaries averaged to arrive at the income for each area of studies. This information was also subjected to alpha coefficient of 0.67 to take care of extraneous factors.

Research Question One

Is there any difference in the social and private cost for informatics polytechnic education in Southwest Nigeria from 2012 to 2016?

To find out the difference in the social and private cost of polytechnic education, crude social direct unit cost and private direct unit cost were compared from the sampled institutions. The results are shown in Table 3.

Table 3
Refined Social and Private Unit Cost of Informatics Polytechnic Education in Southwest, Nigeria from 2012 to 2016

Year	Social (₦)	Private (₦)	Total (₦)
2012	1,585,215.61	174,083.05	1,759,298.66
2013	1,236,363.36	198,000.50	1,434,364.10
2014	2,428,571.43	202,005.20	2,630,576.63
2015	1,130,013.22	300,090.10	1,430,103.22
2016	1,012,524.56	325,000.56	1,337,525.12

*Adjusted for alpha coefficient of 0.67

Source: Fieldwork

Table 3 reveals the direct social and private unit cost of informatics polytechnic education in Southwest, Nigeria from 2012 to 2016. An average of ₦ 2,428,571.43 was spent by the government /society and the household to provide polytechnic education in 2014. However, an increasing private cost from average of ₦ 174,083.05; ₦ 198,000.50; ₦ 202,005.20; ₦ 300,090.10 ;and ₦ 325,000.56 in 2012;2013;2014;2015;and2016 respectively. The trend in the social cost shows that the highest cost was incurred in 2014 with ₦ 2,428,571.43 and least of ₦ 1,012,524.56 in 2016 an indication that the government funding is dwindling or decreasing.

But the total cost on informatics education reveals an increase from ₦ 1,434,364.10 to ₦ 2,630,576.63 (2013 to 2014) while it decreased to 1,337,525.12 in 2016.

Research Question Two

Is informatics education in polytechnic more profitable than other programmes of polytechnic education in Southwest Nigeria from 2012 to 2016?

In answering this question, the average age-earning profiles for various workers based on their area of studies are derived alongside cost of embarking on the programme of qualification. It should be noted that it takes a minimum of two years duration to complete the ND and HND programmes respectively. Also, a preliminary private and social cost for two years was used to derive the stream of costs for the programme and thus compared with the stream of benefit from private earnings to ascertain the profitability of each programme.

Table 4
Summary of the Profitability of Polytechnic Education for ND Holders in Southwest, Nigeria

Programme	Social Cost (₦)	Private Cost (₦)	Total	Average Earnings (Life Time)	
				Pre-Tax (Social)	Post-Tax (Private)
Agric. Tech	3,226,519.34	175,993.40	3,389,382.36	19,778,319	19,247,193.00
Business Stu	3,226,519.34	207,122.42	3,433,641.76	22,694,974.53	26,911,930.50
Environment	3,226,519.34	230,743.30	3,457,262.76	21,854,016.00	21,087,472.95
Informatics	3,226,519.34	372,325.84	3,598,845.18	29,374,829.97	29,177,124.00
Engineering	3,226,519.34	175,993.40	3,402,512.74	20,255,581.17	21,087,472.95

Source: Fieldwork

Table 4 reveals the average earning profile for ND, the total cost for informatics education and Engineering had the highest with ₦ 3,598,845.18 and ₦ 3,402,512.74 respectively. However, Agricultural Technology had the least social cost with ₦ 3,389,382.36. Meanwhile, Informatics education had the highest average social earning with ₦ 29,374,829.97 and a private earning of ₦ 29,177,124.00 meaning that it has the highest returns to investment than other courses under review.

Table 5
Summary of the Profitability of Polytechnic Education for HND Holders in Southwest, Nigeria

Programme	Social Cost ₦	Private Cost ₦	Total	Average Earnings (Life Time)	
				Pre-Tax (Social)	Post-Tax (Private)
Agric. Tech	6,558,584.65	200,827.34	6,759,411.99	49,152,171.96	47,016,028.98
Business Stu	6,558,584.65	234,627.22	6,793,211.87	35,121,570.03	34,320,127.50
Environment	6,558,584.65	236,364.94	6,794,949.59	39,184,989.78	32,857,821.36
Informatics	6,558,584.65	202,473.50	6,761,057.65	46,690,795.26	53,351,129.28
Engineering	6,558,584.65	191,898.48	6,750,483.13	40,511,162.34	35,514,306.90

Source: Fieldwork

From table 5, HND holders' private cost for environmental science had the highest with ₦ 236,364.94, and engineering had the least private cost with ₦ 191,898.48. However, informatics education had the highest average earning with ₦53,351,129.28 followed by agric. Technology with ₦ 47,016,028.98.

Hypotheses Testing

Hypothesis One

There is no significant difference in the returns of polytechnic education graduates based on discipline in Southwest, Nigeria.

In testing this hypothesis, a one way ANOVA was performed to arrive at table 6.

