ASPECTS OF THE THEORY OF HUMAN CAPITAL AND ITS APPLICATION TO SOUTH AFRICAN ECONOMIC DEVELOPMENT

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INTRODUCTION

Human capital is an important economic concept. The significance of human resource development, in the form of both education and health, has long been realised and was stressed even in the writings of the early economists. Yet detailed economic analysis of the subject gave way to the reputations of great writers and the pressures of strongly held opinion. As a result the economics of human resource development became a study of secondary importance, tagged onto the general field of economics and lost amongst a meaningless plethora of theories and sub-theories. Some writers did dabble in it, but it did not receive the exacting treatment of economists to any significant extent and was, consequently, a mass of unconnected theory. Even up to the last decade there was no "received doctrine" on the subject comparable, in extent, to the other fields of economic theory. What statements did exist were *obiter dicta* and the range of agreement was limited, especially on the central concept of the theory, human capital. This notion has become the focus of attention, as the entire theory of human resource development is couched in terms of the proposition that people enhance their economic capabilities by investment in themselves, whether by education, health or any other means.[1]

There is a vital need for a systematic treatment of human resource development and to some extent the present revival of interest in this field as witnessed by the explosive increase in the volume of research and literature on the topic has gone some way towards filling the gap. This remains a relatively underdeveloped field compared to the more traditional branches of economic theory, but the work done since 1960 suggests that the concept of human capital could become a central, permanent consideration in economics.

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[1] Education is generally considered to be the most influential form of human resource development, though it is by no means the only one. Other recognised forms are health, migration and knowledge of the labour market, each of which enhances the value of human capital in its own way.

Closely linked with the revival of interest in the subject of human capital formation is the modern emphasis on the problem of economic growth. There is naturally a wide range of opinion on this subject, yet it is evident that it has become a prime objective of the great majority of economies, whether developed, developing or underdeveloped, to pursue a policy of growth, almost at any cost. Growthmanship has become an economic dogma to many economists, for they explicitly or implicitly support the notion that "To be 'with' growth is manifestly to be 'with it' and, like speed itself, the faster the better."[2]

Whether growth per se should be the ultimate aim of an economy is a matter of opinion. There cannot, however, be any doubt that growth, in the broadest sense of the word, has become the "conventional wisdom"[3] of modern economic policy.

One of the critics of the popular creed of growthmanship is Mishan, who bases his arguments on the fact that economic policy which is primarily growth oriented aims only at enhancing material well-being. The generally accepted doctrine, however, remains one of preoccupation with growth and growthmanship. This is evidenced by the fact that modern economists even speak in such euphemistic terms as "growth recessions" when an economy is in the tortuous course of events previously known as an economic slump.[4] Growth orientation remains the "conventional wisdom" of modern society

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[2]E.J. Mishan, The Costs of Economic Growth (England, 1969), pp. 27-28.

[3]J.K. Galbraith, The Affluent Society (England, 1968), Ch. 2. Galbraith describes the conventional wisdom in the following way. "Audiences of all kinds most applaud what they like best. And in social comment the test of audience approval, far more than the test of truth, comes to influence comment ... Ideas come to be organised around what the community as a whole or particular audiences find acceptable ... Because familiarity is an important test of acceptability, the acceptable ideas have great stability. They are highly predictable. It will be convenient to have a name for the ideas which are esteemed at any time for their acceptability, and it should be a term that emphasises the predictability. I shall refer to these ideas henceforth as the conventional wisdom." pp. 17-18.

[4]This new phrase was coined by the National Bureau of Economic Research in America as a happier phrase to describe the state of the economy than labels such as "retardation".

and is even considered by some to be the justification of our very economic existence. It is in this light that economists look to the concept of human capital in their search for growth-inducing factors within the economy, for it is in its role as a "primum mobile"[5] that human capital is directly linked to both growth and development.

