PRIVATE RATES OF RETURN TO INVESTMENT IN TECHNICAL EDUCATION: A CASE OF MANUFACTURING INDUSTRIES IN THIKA, KIAMBU COUNTY, KENYA

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E83/CE/12983/2009

A RESEARCH THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN ECONOMICS OF EDUCATION AND EDUCATIONAL PLANNING IN THE SCHOOL OF EDUCATION OF KENYATTA UNIVERSITY

MAY 2015
DECLARATION

STUDENT’S DECLARATION:
I confirm that this research thesis is my original work and has not been presented in any other university/ institution for certification. The thesis has been complemented by referenced works duly acknowledged. Where text, data, graphics, pictures or tables have been borrowed from other works- including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

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DEDICATION

This thesis is dedicated to my beloved parents, Mrs. Lydia Wangui Muthima and my late father Mr Nahashon Muthima.
ACKNOWLEDGEMENTS

First, I would like to thank the Almighty God for His goodness to me and the gift of life. Second, I would like to thank Kenyatta University for supporting me financially as I undertook my studies without which the study would not have been possible.

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I am equally indebted to my dear family members for their unwavering love, concern, prayers and emotional support. They kept encouraging me to forge on. Finally, I want to appreciate all the members of my church for their understanding. Many a times I did not perform the duties as I should have yet I was understood. God bless you all.
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# ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
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<td>BCR</td>
<td>Benefit – Cost Ratio</td>
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<td>CBA</td>
<td>Cost Benefit Analysis</td>
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<td>DFID</td>
<td>Department for International Development</td>
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<td>ECDE</td>
<td>Early Childhood Development Education</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>HCT</td>
<td>Human Capital Theory</td>
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<td>HELB</td>
<td>Higher Education Loans Board</td>
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<tr>
<td>IRR</td>
<td>Internal Rate of Return</td>
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<tr>
<td>IT</td>
<td>Institute of Technology</td>
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<tr>
<td>KESSP</td>
<td>Kenya Education Sector Support Programme</td>
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<tr>
<td>KIPPRA</td>
<td>Kenya Institute of Public Policy Research Analysis</td>
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<td>Ksh</td>
<td>Kenya Shillings</td>
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<tr>
<td>KTTC</td>
<td>Kenya Technical Teachers College</td>
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<tr>
<td>MoEST</td>
<td>Ministry of Education, Science and Technology</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>MOYA</td>
<td>Ministry of Youth Affairs</td>
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<td>NCVER</td>
<td>National Centre for Vocational Education Research</td>
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<td>NPV</td>
<td>Net Present Value</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
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<td>PRR</td>
<td>Private Rate of Return</td>
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<td>SPSS</td>
<td>Statistical Package for Social Science</td>
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<td>TE</td>
<td>Technical Education</td>
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<tr>
<td>TIVET</td>
<td>Technical, Industrial, Vocational, and Entrepreneurial Training</td>
</tr>
<tr>
<td>TTI</td>
<td>Technical Training Institutions</td>
</tr>
<tr>
<td>TVET</td>
<td>Technical and Vocational Education and Training</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Environmental, Scientific and Cultural Organization</td>
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<td>UNICEF</td>
<td>United Nations International Children’s Emergency Fund</td>
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<td>VTE</td>
<td>Vocational Technical Education</td>
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<td>YP</td>
<td>Youth Polytechnic</td>
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ABSTRACT

The degree of relationship between cost of education and earnings (Private Rate of Return) (PRR) is a determining factor in making decisions about investment choices in education. The Kenya government and individuals have continued to pay large amount of resources to acquire Technical Education (TE) for individuals to train as Artisans, Crafts persons, Technicians and Technologists whose levels of TE are Grade Test, Certificate, Diploma and Higher Diploma respectively. The monetary gains to individuals with technical skills are unequally distributed among the four cadres. Moreover, these returns are perceived to be low. PRR for the four aforementioned cadres have not been determined. The purpose of this study was to determine the PRR to investment in TE by focusing on technical skilled workers in the manufacturing industries in Thika, Kenya in order to guide policy makers on TE investment. The study objectives aimed to: establish direct private costs of obtaining different levels of TE; establish the lifetime earnings based on the different levels of TE; determine the PRR to different levels of TE; determine the relationship between personal characteristics and lifetime earnings and compare PRR between self-employed and salaried skilled technical workers in Thika. The Human Capital Theory was employed to explain the increase in earnings to additional years of schooling. The study employed descriptive and co-relational designs which embraced quantitative approach. The target population consisted of 1381 technical skilled workers. A sample size of 276 respondents was used. Stratified and simple random sampling techniques were used to select the respondents. A questionnaire for skilled technical workers was used to gather information on costs, levels of TE, earnings and personal characteristics. Test re-test technique was used to ascertain reliability of the instruments using Pearson product-moment correlation coefficient. Content validity of the instrument was determined by specialists in Economics and Planning of Education. Quantitative data was analyzed using both descriptive and inferential statistics through SPSS and STATA. Five hypotheses were tested at 5 percent significant level. Findings revealed that; private direct costs of TE were significantly different at a p value of 0.000. There was a positive relationship between lifetime earnings and TE levels at p value of =0.000. Further, there was a significant difference in PRR across the four the levels. There was a positive relationship between personal characteristics and earnings at p=0.000 and that there was no significant difference in PRR by type of employment at p=0.8136 and t statistics of 0.2361. The study concluded that higher diploma is the most expensive but profitable level and lifetime earnings increase with TE levels. PRR by type of employment are similar. The study recommended that individuals investing in TE should opt for extra TE expertise, the national government should introduce free TE for the first three levels and increase bursary to investors as an incentive. Individuals investing in TE should study early in order to reap optimal returns and the national governments should strengthen the components of TE within the secondary school curriculum.
CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This chapter comprises of the Background to the Study, Statement of the Problem, Purpose of the Study, Research Objectives, Research Hypotheses and Significance of the Study. It also presents Assumptions, Limitations and Delimitations of the Study, Theoretical Framework, Conceptual Framework and Operational Definition of Terms.

1.2 Background to the Study

It is widely accepted by economists that education is an investment that yields a positive rate of return. Tsang (1997) agrees that the benefits of Technical and Vocational Training (TVET) to a trainee are both pecuniary benefits (such as increased earnings, enhanced probability of getting the first job and more stable employment) and non-pecuniary benefits (such as increased job satisfaction and more occupational options). Besides, educational benefits can be either to an individual or society. Benefits to society (social benefits) include increased economic productivity and higher taxable earnings. Notwithstanding, the study focused on the benefits to an individual in terms of earnings.
Technical and Vocational Education plays a crucial role in social-economic development of any nation (Seng, 2007). Educated and skilled people spur the economic growth and development. Manda, Mwambu & Kamenyi, (2002) and Nyerere (2009) all agree that TE deliver core skills (i.e. entrepreneurial, communication, financial and leadership) and increased employment opportunities (including wage employment and self-employment). In Kenya, the Report of the Education Sector Review (Republic of Kenya, 2003), noted that there is a clear recognition of the role of education and training in contributing to the projected Gross Domestic Product (GDP) growth with particular emphasis on TVET. To this end, the study paid attention to the subsector as it is aimed to spur economic development within the next 16 years to achieve the vision.

Usually, in the process of acquiring education, costs are incurred. Both direct and indirect costs are incurred at an individual and societal level. Psacharopoulous (1985) observes that for the individual, forgone earnings often represent the largest proportion of the private costs of education. Further, another proportion consists of fees and expenditure on books while scholarships, bursaries or other forms of financial aid reduce the private costs of education. To compare the costs of TE, the present study centred on the direct costs incurred by individual’s acquiring TE experience in the manufacturing industries. Comparing the costs of investing in TE by levels is necessary in order to assess the viability of investing in TE. The levels of TE that this study paid attention to are; grade test, certificate, diploma and higher
diploma which produce artisans, crafts people, technician and technologists’ cadres respectively.

Most countries with developed TVET system finance Technical Education (TE) heavily. For example, Singapore pays 2 or 3 times more than the general education according to United Nations Environmental, Scientific and Cultural Organization (UNESCO, 1995). Other countries like Peru fund TE at the same level with academic institutions and the returns are almost identical for the graduates of the two streams (academic and TE) (Bellow, 2002). Today, Africa is closely investing in TE. The increasing importance African governments attach to TVET is reflected in the various Poverty Reduction Strategy Papers that governments have developed in collaboration with the World Bank (Afeti, 2006). Nonetheless, TE public funding levels in the Sub-Saharan Africa are generally low compared to developed economies.

The rate of return to schooling is an influential instrument. It is used in educational decision making as it determines the magnitude of the return from the investment in education (Shahar, 2008), as well as policy evaluation in education. More often than not, such policies may include expansion or lack of it for certain levels of education. Tsang (1999) asserts that high rate of return to an individual increases demand for certain levels of education. Additionally, measures can be introduced to increase or reduce enrolment in some levels.

Woodhall (2004) describes rate of return as a systematic comparison of the magnitude of the costs and benefits in any form of investment. In fact, it is one
of the methods used in Cost Benefit Analysis (CBA) to determine the viability of an investment. It is agreed that education is an investment in human capital. CBA tends to consider investment alternatives that can be valued in monetary terms (Psachoropolous, 1995). In this case, the current study sought to find out the degree of profitability in investing in different levels of TE in Kenya by systematically comparing the extent of costs and benefits of technical skilled workers.

Rate of return analysis has been a basis to assess the economic profitability in education sector internationally (World Bank, 1996; Wood hall, 2004) but with limited attention to the technical sub-sector of education. Psacharopolous & Patrinos (2002) observe that most studies tend to focus on the rate of return to general academic education (primary, secondary and university), with very little attention being paid to the Private Rates of Return (PRR) to various levels of TE. Equally, Wolf (2009) underscores that the economics of Technical, Vocational and Educational Training (TVET) have so far been neglected by both scientists and practitioners while Nishimura & Orodro, (1999) recommend the need for rigorous studies on the economic returns to vocational education to guide on policies in Africa. However, the area has been under-researched in Kenya. This study gave focus to the monetary returns to technical skilled workers who are TVET graduates.

Studies done on PRR have shown that there are higher lifetime earnings to higher levels of education compared to low levels. Psacharopolous & Woodhall (1985) observed that there are higher PRR to university level,
followed by secondary and primary level at 53 percent, 37.3 percent and at 12.6 percent respectively. Psacharopoulos & Patrinos (2002) observed that the rate of returns to levels of education in Pakistan was 8.4 per cent, 13.7 per cent and 31.2 per cent for primary, secondary and university respectively. In Tanzania, Godius & Fran cis (2007) found that the PRR to one year of vocational education ranged between 1.4 and 2.8 percent. Yet in Kenya studies are scanty that ascertain whether or not the same trend applies to TE. It is against this background that the current study sought to establish PRR in Kenya’s manufacturing industries.

In Sub-Saharan Africa context, TVET systems differ from country to country (Afeti, 1998). Different names are used to refer to TE in different countries. Such names for instance are Vocational Education and Training (VET), Vocational Training Education (VTE), Technical and Vocational Education and Training (TVET) and Technical, industrial and Vocational Education and Training (TIVET) which are all used synonymously. TIVET is the Kenyan version of the internationally known Technical, Vocational and Entrepreneurial Training (TVET) (Republic of Kenya, 2012a). Besides, it is a comprehensive term referring to pragmatically important components of national training system that entails those aspects of the educational process that involve general education, the study of knowledge, practical skills and attitudes, relating to occupations in various sectors of economic and social life. For the purpose of this study, the term TVET was adopted since it is the recommended term internationally.
Technical Education is offered in Universities and Technical, Industrial, Vocational and Entrepreneurial Training institutions and other ministries in Kenya. Observably, two middle level technical national polytechnics have so far been upgraded to universities (Republic of Kenya, 2012b). The report records that they are Kenya and Mombasa polytechnics. In addition Technical institutions have increased to 26, Institute of Technology to 14 and 697 Youth Polytechnics (Republic of Kenya, 2012a). In fact, a new progression structure for TIVET education has been developed according to Sessional Paper No. 1 of 2005. This implies that the government has realized that there are social (public) returns to investment in TE. However, it is not clear if these gains are transferred to the individual investing in TE. This study provided approximately calculated returns to the individual.

The government of Kenya’s recurrent and development expenditure on technical institutions increased from Kenya shillings (Ksh.) 2,697,000 million ($33713) in 2006 to Ksh 6,301,000 million ($78763) in 2010, representing approximately a 134 percent increase (Republic of Kenya, 2011a). Youth Polytechnics (YPs) had the largest increment, from Ksh 1,907,300 million ($23841) in 2007 to 5,237,000 million ($65463) in 2010. This represented a 174 percent increase (Republic of Kenya, 2011a). Technical Training Institutes (TTIs), Institutes of Technology (ITs) and National Polytechnics (NPs) rose from 2,465,000 million ($30813) to Ksh 6,301,300 million ($78763) thereby representing 133.6 per cent increase during the same period of time. Despite the fact that the government has continued to spend on TE, so
far, it is not clear which level has the highest or lowest returns. It is against this background of this scenario that this study aimed to find out which level of TE has the highest rate of returns. Wanjala (2002) underscores that higher earnings influence private demand of a program holding all other factors constant.

Equally, it is observed that from year 2006 to 2010, individual average tuition fees alone for the artisans, craftsmen, technicians and technologists was Ksh 25, 000 ($313), 30,000 ($375), 84,000($1050) and 110,000 ($1375) respectively per annum in 2006. This has risen at a rate of 33.3 per cent, 19.04 per cent, 90 percent and 91 percent for the four levels, according to TVET institutions fees structures in Kenya in 2012/13 as shown in Appendices IV and V. Given the cost, it is not clear if it is worthwhile for an individual to invest in TE. To an individual, information on the cost incurred in TE during the schooling period is fundamental as this involves how much one is willing to invest.

Republic of Kenya (2011b) revealed that wages for different categories of workers in the manufacturing industries. In this report, it is noted that lower paid workers earn less than Ksh4 000 per month. Other workers are within the range of Ksh 8,000 to 14,999 per month while the highest paid workers earn over Ksh. 30,000. Given the cost of investing in TE, the study sought to answer the question whether these returns are worth the current investment especially in relation to TE levels.
The statistics indicates that TVET enrolment in Kenya has increased from 71,167 in 2006 to 82,843 in 2011, representing 16.4 percent rise (Republic of Kenya, 2011b). That notwithstanding, the enrolment in these levels vary, for example, the enrollment in YPs increased by 44.0 percent between 2006 and 2010 and TTIs and ITs increased by 22.63 percent and 20.16 percent respectively during the same period, while NPs and TIVET University Colleges declined by 28.35 percent. This variation raises the curiosity to find out which category benefits most from this government funding. Lack of this information may lead to under or over investment, under or over production of some skills in some levels. Psacharopolous (1995) asserts that profitability of the investment explains individual behaviour regarding the demand or lack of demand for particular levels of education.

King (2007) concluded that there are general perceptions globally that investment in TE does not commensurate to the returns. Observably, studies done in Kenya’s TVET sector have observed that the sector is perceived to have low returns compared to other opportunities (Chege & Sifuna, 2006; Manda & Mwabu, 2002; Onsomu Wambugu & Wamalwa 2009; Nyerere 2009). However, none of these studies determined empirically the PRR, which this study aimed to unearth. Households often seem to evaluate schooling decisions in terms of their benefits to future income (Appleton, Bigsten & Manda; 1999).

Conversely, by comparing student enrolment in TVET institutions to that of the universities, enrolments rose by 13,108 and 98,527 represented by 20 and
120 percent respectively during the period between 2003 and 2010 (Republic of Kenya, 2012b). Parents and school leavers perceive university education to have higher returns than TE yet, statistics showing that the rates of return to TE are hardly available. Provision of this information may guide school leavers, parents and interested investors in TE to make optimal choices in TE investment. In Kenya, TVET is yet to produce adequate and skilled middle level human resource required to meet the demands for national development with the anticipated ratio of 1:3:12:60 for technologists, technicians, craftspeople and artisans respectively (Republic of Kenya, 2012a).

Republic of Kenya (2012a) reveals that there are challenges facing the TVET sector as: negative perception which has accumulated overtime unattended and low status of formal TVET in the eyes of the general public. In addition, parents consider it to be an option suitable only for pupils who perform poorly in general education and do not progress. It is unclear whether the negative attitude towards TVET is as a result of lack of knowledge on the benefits attached to TE schooling or otherwise. Despite the fact that TVET in Kenya has been regarded for a long time as inferior to general academic education, the current research provided empirical evidence to bring to light the role of TVET in producing monetary gains in terms of higher earnings. This is because investment in TVET could as well be effective as in academic education.

Additionally, studies have shown that there are other factors that influence returns such as ability, age and family backgrounds, among others.
Psacharopolous et al. (1985) observed that there is an influence of cost, ability, type of employment and other factors on earning capacity of an individual. These factors are age, intelligent quotient and family background among others. The World Bank estimated the effect of earnings on several variables that included parents’ literacy, home background, ethnic group and type of school attended in African countries where Kenya was included. Education was found to have the highest relationship. Notwithstanding, the variables were not used to determine their effect on TE earnings. Some of the variables under study that influence earnings include; age, gender and area of specialization. Additionally, ability, experience and type of employment were included.

Within the Vision 2030, Kenya is currently implementing the Vision strategy which emphasizes the role of TE as a part of the springboard to the country becoming a middle income economy and eventually knowledge based society (Republic of Kenya, 2007). Moreover, the Vision 2030 has placed special demands on TVET as the leading engine that the economy must fundamentally rely on to produce sufficient middle level professionals much needed to propel the economy towards the attainment of the Vision (Republic of Kenya, 2012a). The need to analyze the magnitude of the benefits in relation to costs is essential in a world where resources are scarce and investment choices must be made. The government and individuals have continued to pay large amounts of resources to TE and yet the returns are perceived to be low and unequally distributed among technical skilled
workers. It is, therefore, worthwhile to establish empirically the extent of relationship that exists between the earnings and the schooling costs to an individual in Thika manufacturing industries. Determining the level of returns to an individual justifies the resources invested in schooling.

1.3 Statement of the Problem
Within the Vision 2030, Kenya is currently implementing the Vision strategy which emphasizes the role of Technical Education (TE) as a part of the springboard to the country becoming a middle income economy and eventually knowledge based society. Moreover, the Vision 2030 has placed special demands on TVET as the leading engine that the economy must fundamentally rely on to produce sufficient middle level professionals much needed to propel the economy towards the attainment of the Vision. The statistics indicates that TVET enrolment in Kenya has increased from 71,167 in 2006 to 82,843 in 2011, representing 16.4 percent rise. That notwithstanding, the enrolment in these levels vary, for example, the enrollment in Youth Polytechnics increased by 44.0 percent between 2006 and 2010 and Technical Training Institutes and Institutes of Technology increased by 22.63 percent and 20.16 percent respectively during the same period, while National Polytechnics and TIVET University Colleges declined by 28.35 percent. In Kenya, TVET is yet to produce adequate and skilled middle level human resource required to meet the demands for national development with the anticipated ratio of 1:3:12:60 for technologists, technicians, crafts persons and artisans respectively. The government of Kenya needs to achieve a ratio of
1:3:12:60 by 2015 of a technologist (engineer), technician, crafts-person and artisan compared to the ideal ratio of 1:2:4:16. For industrial takeoff, the country should be having at least over 30,000 thousand engineers and engineering technologists. This means that the economy will require at least 7,500 engineers, 22,500 engineering technologists, 90,000 engineering technicians, and 450,000 artisans (craft persons).

The pertinent question therefore that the study sought to address was: why has it been difficult to attain the target ratios? Why is the skill imbalance continuing? Could it be that some levels of TE are more profitable than others and therefore preferable? This study therefore sought to determine the level of TE with the highest Private Rate of Return among the four levels.

1.4 Purpose of the Study

The purpose of this study was to determine the Private Rates of Return (PRR) to investment in Technical Education (TE) among technical skilled workers in manufacturing industries in Thika. This was necessary to establish which level of TE has the highest returns and also to establish statistically if the returns are low as perceived. This would guide policy makers on TE investment
1.5 Objectives of the Study

The objectives were to;

i. Determine the direct private cost of obtaining different levels of Technical Education among skilled technical workers in the manufacturing industries in Thika, Kenya.

ii. Establish the lifetime earnings based on the levels of Technical Education among skilled technical workers in the manufacturing industries in Thika, Kenya.

iii. Determine the Private Rate of Return to Technical Education by levels among skilled technical workers in the manufacturing industries in Thika, Kenya.

iv. Establish the relationship between personal characteristics and lifetime earnings among skilled technical workers in the manufacturing industries in Thika, Kenya.

v. Compare Private Rate of Return to type of employment among the skilled technical workers in the manufacturing industries in Thika, Kenya.
1.6 Research Hypotheses

The study was guided by the following null and alternative hypothesis tested at 5% significance level.

\(H_{01}\): There is no significant difference in direct private cost of obtaining technical schooling by an artisan, a craftsman, a technician and a technologist in manufacturing industries in Thika, Kenya.

\(H_{a1}\): There is a significant difference in direct private costs of obtaining technical schooling by an artisan, a craftsman, a technician and a technologist in manufacturing industries in Thika, Kenya.

\(H_{02}\): There is no significant difference in lifetime earnings accruing to an artisan, a craftsman, and a technician and a technologist in manufacturing industries in Thika, Kenya.

\(H_{a2}\): There is a significant difference in lifetime earnings accruing to an artisan, a craftsman, technician and a technologist in manufacturing industries in Thika, Kenya.

\(H_{03}\): There is no significant difference in the Private Rate of Return among the artisans, a craftsmen, technicians and technologists in manufacturing industries in Thika, Kenya.