Table 6
Difference in the Means of the Returns of Polytechnic Education Graduates based on Specialization/Discipline in Southwest, Nigeria

Source of variation	Sum of square	df	Mean Square	F-cal	F-val	Sig.
Between Groups	45569452894391.21	4	11392363223597.80	0.056	0.992	P>0.05
Within Groups	1011893429033040.80	596	202378685806608.16			
Total	105746288192743.00	600				

NS= Not Significant

Table 6 revealed the One way ANOVA output showing that significant difference does not exist among the means in the returns of polytechnic education graduates based on discipline Southwest, Nigeria. $Df = (596) = F\text{-cal } 0.056 > F\text{-val } .963; p > 0.05$. Indicating that the hypothesis which state that there is no significant difference in the returns of polytechnic education graduates based on discipline Southwest, Nigeria is upheld.

Hypothesis Two

There is no significant difference between the direct private cost of educating male and female Polytechnic graduates in Ondo State.

The hypothesis was analyzed using the t-test to determine the difference in the mean responses of direct private cost from male and female OND polytechnic graduates in Ondo State to know whether significant difference exist.

Table 7
Summary of Mean Difference in the Direct Private Cost of Educating Male and Female OND Polytechnics Graduate in Ondo State

Source	N	Mean	SD	SEM	df	t-cal	t-val	Sig.
Male	419	70394.55	12975.30	5802.73				
					827	0.266	0.797	P>.05
Female	410	72319.43	9656.18	4318.37				

NS= Not Significant

Table 7 shows the t-test analysis based on the direct private cost from male and female polytechnic graduates in Ondo State ($t(827) = 0.266; p > .05$). Thus, there is no significant difference between the direct private cost of educating male and female OND Polytechnic graduate in Ondo State. The null hypothesis is hereby upheld.

The hypothesis was analysed using the t-test to determine the difference in the mean responses of direct private cost from male and female HND polytechnic graduates in Ondo State to know whether significant difference exist.

Table 8
Summary of Mean Difference in the Direct Private Cost of Educating Male and Female HND Polytechnics Graduate in Ondo State

Source	N	Mean	SD	SEM	df	t-cal.	t-val.	Sig.
Male	250	80334.34	7097.47	3174.09	513	0.068	0.948	P>.05
Female	265	79995.20	8614.76	3852.64				

NS= Not Significant

Table 8 reveals that the t-test analysis on the direct private cost from male and female HND polytechnic graduates in Ondo State ($t(513) = 0.068$; $p > .05$). Thus, there is no significant difference between the direct private cost of educating male and female HND Polytechnic graduates in Ondo State. The null hypothesis is hereby upheld. The summary decision on this hypothesis is that for both OND and HND male and female polytechnic graduates, there is no significant difference in the means of private cost.

Discussion

It was discovered that in spite of high social cost for all level of programmes as a whole, both social and private rate of returns were high and vary among the disciplines. This was supported by the findings of Samuel (1987) and Mincer (1994). The finding also revealed that, the direct social cost of polytechnic education is higher than the direct private costs. This can be attributed to high inflation rates, high personnel income and high student enrollment. The difference in the private cost of polytechnic education of male and female gender by choice of discipline might be due to higher number of courses enrolled in. This finding is supported by Bratti, Naylor and Smith (2008) who opined that gender differences in the costs and rates of returns with women selecting disciplines which offer lower life-time earnings. Also, Bratti, Naylor and Smith (2008) also confirm the existence of substantial variations in wage returns to various fields of study. The high private rates of returns to polytechnic education can be attributed in part to high subsidy for polytechnic education by government and non-inclusion of externalities in the social rate of returns calculations.

This differential in gender cost of university education as revealed by the study was corroborated by Bratti, Naylor and Smith (2006) who also reported that there are cost differentials of male and female undergraduates. Also, Aina, Oyetakin and Oshun (2010) submitted that the cost educating university students in Nigeria varies as a result of gender, price of commodities and university location.

Generally, the findings indicated that the investment in informatics polytechnic education is still more viable and could be one of the favourable personal choices of investment. This is also supported by Sharawati (2008) that the return to investment in education for polytechnic diploma programme is fairly attractive and socially profitable.

Conclusion

The significant contribution of education to economic growth and development put increased pressure to expand and improve education in Southwest and Nigeria in general. This study has provided a good insight into cost and benefits of informatics polytechnic education vis a vis expenditure and the returns derived from polytechnic education. Hence, there is need for increased investment in informatics polytechnic education for the development of Nigeria economy particularly where the interest/returns is higher.

Recommendations

The informatics polytechnic education is profitable to the government/society and the individual, therefore

1. The students should enroll in the courses with lower private cost and higher private benefit.
2. More efforts should be put in place by government and policy makers to improve the quality and investment in informatics education which is the recent global trend with high level of employerability.
3. Government should develop new policies for financing polytechnic education.
4. Government, institutions and individuals should come up with education policies that will enhance higher returns to polytechnic education to both the individual and the society as a whole.

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