In the modern world affluence amidst poverty is a common situation. Whilst a few countries are immensely affluent and prosperous, nearly two-thirds of the world population subsists on sub-standard incomes. This situation and the need to overcome it has had an important influence on economic thought and policy. An increasingly popular belief is that human capital, as a "missing link" in economic underdevelopment theory, could prove to be the panacea of all such ills. Whilst it is true that human resource development is one of the vital keys to breaking the "vicious circles"[6] which commonly exist in underdeveloped areas, it is by no means the exclusive cure, for one must be aware of the complexity of the problem of economic underdevelopment.

This study aims to give some insight into the theoretical aspects of the concept and to indicate its applicability to the South African economy. The first part deals with the theoretical analysis of human capital. A historical survey of the concept is given, followed by a discussion of some of the economic aspects of the subject. A detailed analysis of the more important factors such as costs, returns and the contribution to economic growth is presented, as well as an outline of the role of human capital in growth and development.

Following the theoretical analysis, the second part attempts to indicate the applicability of human capital to the South African economy. A survey of the human resources in the economy and the investments made in them is followed by an analysis of the present situation of the economy, the role human capital can play in the situation, and the overall human resource position of the economy in the light of these factors.

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[5] For a fuller description of this concept and its role in the developmental process, see A.O. Hirschman, The Strategy of Economic Development (New Haven, 1958), Ch. 1, pp. 1-7.

[6] See R. Nurske, Problems of Capital Formation in Underdeveloped Countries (Oxford, 1965), p.4.

Finally, a case study is presented to give an insight into some of the practical aspects of investment in human capital and to show the relevance and applicability of the concept to South African economic growth and development.

PART ONE

THEORETICAL ANALYSIS OF HUMAN CAPITAL

"It is human because it becomes part of man, and it is capital because it is a source of future satisfaction, or of future earning, or both of these."

Theodore W. Schultz.

CHAPTER 1

HISTORICAL SURVEY OF THE CONCEPT

1. THE CLASSICAL ROOTS OF HUMAN CAPITAL

The fact that there has been a recent emphasis on the concept of human capital in contemporary economic literature, does not necessarily suggest that this is an example of "clustered innovation" resulting from an entirely new field of study, or even that the constituent components have latterly been discovered. It is, in fact, representative of an upswing in the cyclical history of the concept.

The concept of human capital was prevalent, both implicitly and explicitly, in the writings of many of the early economists,[1] but due to a concatenation of forces, was subsequently suppressed into obscurity and the primacy of material capital became the order of the day. The modern revival of interest in the original field of concern about human capital and human resource development represents a current (and probably permanent) reversal from a purely materialistic orientation towards capital.

Adam Smith (1776) believed that a person's capital was that part of his stock from which he expected to derive an income and boldly included all useful abilities of inhabitants of a country, whether in-

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[1] Those in whose writings the concept appeared include A. Smith (1776), W. Petty (1691 - posthumously), D. Hume (1752), J. Bentham (1748-1832), J.B. Say(1803), D. Ricardo (1817), T. Malthus (1820), J.S. Mill (1829), F. List (1841), Engels (1883), A. Marshall (1890) and others. It is, however, important to note that none of these writers recognised human capital as a prime mover of economic growth and development.

[2] A. Smith, The Wealth of Nations (London, 1869).

herited or acquired,[3] as part of capital. He does not, however, define the term "capital" specifically, but includes in his category of fixed capital, the skills and useful abilities of human beings.[4] Smith does, however, enumerate four different methods whereby capital is employed; in application to natural resources, manufacturing, wholesaling and retailing.[5]

No specific mention of human capital is made, but the statement that, "The expense of the institutions for education (is) ... no doubt, beneficial to the whole society, and may therefore, without injustice be defrayed by the general contribution of the whole society",[6] implies that skilled labour is not excluded from the catalogue of human wealth, nor is the outlay devoted to the production of such labour denied the attributes of an investment. It is, however, not easy to determine under which of the preceding schedules such a form of expenditure would fall.[7]

Others who contended that human capital was part of the capital concept as it increased skills and abilities, was acquired at a cost and induced higher labour productivity, were Say, Mill, Bentham and List. All believed that capital was defined as "a produced means of production", but they did not include the human being himself, only his acquired abilities, as they considered it necessary to have a clear division between capital and labour to some extent.[8]

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[3]Though these abilities differ importantly in the formation of human capital, they are a clear effort to incorporate human capital within the overall definition of capital.