\(H_{a3}\): There is a significant difference in the Private Rate of Return among the artisans, a craftsmen, technicians and technologists in manufacturing industries in Thika, Kenya.
$H_{04}$: There is no significant relationship between personal characteristics and lifetime earnings among the technical workers in manufacturing industries in Thika, Kenya.

$H_{a4}$: There is a significant relationship between personal characteristics and lifetime earnings among the technical workers in manufacturing industries in Thika, Kenya.

$H_{05}$: There is no significant difference between Private Rates of Return and type of employment among workers in manufacturing industries in Thika, Kenya.

$H_{a5}$: There is a significant difference between Private Rate of Return and type of employment among workers in manufacturing industries in Thika, Kenya.

1.7 Assumptions of the Study

The study assumed that the respondent would provide true information on their earnings. The study assumed that taxation rate in Kenya would remain constant as it would be used in calculating annual wage differentials. The other assumption was that the technical skilled workers are in full employment or self-employment up to 60 years of age, which is the retirement age in the Kenyan civil service index regulation. The study assumed that all respondents passed through TVET government institutions in Kenya and studied through full time mode. The study assumed that there are zero inflation rates. Finally,
the study assumed that intervening variables like political factors, family background and trade unions effects on earnings are constant.

1.8 Limitations and Delimitations of the Study

1.8.1 Limitations of the Study

The study was faced with financial as well as time limitation during field work as the respondents were not easy to get and provide information. Tracing technical skilled workers in self employment by their level of TE was an overwhelming task despite the fact that they were a key sample for this study. Out of the 121 earmarked self employed technical skilled workers, the researcher was able to trace 101 of them.

In addition, most of the industries had day and night shifts. These shifts therefore, prolonged the data collection period since it was not anticipated. Besides, most of the respondents especially those with low level of TE had challenges in reading and understanding the questionnaire. However, the researcher and the research assistant assisted where possible. The study faced the challenge of unwillingness of some respondents to fill in the questionnaires. This was frustrating especially to the self employed who said they must be paid before filling in the questionnaire as their daily pay depended on the amount of work they do. They were, consequently, constrained by time. Lack of data for the self employed respondents on information related to their level of TE was a hindrance. The anticipated limitation of this study was that the respondents might not give the exact
figures of their salaries. However they willingly provided the information on earnings, but majority of them failed to fill in the part that required them to provide information on earnings they got in the previous years which was to be used for calculating internal rate of return. Nevertheless, the study employed Mincer’s semi-log earnings function which used the current earnings to project the lifetime ones. The study had also anticipated that respondents would not remember the amount of money they spent during their education period in TIVET; that notwithstanding, the general response was positive.

1.8.2 Delimitations of the Study

Despite the fact that there are other industrial towns in Kenya, the study confined itself to one industrial town Thika, Kiambu. This limits the generalizability of the findings to other industrial towns and sectors outside the scope of the study other than the manufacturing one. The study established the direct earnings, costs of TE and level of TE to skilled technical workers in the manufacturing industries that accrue to the individual but not to the society. The study was limited to gathering information on direct private cost and direct benefits that are measurable in monetary terms. Majority of the self employed skilled technical workers were found to be higher diploma or degree holders. Given that there was no data to show the level of TE for the unemployed, the anticipated number of self employed grade tests artisans and craftspeople certificate was very low as the majority were diploma technicians and technologist or engineers with higher diploma or degree level of TE. The
study delimited itself to technical skilled workers who have been in employment for at least one year as earnings were key to the study. The study delimited itself to only those technical skilled workers with hard skills as opposed to soft skills that were of interest to the study for instance, mechanical, building and electrical. The reason being that there is a demand for middle level technical people in Kenya and the vision 2030 notes that the rapidly growing economy has started showing human resource constraints particularly in the most scientific areas of science and technology and innovation.

1.9 Significance of the Study

First, the findings of the study could be used by students, school leavers and parents who are potential investors in TE. It would guide them in making informed choices on which level of TE they can invest in and which level gives higher returns or to opt for extra TE. They can make an assessment about whether it is optimal to undertake extra education and balance between the present costs (at the present) and the financial gains in the future. This helps them to decide where to channel their funds in terms of investment choices.

Second, teachers and instructors in TE can guide and advice learners on the most profitable level of TE to invest in given the limited resources available and depending on their academic abilities.
In addition, study findings would equally be vital guiding policy makers in the Ministry of Higher Education and Ministry of Youth Affairs in Kenya where the TIVET subsector lies. It is possible that they would use the findings in identifying priorities in resource allocation rather than rely on political decisions. Most importantly, efficient allocation of scarce resources among the different levels of TE in order to avoid inequities resulting from funding levels. This is because ROR throws light on trends in private demand for certain levels of education and influences enrolment of students in some levels compared to others.

In addition, TVET in Kenya is in the process of rebranding the sector. Rate of returns figures might guide the sector in re-branding the sector that currently is perceived negatively (Republic of Kenya, 2012). Findings on rate of return could guide the sector on the possible strategies to be employed in making the sector more attractive

Technical skilled workers in manufacturing sector could find this in deciding whether or not they can opt for extra education. The Human resource managers in the manufacturing industries in Thika could benefit from the findings of the study in that the statistics provided might assist them in determining the wages of their workers in relation to their levels of TE. Additionally, development planners in Thika could use the statistics to guide development of new policies to solve the income disparity problem in the region.
Donor funding agencies for example World Bank and UNESCO among other international bodies might consider the amount to grant to technical institutions in relation to returns. For example, where PRR is zero, it means there are no incentives and therefore, donors can determine how much donations to give. Lastly, other administrators and policy makers in other sectors of the economy may use the findings to solve the problem of wage differentials among workers in different sectors and occupations since the investment and benefits differ with levels of education and costs involved in schooling.

Lastly, the findings may replenish the data bank and add to the body of statistical knowledge on PRR in TE in Thika, Kenya. The study findings could be relied on as a basis for other future research in TE in Kenya. Findings of the study can provide important information on the main determinants of the return to investment in TE.

1.10 Theoretical and Conceptual Framework

1.10.1 Human Capital Theory (HCT) (1994)

The study focus was to determine PRR to investment in TE among the four levels in order to establish which level pays. The study was based on the Human Capital Theory (HCT) applied by Becker (1994). Human Capital Theory states that education or training raises the productivity of workers by imparting useful knowledge and skills, hence raising workers future income by increasing their lifetime earnings (Becker, 1994; Psacharopolous &
Woodhall, 1985). For this reason, future income rise by increasing their lifetime earnings.

The present study focus was thus mirrored through the HCT frames of thoughts since its primary focus was to find out the variations in: direct cost of TE, lifetime earnings and the rate of return to an individual skilled technical worker in the manufacturing industries of Thika. Importantly, Psacharopolous et al. (1985) and Woodhall (2004) stress that during the process of obtaining schooling, it is well agreed that education is undertaken as an investment that incurs costs. These benefits extend over prolonged period in future. In addition, investment in human capital is a decision.

To invest in human capital is understood to be a decision that is a function of the expected cost of education and benefits. Costs incurred are expected to give prospective return in the future. Given that there is an anticipated timeframe where benefits will be recovered, a totally well-versed rational individual will make the choice to invest in additional education when there is predictable rate of return (Shahar, 2008).

This theory was relevant to this study in several ways; First, HCT helped the researcher to determine the direct private costs of TE and future lifetime earnings of an individual investor at every level of TE since costs and earnings are a component in determining rate of return. Human Capital Theory affirms that spending on training and education is expensive and should therefore be considered as an investment. The reason being, education and training is
undertaken with a motive of increasing personal incomes in future. In this respect, the theory affirmed the need to ascertain the costs incurred during the study period of an individual technical skilled worker.

Human Capital Theory has been used in comparing types of education, for example, technical and general education by Psacharopolous (1995), Woodhall (2004), other scholars, researchers and the World Bank. The theory assumes that earnings rise with additional years of schooling. Therefore, the theory is appropriate in determining the productivity levels in terms of earnings to different technical skilled workers with different TE levels namely grade test, certificate, diploma and higher diploma. The tenets of the HCT would also help the researcher to establish if increase in levels of TE in Kenya increases returns. However, economists and educationists also say that education acts as a ‘filter’ or ‘a screening device’ which helps employers to identify those individuals with superior abilities (Woodhall, 2004).

Individuals are assumed to invest in training during an initial period and then receive returns later in subsequent periods. Therefore, since training is assumed to make workers more productive, workers collect the returns from their investment in later periods through higher marginal products and higher wages. The HCT, therefore, was appropriate to this study in comparing individual direct benefits with the direct costs incurred by the respondent in the process of obtaining TE. Notably, increase in level of TE increases returns. This study was designed with a view of establishing if increase in earnings rise with investing in higher levels of TE in Thika, Kenya.
On one hand, there are several Cost Benefit Methods (CBA) methods that the theory HCT employs to appraise projects. One of them is Benefit – Cost Ratio (BCR) which is a tool for analyzing returns to education that gives a numerical figure. Net Present Value (NPV) is also a tool for analyzing returns on education by calculating the difference between the value of discounted benefits and discounted costs. That is, NPV is equal to discounted returns minus discounted costs. If NPV is positive it indicates that the project is worth the investments in which case costs and benefits are assumed to be the true representative of the actual. If NPV is negative, it then means it is not an appropriate investment. In addition, Internal Rate of Return (IRR) method which equates the discounted present value of expected benefits to the present value of cost as reflected in the formulae below;

\[ \sum_{t=1}^{n} \frac{B_t}{(1+r)^t} = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} \]

Where \( B \) = is benefits
\( r \) = internal rate of return
\( n \) = number of years
\( C \) = Costs
\( \Sigma \) = sum of benefits or costs from Yr 1-n.

On the other hand, there are other alternative methods of determining rates of return to education according to Woodhall (2004). These methods include: the ‘short cut’ method, the ‘reverse’ cost benefit method, complete method (elaborate) and the ‘earning function’ method.

The short cut method is a simplified method used when no data are obtainable to compute earning functions. However, if there is data showing the average
earnings at one point the worker was in school, it is an appropriate approach to use. Additionally, the reverse cost benefit ratio method is appropriately used when the costs of investments are available but there is no data on the earnings. The method fails to provide concrete rate of returns. Nevertheless, it offers a rough sign of the benefits that may be needed to create an intended rate of return. The complete method is also referred to as the elaborate method. In this method rate of return is arrived at when the value of the discounted net returns is zero. At this point an interest rate is obtained.

Lastly, Jacob Mincer’s semi –log earnings functions, which the current study employed, is also used to measure individual rate of returns to education. It is a multi-regression equation. According to Heckman (2006), the Mincerian earning function is specified as:

\[ \ln Y = \alpha + \beta S + \theta Exp + \rho Exp^2 \]

Where \( \ln Y \) represents the natural log of income (Y)

\( S \) represents the number of years of schooling

\( Exp \) represents the number of years of work experience

\( Exp^2 \) represents the square of number of years of work experience

This method has an advantage of including other personal factors other than schooling which in turn can influence earnings among technical skilled workers. It is worth noting that the personal factors that were used in the calculation included; age, (represented by experience squared), ability, gender, experience and years of schooling. Therefore, modified Mincer’s model was used in the study. This method assumes that earning differentials relating to
each educational level is constant throughout the working life of a worker. It also considers the foregone earnings.

Nevertheless, given investment in human capital yields earnings in future, earnings function method was appropriate given the income, schooling period and work experience information is available. The theory was designed with a view to establish if levels of TE increase returns.
1.10.2 Conceptual Framework

**Independent variables**

**Cost of Technical Education**
- Fees, transport, stationery
- Expenditure on books
- Pocket money-school fees
- Food and accommodation
  - industrial attachment, tool box

**Level of Technical Education**
- Grade test
- Certificate
- Diploma
- Higher diploma

**Personal characteristics,**
- Sex, age, gender, ability, experience

**Type of employment**
- Salaried
- Self employed

**Dependent variable**

**Earnings**
- High or low life time earnings

**Figure 1:1 Own Conceptualized Relationship between Earnings and Other Variables**
The Figure 1.1 shows that there are two types of variables; dependent and independent variables. The independent variables are the cost of obtaining TE, levels of TE, personal characteristics and type of employment. The dependent variable in this study is the earnings in terms of income.

The conceptual framework shows how independent variables influence earnings. Earnings are a function of the independent variables. This means that the earnings may be high or low depending on the change in the independent variables. Earnings and by extension lifetime earnings, are influenced by several factors. Specifically, this study focused on the following factors in relation to earnings: the cost of TE, level of TE, personal characteristics and type of employment of the skilled technical worker.

The study focused on the costs of Technical Education which the individual incurred during the schooling period. This includes; fees, pocket money, accommodation and stationery among many others. The amount of money spent during schooling period influences the rate of return. For example if the cost of TE is high and the earnings are low, the rate of return will be low and vice versa. Students in TVET undertake their training in different periods of years, normally ranging from 1-5 years as it is flexible. The cost, therefore, incurred may not be the same if all factors were held constant. The preceding arguments are considered useful to this study because they were used to compare costs borne by skilled technical workers during their respective TE.
On the Levels of Technical Education studies have shown that there is a positive relationship between levels of education and lifetime earnings. It is argued that there are higher lifetime earnings to those who have undertaken higher level of education and vice versa. For example university graduates earn more than primary school graduate teachers. The levels of TE focused on in this study were grade test (artisans), certificate (craftspeople) and diploma (technicians) and higher diploma (technologists). If the skilled technical worker has attained high levels of TE then, it is assumed that the lifetime earnings will be higher and vice versa. However, those technical skilled workers who increase their TE are likely to increase their salary or wages. The study, therefore, explains the marginal gains of taking up an extra level of TE.

Differences in personal characteristics are found to contribute differently to earnings. Study done by Psacharopolous et al., (1985) showed that there is an influence on ability and other factors on earning capacity such as age, intelligent quotient, family background, experience, natural abilities and parent’s education among others. This study limited itself to age, ability, and gender. It also included area of specialization (mechanical, electrical and civil and building engineering courses) and experience of the skilled technical worker in Thika, Kenya. The researcher limited the study to these characteristics as most of the employer’s highly regard them during recruitment for individuals with TE related skills unlike other variables like family background and parent’s level of education among other variables.
The type of employment in this study means that the individual technical skilled worker is either salaried or self-employed. There are skilled technical workers who have their own businesses while others have been employed in various industries. One of the guiding principles of TVET is to promote and develop innovation, creativity and entrepreneurial minds for self-reliance (Republic of Kenya, 2012a). Different countries have reported different wages or salaries between the self and salaried TE workers. This information helped this study to formulate conceptual framework which seeks to show PRR by type of employment.
1.11 Operational Definition of Terms

The following terms have been operationalised in this study to assume the corresponding meaning:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Artisan</td>
<td>Technical skilled graduate worker whose highest level of Technical Education is a grade test</td>
</tr>
<tr>
<td>Cost of TE</td>
<td>Total individual monetary expenditure by a technical skilled worker during the TE schooling period</td>
</tr>
<tr>
<td>Craftsperson</td>
<td>Middle level technical graduate whose highest Technical Education level is certificate</td>
</tr>
<tr>
<td>Direct Private Costs</td>
<td>Direct expenses incurred by an individual technical skilled worker in the process of obtaining a particular level of TE</td>
</tr>
<tr>
<td>Earnings</td>
<td>A term used synonymously to referring incomes in form of salary or wages gained by an individual upon completion of a certain level of TE and upon on employment.</td>
</tr>
<tr>
<td>Investment</td>
<td>Financial expenditure on Technical in the hope that the technical skilled worker will reap profit in terms of earnings in the future</td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td>A formal stage in Technical Education that leads to certification</td>
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<td>------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Lifetime Earnings</strong></td>
<td>Projected measurable monetary earnings in form of incomes gained throughout an individual working life that has completed a certain level of TE</td>
</tr>
<tr>
<td><strong>Manufacturing Industries</strong></td>
<td>A place where machines, tools and labour is used to make things (goods or wares) by adding their value for use or sale in large or small firms either in self employment or in salaried employment</td>
</tr>
<tr>
<td><strong>Personal characteristics</strong></td>
<td>The gender, age, experience, abilities area of specialization, or any other special skill apart from TE undertaken by the technical skilled worker that earns him or her some income.</td>
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<tr>
<td><strong>Pocket money</strong></td>
<td>Amount of money a technical skilled worker was given for use and emergencies during his or her stay in the learning institution</td>
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<tr>
<td><strong>Private Rates of Return</strong></td>
<td>It is a proportion which describes the relationship between the private costs and private earnings associated with investment in TE</td>
</tr>
</tbody>
</table>
**Technical Education**  
Refers to the study of knowledge, practical skills and attitudes relating to preparing a technical schooler to take up a certain occupations

**Technician**  
A technical skilled worker who has a diploma certificate from a TIVET institution in Kenya.

**Technologist**  
A technical skilled worker who has a higher diploma certificate from a TVET institution in Kenya or its equivalent

**Type of employment**  
Mode of earning by a skilled technical worker either through salaried income or wage
CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This section presented a review of related literature on Technical and Vocational Education and Training (TVET), Direct Private Costs of Technical Education (TE), Levels of Technical Education and Lifetime Earnings and Private Rates of Return to Technical Education. It also presents the Personal Characteristics in relation to Lifetime Earnings and Private Rates of Return by Type of Employment of the technical skilled worker as well as a summary of the literature reviewed.

2.2 Technical, Vocational Education and Training

Education is the cornerstone of economic and social development. According to Blaug, 1963 as cited by Nyakweba (2006), education furnishes the economy with required skills that are directly employed in the productive process and getting a favourable and stimulating potential workforce. It is broadly recognized as a tool for economic development of a society (Psacharopoulos et.al, 1985) and has contributed a great deal to the national development of both less and more industrialized countries. There are different types of education. For instance, there is general and Technical Education (Woodhall, 2004). The former is the academic education while the latter is the study of
practical skills related to occupations. Training and skills development play a vital role in an individual’s productive capacity. The study paid attention to TE.

Importantly, Technical Education is the foundation of any sustainable technological development (Medugu & Bappah, 2013). It helps in human capital development of any nation and is regarded as workforce education that facilitates the adjustment of the skills and knowledge of man to the changing demands of the society. TVET is essential to the world of work and an effective means of empowering society to engage in productive and sustainable livelihoods (Simiyu, 2009). Recently, Kenya has revitalized the subsector in order to locate herself strategically on the in the international scene.

Moreover, European Union Report (2013) agrees that there is a correlation between education expenditure and promotion of economic growth, development, efficiency and contributions to both social and individual growth. As a result, some countries were rated according to how much they contribute to education against their Gross domestic Product (GDP). These countries included Denmark, Cyprus and Sweden, which had 8.8, 7.9 and 7.0 percent of GDP respectively. Nevertheless, these are developed countries whereas a developing country like Kenya contributes only 0.002 percent to TVET sector (MoEST, 2012). Hence, there is need for a country like Kenya to invest more in TE for rapid development.
Many economists agree that education and training plays a great role in economic and social development of a country (Shahar, 2008; Wolf, 2009; Nyerere, 2009; European, Union 2011). Technical and vocational education and training (TVET) is essential for rapid industrialization and national development. Such other benefits include economic growth, employment (wage or self), income stability as well as cohesive and responsible society. Therefore determining those benefits empirically is vital in order to guide in policy making process.

Technical and Vocational Education and Training has been neglected for a long time. However, is now firmly on the agenda of governments around the world. According to Nyerere (2009), a number of countries both developed and developing, have paid more attention to TVET institutions by providing satisfactory funding. Consequently, students in those technical institutions are well versed and endowed with scientific culture of research and application at an early age. Such countries according to Nyerere (2009) include: Japan, Italy, China, Brazil and Sweden. Limboro (2012), notes that almost 50 percent of the students in upper secondary education follow some form of technical or vocational education in Europe. Although, the importance the World Bank driven strategies has had significance emphasizes on Technical Education, they did not pay much attention to the monetary returns to the individual, which the present study examined.
In recent times, Africa is closely investing in Technical Education. The Republic of Cameroon for example focused on development of vocational and professional training to facilitate integration into the labour market, Cote d’Ivoire strengthened vocational training while Ghana linked vocational education and training with education of the youth and the development of technical and entrepreneurial skills. In addition, Lesotho and Rwanda focused on linking TVET to businesses while Malawi emphasized the need to promote self-employment through skills development (Afeti, 2006). Nevertheless, none of these countries tried to explain the gain or loss to the individual investor in TE.

Additionally, in Africa, several countries have given priority to TVET initiatives in their national development policy documents. These countries include: Chad, Sierra Leone, Guinea, Senegal and Ethiopia. In Tanzania and Mauritania, the governments have in collaboration with multilateral and bilateral donors, provided funds for private secondary schools (Onsomu et.al. 2009). In Gambia and Zimbabwe, direct subsidies take the form of teacher salaries to grant aided private schools, and also a per capita grant for non-recurrent expenditure and building grants. However, with this revitalization of the technical subsector the study compared the costs incurred in investment in TE levels. In Uganda and Zambia however, most of the studies have observed that TE is expensive as compared to general education. Notwithstanding, hardly any study has established whether or not the high cost of TE bears corresponding returns, which the current study sought to establish.
In Kenya, various policies have been formulated since independence. These policies had a TE scope. These are Ominde Report, 1964, Gacathi Report, 1976 and Mackay, 1981. The reports had diverse proposals on TE implementation over the years. For instance, the Ominde Commission on the one hand commended that all trade schools to be converted to technical schools. Mackay report on the other hand recommended the increase of vocational education in order to enhance training chances for the swelling amount of school leavers. Additionally, the report introduced 8- 4- 4 system of education. Specifically technical subjects were initiated at the primary level of education. Technical subjects were later crumbled by the Koech Report of 1988. Today, the revitalization of Technical, Industrial, Vocational and Entrepreneurship Training (TIVET) has kicked off as shown in the Session Paper No 1 of 2005 and Kenya Educational Support Sector Program (KESSP) (Republic of Kenya, 2005a; Republic of Kenya, 2005b). Despite the massive investment in Technical Education, lack of adequate cost benefits analysis continues as a challenge due to lack of knowledge on whether TE is viable or not especially to the individuals.