[4]In this case the skills of a man are regarded as a machine which has a genuine cost and returns a profit.

[5]A. Smith, op.cit., Vol. 1, Bk. 2, Ch. 5, pp. 363-4.

[6]ibid., Vol. 2, Bk. 5, Ch. 1, p.403.

[7]It would, perhaps, be best to include a fifth head to incorporate it.

[8]The modern approach, in general, does away with this exclusion, but as will be shown later, this is at the expense of disregarding an inherent trait resisting the subjection of man to the indignity of pure statistical analysis and the diminution of his rights and freedom

Bentham distinguished labour into its physical exertion and skill or mental power components. Mill stated, "That the productiveness of the labour of a people is limited by their knowledge of the arts of life, is self-evident; and that any progress in these arts ... enables the same quantity of labour to raise a greater produce."[9]

Sir William Petty was one of the first to attempt to estimate the money value of a human being. To him labour was the "father of wealth" and had to be included in any estimation of material wealth. He attempted his evaluation of the stock of human capital by capitalising the wage bill to perpetuity at the market rate of interest. Such an analysis was obviously very general and therefore inadequate, and Petty was heavily criticised for his efforts,[10] because it required too restrictive assumptions, and the price paid for the simplification of his basic hypothesis to render it practical, was too great to afford any really meaningful conclusions.

William Farr (1853) attempted an analysis of the present value of the individuals net future earnings,[11] making allowances for untimely death and length of life. To him, however, human capital raised an irreconcilable contradiction, for if human beings were capital, he believed they should be treated as such. This would, however, oblige people to pay tax on wealth they did not have on hand and would lead to absurd results. Engels (1883) preferred the cost-of-production procedure (based on Petty's approach) and considered it a way of overcoming Farr's complications.

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in any way. Yet, even at that stage in the history of economic thought, there were others who claimed that economic analysis had to abstract from considerations of justice and practical expediency, and regard human beings exclusively from the point of view of exchange.

[9] J.S. Mill, Principles of Political Economy (London, 1862), Bk. 1, Ch.7, p.130.

[10] The greatest failing of Petty's attempt was that it took no cognisance of values by age, sex and economic status. A bitter satire of his analysis was rendered by D. Swift in his "A Modest Proposal for Preventing the Children of Poor People from Being a Burden to their Parents or the Country."

[11] Here net means "net of maintenance". It is derived from future earnings less personal living expenses.

During this period many empirical and analytical studies of human capital were carried out, but the results of all were generally inconclusive and devoid of any real accuracy and significance. Nicholson (1891), for example, estimated roughly that the English nation was worth at least five times the value of other existing wealth in England.[12] One of the latest such studies was based on the belief that the yield value of certain human beings (for example, a Newton) could not be determined, but as their rearing was a positive cost, they had a social money value.[13]

Analytically, the hypothesis was as follows:-

$$Cx = Co \left[1 + x + k \left[X\,(x+1) \,/\, 2 \right] \right]$$

where x = any age.

Cx = total cost of producing a human being.

Co = costs incurred up to point of birth.

k = annual percentage increase in costs.[14]

In general, both the cost-of-production and the capitalised-earning approaches of the early writers had insignificant and inconsequential results in further developing and quantifying the concept of human capital. Throughout the early stages of the history of economic thought estimates of the value of human capital were attempted based on the belief that the costs of rearing were real, the resultant product added to national wealth and any expenditure on human beings which increased individual production, ceteris paribus, increased national wealth. Although no exact theoretical formulation or accurate empirical

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[12] J.S. Nicholson, "The Living Capital of the United Kingdom", Economic Journal, Vol. 1, (1891) p.105.

[13] A study by Dublin and Lotka, quoted in; B.F. Kiker, "The Historical Roots of the Concept of Human Capital", Journal of Political Economy, Vol. 74 (1966), p.485.