Technical Education in Kenya is provided in different technical training institutions including Youth Polytechnic (YPs), National Youth Service (NYS), The Kenya Technical Teachers College (KTTC), Institutes of Technology (IT), Technical Training Institutes (TTCs) and in higher institutions of learning. Additionally, other ministries like agriculture have vocational centres. Some of the technical universities include Mombasa and
Kenya polytechnics have been recently upgraded to offer degrees in TIVET disciplines with a range of technical training relevant to the manufacturing industries (Republic of Kenya, 2005b, Nyerere, 2009; JAB, 2011). This study paid attention to the TVET institutions in the Ministry of Education.

The objectives of Kenya’s TVET systems are to: provide and promote life-long education and training for self-reliance, provide increased training opportunities for school leavers that will enable them to be self–supporting, develop practical skills and attitudes which will lead to income earning activities in the urban and rural areas. Besides, it is to provide technical knowledge, vocational skills, and attitudes necessary for manpower development and to produce artisans, craftsmen, technicians and technologists for both formal and informal sectors (Republic of Kenya, 2005a; Republic of Kenya, 2012a). Nevertheless, information on whether these objectives have all been met without informed calculated statistics on cost and benefits of the various income projects to make a choice to invest in is imprecise. It is against this background that the study focused on the four cadres.

Republic of Kenya (2012a) reports that Kenya will strive to achieve a ratio of 1:3:12:60 by 2015 of a technologist (engineer), technician, crafts-person and artisan compared to the ideal ratio of 1:2:4:16. Besides, in 2010, out of 357,488 candidates who sat for the Kenya Certificate of Secondary Education (KCSE) examination, 60 percent or 215,488 school leavers did not join any education institutions but had to undertake non-formal training or join the workforce directly while unskilled, which is a huge loss to the national
economy. It is not clear if this group of school leavers is aware of the cost involved in investing in TE and the returns. This present study provided PRR statistics with a hope of guiding school leavers in making investment decisions in TE. The statistics may help school leavers chose to join the technical institutions in various levels of TE and the ratio might be improved.

Also, there has been a tremendous growth in Kenya’s graduates from the primary and secondary school level to an annual average of 600,000 and 250,000 respectively in recent times, Out of this number, only 55 per cent and 10 per cent or 350,000 and 20,000 respectively proceed to secondary schools and universities respectively (MoEST Strategic Plan-2007). Yet this group of people needs information on rate of returns to investment in TE in order to make decisions on which level they could join. Research on PRR is hardly available especially in TE which the study provided.

2.3 Direct Private Cost of Technical Education

Large disparities in direct private costs can enhance inequity. As a result, such private costs may possibly decrease the demand for education for the children from poor families. Therefore, costs of education and earnings are a determining factor in making decisions about investment choices in education.

In the process of acquiring education, an individual incurs costs and reaps benefits at a future date (Shahar, 2008). These may be direct or indirect private costs of education. Direct private costs refer to expenses incurred
directly by the individual and paid to the institution. Such expenses include school fees, out of pocket money, expenditure on books. Scholarships, bursaries or other forms of financial aid reduce the private costs of education. Furthermore, for the individual, forgone earnings often represent the largest proportion of the private costs of education (Psacharopolous et al., 1985). Direct private benefits accruing from such expenses take the form of improved earnings and increased productivity due to better education, among others (Woodhall, 2004). Grierson (1997: 11) cited in DFID (2007) reiterates that “there is a crisis of cost since vocational training is inherently expensive” yet this is a vital sub-sector that provides parallel opportunities either as alternatives to the general education or as after-school training geared towards preparing students for either self-employment or the world of work. The current study sought to establish direct private costs that accrue to a TE investor.

Moreover, both direct and indirect costs are incurred at an individual and societal level. Psacharopolous (1985) observes that for the individual, forgone earnings often represent the largest proportion of the direct private costs of education. Further, another proportion consists of fees. The study centered on the private costs incurred by individual’s acquiring TE experience in the manufacturing industries in Thika. Determining the relationship between earnings and costs of investing in that education is necessary in order to assess its viability. Despite the fact that the direct private costs were derived at, the
forgone earnings as well were not missed out especially in calculating the PRR.

Becker (1964) noted that there are significant differences in cost per student in different subjects or fields of study at college or schools and often large differences between the earnings of graduates with different subject specialization. This is also observed by Urich (1998) who noted that in economic terms, Vocational Education and Training (VET) is an investment in human resources. This is because vocational training in the widest sense generates costs but which must pay off later by means of higher returns. To this end, the study paid attention to engineering courses such as mechanical, electrical, civil and building and construction.

A study done by Tsang (1999) compared two types of training programs. These programs were institutional training and enterprise based vocational training. The study used empirical data from both developed and developing countries. The study found out that technical and vocational programs were more expensive than the general education programs. Despite the fact that the study compared two types of programs, it failed to consider private direct costs for different levels of TE. The current study compared the four levels of TE and showed the variation in terms of private direct costs.

Kathrin (2008) observed that VET costs on the side of the government would refer to costs it incurs directly and which might include apprentice wages, salaries for training personnel teaching materials, equipment, building and
infrastructure among others. Conversely, indirect costs would include tax expenditures or subsidies, but also the opportunity cost or what might synonymously be referred to as foregone earnings due to unskilled workers and or drop out costs. While the study evaluated the TVET costs incurred by the government, the current study determined the cost to an individual. In fact knowing the cost spent on TE throughout the study period is essential. This is because an interested investor in TVET will recognize the amount of money; he or she is willing to spend (Shahar, 2008). Table 2.1 shows a summary of examples of social costs as well as the private costs of education.

Table 2.1

Social and Private Costs of Education

<table>
<thead>
<tr>
<th>Social costs</th>
<th>Private costs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct</strong></td>
<td><strong>Private costs</strong></td>
</tr>
<tr>
<td>Teachers salaries</td>
<td>Fees, minus average value of scholarships</td>
</tr>
<tr>
<td>Other current expenditures on goods and services</td>
<td>Books, etc</td>
</tr>
<tr>
<td>expenditure on book etc</td>
<td></td>
</tr>
<tr>
<td>Imputed rent</td>
<td></td>
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<tr>
<td>Earnings foregone</td>
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*Source: Woodhall (2004)*

Davis (2013) conducted a study on cost effectiveness of prison education programs in Europe. The study found out that the direct cost of providing education was estimated to be between $1,400 and $1,744 per inmate. In addition, there was a re-confinement cost of $8,700 to $9,700 less for each
inmate who received correctional education as compared to those who did not. Despite the fact that the study paid attention to the direct cost to inmates, the present study addressed private costs incurred by technical skilled workers in the manufacturing industries. Notwithstanding, the average cost of an artisan, craftsman, technician and technologist is as shown on the study background.

Looking at the situation from Asian continent, evidence from research shows that Korea, Malaysia and India are good examples of countries that invest in TVET, as a route to industrialization (Nyerere, 2009). For instance, in Malaysia there are numerous TVET providers and the government is the main provider with several ministries and agencies involved. The analysis of costs and benefits of VTE in Peru partly substantiates that VTE in developing countries fails to offer a return commensurate with its cost. The costs of academic and VTE streams in Peru are similar and the monetary returns to, and occupational profiles of, graduates of the two streams are almost identical. These similarities are most likely to occur because VTE institutions in Peru are funded at the same level as academic institutions (Bellew, 2002). Despite the fact that the costs and monetary gains seem to be equal in Peru, the case in Kenya is different. Kenya Economic survey reveals that funding levels for general education are higher than TE (Republic of Kenya, 2011a).

In an effort to understand whether or not it is worthwhile investing in VET, Kathrin (2008) found out that VET is costly compared to general education. However, blue collar workers are still needed in today’s economies. Kathrin (2008) tried to compare VET costs in Organization for Economic Co-
operation and Development (OECD) countries. The study noted that, compared to general academic education, the costs of VET are substantial in particular for those occupations that require heavy equipment and sophisticated infrastructure. Evidence shows that the demand for blue collar workers, for example VET graduates, is high and salaries are on the rise (JMcEwan, 1998). The present study determined and compared the earnings among the four categories of technical skilled workers.

In Singapore, UNESCO (1996) noted that the costs on VET as compared with general education are as 2 to 3 times higher as classes are small with instructor trainee ratios of 1:7 sometimes. Seng (2011) agrees that Singapore government believed in and has invested continuously and heavily in education and training, not only in the universities and polytechnics but also in Technical and Vocational Education. Yet in Kenya, expenditure on TVET is very low. For instance, in 2009/2010 financial year only 0.002 percent of the GDP (MoEST, 2012) while expenditure on university education was estimated at 11 percent. Nevertheless, the study determined the average private cost that an individual investor in TE pays. Despite the low GDP proportion dedicated to TVET, empirical studies to show how this translates to individual costs, are limited which the current study provided.

Tsang (1990) carried out a study on private direct costs in two Chinese provinces, namely Guizhou and Shanxi. The study found out that at the primary level, private direct costs comprised of 2.1 and 1.2 percent of the household income in both rural and urban areas respectively. Private direct
costs were more in urban than in rural areas for the same level of education. Information (data) was gathered through interviewing school staff and parents. In addition, it was observed that private direct costs increased with the level of education in both provinces. The study concluded that the heavy load of private costs could influence the demand for education especially for those in poor areas. Although, the study established the private direct costs of primary education and used interview method, the current study used questionnaires to gather the information from technical skilled workers who have undertaken technical schooling.

Additionally, in countries such as China and Indonesia, private schools receive direct subsidy differentiated by level of secondary schools in China and rural private schools in Indonesia. Aided private schools in India receive substantial support almost indistinguishable from public schools (OECD, 2011). Besides, China’s VET systems are considered to be strong because the government has put in place a set of measures both at national and provincial levels to ensure that majority of the learners are in school. That notwithstanding, every student receive 1500 (Yuan Renminbi) (240 US dollars) per year specifically for fees for the upper secondary vocational education that was made free from 2009. It is against this background information that the researcher sought to recommend increased government funding in TE in the current study.

Nair (2005) estimated the average total private cost of postgraduate students’ course in India. The cost per student undertaking a postgraduate course was Rs.37, 980 (622 US dollars) specifically for a student in the faculty of Arts and
Humanities. However, those students with scholarships had lower private cost of Rs, 25,248 (413 US dollars) compared to those without at Rs 41,890 (686.7 US dollars). Nevertheless, the study failed to provide average private total cost for students in technical institutions. The present study determined the average private total cost of TE in Thika, Kenya. Information on costs is necessary in making educational decisions as well as monitoring resource allocation and utilization in the schooling process (Tsang, 2002).

Oyegoke (2012) correlated private costs to school students’ performance in Nigerian secondary schools. The study revealed that the relationship between private unit cost and academic performance of students was insignificant. It was recommended that secondary education budgetary allocations should be enhanced by the state. Despite the fact that the study determined private direct costs and correlated it with student’s performance in secondary schools, it failed to compare with other levels of education. Notwithstanding, the present study established private direct costs of TE and determined the variation for the four levels of TE in Kenya.

Tan (1985) observes that despite, the fact that students do not pay fees in Tanzania secondary education; their school related expenditure is reasonably significant. In 1981 it amounted to US$139 for government sponsored students and US$439 (including US$242 for fees) for self sponsored students. Nevertheless, while the study compared state and private students’ expenditure in secondary education in Tanzania, the current study focused on self and wage employed technical skilled workers in Thika Kenya.
The Task Force on the Re-Alignment of the Education Sector to the Constitution of Kenya 2010 posed the concern that despite TVET education becoming a priority investment in Kenya, the costs have increased for both country and individuals (MoEST, 2012). In Kenya, TVET is delivered by both government and private providers, which include for-profit and non-profit, Non Governmental Organizations (NGO) and Church-based institution.

Financing of TE in Kenya is both private and social. This is where families’ employers, public spending and donors contribute to paying of tuition and purchasing equipment. However, it has not been adequate (Republic of Kenya, 2008) and Ministry of Youth Affairs Strategic Plan from 2007-2012 of (Republic of Kenya, 2007). The study focused on private financing as opposed to public financing. TVET students are each receiving a bursary of 15,000 each while university student get a loan from Higher Education Loans Board (Republic of Kenya, 2005a).

Despite the fact that the government expenditure on recurrent and development expenditure on TE has increased over time in different levels of TVET, Republic of Kenya (2012a) reported that most trainees end up in cheap irrelevant programmes whose graduates do not acquire the requisite skills necessary for the work place due to high cost of TE. The study determined the cost of TE in order to guide on policy making investment decisions. The expenditure as a percentage of total education sector was approximately 3.0 percent in 2009/2010 which represents 0.002 percent in Kenyan GDP (Republic of Kenya, 2012b). Much of this expenditure on TIVET goes to
salaries which consume an average of 76 percent of total expenditure on TIVET. Similarly only 0.12 percent of the GDP is allocated for TIVET. In addition unit costs for TIVET are high due to the low teacher ratio, and the expensive training equipment. This low budgetary allocation has continued to be a major constraint in the TIVET sector, yet it is expected to be a vehicle for rapid industrialization as outlined in the Kenya Vision 2030.

Ngerechi (2003) agreed that TVET is a very expensive undertaking in terms of equipment, physical facilities such as workshops, training materials and teachers’ salaries. Placing the whole burden on the government would result in drastic budgetary reduction in most of other public essentials. The government through the 1988 report on the presidential working party on education and manpower training introduced cost sharing policy which meant that parents were to share the cost with the government on essentials like tuition fees, operational costs and accommodation expenses. With this approach, most of the government contribution goes towards the payment of salaries and depending on availability of funds, subsidize on the supply of equipment (Ngerechi, 2003). Understanding the cost incurred during TE period is crucial as this involves how much money an individual is willing to spend as well as the benefit gained.

2.4 Level of Technical Education and Lifetime Earnings

Olayadan & Okemakinde (2008) noted that it is widely accepted that there is a positive correlation between education and increased earnings and this notion
has lead to an increased investment in education. The benefits of an education program are measured by the wage differentials between program graduates and those with the next lower level of education (Horomtz and Schenzler, 2012). In associating program benefits with labour –market outcomes, it is assumed that graduates are able to obtain jobs that match the education received. In this regard, the study established the lifetime earnings to different levels of TE.

Studies found out that returns to academic qualifications in United Kingdom are significantly higher than the returns in vocational qualification (Dearden et al., 2004; Dickerson, 2005 & McIntosh, 2004). The return to O- levels General Certificate of Secondary Education is between 10 percent and 20percent as compared to nil return to national vocational qualifications LEVEL 1-2. Individuals with VET qualifications receive higher wages than those without post school qualifications, especially early school leavers. Further, when time taken to acquire qualifications was examined, the value of vocational qualifications moved much closer to the value of academic qualifications. (Dearden et al., 2004; Dickerson, 2005 & McIntosh, 2004 as cited in Nattavudh & Anna (2006). While the study compared returns to TVET and academic education in secondary schools, the current one established the relationship between level of TE and earnings in the manufacturing industries.

Woodhall (2004) asserted that the relationship between benefit and costs associated with different levels of education is the cornerstone of economics
of education. Cost Benefit Analysis has been used to advocate for the adoption of the internal rate of return as a more widely used tool in the analysis of education projects. It was observed that the rate of return to a master’s degree in the United States and Great Britain has a negative value and a doctorate degree only a very modest positive one. To compare the rates of return on educational status may help to throw light on the debate on whether increasing vocational specialization is desirable or profitable.

Psacharopolous (1994), in a global update, also agrees that returns increase by level of schooling where primary education maintains the first investment priority. However, the study failed to show the rate of returns increase in to TE. Psacharopoulos et al. (1985) conducted a study on earnings profiles, related to age earning profiles by level of education. The findings showed a strong relationship between earnings and education throughout the world, in both developed and developing countries. The study found out that the average lifetime earnings of educated workers are higher than the average earnings of illiterate workers, or those with lower levels of education. Observably, average earnings tend to rise to a peak in middle-career or later and then stabilize or decline until the age of retirement. Whereas the study compared level of general education between developed and developing countries, this study sought to establish the average lifetime earnings for technical skilled workers in a developing country.

In determining the returns to vocational training and academic education Godius & Teal (2007) in Tanzania using earning functions, found out that high
levels of academic education have higher returns than either vocational or lower levels of academic, though lower vocational returns exceeded academic. The present study also employed the earnings function method. Notably, despite the fact that both studies used earning function method, the former study was conducted in Tanzania in 2007 while the present study was carried out in Kenya.

Godius, Wambugu, Mans and Teal (2005), conducted a study in Tanzanian and Kenyan manufacturing industries to explore the shape of earnings function. The study found out that the earnings functions shape were convex for both countries. This explained how fast increase of education in Africa had contributed to too slight growth especially if lower levels of education are given more attention. The study used secondary data of employees in the manufacturing centre. It also considered employees with general academic education levels. However, the present study employed primary data collected through the use of a questionnaire and focused on skilled technical workers with different levels of TE.

Rugar (2010) established lifetime earnings accruing from university education in Kenya. He was of the opinion that it would be more profitable to invest in more university education. This was supported by the approximately 48.0 percent PRR, with the doctoral degree being the most profitable level of education, though a master’s degree paid back faster. As far as lifetime earnings and education were concerned, the study concluded that there was a highly significant positive relationship between level of university education
and lifetime earnings. It is noteworthy that while the study was conducted in public universities. This study sought to establish lifetime earnings accruing from TVET levels of TE namely grade test, certificates, diploma and higher diploma from technical workers in the Thika manufacturing industries.

According to Republic of Kenya (2012b), the Engineers’ Registration Board of Kenya estimated that in 2010 there were 6,350 engineers in Kenya, a figure that is estimated to increase to by 2030 when Kenya’s population will be 60 million. The policy stipulates that at this point then, for industrial takeoff, the country should be having at least over 30,000 thousand engineers and engineering technologists. This means that the economy will require at least 7,500 engineers, 22,500 engineering technologists, 90,000 engineering technicians, and 450,000 artisans (craft persons). The current study calculated earnings connected to the four cadres with a view of informing the school leavers that there are returns to TE, in order for them to have a guide in making decisions whether or not to invest in the sector. Wanjala, (2002) underscores that higher earnings influence private demand of a program holding all other factors constant. If Kenya’s fails to produce the recommended ratio and numbers of technical workers, the Vision 2030 may not be achieved.

Kamenyi, Manda & Mwabu (2002) agreed that households evaluate educational decisions in terms of future income benefits. If these benefits turn out to be too low then demand for that level of education is lowered. Conversely, if these rates of return are very high, it could be evidence that
individuals cannot obtain the optimal amount of education. It is the hope of the researcher that investors will make investment decisions based on the statistics obtained in the current study.

Some of the challenges facing TVET sector in Kenya according to Republic of Kenya (2012a) include: negative perception of TVET, lack of awareness and the fact that in Kenya TVET is yet to produce adequate and skilled middle level human resource required to meet the demands for national development. Equally, it is noted that despite the fact that the overall student enrolment in TVET institutions is seen to have increased between the years 2006-2010 (Republic of Kenya, 2011a), comparatively the sub sector is still faced with a challenge of low enrolment due to high cost of TE. This is compounded by the fact that despite the high cost of TE, it is not yet determined if returns are high. Nevertheless, information on the returns despite the high cost is wanting. The present study estimated the return rate. The researcher in this study determined lifetime earnings associated with TE investment in the four levels.

2.5 Private Rates of Return to Levels of Technical Education

Education does produce significant economic benefits, and therefore the need to analyze the nature and magnitude of these benefits in relation to costs is inescapable in a world in which, resources are scarce and investment choices must be made (Woodhall, 2004). An individual considering investing in education is primarily concerned with how he or she will be directly affected by the investment. The measure of greatest interest to them is likely to be the
PRR, which considers only the benefits and costs that accrue solely from the individual (Stark, 2007) and not benefits to the society. Further, returns to education can be examined with a broader context, from the viewpoint of society as a whole. Consequently, this study compared all the direct costs and benefits accruing to the individual using Jacob Mincer's semi-log earnings function.

There are three ways of presenting the rate of return on investment in education according to Woodhall (2004). These include: Benefit – Cost Ratio (BCR), the Net Present Value (NPV) and Internal Rate of Return (IRR). The Benefit – Cost Ratio is a tool for analyzing returns to education that gives a numerical figure. The larger the BCR the more desirable is the project. BCR should always be more than 1 for anyone to invest in the alternative. If BCR is less than 1, the costs are more than the benefits, which implies that it is not wise to invest in the alternatives. NPV is also a tool for analyzing returns on education by calculating the difference between the value of discounted benefits and discounted costs. That is, NPV is equal to discounted returns minus discounted costs. If NPV is positive it indicates that the project is worth the investments in which case costs and benefits are assumed to be the true representative of the actual. If NPV is negative, it then means it is not an appropriate investment. Finally, the I.R.R is the rate of interest that equates the discounted present value of expected benefits to the present value of cost, which is what this study employed.
There are other alternative methods of determining rates of return to education (Woodhall, 2004). These methods include: the ‘short cut’ method, the ‘reverse’ cost benefit method, complete method (elaborate) and the ‘earning function’ method. The Short cut method is a simplified method used when no data are obtainable to compute earning functions. Additionally, the reverse cost benefit method is appropriately used when the costs of investments are available but no data on the earnings. Complete method is also referred to as elaborate method. In this method the rate of return is arrived at when the discounted net returns value is zero. At this point an interest rate is obtained. However, this study employed the earnings function method.