[14] This formulation has an inherent fallacy in that there is no simple and necessary relationship between the cost of producing an item and its economic value - especially human beings, where costs are by no means always profit motivated. Social costs are as appropriate as economic costs. Also its accuracy depends upon the doubtful proposition of obtaining accurate cost figures.

research emanated from the early economists, they were undoubtedly aware of the existence of the concept; all they lacked was the adequate apparatus to quantify it and the perception to appreciate its real significance.

The fact that there was so long a time interval between the prevalence of the concept in the era of the early writers and the modern revival of interest in it, has often been attributed to the works of Alfred Marshall. It was his opinions, and the esteem in which they were held, that was perhaps the greatest single motivating force which can be said to account for the heyday of a materialistic capital concept orientation.[15]

Marshall, under the heading of wealth,[16] gives a detailed exposé of a man's wealth. He classifies "non material" goods into an "external" and an "internal" group; "One consists of his own qualities and faculties for action and enjoyment; ... All these lie within himself and are called 'internal'. The second class are called 'external' because they consist of relations beneficial to him with other people."[17] Marshall then further subdivides each class into "transferable" and "non-transferable" aspects and in all gives a fully comprehensive classification of wealth,[18] which includes the concept of human capital as

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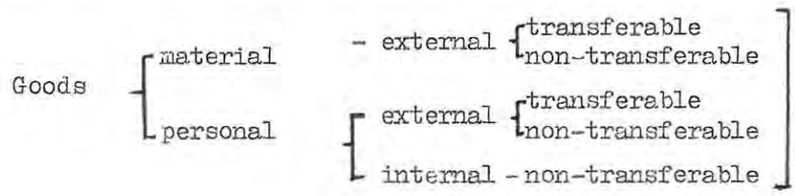
[15]There appears to be a strange conflict of opinion over the evaluation of the role played by Marshall. Although all writers concede that he commented in detail about education and human capital and acquiesed that such a concept did exist, they do not unanimously acclaim that he believed it did not have great relevance to the ordinary economics of everyday life. J. Vaizey, in his works, makes no reference to the important Marshallian view that human capital is of no real importance in "the market place", and only refers to the favourable analysis performed by the great economist. In the author's opinion, such a preclusion of an essential view and the "other side" of the argument, tends to give a false impression of the essence of Marshall's credo in the human capital concept.

[16]A. Marshall, Principles of Economics (London, 1898), Bk.2, Ch.2, p.45-6.

[17]ibid., p.45.

[18]This classification may be shown as follows:-



internal personal goods - that which man finds in himself, given to him by nature, or which he educates in himself by his own free action, such as muscular strength, health and mental attainment. Everything that the out-world offers for the satisfaction of his wants is considered an external good to him.

After an exacting analysis of wealth Marshall then states that in general, a man's "wealth" is taken to exclude all his own personal qualities and faculties, even those which earn him a living. This is a complete rejection of the concept of human capital, a concept over which he went to great pains to include in wealth. His justification for this apparent contradiction and the acceptance of a narrow, more restricted definition of wealth is;

"This use of the term wealth is in harmony with the usage of ordinary life ... For it includes all those things, external to a man, which (i) belong to him ... and (ii) are directly capable of a money measure; ..."[19]

Altogether, though Marshall admits that a broader view of wealth does exist, and that it is useful for some purposes, he maintains recourse must be had to a special interpretation clause to prevent confusion, that is, a definition of personal wealth to include everything which directly contributes to human capital. He believed that "Confusion would certainly be caused by using the term wealth by itself when we desire to include a person's industrial qualities..." and that "the question whether it is ever worth to speak of them as wealth is merely one of convenience, though it has been much discussed as if it were one of principle."[20]

To Alfred Marshall there was a necessary distinction between human capital and material capital and this laid the foundation to the capital dichotomisation, which was perpetuated until the present decade. His basis for this is summed up in his own words, "... the term Capital

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[19] ibid., p.47.

[20] ibid., p.48.

has many different uses both in the language of the market place and in the writings of economists. In fact there is no other part of economics in which temptation is so strong to invent a completely new set of technical terms ... (but) This would throw the science out of touch with real life; our uses of the term must be based upon the uses of the market place."[21]

Although Marshall rejected the incorporation of human capital in the ordinary economic use, he did not believe that it was insignificant - "The growth of mankind in numbers, in health and strength, in knowledge, ability, and in readiness of character, is the end of all our studies..."[22] To this end he maintained that education, in its broadest definition, was the ultimate means. So important did he consider education that, even though he explicitly maintained that the economics of education and human resource development were extraneous to the useful definitions of wealth and capital and could be omitted in the ordinary sense of the terms, he went to extreme lengths to elucidate the value of education. On education, he declared; "It is true that there are many kinds of work which can be done as efficiently by an uneducated as by an educated workman; ... But a good education confers great indirect benefits even on the ordinary workman. It stimulates his mental activity; it fosters in him a habit of wise inquisitiveness; it makes him more intelligent, ...; it is thus an important means towards the production of material wealth."[23]

He believed that education was a means of securing greater material and non-material wealth, and that an education was a necessary investment of both capital and labour "up to that margin at which any further investment appears to offer no balance or gain, no excess or surplus of utility or disutility."[24] To him education and human

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[21] ibid., (7th ed.), Bk.2, Ch.4, p.141.

[22] ibid., Bk.4, Ch.1, p.212.

[23] ibid., Ch 6, p.291.

[24] ibid., Ch.8, p.700. Here Marshall uses the investment approach and the concept of marginal returns. This approach has become more sophisticated, but is essentially, in its present form, a manifestation of the above Marshallian ideas.

capital were of paramount importance and he believed that, "There is no extravagance more prejudicial to the growth of national wealth than that wasteful negligence which allows genius that happens to be born of lowly parentage to expend itself on lowly work."[25] Marshall, on these grounds, believed that material wealth, when wisely used to increase human resources via health and education, was fulfilling its chief role, and that there was wisdom in expending both public and private funds for such purposes.

Altogether Marshall, like many of the classical economists, appreciated the essence of the concept of human capital. His analysis of the concept indicates the importance he attached to it in a theoretical capacity, but he rejected the incorporation of the concept into the practical economics of everyday life upon grounds which to him, and the majority of his successors in the neo-classical schools, seemed justifiable. It was a combination of the pressures of such forces which created a situation in which the concept of human capital could be rehabilitated in the present era. The main point is, however, that "the concept of human capital is by no means new .... (it) was somewhat prevalent in economic thinking, until Marshall discarded the notion as 'unrealistic'".[26]

1.2. REJUVENATION OF THE CONCEPT

After the Marshallian approach to the concept of capital and human resource development, most economists employed a narrower concept that identified capital with material capital goods and equipment used in the production process, distinguishing it sharply from labour. This departure from the "classical"[27] outlook was entrenched in

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[25] ibid., p.292, Ch.6.

[26] B.F. Kiker, op.cit., p.481.

[27] The term "Classical" as cited from here onwards will be taken to indicate the basic views on human capital as enunciated in the previous chapter. Such views will be taken to be representative of the whole classical school of thought, though it is probable that many of the Classical group never held the exact views as those ascribed to them. This generalisation of their individual analysis is taken to be representative of the basic ideas of their writings on the concept, though it is obvious that the generalisation of such a heterogeneous group will tend to violate the postulations of some of its members.

economic thought until a new upsurge in the field of education and human capital was initiated by very recent writings. During the depression of interest in the concept, there were a few prominent economists who challenged the materialistic orientation of capital, but in general it can be safely asserted that the "more modern economists have not paid as much explicit attention to human resources in economic growth as did some of the great classical economists like Smith and Marshall."[28]

For a long time after the Classical concept had been abandoned, material capital held the centre of the stage, but the overall importance of its position was increasingly challenged by the supporters of the "non-conventional", or human, aspect of capital. The use of the restricted wealth concept accounted for only those classes of wealth that were bought and sold, and this excluded human capital by definition. In 1906 Fisher clearly and cogently established the economic basis for an all-inclusive concept of wealth.[29] The prestige of Marshall, however, proved to be too great and his ideas prevailed over Fisher's. Of the Fisherian concept Marshall said, "Regarded from the abstract and mathematical point of view, his (Fisher's) position is incontestable. But he seems to take too little account of the necessity for keeping realistic discussions in touch with the language of the market place."[30]

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[28] F. Harbison and C.A. Meyers (eds.), Education, Manpower and Economic Growth (New York, 1964), p.4.