In Malaysia, Shahar (2008) found out that rate of returns to individuals investing in polytechnic diploma education was 14 and 13 percent for both private and social rates of returns respectively. Moreover, considering the rates of return to those in the private and public sector, the study found that it was 7 and 8 percent respectively. The conclusion was that investment in polytechnic diploma was feasible and was a preferred choice. The study targeted the diploma polytechnic graduates alone. This study involved other levels of TE which included grade tests, certificate, diploma and higher diploma in Thika manufacturing industries. In addition, although the Kenyan government has acknowledged that it is worthwhile to investment in the sector yet empirical evidence that can guide school leavers and parents on the level of profitability of technical investment is lacking. Therefore, the present study sought to fill in the gap by providing such statistics.
In Australia, a study on PRR for students studying courses analyzed costs and benefits of studying for a VET qualification for various students’ characteristics, qualification levels and modes of study. The findings indicated that although the rates of return vary for these different characteristics and scenarios, generally students do have an adequate economic incentive to enroll in VET. The best returns were for students who studied higher level qualifications Certificate 111 upwards and do so through part-time mode according to National Centre for Vocational Education Research (NCVER, 2012). Quite significant is that whereas the study reviewed students’ mode of study, the current study regarded sought to examine earnings by type of employment.

The European Union (2011) agrees that individuals choose their education on the grounds of the expected rate of return. This is in form of wages. Empirical evidence underscores the importance of investment in general education. However, little is known of the capability of VET to produce different results. The researcher in this study compared direct average direct private cost for four levels of TE for skilled technical workers who train as artisans, craftspeople, technicians and technologists against the earnings. This provided the current PRR to investment in TE.

Interestingly, Benell (1996) reported some higher rates of return to vocational education than the rates of return to general education. He argued against any underlying presumption that academic education has a higher return than vocational education. Contrastingly, Zymelman (1976) and
Psachcharoupoulos et al. (1995) affirm that technical and vocational education (TVE) provides a lower rate of return than general education. However, Benell (1996) rebuts this, arguing that even if TVE students are less ‘academically brilliant, the rate of return for TVET is still high. It is evident that the studies reviewed show contradicting results, and which provoked the need for this study to seek to determine the situation of rates of return in manufacturing industries in Thika Kenya. The study determined rates of returns to individuals at different levels of TE as opposed to comparing the types of education.

The Department for International Development (DFID) (2007), in a report on educating out of poverty where Kenya was included among other seven African countries, tried to compare PRR in general and TE among the seven countries. It was observed that unlike general academic education that has primary, secondary and university education, it was observed that it is difficult to compare levels of TE in the seven countries. This is because TVET systems and structures are different in various countries. Therefore, this study sought to determine internally (in Kenya) the various rates of returns to TE.

Further, the report showed the PRR to general and technical education in the 7 countries, where Kenya had no statistics as far as rate of return to technical and vocational education were concerned. It was reported that PRR for primary, secondary and higher education was 25, 7 and 35 percent respectively yet there was none for TE in Kenya (DFID, 2007). Therefore,
this study came in to fill the gap by providing current PRR figures which supports the fact that TVET levels are under researched.

Psacharopolous (1995) made an extensive survey of published studies on the PRR to investments in education around the world by using both elaborate and the earnings function methods. He found out that PRR to education are generally higher than corresponding social returns. Despite the fact that the current study used earning function method, it paid attention to private returns to TE of individual investment in Kenya as opposed to comparing social returns and private returns to general education.

An analysis of data from eleven countries in Latin America by Psacharopoulos in 1995 showed that half of these countries (six) rate of return for vocational secondary education is higher than that for secondary general education. It was also reported from the study that, in seven out of eleven countries, the private return to secondary education does not differ between general and vocational education. Just as much the studies compared secondary general and technical education; it failed to calculate the PRR for middle level Technical institutions. The omission became the focus of this study.

Chris (2010) conducted a study on PRR to investment in both TVET and formal education in Singapore as there was a dearth of empirical evidence for almost 30 years. The study used labour force survey data. The study compared different levels and types of education. The study finding showed that there were very high PRR in Singapore as compared to lower middle income
countries. Additionally, the study used labour force survey data. The present study compared four levels of TE in Kenya using data collected from technical skilled workers in the manufacturing industries.

In Tanzania, Gordius et al. (2006) did a study that compared returns to general and vocational education among workers in manufacturing firms. Their evidence was based on cross sectional data using firm level panel data. They found out that that general education is more rewarding than vocational education and so was the case of on the job training. The marginal rates of returns to one year of education ranged between 4.8 and 17.5 percent compared to the rates of returns to one year of vocational education that was between 1.4 and 2.8 percent. Whereas the reviewed study used secondary data from firm level panel data, the current study used primary data where respondents provided their costs of TE and current earnings.

In Kenya, there have been many studies on returns to general education though scanty on TE. Some of these studies sought to analyze factors that have affected private returns to investment in education over time. In this light, Manda et al. (1999) analyzed the impact of educational expansion and returns to schooling in Kenya over a period. The study found out that PRR to secondary and tertiary education is high but close to zero for primary education. The knowledge gap in that study was that the analysis of rate of returns to TE was lacking despite it being in the category of tertiary education in Kenya. Rugar (2010) found the PRR to university education to be approximately 48.0 percent where doctoral degree was the most profitable
level of education though a master degree paid back faster. It clearly emerged that among studies done in Kenya none has studied the rate of returns to different levels of TE. This in essence justified the need to conduct research of this magnitude to address this glaring knowledge.

2.6 Personal Characteristics and Lifetime Earnings

Studies have compared individual characteristics to earnings such as gender, age, abilities, parent’s occupation and level of education. For example Psacharopolous et al. (1985) noted that earnings are not only determined by level of education but also by age, on-the-job training and workers natural ability. The World Bank estimated the effect of many variables in Kenya on earnings which included occupation, family background, parent’s literacy, tribal group, and type of school attended (urban or rural), examination scores, number of years of schooling among others. However, earning differentials were standardized for social economic and other variables. The study reported that when these adjustments were taken into account, the rate of return to education is reduced. The reviewed study was significant to this research in that whereas the study considered the above variables in relation to general education, this study sought to regard TVET subsector in Kenya in relation to age, experience, ability, gender and area of specialization.

The earnings function method was used to estimate PRR for workers in the United States and other developed countries. The study noted that natural abilities accounts for slightly less than 20 percent of the additional earnings
(Psacharopolous, 1985). However, when all the other factors like age, sex, race and family background are included, education was still the most important single determinant of earnings. This assertion was made in relation to general education yet it is not clear whether it also applies to TVET. Little is known about the effects of these factors on earnings in TE. Besides, the study was carried out in a developed country, while the current study was carried out in a developing country, Kenya. Moreover, this study sought to relate personal characteristics such as ability in terms of academic performance, gender, age and experience.

After the introduction of the cost of education in Latin America, Psacharopolous & Ying (2006) estimated both social and private rates of returns to different dimensions. These dimensions were: sector of employment, gender and level of education. The study also included the nature of the secondary school curriculum and over time using the data for 18 countries. The purpose was to assess earning differentials according to level of education. The study revealed that the payment connected with education had decreased in the 1980s. As a result, primary level of education showed the most return rates. Nevertheless the study did not take into consideration the TVET sector in African countries. The current study however, considered such variables in Thika, Kenya.
Additionally, Grub (1992) conducted a study on post secondary TVET and sub-baccalaureate labour market. The study estimated the returns to credential and course work for the two programs and field of study in California. Returns were compared by institution and field of study. The longitudinal national study transcripts for the 1972 class were used. The results showed considerable returns to varied types of sub-baccalaureate education. Nevertheless, the study compared two types of programs while the current study compared four types of programs or levels of TE.

Borland (2002) carried out a study on private rates of returns to university education in Australia. The estimate of a bachelor degree was 14.5 percent. Lifetime monetary returns were estimated to be $380,958. The study concluded that the returns rates showed a wide disparity across the field of qualification. That notwithstanding, relatively high returns were estimated engineering graduates and for business and administration courses. Rates of return were observed for society, culture and science fields. The current study considered mechanical engineering, building and construction and electrical engineering.

Shahar (2008) carried out a PRR study on diploma polytechnic engineering graduates in Malaysia and found out that female graduates from diploma polytechnics had a higher PRR than the male which was supported by 4 to 8 percent. Despite the fact that the study compared male and female PRR in
Malaysia, it is discussion were useful in the present study as it sought to find out if the same applies to the manufacturing industries of Thika in Kenya.

Kufigwa (2000) conducted a study in Botswana. It revealed that women are paid less than men despite being on average more highly educated than men in general education. The situation in Kenya needed to be explored especially where the recent Sessional Paper No. 14 of 2012 has reported that there is a low female enrolment in engineering courses in Kenya’s TVET institutions. The current study established the influence of gender in earnings.

In Turkey, Tansel (1994) sought to know the earnings, wage employment and returns to schooling for both men and women. He found out that returns to women are smaller than those of men. This study focused on determination of returns for both wage and self-employed technical skilled workers.

Further, Nyerere (2009) notes that female enrolment in Science, Mechanical and Technological related courses in TVET institutions is extremely low. In 1998 it stood at only 1.4 percent in Mechanical Engineering, 4.4 per cent in Electrical and Electronic Engineering, and 5.0 per cent in Building and Civil Engineering (Republic of Kenya, 2007). What is unclear is whether the same pattern is observed in the industries. The current study established the proportion of males to females and their relationship to earnings, hence lifetime earnings.
2.7 Private Rates of Return by Type of Employment

Both unemployment and informal sector employment are considered to be important links between poverty and labour markets. In Kenya, Nyerere (2009) observed that earnings in the informal sector are typically low and not enough to alleviate people out of poverty. There is thus a possibility that some of the people working in the sector may actually be poor. It has also been observed that graduates of TVET in both formal and informal sectors are exploited by their employers (paid below standard wages) since the government does not enforce regulations on wages as indicated in Labour Acts. Despite the fact that the study noted that earnings in the informal sector were low, it was not determined empirically. Further, the study did not compare the returns according to the levels of TE. Therefore, that is why current study sought to establish the individual rate of return to both formal and informal employment.

Comparisons of the rate of return for general and vocational secondary education in Rwanda indicate that the return to vocational secondary education are lower even for workers in the informal sector (World Bank, 2004). According to King (2007), evidence from East Africa has shown that, in the informal economy, those with higher levels of education are more likely to start enterprises and hence have the ability to employ others. This study sought to establish whether or not technical skilled graduates with entrepreneurial skills have higher abilities that influence their earnings.
Comparing public and private sectors workers return, Patrinos et al. (1998) observed that in Vietnam the former have higher returns on average than the latter. The study established PRR for primary and university education. Additionally, both secondary general and vocational education were compared. Notwithstanding, the study failed to compare PRR for the skilled technical graduates which the current study sought to.

Olivier (2009) carried out a study on the informal sector wage gap. The study used an estimated quantile panel data from South Africa, Mexico and Brazil. The study compared the gap between informal and formal salary workers. The study found out that when heterogeneity of the workers is considered, all the countries showed a related pattern. It is worth noting that the wage penalties in the informal sector were considerable in the lower part of the distribution though it had a tendency to disappear at the top. Just as much the study compared the wage gap among the three countries using panel data, the current study compared the PRR between the four levels of TE. Data was collected from the respondent working in the manufacturing industries that had technical education skills.

Monassa (2005) did a study on rates of return to education by gender in Pakistan. The study found out that, statistically, there was a significant difference in the return between men and women. As such, women had higher economic returns than those of males. Moreover, with an additional year of schooling, the PRR was between 7 and 11 percent and 13 and 18 percent for men and women respectively. In regard to the level of education, women with
lower levels were found to be earning more. Thus a convex curve was developed. The study employed Mincerian earning functions. While the study determined PRR by gender and education levels, the current study tested the significant level among several variables against lifetime earnings. Such variables included gender, ability (highest academic level), age and area of specialization.

Chirwa and Zgovu (2001) conducted a rate of return study in education on rural labour markets in Malawi. The study used Mincerian earnings function and survey data from regular salaried and casual or *ganyu* employment. Results showed that the average rate of return on education was 6 percent. It was also observed that average hourly rates for casual employees were reported to be higher than for salaried workers. While the study was conducted in Malawi and used data from worker in a rural set-up, the current study compared PRR for self–employed and salaried workers in an industrial town in Kenya.

Praag, Arjen & Justin (2009) showed that education has a negative effect on people’s judgment to grow to be an entrepreneur. Further, these entrepreneurs have higher education levels than the employees as the former have power over the latter in terms of profitable employment. Even though the study showed the value of education on entrepreneurs’ education, the current study compared the wage earners and the entrepreneurs return rates to their investment to TE.
Barry & Al-Samarrai (2005) conducted a tracer study for those who have completed secondary school in Tanzania, specifically those who failed to get wage employment. The study investigated the extent to which education and training had on a self employed person. The study findings revealed that educational qualifications had an insignificant impact on the rates of return. However, study found out that there was a slight proof of human capital effects on the income determination procedure in the self-employment sector. The study agreed that, when the findings are compared to those of other countries in the region, PRR to education in Tanzania was reasonably low for the wage employment. Just as much the study traced those secondary school completers, the study did not address those with technical education, and instead the focus was given to those with general education. The current study paid attention to Kenyan TVET graduates as opposed to secondary school leavers. Further, it compared the PRR for both the salaried and the wage earners as unlike the self-employed.

It is generally observed that in developed countries TVET graduates have an income higher than that of graduates from other higher institutions. In Kenya, it has been noted that there are gross mismatches between supply and demand for skilled labour, widespread underemployment in the informal sector and low productivity (Nyerere, 2009). The implication is that TVET ought to be demand driven and also be able to promote enterprise culture so as to offer a wide range of employment opportunities to the youth and others. Nyerere’s study (2009) provided the current study with important insights more
importantly in establishing if such individual abilities such as entrepreneurship influence earnings of an individual.

2.8 Summary of the Literature Reviewed

Based on the literature reviewed in this chapter, there is inadequate information on empirical studies done on Private Rates of Return to TE. However, more attention has been given to general academic education, with limited focus on TE. Other studies have compared general education versus TE (Kathrin, 2008; Gordius, et al.; 2006 and Chris, 2010) with limited studies on comparing rates of return among TE levels.

It is clear that most of the countries with developed TVET systems, as opposed to developing countries like Kenya, have heavily financed TVET sector levels. For example, China and India fund secondary technical schools while Peru, Malaysia and Singapore fund universities equally with general education (Bellow, 2002). Whereas, developing countries have low funding for TE. It is not clear the extent to which the governments funding in developing countries influence the PRR which this study sought to establish.

Direct private costs for different levels of general education have been established, with disregard to levels of TE. For example, a prison program in Europe was established by Davis (2013), Tsang (1990) established private direct costs for primary level education. In addition, Tan (1995) established for secondary education and (Seng, 2011) for university education, yet none
for TE levels. Nonetheless, the current study sought to determine direct private
costs to TE among the technical skilled workers in the manufacturing
industries.

Additionally, studies have shown that there is a positive relationship between
the level of education and earnings (Psacharopolous, 1994; Gordius et al.,
2005; Rugar, 2010) yet, studies showing whether or not a similar pattern exists
in TE technical workers are scarce. The current study sought to provide the
level of relationship of level of education and earnings among the four levels
of TE in the manufacturing industries in Kenya.

Besides, PRR studies have been done widely. Some of these studies have
compared different levels of general education with (Psacharopolous et al.
1985; Shahar, 2008). Other studies have compared general education with TE
(Psacharopolous, 1995; Benell, 1996; Gordius et al.; 2006). However, studies
comparing PRR for different TE are rare. The present study determined the
variance of PRR to the four TE levels. Similarly, studies that have compared
TE and general education have found out that PRR are lower for the former as
opposed to the latter (Psacharopolous, 1995; Gordius et al., 2006).
Correspondingly, there are general perceptions that TE has low returns. This
study sought to establish if TE returns are low as perceived.

Studies have focused on personal variables (characteristics) and how they
influence earnings. However, they have found conflicting results on the
relationship between personal characteristics and lifetime earnings
(Psacharopoulos et al., 1985, Kufugwa, 2000; Shahar, 2008) and therefore this study came in to find out the case in Kenya. Moreover, studies comparing rates of return to between salaried and unsalaried individuals have been done. Literature has shown that skilled labour in the informal sector are underemployed (World Bank, 2004; Nyerere, 2009) hence low returns. It is unclear if returns to TE are as low, which this study established. DFID (2007) concluded that it is difficult to calculate PRR across countries as TVET structures and levels are different in different countries as opposed to primary, secondary and university. it is therefore clear that PRR statistics to TE for an individual country like Kenya are lacking. This study therefore, provides a firm base. The study provides a justification for expenditure at the four levels of Technical Education in order to inform school leavers and educational practice in Kenya.
CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The research methodology presented in this chapter discussed the following: Research Design and Locale, Study Population, Sampling Techniques and Sample size determination. The chapter also presents the Research Instruments, Data Collection Procedure, Data Analysis and Ethical Issues.

3.2 Research Design

The purpose of the study was to determine the PRR to investment in TE among workers in the manufacturing industries in Thika. To achieve the objectives, the descriptive survey design was used in this study because it was considered to be the most appropriate. This is because the design helped in gathering information on technical skilled workers direct costs of TE, levels of TE, earnings and personal characteristics of the respondents. Mugenda & Mugenda (2003) observes that a survey design attempts to collect data from members of a population in order to determine the current status of that population and whenever possible to draw possible conclusions from the facts discovered. Surveys are also cost effective and have the advantage of reaching a large number of individuals in short time (Orodho, 2008; Borg & Gall,
Further, findings of a survey research help to explain social phenomena with confidence and authenticity (Ray, 1988).

The independent variables in this study were: the costs of TE and the level of TE namely: grade test, certificate, diploma and higher diploma. In addition, the type of employment (whether one is salaried or self employed) and personal characteristics. The dependent variable was the earnings (returns) to the technical skilled worker. The researcher and the assistant collected the data by use of questionnaires. The study used a cross-sectional data. This data is important is used to construct age –earning profiles.

Quantitative data was generated from the questionnaire and was analyzed using descriptive and inferential statistics. The unit of analysis was the skilled technical workers in the manufacturing. Analysis of Variance (ANOVA), regression analysis and T-test were tools used to test the hypotheses at 5 percent significant level.

3.3 Study Locale

The study was carried out in Thika Town of Kiambu County in Kenya. The place is located in Kiambu County, Kenya. The geographical coordinates are 1° 3' 0" South, 37° 5' 0" East. It lies on the A2 40 kilometers N-E of Nairobi, it has a population of 139,853 and its elevation is approximately 1,631 Meters (5,351 ft).
Thika town was selected for the study for several reasons. First, Thika is one of the largest industrial towns in Kenya with different categories of manufacturing industries (Omwoyo, Fred, & Kisovi, 2007). Some of the industries found in Thika include: motor vehicle assembly, beverage industry like Kenya canners, Kenya tanneries and oil industries like BIDCO. It is also an agricultural town and a commercial and communication centre. Furthermore, the area is considered to be influential in that the economic activities growths are regarded major. The Thika Development Plan of 1997-2001 (Republic of Kenya, 2002) recognized that, despite incomes being generally high in the district, they were not evenly distributed. Yet no study has been done since then to determine the level of income disparities.

Thika unlike other towns in Kenya grew as an industrial town and has available land for industrial growth (Omwoyo et al., 2007). This fast growing urban centre has industries that are major consumers TVET graduates. Manufacturing industries also contribute highly to the socio-economic development of Kenya and have been identified as one of the key subsector to spur Kenya’s industrialization by 2030 (Republic of Kenya, 2007). The sector currently employs 254,000 people which represent 13 percent of the total employment (Republic of Kenya, 2012b). Further, manufacturers in Kenya were found not to have the numbers of technical personnel at the certificate and diploma levels (World Bank, 2004). The study did not establish why the numbers were insufficient; however the current study sought to determine the earnings of the technical skilled workers.
3.4 Target Population

The study targeted 1,381 technical skilled workers in manufacturing industries in Thika. Out of a total number of 1,381 technical skilled workers across Thika industrial development area, there were 776 salaried technical skilled workers. According to the print-out list of names given by District Trading Officer in Thika (2012), there were 605 self employed technical workers who were owners of workshops and service repair contractors. The 776 salaried technical workers were categorized according to levels of TE as follows: 154 grade test artisans, 204 certificate craftspeople, 219 diploma technicians and 199 technologists.

There was no data in Thika municipal town office to show the number of salaried technical graduates employed in each of the manufacturing industries in Thika unlike the self employed ones. Therefore, each individual manufacturing industry was visited and the human resource managers provided the information on the number of technical skilled workers and their various levels of TE in 2012.

3.5 Sampling Techniques and Sample Size Determination

The study employed both stratified and simple random sampling techniques to draw the sample. Simple random sampling helps to avoid bias. All units of the target population have an equal chance of being selected (Kerlinger, 1973; Orodho, 2008; Mugenda, 2012). According to Gay (1992), at least 20 and 10 percent of the population is representative enough of small and large size
populations respectively. For this study, 20 percent of skilled technical workers were captured.

Out of the target population of 1,381 the total sample size was 276 technical skilled workers. These included 155 salaried technical skilled workers and 121 self employed technical workers respectively. On the one hand, the sample size for the salaried was arrived at by getting 20 percent of the total of each level of TE. The total for each category was as follows: 154 grade test artisans, 204 certificate craftspeople 219 diploma technicians and 199 technologists which yielded to a total sample of 155 respondents. These were: 31 grade tests, 41 certificate, 44 diploma and 39 higher diploma respondents.