[29] I. Fisher, The Nature of Capital and Income (New York, 1906). In this work Irving Fisher laid a basis for the attack on the Marshallian restrictive wealth concept by expounding a broader concept, often referred to as "The Fisherian Concept of Capital." Borrowing from Milton Friedman's terminology, Fisher's postulation was in essence as follows:-

$WT = WH + WN - H$ where WT = total wealth
WH = human wealth
$WN-H$ = non-human wealth

and $Y = r\,W$ where Y = income stream
r = return rate on wealth

and wealth represented the capitalised value of an income stream. (This formed the basis of Friedman's permanent income hypothesis). The fact that WH was non-transferable and could only be sold from a seller's viewpoint (e.g. knowledge), precluded it by definition from the Marshallian concept, but because of its importance in the overall concept, Fisher challenged the restrictive definition.

[30] A. Marshall, op.cit., (7th. ed.), pp. 787-8.

In an appendix on the "Definition of Capital" Marshall enhances his argument by stating "we are seeking a definition that will keep realistic economics in touch with the market place."[31] In all, Marshall's market place restriction overcame all early (and logical) attempts to incorporate into "capital" that capital which becomes part of a person.

The incorporation of human capital into the concept of wealth, though logical in theory even in the immediate post-Classical years, was hindered so effectively that by the 1950's there was hardly such a subject as the economics of education and human resource development. The stranglehold of material capital was reinforced by the fact that during the industrialisation of the Western economies a sharp distinction between capital goods and raw labour power made more sense than it does under modern industrial conditions. Also the impact of Keynes' "General Theory" (1936) further entrenched its position, for he emphasised fixed capital investment as the key variable in the economic system and assumed a homogeneous labour force of a given quality.[32] Another obstacle in the path of the rise of human capital was that the treatment of human beings as capital, even if only conceptually, appeared offensive to many economists as being contrary to democratic political philosophy. The end result was that the overwhelming majority of economists, following Alfred Marshall, tended to use the concept as applicable only to that portion of the non-human, material, man-made stock of wealth which is utilised directly in further production.

Nevertheless, in spite of "majority opinion", the application of human capital in economics did not disappear from economic literature, and has, in the past decade especially, experienced a dramatic revival. In the forefront of the efforts in this direction stand the works of Theodore W. Schultz.[33] Although writings appeared on the concept, it

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[31] ibid., p.790.

[32] Although the Keynesian assumption was obviously for a short-run period, the subsequent conversion of this equilibrium model (albeit a short-run one) into the Harrod growth model, rendered a setback to the human capital concept.

[33] A fairly comprehensive list of his relevant and more important works is indicated in the bibliography.

is generally agreed that the "birth" of the concept of human capital can be dated to his Presidential Address to the 73rd. Annual General Meeting of the American Economic Association in December 1960. This, however, is erroneous to a certain degree and it is more closely aligned to a Rostowian "take-off" point in the development of the concept as maintained by Blaug.[34]

The revival of the concept of human capital, based on Fisherian terms,[35] has challenged the Marshallian view that human capital is a metaphor without substantive economic meaning. The modern view is couched in the belief that health and education are a form of investment in human beings, (besides having a purely consumption element). It is maintained that the acquisition of skills and capabilities form human capital which is an integral part of total capital, and that this human capital is the product of a deliberate investment (that is, a produced means of production), which has grown in Westernised societies at a noticeably faster rate than the conventional, non-human capital.[36] It appears then, that this modern concept is, in many respects very much akin to the Classical concept of human capital which existed prior to Marshall. The only major difference, however, was that the Classicists were not aware of the significance of their concept. Prior to as late a date as 1960 economists were generally unaware of the fact that widely different observed economic phenomena could be rendered intelligible by the idea of human capital formation. It was observations such as these[37] which led economists to embark on analyses of human capital formation in recent years. Whether or not the empirical results of these studies

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[34] See M. Blaug (ed.), Economics of Education, Vol. 1 (Great Britain, 1968), p.11.