On the other hand, the 605 self employed technical workers included a sample of 101 respondents arrived at through snowballing method which was against the 121 sample earmarked for the study. According to Kombo & Tromp (2006) snowball or chain sampling begins by asking people who know a lot about what is being investigated. Kombo and Tromp further observe that snowball technique is ideal in situations where the population is unknown or not readily identifiable. This is the reason why the study adopted snowballing method to identify technical skilled workers according to their level of TE.

It is worth noting that determination of the sample size is important in this study since the calculation of PRR requires working out the average cost and earnings of the respondents under each level of TE. During the actual data collection period, it was realized there were very few self employed technical
skilled people with grade test and certificate levels compared to diplomas and higher diploma. There were 6 grade test, 8 certificate, 47 diploma and 40 higher diploma self-employed workers traced and grouped according to their different levels of TE. The total samples are presented in table 3.1.

Table 3.1

Sample Size

<table>
<thead>
<tr>
<th>Category</th>
<th>Population</th>
<th>Sample Size</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaried: Grade test</td>
<td>154</td>
<td>31</td>
<td>20</td>
</tr>
<tr>
<td>Certificate</td>
<td>204</td>
<td>41</td>
<td>20</td>
</tr>
<tr>
<td>Diploma</td>
<td>219</td>
<td>44</td>
<td>20</td>
</tr>
<tr>
<td>Higher dip/degree</td>
<td>199</td>
<td>39</td>
<td>20</td>
</tr>
<tr>
<td>Self Employed</td>
<td>605</td>
<td>121</td>
<td></td>
</tr>
</tbody>
</table>

Total 1381          276

Source: Municipal Council of Thika and Industries (2012)

3.6 Research Instrument

The data for this study was collected using one type of questionnaire for technical skilled workers in the manufacturing industries in Thika. Orodho (2008) and Borg & Gall (2010) underscore the fact that a questionnaire has the ability to collect a large amount of information in relatively quick space of
time. Questionnaires items are standardized and anonymity is maintained. These attributes and advantage of employing questionnaire on one research project explains why the instrument was considered suitable for this study.

Important to mention here is that the questionnaire was administered by the researcher and one research assistant. The questionnaire was divided into four sections: Section (a) Personal details like, gender, age, ability and years of work or experiences. Section (b) The level of TE, section (c) On costs incurred and Section (d) On the individual earnings’ received in form of salary (income) or wages and any other income that resulted from their technical skills. One type of questionnaire was administered to all the four cadres of skilled technical workers. This is because the questions were similar irrespective of the skilled technical workers levels of TE.

3.7 Pilot Study

Piloting of instruments was done in Thika with a view to help the researcher identify ambiguities. For instance, the piloting revealed some unnecessary questions that had to be removed. Bryman (2001) proposes that pilot study should be conducted before the actual research in order to ensure that all the research instruments give the information needed. It was appropriate to pilot the instruments in Thika because the respondents are likely to bear similar characteristics with those used in the final study. However, the respondents were not included in the final study.
A total of 32 questionnaires were administered to technical skilled workers to fill before and after two weeks. The study used test re-test method, as such, 16 questionnaires were administered for each set.

### 3.7.1 Validity of the Instrument

Validity refers to the quality of a data-gathering instrument. This enables it to measure what it is intended to measure (Gay, 1992). Content validity was used to determine the relevance, comprehensiveness and completeness of the research instruments. The content and face validity of the research instruments was arrived at through expert judgment and opinion from experts in the area of Economics of Education and Planning. The expert opinion was sought in order to improve both the content and face validity of instruments in order to ensure that the questionnaire used in this study had a high degree of validity measured what it was supposed. Expert judgment has been proposed by Burns (2000) and Mertens (2005). Consensus was that the research instruments were appropriately designed so as to enable the researcher to capture data relevant to the study objectives.

### 3.7.2 Reliability of the Instrument

Reliability is the degree to which instruments scores are free from measurement error (Kothari, 1993). The reliability of the instruments was tested after the pilot stage. To ascertain the reliability of instruments test re-test technique was used. Questionnaires were administered by the researcher
and research assistant and after two weeks, the same groups of people were given the same research instrument. Thereafter the correlation coefficient for the two scores was calculated to measure the reliability. Thirty two (32) questionnaires were ideal as there were 4 levels of TE. Each level, therefore, had 8 questionnaires for both the self employed and salaried. A correlation coefficient was calculated using Pearson's r, and the result was a correlation coefficient of 0.784. Gay (1992) observes that a correlation coefficient of 0.7 and above can be regarded as reliable.

3.8 Data Collection Procedure

According to Orodho (2008), there are three logistical phases for data collection. Phase one is the pre-field logistics phase where completeness, identification and clear instructions are verified. This included obtaining a permit from the Ministry of Education, Science and Technology and Kenyatta University Graduate School authorization to visit to manufacturing industries in Thika, Kenya. A detailed implementation plan of action to guide the research process as well as formulating a budget to cater for research expenses was drawn and accepted prior to the administering of field work. The research assistant was trained to acquaint himself with the study and the research instrument in the month of January 2014.

Phase two was the field-work logistics stage. It involved actual visits to selected manufacturing industries and workshops in Thika, Kenya. Familiarization visits to the research area to ascertain the availability of the
respondents was made. After developing good rapport with the respondents, they were issued with a copy of the questionnaire. The researcher discussed with the respondents the need for strict confidentiality in dealing with their responses before the administration of questionnaires.

Data was collected by the researcher and an assistant from the month of January to March, 2014. Data was collected during the day and at night, since some respondents had night shifts. The researcher and the assistant had a similar approach whereby the instruments were dropped and collected after an agreed duration between the researcher and the respondents. However, there are those respondents that requested have the questions read to them and they answer. In this case the respondent took 15-20 minutes to write down the answer.

Phase three was the post-field logistics phase. The duly filled questionnaires were picked after a period between three to five weeks. The study used information collected through the questionnaire as first hand data for the analysis.

3.9 Data Analysis

The study was guided by the objectives as outlined in the chapter. Five null hypotheses were used. Quantitatively, the primary data collected was analyzed using both descriptive and inferential statistics. Descriptive statistics like mean and standard deviation as well as minimum and maximum were used. The
statistics were used to determine the total direct private costs and earnings of the skilled technical workers. Hypotheses were tested at 0.05 percent level of significance, meaning they were either accepted or rejected at 95 percent confidence level in a T-test and F-statistics at alpha = 0.05 level of significance. Data was analyzed using STATA software, Version 12. The analysis was done based on the following null hypotheses:

H₀₁: There is no significant difference in direct private costs of obtaining technical schooling by an artisan, a craftsman, a technician and a technologist in the manufacturing industries of Thika, Kenya.

Quantitative data was generated from the questionnaires on costs TE. Direct private costs of TE totals were determined and the mean was worked out according to each level of TE. Subsequently, Analysis of Variance (ANOVA) was used to determine the variance of the means of the four levels of TE namely: grade tests, certificate and diploma and higher diploma. F-statistics and a corresponding P-value were used to interpret the results.

H₀₂: There is no significant difference between lifetime earnings accruing to an artisan, a craftsman, a technician and a technologist graduate worker in the manufacturing industries of Thika, Kenya.

Equally, quantitative data was generated from the questionnaires on earnings. Number of working years was used to project the lifetime earnings. Average annual income was used as a proxy for lifetime
earnings (Becker, 1994). After that, average total lifetime earnings were arrived at. ANOVA was used to determine the variance of the means of the four levels of TE where F-statistics and P-value were used to interpret the results.

For hypotheses 1 and 2, ANOVA was appropriate as it determines the variation of means. To this end there were four categories of means for the four levels of TE. Results were presented in form of tables.

H\textsubscript{03}: There is no significant difference in the Private Rates of Return of an artisan, a craftsman, technician and technologist in manufacturing industries in Thika, Kenya.

The null hypothesis was evaluated using Jacob Mincer’s earning function regression model according to Mincer (1974) and Heckman (2006). The Mincerian earning function is specified as:

\[ \ln Y = \alpha + \beta S + \theta Exp + \rho Exp^2 \]

Where \( \ln Y \) represents the natural log of income \( Y \)
\( S \) represents the number of years of schooling
\( Exp \) represents the number of years of work experience
\( Exp^2 \) represents the square of number of years of work experience

The Mincerian earning function is based on the assumption that years spent in schooling, represents an opportunity cost as time that could otherwise be used to earn wages (Woodhall, 2004; Heckman, 2006). In
this regard, years of schooling represent an indirect private cost to the student. The coefficient of years of schooling represents a rate of return to an individual as it measures the effect of education on earnings. Therefore, to answer hypothesis three, regressions analysis was used to estimate the Mincerian earning function and coefficient of schooling across the four levels of TE. To arrive at PRR, quantitative data on earnings was used. The age of the respondent was also key in the calculations for it provided the number of years of work experience. To interpret results, F-statistics and p-values were used.

H₀₄: There is no significant relationship between personal characteristics and lifetime earnings among the technical workers in the manufacturing industries in Thika, Besides, a regression modified version (multiple regressions) of the Mincerian earning function was applied to answer hypothesis four. According to Woodhall (2004) the modified Mincerian earning function maybe specified as:

\[ \ln Y = \alpha + \beta S + \theta Exp + \rho Exp^2 + \varphi X \]

This is where X represents a vector of personal characteristics including gender, age, ability, area of specialization and experience. Inferential statistics that was used is the regression in order to measure the degree of relationship between various personal characteristics and the lifetime earnings for the four categories of technical skilled workers.
Quantitative data was obtained from the questionnaire on age, gender, area of specialization and ability. In this study, ability was taken to represent the highest level of academic education, for instance, Kenya Certificate of Primary Education, Kenya Certificate of Secondary Education or University Education. Regression analysis used in both hypotheses 3 and 4 was appropriate for it accommodated more than one variable.

H₀₀: There is no significant difference between Private Rates of Return and type of employment among workers in manufacturing industries in Thika, Kenya.

T-test was used to compare PRR between self-employed and salaried technical skilled workers. T-test statistics and the corresponding p-value were used to interpret the results. T-test was the ideal tool used as it compared the two means (self and salaried) technical workers.

3.10 Ethical Considerations

The study was conducted in an ethical manner. The researcher showing treated respondents with respect and privacy. Information was treated with privacy. The researcher acknowledged all writings and research work cited in the study. As such, this eliminated research plagiarism and upheld the integrity of the research process. Actual data collection was done by the researcher and the assistant. The respondents were asked not to write their names or any
information that will reveal their identity during the study to ensure privacy and confidentiality.

Further, the researcher observed high-quality public relations, to ensure that the respondents participate in the study willingly and not coercively. Mien and decorum was observed and good mannerisms were upheld during the study period.
CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

4.1 Introduction

The purpose of the study was to determine the Private Rates of Return to investment in Technical Education among workers in the manufacturing industries in Thika, Kenya. The independent variables studied were: costs of Technical Education, level of TE earnings, personal characteristics and type of employment.

This chapter commences with a brief presentation of participants profile in an attempt to describe the composition of the population of interest. Findings are then presented thematically based on each hypotheses used in the study. Primary data from structured questionnaires was used for analysis. A total of 215 questionnaires which represented 78 percent response rate, were returned. Items related to past income had a high degree of discontinuity leading to significantly low response. This meant average annual income was used as a proxy of lifetime earnings. Consequently, Mincers earning function was used as a method of estimating Private Rates of Return to Technical Education.

The study was guided by the following null and alternative hypothesis tested at 5% significance level.
\( H_{01} \): There is no significant difference in direct private cost of obtaining technical schooling by an artisan, a craftsman, a technician and a technologist in manufacturing industries in Thika, Kenya.

\( H_{a1} \): There is a significant difference in direct private costs of obtaining technical schooling by an artisan, a craftsman, a technician and a technologist in manufacturing industries in Thika, Kenya.

\( H_{02} \): There is no significant difference in lifetime earnings accruing to an artisan, a craftsman, and a technician and a technologist in manufacturing industries in Thika, Kenya.

\( H_{a2} \): There is a significant difference in lifetime earnings accruing to an artisan, a craftsman, technician and a technologist in manufacturing industries in Thika, Kenya.

\( H_{03} \): There is no significant difference in the Private Rate of Return among the artisans, a craftsmen, technicians and technologists in manufacturing industries in Thika, Kenya.

\( H_{a3} \): There is a significant difference in the Private Rate of Return among the artisans, a craftsmen, technicians and technologists in manufacturing industries in Thika, Kenya.

\( H_{04} \): There is no significant relationship between personal characteristics and lifetime earnings among the technical workers in manufacturing industries in Thika, Kenya.
Ha₄: There is a significant relationship between personal characteristics and lifetime earnings among the technical workers in manufacturing industries in Thika, Kenya.

H₀₅: There is no significant difference between Private Rates of Return and type of employment among workers in manufacturing industries in Thika, Kenya.

Ha₅: There is a significant difference between Private Rate of Return and type of employment among workers in manufacturing industries in Thika, Kenya.

4.2 Demographic Characteristics of Respondents

This section presents the distribution of respondents by gender, age, type of employment categorized as self employed or salaried employee and level of Technical Education categorized as grade test, certificate, diploma and higher diploma also designated as artisans, craftspeople, technicians and technologists. Table 4.1 and figure 4.1 shows the proportion of respondents across gender and type of employment respectively.
Table 4.1

Distribution of Respondents by Gender  \( N = 215 \)

<table>
<thead>
<tr>
<th></th>
<th>Proportion</th>
<th>Std. Err.</th>
<th>[95% Conf. interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>.75</td>
<td>.0300965</td>
<td>.6906651 .8093349</td>
</tr>
<tr>
<td>Female</td>
<td>.25</td>
<td>.0300965</td>
<td>.1906651 .3093349</td>
</tr>
</tbody>
</table>

Source: Author

Table 4.1 shows that majority of the respondents are male with up to three-quarters (75) percent while one-quarter percent (25) of the respondents were female. However, this is not a bombshell. Historically and culturally, females have for a long time shied off from enrolling in technical institutions to do courses that are said to be dominated by males. They are more known to invest in institutional management, secretarial and business courses. This supports what Chege & Sifuna (2006) observed in their study on girls’ and women education in Kenya, as reasons for their low enrolment are many and varied. Additionally, some of the possible reasons the study highlighted included: the traditional gender stereotypes of desired male and female occupations, the macro environment of vocational trades and parents’ attitudes toward girls’ vocational training. The findings support literature on gender and technical education that shows that there are few women in engineering courses (UNESCO, 1999; Ogol, 2000, Limboro, 2012).

Figure 4.1 shows respondents distribution across type of their employment.
Figure 4.1: Respondents’ Distribution across the Type of Employment

Source: Author

Figure 4.1 shows that the sample collected was fairly distributed across the type of employment to almost a half. Up to 43.3 percent of the respondents were self employed while 56.7 percent were salaried employees. However, majority (83.3 percent) of the salaried employees were male compared to female (16.7 percent). Noticeably, majority of self employed were male (68.3 percent) compared to female employees (31.7 percent). This indicates that there were more males who were employed either in formal or self employed than females. The demographic profiles of the respondents show that there were more males respondents compared to females.
The fair distribution across employment of both self and formally employed skilled technical workers could be attributed partly to the micro financing organizations increased funding to start –up business firms. Further, the government of Kenya introduced youth fund where young people can be loaned out money to start businesses as a strategy to alleviate unemployment. The fact that there are more male than female employees can be supported by the fact that there are fewer female than male students enrolled in engineering, building and electrical technical courses. This information appeared to be in line with the long held tradition that women are suitable for ‘feminine’ courses such as secretarial, catering, knitting and dressmaking instead of ‘masculine’ engineering courses (MoEST, 2003; Ngerechi, 2003; Afeti 2008 and Limboro 2012). The same is translated in the job market where women are fewer than men, either in formal or self employment. Simiyu (2007) observes that the job market for women engineers and women electricians may not be guaranteed at the moment in view of societal idiosyncrasies. This perception, a product of cultural values, is responsible for shaping student attitudes towards TVET subjects.

A summary of the preceding discussions is shown in Figure 4.2 below. The figure gives a summary of the analysis of the age profile and the age distribution for self employed and salaried technical skilled workers.
Figure 4.2: Age Bracket by the Type of Employment

Source: Author

Figure 4.2 shows the distribution of the respondents’ age profile across the type of employment. Observably, each type of employment has a modal class with one peak at the age bracket 21-25 years and another at 51-60 years for the salaried and self-employed technical skilled workers. Moreover, the distribution of salaried respondents is skewed to the left compared to self-employed respondents’ distribution.

Moreover, the sharp distinction across age and type of employment was an important source of heterogeneity. This could be attributed to the fact that young technical skilled people are more likely to seek employment rather than
open up their own business. However, as they gain experience, they are more likely to be self employed. This scenario where younger technical skilled workers are more at an age of 20-25 than at the age of 51-60 could be attributed to the fact that young people are hired because they are energetic and can handle heavy duty technical jobs as opposed to the older people.

Besides, evaluation of the distribution across level of TE shows that respondents with higher level of TE (diploma and higher diploma) were ready to start their own firms compared to those with low levels (grade test and certificates). The finding concurs with King (2007) whose evidence was that, in East Africa, the informal economy shows that those with the higher levels of education start enterprises and have ability to employ others.

One of the objectives of diploma technical level training is to prepare trainees to enter the job market in confidence as either salaried employment or self-employed. They should also develop skills which would be responsive and relevant to the country’s human resource required at the middle level (KIE, 1996; Limboro; 2012).

The above information is summarized in Table 4.2. The table shows the proportion of self employed and salaried employees based on their level of Technical Education.
Table 4.2:

*Highest level of Technical Education by Type of Employment*

<table>
<thead>
<tr>
<th>Technical education</th>
<th>Type of current employment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Salaried (formal)</td>
<td>Self employment</td>
</tr>
<tr>
<td>Grade test</td>
<td>28.2%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Certificate</td>
<td>29.05%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Diploma</td>
<td>39.5%</td>
<td>56.4%</td>
</tr>
<tr>
<td>Higher Diploma</td>
<td>3.25%</td>
<td>30.7%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

*Source: Author*

It was worth noting that nearly half of the respondents (47.3 percent) indicated diploma as their highest level of TE either for salaried or self employment who are 39.5 and 56.4 percent respectively. This could be attributed to the fact that TVET institutions have for a long time produced diploma graduates that have missed to get to university as opposed to higher national diploma level where a student has to do a diploma course first. Higher diploma respondents in salaried employment had the lowest percentage of 3.25 percent as opposed to those in self employment that had a representation of 30.7 respectively. This can be attributed to a low questionnaire return rate of 38.5 percent.

Notably, few of the respondents 34.5 percent had grade test and certificate level of TE as compared to diploma and higher diploma that comprised of 65.5 percent. This implies that there are few artisans and craftsmen as compared to technicians and technologists. This concurs with the report on Sessional Paper no. 14 of 2012 on Reforming Education and Training Sectors in Kenya (Republic of Kenya, 2012a) which notes that Kenya will strive to achieve a
ratio of 1:3:12:60 by 2015 of an engineer/technologist, technician, crafts-person and artisan compared to the ideal ration of 1:2:4:16.

Lastly, Republic of Kenya (2012a) reveals that despite experiencing moderate growth over the last forty years, Kenya TVET is yet to produce adequate and skilled middle level human resource that that is capable of meeting the demands for national development.

4.3. Direct Private Costs of Obtaining Various Levels of Technical Education

The first objective of this study was to determine the direct private cost of obtaining different levels of TE among skilled technical workers in the manufacturing industries in Thika, Kenya.

$H_{01}$: There is no significant difference between direct private cost of obtaining technical schooling by an artisan, a craftsman, a technician and a technologist in manufacturing industries in Thika, Kenya.

Primary data on total direct private costs was given out by the respondents through a use of a questionnaire. They were asked to provide the amount of money in Kenya shillings they spent during their technical training. This included the cost of accommodation, transport, pocket money, tool box and fees among other expenses incurred. The direct private cost of TE was analyzed according to the four TE levels namely grade test, certificate, diploma and higher national diploma. According to Woodhall (2004) cost-
benefit analysis is used to determine profitability of private investments in education and the cost is borne by the individual and the family. For example, fees charged by institutions, expenditure on books and scholarships. Moreover, earnings foregone by the individual are also included. The number of years each respondent took in the process of obtaining TE was used in the calculations of direct private costs to arrive at the total amount each individual spent. Subsequently, the total average was determined.

Given the fact that respondents schooled at different times, inflation index was used by using a base year. The reason for this was to cater for inflation rate given the fact that respondents schooled at different times. Private direct costs were analyzed using descriptive statistics which included mean, standard deviation, minimum and maximum. The total direct private cost of TE by level is shown in Table 4.3

Table 4.3:

Total Direct Private Cost across Levels of TE in Kenya Shillings

<table>
<thead>
<tr>
<th>Level</th>
<th>No.</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade test</td>
<td>36</td>
<td>68,573</td>
<td>130,719</td>
<td>22,500</td>
<td>775,000</td>
</tr>
<tr>
<td>Certificate</td>
<td>38</td>
<td>344,205</td>
<td>285,867</td>
<td>25,000</td>
<td>895,000</td>
</tr>
<tr>
<td>Diploma</td>
<td>100</td>
<td>285,758</td>
<td>289,462</td>
<td>28,000</td>
<td>1,496,000</td>
</tr>
<tr>
<td>H/diploma</td>
<td>41</td>
<td>415,897</td>
<td>351,949</td>
<td>28,500</td>
<td>898,000</td>
</tr>
</tbody>
</table>

*Source: Author*

Table 4.3 shows the average direct private cost for the four levels of TE in Kenya shillings was: Grade test level of TE had 68,573 ($US 857), certificate, 344,205 ($US 4302), diploma 285,758($US 3571), and higher diploma
Noticeably, the average direct private cost for the four levels is diverse. For instance, on average, certificate level had a higher direct private cost compared to a diploma by Ksh 58,447. This was attributed to the unit cost of TE which depends on the number of years an individual takes and the level of TE differences in other costs. These costs include: transport, accommodation and pocket money. Nevertheless, the grade test had the least direct private costs while higher diploma had the highest. Direct private cost of a grade test holder is approximately 6 times that of a higher diploma while, that of a diploma is nearly one and a half times that of a higher diploma.

Conspicuously, the minimum direct private costs increases with the level of TE as given below in Kenya shillings: 22,500, 25,000 28,000 28,500 for grade test, certificate, diploma and higher diploma respectively. However, the standard deviation for all categories was sufficiently large owing to the diverse cost structure of different technical courses. Scrutiny of the standard deviations of the two categories shows that the wide spread may explain the difference. In addition, Table 4.3 shows that higher diploma was the most expensive followed by certificate level with a difference of Ksh 71,692 (20 percent). It also shows that the gaps between minimum and maximum direct private costs of diploma level were wide with a difference of Ksh 1 468,000.

Low education related courses are not associated with high cost simply because their trainers may not be paid as high as those with high level of TE. That notwithstanding, the results conclusively showed that there is a significant difference between direct private costs across the four levels of TE.
The above findings would no doubt justify the enrollment patterns in TVET sector. Currently the enrollment rate is highest at the lower levels especially in the Youth Polytechnics as compared to middle and higher TVET levels (Republic of Kenya, 2011b). To test whether or not there is any significant difference accruing to the grade test, certificate, diploma and higher diploma levels direct private costs, Analysis of Variance (ANOVA) was used to test the hypothesis at 5 percent level of significance, $\alpha = 0.05$. Table 4.4 shows the ANOVA results.

**Table 4.4**

*Analysis of Variance: Total Private Cost of TE across Levels*

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>2.3607e+12</td>
<td>3</td>
<td>7.8689e+11</td>
<td>10.09</td>
<td>0.0000</td>
</tr>
<tr>
<td>Within groups</td>
<td>1.5757e+13</td>
<td>202</td>
<td>7.8003e+10</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1.8117e+13</td>
<td>205</td>
<td>8.8377e+10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Chi Square (df=3) = 29.6958  Prob>chi^2 = 0.000*

*Source: Author*

The results in Table 4.4 shows that F-statistics was 10.09 had a corresponding P-value of 0.000. Therefore, since P-value (probability) was less than 0.05, it was hypothesized that there is a significant difference between direct private costs of TE across the four levels of TE. Consequently, at 5 percent level of significance, the null hypothesis was rejected. This means that there is a significant difference between direct private costs of TE across different levels.
This finding agrees with Limboro (2012) notion that although expenditure on general education has been on the increase in Kenya, to an average of about 35 percent of the national budget, the allocation to TVET has been consistently low, only 3,370 million shillings earmarked to support TVET programs according to Kenya Education Sector Support Programme of 2005 (Republic of Kenya, 2005a), this represented 3.2 percent of total money invested in the same year under review.

According to Republic of Kenya (2012a) it noted that there is low enrolment in TVET institutions due to the high cost of technical training, and the result is that most trainees end up in cheap irrelevant programmes whose graduates do not acquire the requisite skills necessary for the world of work. Nyerere (2009) observed that in China, India and South East Asia, the statistical figure showed that 35-40 percent benefit from TE, whereas in Africa, it is less than 20 percent. However, despite the period of neglect of TE in Kenya, revitalization of the sector has been identified as one to spur the economic development of the country through industrialization (Republic of Kenya, 2007).

Task Force on the re-alignment of the Education Sector to the Constitution of Kenya 2010 posed the concern that despite TIVET education becoming a priority investment in Kenya, the costs have increased for both country and individuals (MoEST, 2012). Kenya Institute of Public Policy Research and Analysis agrees that developing countries have low budgetary allocations for TE (Onsomu et al. 2009). This implies individuals and families bear the
heaviest fees burden of TE and the situation is compounded by poverty prevalence and which makes it difficult for most Kenyans to pay for TVET.

The findings however contradict the position of other countries. Seng (2011) agrees that Singapore government believed in and has invested continuously and heavily in education and training, not only in the universities and polytechnics but especially in Technical and Vocational Education. Singapore costs on VET as compared to the general education are 2 to 3 times higher yet the availability of funds for Vocational Education and Training (VET) are apparent as VET is dependent on public funds (UNESCO, 1996). In Peru, the costs of academic and VTE streams in Peru are similar and the monetary returns to and occupational profiles of, graduates of the two streams are almost identical. These similarities are most likely to occur because VTE institutions in Peru are funded at the same level as academic institutions (Bellow, 2002).

In China, VET is strong and upper secondary education typically requires fees, but the government has introduced a number of measures, at national and provincial level that overcame the financial barriers and ensured that as many students as possible stay on in schools from 2009 an initiative to make tuition free for upper secondary vocational school students. In developing countries like Kenya citizens are still struggling with poverty. Most individuals may find it hard to enroll in TE. In fact, those from poor families with low disposable income would not enroll in TE. This leads to inequities in terms of access and participation in TE. Studies that have determined the direct private cost for TE are scarce. Otherwise, in Kenya, variations in cost could be attributed to the
diverse nature of the courses, transport costs, accommodation and the location of the institute (urban or rural).

### 4.4 Lifetime Earnings and Levels of Technical Education

The second objective of the study was to establish the lifetime earnings based on the levels of Technical Education among skilled technical workers in the manufacturing industries in Thika, Kenya. Besides, the hypothesis was used that stated:

\[ H_{02}: \text{There is no significant difference between lifetime earnings accruing to an artisan, a craftsman, and a technician and a technologist in manufacturing industries in Thika, Kenya.} \]

The responses to determine whether there was or there was no significant difference between lifetime earnings accruing were analyzed using descriptive statistics which included mainly the mean and standard deviation, minimum and maximum. Table 4.5 shows the earnings in monetary value of the four categories of TE levels namely the grade tests, certificate, diploma and high diploma. The earnings included their gross salaries and any other forms of income resulting from the use of their technical skills.

Average annual income was used as a proxy for lifetime earnings. According to Psacharopolous at al., (1985) and Becker, (1994) annual wage maybe a suitable proxy under the assumption that wages remain constant across time or grow at the same rate across the level of TE. Table 4.5 shows the mean,
standard deviation and range of annual income after taxes across the levels of TE. The reason why income was taxed is to arrive at the individual earnings. Tax belongs to the government (society).

Table 4.5

*Lifetime Earnings across Levels of TE in Kenya Shillings*

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Test</td>
<td>36</td>
<td>11,585,009</td>
<td>4,363,580</td>
<td>3,600,000</td>
<td>20,038,636</td>
</tr>
<tr>
<td>Certificate</td>
<td>38</td>
<td>12,183,550</td>
<td>3,837,299</td>
<td>4,450,224</td>
<td>20,530,036</td>
</tr>
<tr>
<td>Diploma</td>
<td>100</td>
<td>13,384,466</td>
<td>5,495,643</td>
<td>2,055,244</td>
<td>28,116,414</td>
</tr>
<tr>
<td>Higher diploma</td>
<td>41</td>
<td>14,072,604</td>
<td>9,904,868</td>
<td>3,860,976</td>
<td>44,741,528</td>
</tr>
</tbody>
</table>

*Source: (Respondents)*

Table 4.5 shows that on average, the lifetime earnings for grade test, certificate, diploma and higher diploma levels of TE was: Grade test level of TE had Ksh. 11, 585,009($US 144 812), certificate level- Ksh 12, 183,550 ($US 152 294), diploma level - Ksh 13,384,446 ($US 167 305) and higher diploma levels -Ksh 14,072,604 ($US 175 907).

Table 4.5 also shows that there is an increase in lifetime earnings with every level of TE. The table shows that average annual income is increasing with the level of TE. Higher diploma had the highest lifetime earnings while grade test had the lowest. Visibly, the range is approximately Ksh 2,487 595 which is equivalent to 21.5 percent. However, at the maximum, higher diploma is twice as much as that of a grade test, while the range is Ksh 24,702 892. This represents 123.3 percent difference.
The standard deviation for grade tests, craftsman’s’ and higher diplomas annual income after taxes is fairly small compared to the mean showing that the estimated average annual income after taxes is representative of the population. The standard deviation of diploma technician was fairly large which implies that there is wide spread of technician’s income. This is attributed to the diverse nature of diploma courses and earnings.

Annual wages after taxes were computed using the graduated tax rate structure applied in by Kenya Revenue Authority (KRA, 2013) to arrive at lifetime earnings. Additionally, the study assumed that a technical worker will be in employment until the age of 60 years. In this regard, to estimate the lifetime earnings, the difference between 60 years and the current number of years of the technical skilled worker was used. This difference was used in projecting the life time earnings.

To test whether the level of TE and lifetime earnings are statistically significant or not, Analysis of Variance (ANOVA) was used to test the hypothesis at 5 percent level of significance, \( \alpha = 0.05 \). Table 4.6 shows the ANOVA results.
Table 4.6

Analysis of Variance: Lifetime Earnings by Level of TE

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>5.7710e+12</td>
<td>3</td>
<td>1.9237e+12</td>
<td>11.59</td>
<td>0.0000</td>
</tr>
<tr>
<td>Within groups</td>
<td>3.221e+13</td>
<td>194</td>
<td>1.6604e+11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.7983e+13</td>
<td>197</td>
<td>1.9281e+11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bartlett’s test for equal variances: $\chi^2(3) = 79.8683$  
Prob>$\chi^2 = 0.000$

Source: Author

The results in table 4.6 show that F-statistics was 11.59 with a p-value of 0.000 which was less than 0.05. Therefore, at 5 percent level of significance, the null hypothesis was rejected. This means that there is a significant positive difference between lifetime earnings across different levels of TE.

In this regards, the results support the assertion that education has a significant positive relationship with lifetime earnings as respondents with higher levels of TE make more income compared to those with lower levels of TE. However, it is important to note that this inference does not take into account increase in productivity due to experience gained in the workplace.

These findings are in agreement with the study done by Psacharopoulos et al. (1985) which showed a strong relationship between earnings and education levels throughout the world, from developed and in developing countries. The study found out that the average lifetime earnings of educated workers are higher than the average earnings of illiterate workers, or those with lower levels of education. Based on the United Kingdom data, a study showed that
individuals with VET qualifications receive higher wages than those without post school qualifications. Especially, for early school leavers though there are some exceptions showing little labour market value of certain VET qualifications (Kathrin, 2008). Kamenyi, Manda & Mwabu, (2002) also found out that there is a positive relationship between earnings and level of education. This study finding shows that there is positive relationship between earnings and levels of TE. This also agrees with the human capital theory which says that earnings increase with additional schooling.

4.5 Private Rates of Return by Levels of Technical Education

The third objective was to determine the Private Rate of Return to Technical Education by levels among skilled technical workers in the manufacturing industries in Thika, Kenya. The formulated hypothesis was that:

\[ H_{03} : \text{There is no significant difference in Private Rates of Return among the artisans, a craftsmen, technicians and technologists in manufacturing industries in Thika, Kenya.} \]

For the purpose of investigation, Woodhall (2004) recommend using Jacob Mincerian regression equation to determine PRR. Regression models were estimated across levels of TE and the results presented in appendix VI. Regression model in appendix VI was tested for heteroskedasticity and multicolinearity. None of the cited problems were present. Therefore ordinary least squares were used to estimate the model (Woodhall, 2004).The
regression model shows that adjusted R-square ranged from approximately 33 percent to 47 percent as shown in appendix vi. According to Mugenda and Mugenda (2003), adjusted R-square of more than 30 percent is acceptable especially when primary data is used for analysis. Based on the Mincer’s earning function, the Private Rate of Return is measured using the coefficient of years of schooling. Essentially, the higher the PRR the better returns from the investment to an individual. Important to note is that, the earnings function method considers the foregone earnings (opportunity cost) in its calculation.

It follows that, the coefficients of years of schooling were used as proxy measure of PRR. Table 4.7 shows the extract from regression results presented in appendix VI.

Table 4.7

*Private Rates of Return across Levels of Technical Education*

<table>
<thead>
<tr>
<th>Level of Technical Education</th>
<th>PRR</th>
<th>Std Dev</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Test</td>
<td>-0.64%</td>
<td>7.30%</td>
<td>0.936</td>
</tr>
<tr>
<td>Certificate</td>
<td>-46.3%</td>
<td>12.90%</td>
<td>0.62</td>
</tr>
<tr>
<td>Diploma</td>
<td>3.50%</td>
<td>10%</td>
<td>0.726</td>
</tr>
<tr>
<td>Higher Diploma</td>
<td>37.30%</td>
<td>12.30%</td>
<td>0.017**</td>
</tr>
</tbody>
</table>

Source: Author

Table 4.7 shows that the PRR for grade test, certificate, diploma and higher diploma levels as -0.6.4 percent, -46.3 percent, 3.5 percent and 37.3 percent respectively. Higher diploma has the highest PRR of 37.30 percent while certificate course had the lowest of -46.3 percent. Table 4.7 shows that diploma has a positive value of 3.50 percent, implying that it is viable to invest
in diploma TE though the return rate is insignificant. Grade test and certificate levels have a negative value. The hypothesis asserts that, there is no significant difference in PRR of an artisan, a craftsman, a technician and technologist in the manufacturing industries in Thika. Firstly, the F statistics for all the four models representing respective levels of TE had a p-value of less than 0.025 as shown in appendix V1. Observably, grade test, certificate, diploma and higher diploma had a p-value of 0.0023, 0.0101, 0.000 and 0.0011 respectively.

However, P-value for artisans, craftsmen and technicians shows that their respective coefficients were not significantly different from zero at 5 percent level or above. This meant that PRR for respondents with grade tests, certificate and diploma from technical institutions was approximately zero. This explains why the null hypothesis was accepted at 5 percent level of significance which means that the PRR was not significantly different across the first three levels of TE namely grade test, certificate and diploma. However, there was a significant difference in PRR across the four levels of TE.

In essence, it follows that, the PRR for technologists as measured by coefficient of schooling has a p-value of 0.017 which was less than 0.025. The null hypothesis was rejected at 5 percent level of significant which means that the PRR of technologists was significantly higher compared to artisans, craftsmen and technicians.
In fact, high direct private cost of TE influence the PRR negatively. Noticeably, Table 4.3 shows clearly that certificate level has higher direct private cost than diploma. The PRR for certificate level is -46.3 percent which was the lowest. The PRR for grade test, certificate and diploma can be attributed to low wage levels associated with lack of high level of TE as compared to those with higher diploma. This implies that at a lower level of TE, returns do not pay back much as compared to its cost. Yet again, this implies that the demand and supply of technical skilled artisans, craftspeople and technicians are not at equilibrium. This is because when the cost is high, then the rate of returns to an individual will be low and the programs may be unattractive to school leavers.

This supports the perception that there are low returns to TE compared to other opportunities (Chege & Sifuna, 2006; Manda & Mwabu, 2002; Onsomu et al., 2009 & Nyerere, 2009). Households often seem to evaluate schooling decisions in terms of their benefits to future income (Manda & Bigsten, 1999). Further, Republic of Kenya (2012a) notes that enrolments in TVET are relatively low compared to other types of education. Sessional Paper No. 14 of 2012 notes that TVET sector suffers from low enrolments due to high cost of Technical Education. The irony is that the Vision 2030 blueprint clearly reveals that middle level human resources are inadequate and yet, the returns are low. King (2007) underscores that investment in TE does not commensurate the returns.
Despite the fact that the MoEST (2012) reveals that there is a trend in surging enrolment at all other levels of general education except in TVET, the study findings agree that there is inadequate monetary incentive to invest in TE and the implications are that school leavers and parents may not invest in it. This as a result could lead to underinvestment in TE.

The findings show that at a higher level of TE, PRR is higher. This is attributed to several factors. Considering that today we are in a competitive labour market, individuals who are likely to get employed are those with higher education. In addition, individuals joining higher diploma courses might be on job training and thus already have jobs. As such, it may be cheaper to learn on the job.

This finding agrees with a report by Gordius & Franscis (2006) in Tanzania that found out that the rate of returns to one year of vocational education ranged between 1.4 and 2.8 percent. Psachaopolous et al, (1995), Zymelman (1976) and Benell (2006) affirm that technical and vocational education provides a lower rate of return to general education.

4.6 Personal Characteristics and Lifetime Earnings

The fourth objective was to establish the relationship between personal characteristics and lifetime earnings among skilled technical workers in the manufacturing industries in Thika, Kenya. To do so, the following hypothesis was tested:
H₀₁: There is no significant relationship between personal characteristics and lifetime earnings among technical workers in manufacturing industries in Thika, Kenya.

For the purpose of investigation, Woodhall (2004) recommends the use of a modified Mincer’s equation that incorporates personal characteristics. For the purpose of this investigation, age, gender, ability and area of specialization were incorporated as measures of personal characteristics. Highest academic level was used as a proxy for ability. It should be noted that age was highly correlated with experience. Age was used also to arrive at experienced squared thereby, squaring for specification purposes. The modified Mincer earning function is presented in appendix VII.

The model in appendix V11 was tested for multicolinearity and heteroskedasticity. None of the cited problems were present. It therefore, follows that the ordinary least squares method was used to estimate the model. Adjusted R square (adjusted $R^2$ is used to assess the fit of ordinary least square regression models) of 0.57 means that 57 percent of variability in the dependent variables is explained by the explanatory variables while 43 percent is explained by other factors not included in the model. The findings show that age, ability and experience are significant at 1 percent significance level. Schooling years and experience (squared) was significant at 10 percent level. This means that schooling years and age are powerful predictors of lifetime earnings. However, gender and area of specialization were insignificant and did not explain variations in lifetime earnings.
Inferring from the findings, it suffice to state that after incorporating personal characteristics, the coefficient of schooling overall rate of return on TE was approximately 7 percent. Moreover, age had a coefficient of 0.12 meaning that the increase in age (or experience) by one year increases lifetime earnings by approximately 12 percent. Therefore, the null hypothesis was rejected at 5 percent significance level. This means that age as a personal characteristic, significantly influences growth of lifetime earnings among skilled technical workers in Thika. This concurs with the theory of investment in human capital which suggests that most investments in human capital raise observed earnings at older ages. This is because the returns are added to earnings and lower them at younger ages as costs are deducted from earnings (Becker, 1962).

A study done by Rugar (2010) among university lecturers observed that lifetime earnings rose with age among respondents with 16 and 18 years of schooling. However, age did not influence lifetime earnings among respondents with doctoral degrees until after the age of 59 years. At this point lifetime earnings showed a steady decline with rising age.

The findings concurs with Psacharopoulos et al. (1985) who conducted a study on earnings profiles, related to age earning profiles by level of education where each showed a strong relationship between earnings and education throughout the world, from developed and in developing countries.
Notably, findings show that age is a determinant of Private Rate of Return and as those who go to school early are likely to have higher lifetime earnings. However, according to MoEST (2012), in Kenya, TE has no clear age requirements per level as compared to general academic education levels. The report notes that in TE, age is flexible and variable and the number of years is not formally integrated. This means that any time one can join TE irrespective of the age. Notwithstanding, primary, secondary, adult and university education, the years recommended by the report are 6-13, 14-17, 18 plus and 18-21 respectively. On a positive key, TE in Kenya has received the approval of a new progression structure recently according to Sessional paper no. 5 of 2005 where an individual can progress from a grade test to a degree level or rise from a youth polytechnic to university respectively (Republic of Kenya, 2005b).

In addition, the finding shows that ability is significant and at 1 significant level with a p-value of 0.008 and the coefficient of schooling was 0.20. This means that, the increase in ability in one year raises the lifetime earnings by 20 percent. Many studies agree with this finding that, increase in level of education raises the lifetime earnings. For instance, Olayadan & Okemakinde (2008) observed that there is a positive correlation between education and increased earnings and this notion has lead to an increased investment in education. Rugar (2010) also agreed that lifetime earnings accruing from level of university degree in Kenya. He was of the opinion that it would be more profitable to invest in more university education.
However, a study done in China contradicts the findings. Tsang (1990) carried out in China used data from the Beijing auto industry. The study gave focus to technical and secondary education in China. The study compared performance of technical and vocational graduate’s performance at the work place to those with general education. It found out that workers education had a smaller influence on productivity specifically when the worker performs in a more cooperative environment.

Appendix V11 shows that the coefficient of gender, area of specialization and experienced squared was 0.031 (3.1 %), -0.039 (3.9 %) and 0.004 (0.4 %). They were not significant at 5 percent level. This findings support the null hypothesis that gender and specialization do not have a significant relationship with growth of lifetime earnings among technical skilled workers in Thika. The finding agree with Christophe & Charles (2009), who found out that in selected Africans manufacturing firms where Kenya was included, the wage gap is insignificant, gender gaps remains not constant across the wage distribution. Contrasting results were given by Kufigwa (2000), who found out that in Botswana, women are paid less than men despite being on average more highly educated than them in general education.

As far as the relationship between area of specialization and lifetime earnings is concerned, the study found out that there is no significant with growth of lifetime earnings. A study carried out by Borland (2002) on private rates of returns to university education in Australia, showed that the estimate of a bachelor degree was 14.5 percent. Lifetime monetary returns were estimated
to be $380,958. However, the study concluded that the returns rates showed a wide disparity across the field of qualification. That notwithstanding, relatively high returns were estimated for engineering graduates and for business and administration courses. Nonetheless rate of returns were observed for society, culture and science fields.

After the introduction of the cost of education in Latin America, Psacharopolous & Ying (2006) estimated both social and private rates of returns to different dimensions. These dimensions were: sector of employment, gender and level of education. The study also included the curriculum nature of the secondary school and over time using the data for 18 countries. The purpose was to assess earning differentials according to level of education. The study revealed that the payment connected with education had decreased in the 1980s. As a result, primary level of education showed the most return rates.

4.7. Comparison of Private Rates of Return by Type of Employment

The fifth objective sought to compare Private Rate of Return by type of employment among the skilled technical workers in the manufacturing industries in Thika, Kenya. The fifth hypothesis was to:

H₀₅: There is no significant difference in Private Rate of Return by type of employment among workers in manufacturing industries in Thika, Kenya.
There are two main categories compared namely salaried respondents and self employed respondents. Appendix V111 Shows the Mincer’s models across the two aforementioned type of employment.

The results show that the coefficient of schooling in model 1 and II was significant at 5 percent significant level. This means that an increase in schooling year by year increases earnings by approximately 11 percent for both self employed and salaried technician. Therefore, the PRR for both salaried and self employed was approximately 11 percent. Experience was a significant determinant of lifetime earnings as it is represented in both models. This implies that given experience, technical expertise is more beneficial for people in private practice compared to salaried employees.

To test the fifth hypothesis that there was no significant difference between PRR across type of employment among workers in the manufacturing industries Thika, Kenya, students’-test was used to evaluate whether the difference between PRR was significantly different from zero. Table 4.8 a shows summary of the results.
Table 4.8

*Independent Sample T-test*

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>PRR</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salaried</td>
<td>0.1107</td>
<td>0.4472</td>
</tr>
<tr>
<td>Self Employed</td>
<td>0.1093</td>
<td>0.4138</td>
</tr>
</tbody>
</table>

\[ H_0 : \text{PRR}_{\text{sal}} - \text{PRR}_{\text{self}} = 0 \]
\[ H_A : \text{PRR}_{\text{sal}} - \text{PRR}_{\text{self}} \neq 0 \]

T-Statistics 0.2361

\[ P|T|>|t| = 0.8136 \]

*Source: Author*

Table 4.8 shows that the independent sample t-statistic is 0.2361 with a p value of 0.8136. Therefore the null hypothesis is not rejected at 5 percent level of significance. This implies that the PRR for self employed respondents was not significantly different from salaried employees.

The findings concur with Olivier (2009) who carried out a study in the informal wage gap. The study found out that when heterogeneity of the workers is considered, all the countries showed a related pattern. The study used an estimated quantile panel data from South Africa, Mexico and Brazil.

However, the findings contradict a study carried out by Chirwa & Zgovu (2001) who conducted a rate of return study in education on rural labour markets in Malawi. The study used Mincerian earnings function and survey data from regular salaried and casual or *ganyu* employment. Results showed that the average rate of return on education was 6 percent. It was also observed that average hourly rates of payment for casual employees were reported to be higher than for salaried workers. The difference could be attributed to the fact
that this study was carried out in rural areas while the current study was carried out in an industrial town. Nyerere (2009) negates from the findings and observed that earnings in the informal sector are typically low and not enough to lift people out of poverty. There is thus a possibility that some of the people working in the sector may actually be poor. Additionally, it has also been observed that graduates of TVET in both formal and informal sectors are exploited by their employers (paid below standard wages) since the government does not enforce regulations on wages as indicated in Labour Acts.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the research findings, presents conclusions, recommendations of the study and suggestions for further research. The purpose of this study as indicated in chapter one was to determine the Private Rates of Return to investment in TE by focusing technical skilled workers in the manufacturing industries in Thika, Kenya.

The specific tasks of the study were to: determine direct private costs of obtaining different levels of TE, establish the lifetime earnings based on the four levels of TE; determine the PRR to different levels of TE, determine the relationship between personal characteristics and lifetime earnings and compare PRR between self and salaried skilled technical workers in Thika.

5.2 Summary of Findings

The purpose of the study gave rise to the following statistical hypotheses:

\( H_{01} \): There is no significant difference between direct private costs of obtaining technical schooling by an artisan, a craftsman, and a technician in the manufacturing industries of Thika, Kenya.
$H_{O2}$: There is no significant difference between lifetime earnings accruing to an artisan, a craftsman, and a technician graduate worker in the manufacturing industries of Thika, Kenya.

$H_{O3}$: There is a significant difference in the Private Rate of Return among the artisans, a craftsmen, technicians and technologists in manufacturing industries in Thika, Kenya.

$H_{O4}$: There is no significant relationship between personal characteristics and lifetime earnings among the technical workers in the manufacturing industries in Thika,

$H_{O5}$: There is a significant difference between Private Rate of Return and type of employment among workers in manufacturing industries in Thika, Kenya.

To achieve this, data was collected from a sample of 215 respondents through the use of questionnaires. Data was analyzed through statistical procedures in order to adequately test the hypotheses. The study employed a descriptive survey design. The findings of the study were summarized as per the objective and hypothesis.

5.2.1 The first hypothesis tested if there was any significant difference between direct private costs across the four levels of Technical Education.

The levels that were considered were grade test, certificate, diploma and higher diploma that produce artisans, craftspersons, technicians and technologists cadres respectively. The results showed that on average there is a
significant difference between direct private costs across the four levels of TE. The total direct private cost per level in Kenya shillings was: Grade test level of TE had 68,573 ($US 857), certificate, 344,205 ($US 4302), diploma 285,758 ($US 3571) and higher diploma had 415,897 ($US 5198). The grade test had the least direct private costs while higher diploma had the highest. Direct private cost of a grade test holder is approximately 6 times that of a higher diploma while, that of a diploma is nearly one and a half times that of a higher diploma.

However, the finding showed that average direct private cost for certificate level of TE was higher than that of a diploma level. Higher diploma was the most expensive. Higher diploma was the most expensive followed by certificate level by a difference of Ksh 71, 692 (20 percent). That notwithstanding, the results conclusively showed that at 5 percent, there is a significant difference between direct private costs across the four levels of TE. This was confirmed by F-statistics of 10.09 with a corresponding P-value of 0.000.

5.2.2 The second hypothesis sought to establish if there was any significant difference between lifetime earnings accruing to the four levels of TE among the technical skilled workers in manufacturing industries of Thika, Kenya.

The finding revealed that there was a significant difference between lifetime earnings across the different levels of TE. Levels of TE have a significant positive relationship with lifetime earnings. Respondents with higher levels of
TE had more lifetime earnings compared to those with lower levels. There is an increase in lifetime earnings with every level of TE. Grade test level of TE had Ksh. 11, 585,009 ($US 144 812), certificate level- Ksh 12, 183,550 ($US 152 294), diploma level - Ksh 13,384,446 ($US 167 305) and higher diploma levels - Ksh 14,072,604 ($US 175 907). Specifically, higher diploma had the highest lifetime earnings while grade test had the lowest. The range is approximately Ksh 2,487,595 which is equivalent to 21.5 percent. However, at the maximum, higher diploma is twice as much as that of a grade test, while the range is Ksh 24,702,892. This represents 123.3 percent difference. F-statistics showed that at 11.59, the p-value as 0.000 which was less than 0.05.

5.2.3 Third hypothesis stated that there is no significant difference in Private Rate of Return among the grade test, certificate, diploma and higher diploma levels of TE in manufacturing industries of Thika, Kenya.

The findings showed that there is no significant difference in PRR among the four level of TE, grade test, certificate, diploma and higher diploma in the manufacturing industries in Thika. The tests showed that PRR for respondents with diploma, certificate and grade tests from technical institutions was approximately zero. This meant that the PRR was not significantly different across the first three levels of TE namely grade test, certificate and diploma. However, the coefficient of schooling for respondents with higher diploma had a higher value. PRR for grade test, certificate, diploma and higher diploma levels were -0.6.4 percent, -46.3 percent, 3.5 percent and 32.9 percent.
respectively. Higher diploma has the highest and certificate level had the lowest PRR of -46.3 percent. This means that Private Rate Return for technologists (with higher diploma) was significantly higher compared to artisans (grade test), craftsmen (certificate) and technicians (diploma). F Statistics for all the four models representing respective levels of TE had a p-value of less than 0.025. Observably, grade test, certificate, diploma and higher diploma levels of TE had a p-value of 0.0023, 0.0101, 0.000 and 0.0011 respectively.

However, P-Value for grade test certificate and diploma levels shows that their respective coefficients were not significantly different from zero at 5 percent level or above. This explains why the null hypothesis was accepted at 5 percent level of significance which means that the PRR was not significantly different across the first three levels of TE. It follows that, the PRR for technologists as measured by coefficient of schooling has a p-value of 0.017 which was less than 0.025. The null hypothesis was rejected at 5 percent level of significant which means that the PRR of technologists was significantly higher compared to artisans, craftsmen and technicians.
5.2.4 The fourth hypothesis sought to determine the relationship between personal characteristics and lifetime earnings among technical skilled workers in the manufacturing industries in Thika Kenya.

In this study age, ability, gender, area of specialization and experience squared were incorporated as measures of personal characteristics. Highest academic level was used as a proxy for ability. The findings showed those schooling years, age and ability are significant at 1 percent significant level while experience (squared) was significant at 10 percent level. This means those schooling years, age, experience and ability were powerful predictors of lifetime earnings. However, gender and area of specialization were insignificant and did not explain variations in lifetime earnings. It was also observed that after incorporating personal characteristics, the coefficient of schooling overall rate of return on TE is approximately 9 percent. It is important to note that among the respondents, ability positively influences lifetime earnings. However the results per every variable were as follows: F-statistics confirmed that the P – Value of age, ability, gender, area of specialization and experience squared were: 0.000, 0.008, 0.602, 0.193 and 0.03 respectively. It also follows that the coefficient of age, ability, gender, area of specialization and experience squared were 0.12 (12%), 0.20 (20%), 0.031 (3.1 %), -0.039 (3.9 %) and 0.004 (0.4 %). The figure implies the following:
a) Age has a coefficient of 0.12 meaning that an increase in age by one year increases lifetime earnings by approximately 12 percent with a P-value of 0.000

b) Ability has a coefficient of 0.20 meaning that an increase or additional level of Technical education(certificate) increases lifetime earnings by approximately 20 percent with a P value of 0.008

c) Experience (squared) has a coefficient of 0.004 meaning that an increase in one year experience increases lifetime earnings by approximately 0.4 percent with a P value of 0.004

However, for gender and area of specialization, they were insignificant as the p=value was more than 0.05, that is, P –value of -0.602 and 0.193 respectively.

5.2.5 Fifth hypothesis sought to compare PRR across the Types of Employment.

The findings of the study revealed that PRR for self employed respondents was not significantly different from salaried employees. The PRR for both salaried and self employed was approximately 11 percent.

Sample t-statistic shows 0.2361 with a p value of 0.8136. Given experience, technical expertise are more beneficial for people in private practice compared to salaried employees. The coefficient of schooling was not significant meaning that PRR for salaried respondent was not different from zero. However, schooling years was significant at 5 percent significant level.
5.3 Conclusions

Based on the findings, it was logical to make the following five conclusions.

The first hypothesis was testing if there was any significant difference between direct private costs across the four levels of Technical Education. The levels that were considered were grade test, certificate, diploma and higher diploma that produce artisans, craftsmen, technicians and technologists cadres respectively.

Therefore from the first hypothesis, it was concluded that on average there is a significant difference between direct private costs across the four levels of TE. Higher diploma was the most expensive and grade test was the least expensive. F-statistics was 10.09 and had a corresponding P-value of 0.000 which showed that there is significant difference in private direct costs among the four levels. The different private direct costs can be attributed to varied costs of inputs by individuals across the four levels. Given the wide variation of direct private costs, it implies that enrollments will vary and demand for levels with high cost will continue to be low yet there is demand for personnel at these levels (higher diploma and certificate). Kenya’s Vision 2030 requires meeting the required ratio of technologists, technicians, craftsmen and artisans. It also implies that children from poor families will be unable to enroll in TE institutions. Therefore, this would result to inequities in education.
The second hypothesis sought to find out if there was any significant difference between lifetime earnings accruing to an artisan, a craftsman, and a technician and a technologist in manufacturing industries in Thika, Kenya. Based on the findings, it is appropriate to conclude that there is a significant positive relationship between levels of TE. This was confirmed by F-statistics at 11.59 with a p-value of 0.000. There is an increase in lifetime earnings with every level of TE. It is therefore beneficial to invest in more TE. Higher diploma had the higher lifetime earnings while certificate level had the lowest.

The Third hypothesis sought to test if there was any significant difference in the PRR among the artisans, a craftsmen, technicians and technologists in manufacturing industries in Thika, Kenya. Based on the findings, the third hypothesis indicated that there was a significant difference between PRR of an artisan, a craftsman, a technician and a technologist. PRR was not significantly different across the first three levels of TE namely grade test, certificate and diploma as their coefficients were not significantly different from zero at 5 percent level. However, PRR of higher diploma was significantly higher. It follows that, the PRR for higher diploma as measured by coefficient of schooling had a p-value of 0.017 which was less than 0.025. Returns to TE are low especially to certificate and grade test, however it is viable to invest in diploma and higher diploma. The enrolments are likely to remain low and yet these middle level skilled personnel are needed for industrialization thus, not achieving them Vision 2030 on national development. It is prudent therefore, to continue investing in TE.
The fourth hypothesis sought to find out if there was any significant relationship between personal characteristics and lifetime earnings among the technical workers in the manufacturing industries in Thika; based on the findings, the study concluded that there was positive relationship between personal characteristics and earnings among technical skilled workers in the manufacturing industries in Thika Kenya. Personal characteristics included age, experience, gender, ability and area of specialization. Given all the variables comprising the personal characteristics, ability has the highest relationship with lifetime earnings, followed by age and experience squared. However, gender and area of specialization are insignificant. Age has a coefficient of 0.12. This implies that an increase in age by one year increases lifetime earnings by approximately 12 percent at a P= 0.000. Ability has a coefficient of 0.20 implying that an increase or additional level of education by one year increases lifetime earnings by approximately 20 percent at a P= 0.008 and experience (squared) has a coefficient of 0.004 meaning that an increase in one year experience increases lifetime earnings by approximately 0.4 percent. P= 0.004. However, for gender and area of specialization, they were insignificant as the p=value was more than 0.05, that is, P-0.602, 0.193 respectively.

The last hypothesis sought to find out if there was any significant difference between Private Rates of Return and type of employment among workers in manufacturing industries in Thika, Kenya. The hypothesis revealed that there was no significant difference between Private Rates of Return across type of
employment among workers in the manufacturing industries Thika, Kenya. The two types of employment were self and salaried. The PRR for both salaried and self employed was approximately 11 percent. Sample t-statistic shows 0.2361 with a p value of 0.8136. It can be concluded that both type of employments are profitable and are similar. Type of Technical Education does not matter as far as Private Rates of Return are concerned. This implies that skilled technical TIVET graduates should not always aim at securing a salaried white collar job but also aim at employing themselves.

5.4 Recommendations

In the light of the research findings and conclusions, study wishes to make the following recommendations:

5.4.1 Policy Recommendation

i. Due to high variations in direct private cost of TE, the Ministry of Higher Education and Technology (MoEST) should increase bursaries and friendly loan through HELB to school leavers who wish to invest in TE to reduce the cost. Additionally, the government should peg its funding levels depending on levels of TE.

ii. Given that lifetime earnings increase with an increase in level of TE, individuals investing in TE should opt for extra Technical Education in order to gain higher returns.
iii. Since the Private Rates of Return was not significantly different across the first three levels of TE namely: grade test, certificate and diploma, it’s imperative for the national government of Kenya to make TE free for these first levels of education to make it more attractive and to increase the demand. However, for higher diploma the individual investors can share the cost with the government since the returns are high.

It was concluded that there is a significant relationship between personal characteristics and earnings among technical skilled workers in the manufacturing industries in Thika Kenya. Age, ability and experience were powerful predictors of lifetime earning while gender and area of specialization had no insignificant relationship with lifetime earnings. Therefore the study recommends the following: Individuals who wish to invest in TE, to do so at an early age to be able to obtain optimal benefits from their investment despite the fact that currently, in TVET sub sector, age is flexible and variable and the number of years is not formally integrated as it is in general education. Further, given that it was concluded that ability (highest academic achievements) produces the highest lifetime earnings, the study recommends that the national governments to strengthen the component of TE within the secondary school curriculum.

On experience (squared), given that one year of schooling increases lifetime earnings, the study recommends that employers to identify
strategies that can increase experience levels through field practical like practicum, internship and mentorship programmes.

iv. Private rate of return by type of employment were similar. Therefore, skilled technical workers in the manufacturing industries should be encouraged to embrace both self and formal employment of TE since they are profitable.

5.4.2 Suggestions for Further Research

The study makes the following recommendations based on the limitations and delimitations of the study

i. Since the current study determined the private direct cost of TE to technical workers in the manufacturing industries, the researcher recommends that a similar study can be done in other sectors of the economy that have been identified to spur economic development.

ii. This study focused on the relationship between level of TE and lifetime earnings. A similar study can be done to compare lifetime earnings at secondary and primary levels for general education and TE. This will help them make decisions on which type of education to take.

iii. Based on the PRR found, a study can be done to find out the causes of low returns to individuals in the first three levels of TE in the manufacturing industries. This is because the findings showed that
there are low rates of return to individuals in the grade test, certificate and diploma levels as opposed to higher diploma.

iv. A similar study on the relationship between personal characteristics should be conducted in other major industrial towns and rural areas in Kenya.

v. Since there was a short supply for grade test and certificate craftsman in self employment unlike the diploma and higher diploma respondents, a study can be carried out to find out why these low cadres do not start their own workshops. Besides, a study on factors discouraging skilled technical women to start their own self employment workshops can also be carried out, this is because the proportion of women to men found as technical skilled workers was minimal.
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APPENDICES

APPENDIX 1

LETTER OF INTRODUCTION TO RESPONDENTS

Muthima Purity W
Kenyatta University
Dept of Education Management
Policy & Curriculum Studies
puriwate@gmail.com or
puriwate@yahoo.mail.com
Mob no. 0721 913 595

Dear respondent,
I am a postgraduate student from Kenyatta University pursuing a PhD degree. I am conducting a study on: Private Rates of Return to Investment in Technical Education, a Case of Manufacturing Industries in Thika, Kenya. I hereby request you to respond to the questionnaire items as honestly as possible and to the best of your knowledge.

The questionnaire is designed for this research purpose only. Therefore, the responses shall be absolutely confidential. Please DO NOT write your name or organization. Thank you in advance.

Purity W. Muthima
PhD Student
Kenyatta University
APPENDIX 11

QUESTIONNAIRE FOR TECHNICAL SKILLED WORKERS

The purpose of this questionnaire is to ask for information regarding Private Rate of Return to investment in technical education in Thika, Kenya. This is information regarding costs and earnings’.

INSTRUCTIONS

The questionnaire is designed for this research purpose only. Therefore, the responses shall be absolutely confidential. Please DO NOT write your name or organizations. Thank you in advance.

Instructions: please put a tick (✓) where appropriate and / or fill in the spaces provided.

**Part one: Personal Data**

1) Gender  Male [✓]  Female [ ]

2) What is your age bracket: 15-20 years [ ] ; 21-25 years [ ] ; 26-30 years; [ ] 31-35 years [ ]
   36-40years [ ] ; 41-45 years [ ] 46-50years [ ] 51 – 60; [ ] 61-65 [ ]
   Over 65 [ ]

3) At what age did you enter in employment? [ ]

4) What are your terms of employment: permanent [ ] temporary [ ]
   contract [ ] self employment [ ]

5) Approximately how long did you stay without a job after completing your training ________ year(s)

6) What is the type of your current employment? Salaried (formal) employment [ ]  Self employment [ ]

7) I have worked as a technical skilled person for _____________ years
Part Two: Technical Education levels

8) How did you acquire your technical skills
   (a) Attended a technical institution ☐ (b) On the job training ☐

9) Which is your area of specialization; Mechanical ☐ Electrical ☐
   building ☐ others

10) What is your highest level of Technical Education: Grade Test ☐
    Certificate ☐ Diploma ☐
    Higher Diploma ☐ Degree ☐ others ☐

11) What is your highest academic qualification?

12) Please indicate the period of your technical training;
    From___________ to___________ year

13) How long did you take to complete your technical training? _______ years

14) The Examining body was: KNEC ☐ ; University ☐ Others.
    Specify_____________

15) Which category of the technical training college did you attend?:
    Youth Polytechnic ☐ ; Institute of Technology ☐ ; Technical
    Training Institute ☐ ; National Polytechnic ☐ University ☐ . I
    trained on -the –job ☐ others ________________.
Part Three; Cost of Technical Education

16) My technical training fee was paid by; Self   Scholarship   Parents/Guardians

17) Approximately what is the total amount of money did you spend per year on the following while you were training in Ksh.?

   i) College fees per year? 0-15,000 15,001 – 30,000 30,001-45,000 Over 45,001

   ii) Pocket money? Ksh. 0-10,000 0,001-20,000 20,001-30,000 Over 30,001

   iii) Accommodation? Ksh. 0-10,000 0,001-20,000 20,001-30,000 Over 30,001

   iv) Transport? Ksh 0-10,000 10,001-20,000 20,001-30,000 Over 30,001

   v) Stationery? Ksh 0-5,000 5,001-10,000 10,001-20,000 Over 20,001

   vi) Industrial attachment per year? Ksh

   vii) Tool box kit? Ksh

   viii) Library fee per year? Ksh

   ix) Other expenses Ksh

18) (i) If you were trained on the job how much were you paid during the training Ksh. 0 -5,000 5,001-10,000 10,001-20,000 Over 20,001 N/A
(ii) How much were you paid after the training Kshs

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<th>Box</th>
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<td>5,001-10,000</td>
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<td>0,001-20,000</td>
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<td>001- 40,000</td>
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<tr>
<td>over 40,001</td>
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(iii) How long did your employer take to increase your salary after obtaining a new skill level? ________________ years.

Part four: Earnings

19) Which year did you start earning your first salary/income__________

20) What was your average starting gross salary/ income per month in Ksh

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<td>11,000-20,000</td>
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<td>over 40001</td>
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21) My current monthly gross salary is between Ksh---

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<td>90,000-150,000</td>
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<td>(Others)________</td>
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22) Had you worked before joining the current employer or self employment? Yes ☐ No ☐

If yes, kindly fill in the table below by indicating the number of employers you have worked for, if any, the year when you started working, the duration you stayed in terms of years or months and your monthly average gross salary.
23) Do you have any other form of earnings (part-time) resulting from your technical training skills? Yes ☐ No ☐, If yes, how much do you earn on average per month in Ksh: 1,000-10,000 ☐ 11,000-20,000 ☐ 21,000-30,000 ☐ 31,000-40,000 ☐ 41,000-50,000 ☐ over 50,000 ☐

24) Do you have any other skill(s) you have acquired besides your technical skills? Yes ☐ No ☐ If yes, please indicates which ones... (eg. Teaching, management, counseling etc) __________________________

25) Do the named skills noted in 24 above contribute to your earnings? Yes ☐ No ☐, If yes, how much on average per month in Ksh __________________________

26) Do you hold any administrative position? Yes ☐ No ☐?If yes which one_______

27) Does the position held on 26 above earn you any extra income (allowance)? Yes ☐ No ☐
If yes, how much on average per month in Ksh ……….

Employers I have worked for e.g Employer 1,Employer 2

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<tr>
<th>Employers I have worked for e.g Employer 1,Employer 2</th>
<th>Year From – to e.g 1999-2002</th>
<th>Duration e.g 3 years</th>
<th>Average monthly gross salary</th>
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APPENDIX III

RESEARCH PERMITS

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MISS. PURITY WATETU MUTHIMA

OF KENYATTA UNIVERSITY, 0-100

HAS BEEN PERMITTED TO CONDUCT

RESEARCH IN KAMBU COUNTY

ON THE TOPIC: PRIVATE RATE OF RETURN TO INVESTMENT IN TECHNICAL EDUCATION, A CASE OF MANUFACTURING INDUSTRIES IN THIKA,

Kении.

FOR THE PERIOD ENDING:

31ST DECEMBER, 2014

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Permit No.: NACOSTI/P/13/1136/332
Date of Issue: 19th November, 2013
Fee Received: Kshs 2,000.00

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NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349,310571,2219420
Fax: +254-20-318245, 318249
Email: secretary@nacostl.go.ke
Website: www.nacostl.go.ke
When replying please quote

Ref: No.

19th November, 2013

NACOSTI/P/13/1136/332

Purity Watetu Muthima
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “Private rate of return to Investment in Technical Education, a case of manufacturing industries in Thika, Kenya,” I am pleased to inform you that you have been authorized to undertake research in Kiambu County for a period ending 31st December, 2014.

You are advised to report to the County Commissioner and the County Director of Education, Kiambu County before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

[Signature]

DR. M. K. RUGUTT, Ph.D, HSC.
DEPUTY COMMISSION SECRETARY
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Copy to:

The County Commissioner
The County Director of Education
Kiambu County.
APPENDIX IV

FEES STRUCTURE FROM A TECHNICAL INSTITUTE

SEPTEMBER INTAKE
(Course applications will be done in July)

Diploma in Technology (Architecture), (Regular Mode)
Duration: 7 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, English and Physics.

Diploma in Technology (Urban and Regional Planning) (Evening Mode)
Duration: 7 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, Physics/Biology/Chemistry, or History/CRE/PER/RE; or any other subject.
Tuition Fees: Kshs. 36,000/= per semester exam Kshs. 3,000/= per semester.

Diploma in Technology (Building Construction) (Regular & Evening Mode)
Duration: 7 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, English and Physics or CTI.
Tuition Fees: Kshs. 36,000/= per semester exam Kshs. 3,000/= per semester.

Diploma in Technology (Valuation and Property Management)
Duration: 7 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, English, Business Studies and Geography or CTI or CAD.
Tuition Fees: Kshs. 36,000/= per semester exam Kshs. 3,000/= per semester.

Diploma in Technology (Quantity Surveying)
Duration: 7 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, English and Physics.
Tuition Fees: Kshs. 36,000/= per semester exam Kshs. 3,000/= per semester.

Please Note:
Applications for courses are available only when courses have been advertised in the daily newspapers and should be made during the official application period following the course advertisement. Application forms, made on or before the course application deadline, addressed to the Senior Assistant Registrar - Student Recruitment and Admissions, should be made on official course application forms and available at the University & in the newspaper advertisement accompanied by copies of ACADEMIC AND/OR PROFESSIONAL CERTIFICATES, copy of NATIONAL IDENTIFICATION CARD, or MAILING ADDRESS & PASSPORT, and KENYA DEPOSIT SAVINGS or a BANKER'S CHEQUE, or a POSTAL MONEY ORDER made payable to the University College of a NONREFUNDABLE COURSE APPLICATION FEE of Kshs. 2,000/=.

Fee payments may be made by cash, credit cards, and personal and/or company cheque; PLEASE NOT be accepted at the University.

Successful students shall pay Tuition Fees plus the STATUTORY FEE listed below ONLY THROUGH the following ways:
1. The university fee collection accounts at any branch of Equity Bank, M.N.B 0840 239 9736 or Cooperative Bank of Kenya, M.N.B 0112 006 234 800.
2. A bankers cheque.
3. Any form of money transfer such as KOS or EPT accompanied by a corresponding advice slip indicating the particulars of the beneficiary.

Registration fee (paid per academic year) Kshs. 2,000/=.
Medicine fee (paid per academic year) Kshs. 2,000/=.
Continuation fee (paid once (Refundable) Kshs. 2,000/=.
Industrial Attachment fee for diploma students taking regular courses (paid once) Kshs. 1,800/=.
Computer fee (paid per academic year) Kshs. 2,000/=.
Maintenance fee (paid per academic year) Kshs. 400/=.
Library fee (paid per academic year) Kshs. 2,000/=.
Student union fee (paid per academic year) Kshs. 500/=.
Sports fee (paid per academic year) Kshs. 500/=.
Activity fee (for degree students paid per academic year) Kshs. 1,000/=.
Examination fee (paid per academic year) Kshs. 3,000/=,

TECHNICAL UNIVERSITY OF KENYA
FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

SCHOOL OF ARCHITECTURE AND THE BUILT ENVIRONMENT

COURSE BROCHURE 2013/2014

LOCATION: Q-BLOCK 2nd FLOOR

Technical University of Kenya
P.O. Box 52432-00203 Nairobi
Rajaz Salama Avenue
Telephone: 020 343 5722, 343 633; 2211 9774, 321 8212; 321 8220; 0722 3557;
754 0733 3557
Fax: 020 343 5735, 9069

154
MAY INTAKE
(Course applications will be done in March)

Bachelor of Built Environment (Construction Management)
Duration: 11/15 semesters
Minimum entry qualifications: KCSE mean grade C plus including C plus in Mathematics, English, Geography and Physics.
Tuition Fees: Kshs. 90,000/= per semester

1. Bachelor of Built Environment (Urban Design Development)
2. Bachelor of Built Environment (Urban and Regional Planning)
Duration: 11/15 semesters
Minimum entry qualifications: KCSE mean grade C plus including at least C plus in Mathematics, C or in either Physics, Biology, Chemistry, or History/CSE/IGCSE, or any other subject.
Tuition Fees: Kshs. 90,000/= per semester

1. Bachelor of Technology (Building Construction)
2. Bachelor of Quantity Surveying
Duration: 11/15 semesters
Minimum entry qualifications: KCSE mean grade C plus including C plus in Mathematics, English and Physics.
Tuition Fees: Kshs. 90,000/= per semester

Bachelor of Architectural Studies/
Bachelor of Architecture
Duration: 11/15 semesters
Minimum entry qualifications: KCSE mean grade C plus including C plus in Mathematics, English and Physics.
Tuition Fees: Kshs. 90,000/= per semester

Bachelor of Built Environment (Construction Management)
Duration: 11/15 semesters
Minimum entry qualifications: KCSE mean grade C plus including C plus in Mathematics, English and Physics.
Tuition Fees: Kshs. 90,000/= per semester

Bachelor of Architectural Studies/
Bachelor of Architecture
Duration: 11/15 semesters
Minimum entry qualifications: KCSE mean grade C plus including C plus in Mathematics, English and Physics.
Tuition Fees: Kshs. 90,000/= per semester

Diploma in Technology (Construction Management)
Duration: 7 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, English and Physics.
Tuition Fees: Kshs. 35,000/= per semester for evening.

Diploma in Technology (Spatial Design and Planning)
Duration: 8 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, English, Business Studies and Geography.
Tuition Fees: Kshs. 35,000/= per semester

Diploma in Technology (Architecture) (Evening Mode)
Duration: 9 semesters
Minimum entry qualifications: KCSE mean grade C minus including C minus in Mathematics, English and Physics.
Tuition Fees: Kshs. 35,000/= per semester for evening.

January Intake
(Course applications will be done in October)

Bachelor of Philosophy in Technology:
Construction Management
Duration: 4 semesters
Minimum entry qualifications: Higher Diploma in Construction or any other equivalent qualification in the field of built environment.
Tuition Fees: Kshs. 90,000/= per semester

Certificate in Construction
Duration: 3 semesters
Minimum entry qualifications: KCSE mean grade D plus including D plus in Mathematics, English and Physics.
Tuition Fees: Kshs. 25,000/= per semester
APPENDIX V

FEES STRUCTURE FROM AN INSTITUTE OF TECHNOLOGY

### CERTIFICATE IN BAKING TECHNOLOGY CLASS FEES STRUCTURE PER TERM

<table>
<thead>
<tr>
<th>ACCOUNT (VOTE HEAD)</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports and games income</td>
<td>700.00</td>
</tr>
<tr>
<td>Students Council</td>
<td>300.00</td>
</tr>
<tr>
<td>Generator Fuel</td>
<td>200.00</td>
</tr>
<tr>
<td>Tuition</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Catering</td>
<td>6,200.00</td>
</tr>
<tr>
<td>Boarding</td>
<td>5,000.00</td>
</tr>
<tr>
<td>Examination fees</td>
<td>11,400.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>37,609.00</td>
</tr>
</tbody>
</table>

### DIPLOMA IN ELECTRICAL AND ELECTRONICS CLASS FEES STRUCTURE PER TERM

<table>
<thead>
<tr>
<th>ACCOUNT (VOTE HEAD)</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports and games income</td>
<td>700.00</td>
</tr>
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<td>300.00</td>
</tr>
<tr>
<td>Generator Fuel</td>
<td>200.00</td>
</tr>
<tr>
<td>Tuition</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Catering</td>
<td>6,200.00</td>
</tr>
<tr>
<td>Boarding</td>
<td>5,000.00</td>
</tr>
<tr>
<td>Examination fees</td>
<td>11,400.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>37,609.00</td>
</tr>
</tbody>
</table>

### DIPLOMA IN INSTRUMENTATION AND CONTROL CLASS FEES STRUCTURE PER TERM

<table>
<thead>
<tr>
<th>ACCOUNT (VOTE HEAD)</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports and games income</td>
<td>700.00</td>
</tr>
<tr>
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<td>300.00</td>
</tr>
<tr>
<td>Generator Fuel</td>
<td>200.00</td>
</tr>
<tr>
<td>Tuition</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Catering</td>
<td>6,200.00</td>
</tr>
<tr>
<td>Boarding</td>
<td>5,000.00</td>
</tr>
<tr>
<td>Examination fees</td>
<td>11,400.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>37,609.00</td>
</tr>
</tbody>
</table>

### CERTIFICATE IN ELECTRICAL AND ELECTRONICS CLASS FEES STRUCTURE PER TERM

<table>
<thead>
<tr>
<th>ACCOUNT (VOTE HEAD)</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports and games income</td>
<td>700.00</td>
</tr>
<tr>
<td>Students Council</td>
<td>300.00</td>
</tr>
<tr>
<td>Generator Fuel</td>
<td>200.00</td>
</tr>
<tr>
<td>Tuition</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Catering</td>
<td>6,200.00</td>
</tr>
<tr>
<td>Boarding</td>
<td>5,000.00</td>
</tr>
<tr>
<td>Examination fees</td>
<td>11,400.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>37,609.00</td>
</tr>
</tbody>
</table>
# KIAMBU INSTITUTE OF SCIENCE AND TECHNOLOGY

## DIPLOMA IN FOOD AND BEVERAGE CLASS FEES STRUCTURE PER TERM

<table>
<thead>
<tr>
<th>ACCOUNT (VOTE HEAD)</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports and games income</td>
<td>700.00</td>
</tr>
<tr>
<td>Students Council</td>
<td>300.00</td>
</tr>
<tr>
<td>Generator Fund</td>
<td>200.00</td>
</tr>
<tr>
<td>Toliet</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Catering</td>
<td>8,200.00</td>
</tr>
<tr>
<td>Boarding</td>
<td>5,600.00</td>
</tr>
<tr>
<td>Examination fees</td>
<td>11,400.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
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</tr>
</tbody>
</table>

## CERTIFICATE IN FOOD AND BEVERAGE CLASS FEES STRUCTURE PER TERM

<table>
<thead>
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<th>ACCOUNT (VOTE HEAD)</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sports and games income</td>
<td>700.00</td>
</tr>
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<td>300.00</td>
</tr>
<tr>
<td>Generator Fund</td>
<td>200.00</td>
</tr>
<tr>
<td>Toliet</td>
<td>15,000.00</td>
</tr>
<tr>
<td>Catering</td>
<td>8,200.00</td>
</tr>
<tr>
<td>Boarding</td>
<td>5,600.00</td>
</tr>
<tr>
<td>Examination fees</td>
<td>11,400.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>40,800.00</strong></td>
</tr>
</tbody>
</table>

## DIPLOMA IN BAKING TECHNOLOGY CLASS FEES STRUCTURE PER TERM

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<th>ACCOUNT (VOTE HEAD)</th>
<th>AMOUNT</th>
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<tbody>
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<td>Sports and games income</td>
<td>700.00</td>
</tr>
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<td>300.00</td>
</tr>
<tr>
<td>Generator Fund</td>
<td>200.00</td>
</tr>
<tr>
<td>Toliet</td>
<td>15,000.00</td>
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<tr>
<td>Catering</td>
<td>8,200.00</td>
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<tr>
<td>Boarding</td>
<td>5,600.00</td>
</tr>
<tr>
<td>Examination fees</td>
<td>11,400.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>37,800.00</strong></td>
</tr>
</tbody>
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## APPENDIX VI

**PRR across the Levels of Technical Education**

### MODEL I: ARTISAN (Dep Var: Log(Annual Income After Tax))

<table>
<thead>
<tr>
<th></th>
<th>N=32</th>
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</thead>
<tbody>
<tr>
<td>Number of Obs.</td>
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</tr>
<tr>
<td>F Statistics</td>
<td>F(3,28) 6.18</td>
</tr>
<tr>
<td>Prob&gt; F</td>
<td>0.0023</td>
</tr>
<tr>
<td>Pseudo R square</td>
<td>33.39%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling (years)</td>
<td>-0.0064</td>
<td>-0.08</td>
<td>0.936</td>
</tr>
<tr>
<td>Experience</td>
<td>-0.005</td>
<td>-0.08</td>
<td>0.935</td>
</tr>
<tr>
<td>Exp(Squared)</td>
<td>0.0001</td>
<td>3.06</td>
<td>0.005***</td>
</tr>
<tr>
<td>Constant</td>
<td>12.6</td>
<td>52.24</td>
<td>0.000***</td>
</tr>
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</table>

### MODEL II: CRAFTSMAN (Dep Var: Log(Annual Income After Tax))

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Number of Obs.</td>
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<tr>
<td>F Statistics</td>
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<tr>
<td>Prob&gt; F</td>
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<tr>
<td>Pseudo R square</td>
<td>33.39%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling (years)</td>
<td>-0.463</td>
<td>-0.5</td>
<td>0.62</td>
</tr>
<tr>
<td>Experience</td>
<td>0.104</td>
<td>2.26</td>
<td>0.031*</td>
</tr>
<tr>
<td>Exp(Squared)</td>
<td>0.0001</td>
<td>0.01</td>
<td>0.995</td>
</tr>
<tr>
<td>Constant</td>
<td>12.533</td>
<td>35.78</td>
<td>0.000***</td>
</tr>
</tbody>
</table>

### MODEL III: TECHNICIAN (Dep Var: Log(Annual Income After Tax))

<table>
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</thead>
<tbody>
<tr>
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<td>F Statistics</td>
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<tr>
<td>Pseudo R square</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling (years)</td>
<td>0.035</td>
<td>0.52</td>
<td>0.726</td>
</tr>
<tr>
<td>Experience</td>
<td>0.133</td>
<td>4.91</td>
<td>0.000***</td>
</tr>
<tr>
<td>Exp(Squared)</td>
<td>0.0001</td>
<td>0.29</td>
<td>0.831</td>
</tr>
<tr>
<td>Constant</td>
<td>12.355</td>
<td>53.98</td>
<td>0.000***</td>
</tr>
</tbody>
</table>

### MODEL IV: (Dep Var: Log(Annual Income After Tax))

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Obs.</td>
<td></td>
</tr>
<tr>
<td>F Statistics</td>
<td></td>
</tr>
<tr>
<td>Prob&gt; F</td>
<td></td>
</tr>
<tr>
<td>Pseudo R square</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling (years)</td>
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<td></td>
</tr>
<tr>
<td>Experience</td>
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<td></td>
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<tr>
<td>Exp(Squared)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N=30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Obs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F Statistics</td>
<td>F(3,26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prob&gt; F</td>
<td>0.0011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudo R square</td>
<td>39.3%</td>
<td></td>
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</table>

<table>
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<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling (years)</td>
<td>0.373</td>
<td>2.55</td>
<td>0.017**</td>
</tr>
<tr>
<td>Experience</td>
<td>0.124</td>
<td>2.00</td>
<td>0.056*</td>
</tr>
<tr>
<td>Exp(Squared)</td>
<td>-0.0002</td>
<td>-0.79</td>
<td>0.356</td>
</tr>
<tr>
<td>Constant</td>
<td>11.105</td>
<td>17.08</td>
<td>9.77</td>
</tr>
</tbody>
</table>

*significant at 10% level of significance  **significant at 5%  ***significant at 1%

Source: Researcher
## APPENDIX VII

### Personal Characteristics and Lifetime Earnings

<table>
<thead>
<tr>
<th>Goodness of fit</th>
<th></th>
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<tbody>
<tr>
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<td>F Statistics</td>
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</tr>
<tr>
<td>Prob&gt; F</td>
<td>0.0000</td>
</tr>
<tr>
<td>Pseudo R square</td>
<td>57.37%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling (years)</td>
<td>0.074</td>
<td>2.15</td>
</tr>
<tr>
<td>Age</td>
<td>0.12</td>
<td>6.17</td>
</tr>
<tr>
<td>Ability (base category K.C.P.E)</td>
<td>0.20</td>
<td>2.67</td>
</tr>
<tr>
<td>Gender (Base Category Male)</td>
<td>0.031</td>
<td>0.52</td>
</tr>
<tr>
<td>Specialization (Base category Mechanical)</td>
<td>-0.039</td>
<td>-1.31</td>
</tr>
<tr>
<td>Experience(Squared)</td>
<td>0.004</td>
<td>2.18</td>
</tr>
<tr>
<td>Constant</td>
<td>11.98</td>
<td>71.25</td>
</tr>
</tbody>
</table>

*significant at 10%  ** significant at 5%  ***significant at 1%

Source: Author
APPENDIX VIII

Private Rate of Return across Types of Employment

<table>
<thead>
<tr>
<th>Goodness of fit</th>
<th>Model I: Employed</th>
<th>Model II: Self-Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Obs.</td>
<td>N=117</td>
<td>N=79</td>
</tr>
<tr>
<td>F Statistics</td>
<td>F(3,113))</td>
<td>F(3,76))</td>
</tr>
<tr>
<td>Prob&gt; F</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Pseudo R square</td>
<td>24.36%</td>
<td>33.74%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
<th>Coef</th>
<th>t-stat</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schooling (years)</td>
<td>0.109</td>
<td>2.64</td>
<td>0.009**</td>
<td>0.111</td>
<td>2.48</td>
<td>0.016**</td>
</tr>
<tr>
<td>Age (Experience)</td>
<td>0.098</td>
<td>3.80</td>
<td>0.000***</td>
<td>0.102</td>
<td>4.60</td>
<td>0.004***</td>
</tr>
<tr>
<td>Specialization</td>
<td>0.018</td>
<td>0.48</td>
<td>0.633</td>
<td>-0.079</td>
<td>-1.59</td>
<td>0.117</td>
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<tr>
<td>Constant</td>
<td>12.09</td>
<td>75.44</td>
<td>0.000***</td>
<td>12.53</td>
<td>70.04</td>
<td>0.000***</td>
</tr>
</tbody>
</table>

*significant at 10%
** significant at 5%
***significant at 1%

Source: Author