[35] The basic tenets are that the absence of a capital market for human labour does not preclude an examination of the services of human investment "as if" they were capitalised.

[36] This claim is very subjective, as to date there is no really accurate measurement of human capital or its growth rate.

[37] The main problem was the large and gowing divergence between increases in income and increases in resources utilised in the production of that income, especially in economically advanced countries.

were strictly correct, the general trend is apparent as is the general interest of contemporary economists in the concept of human capital. The previous absence from popular economics of the notion of human resource development has been ascribed to a wide range of factors. The fact remains that although the Classicists attempted to use an unsophisticated approach to the concept in estimating the economic power of nations, calculating wealth, accounting for productivity increases and suchlike, no attempt was made by economists, until recently, to follow up and hybridise the concept, to evaluate it in money terms, or to employ it for any specific purpose. The modern relevance of the subject is based upon an analogy between technological improvements in material capital and qualitative improvements in human capital. The study of human resource development (and the notion of human capital and investment-in-self) has become so prevalent that it has led, in many ways, to a transformation of orthodox economics, which is acting as an inducement mechanism to the further development of the concept.

CHAPTER 2

ECONOMIC ASPECTS OF HUMAN CAPITAL

2.1. INVESTMENT FORMS AND HUMAN RESOURCES

2.1.1. Introduction

The recent emphasis in economic literature has been on developing and quantifying the concept of human capital and then analysing how such factors as investment in education and health facilities enhance human resource development.[1] The modern concept of human capital is basically a more sophisticated version of the Classical concept and is essentially manifest in the inherited and acquired abilities of producers and consumers.[2] Inherited abilities are those "given by nature" and can, for all intents and purposes, be regarded as constant. Any genetic drift affecting these abilities occurs so slowly as to be irrelevant in economic analysis. Also the distribution of such abilities can be assumed given and does not depend upon the state of development of an economy or country.

Acquired abilities, however, are different and it is through these that health and education are directly linked to human capital and human resource development. The formation and maintenance of such abilities are analogous in most regards to the formation and maintenance of reproducible tangible capital. The distribution and level of acquired abilities can be importantly altered over a time span relevant to economic analysis and historically they have altered in harmony with the economic development of an economy or country.[3]

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[1] Human resource development is the resultant of the elements of education and health economics, which comprise it.

[2] This statement of the concept takes no cognisance of the relatively minor, but nevertheless contributory, aspects of migration and population growth.

[3] This renders acquired abilities more important than inherited abilities in the economic analysis of the development process, for they can differ greatly between rich and poor nations (often solely dependent upon educational and health facilities), whereas inherited abilities show no such tendency.

The principal forms in which such abilities are usually attained are through direct investment in education and health. The analytical scaffolding upon which this postulate rests is that people enhance their capabilities as producers and consumers by investing in themselves. Acquired abilities that have an economic value usually entail identifiable costs and consequently each process that enhances the income-earning prospects of any person has the attributes of an investment. Modern theory supports the belief that education, in conjunction with health and other such resource developing factors, fulfils this investment function.

2.1.2. Education

That education is the road to greater human capital formation is the contemporary creed, but it is as yet not unequivocally proven. There is no adequate means at present of measuring the consequences of education and this often results in the imposition of educational systems which are not suited for optimum benefit under modern conditions. Thus although there is a battle being fought for the accumulation of human capital via an education process, too often this battle is being fought with the tactics of previous decades. At present the evaluation of education is a mere numbers game, with the quantities of money and children given, but with no apparatus to link the two together and evaluate the result. This is because it is easier to count children and money than such aspects as motivation, morale and knowledge.[4]

Although no highly accurate statistical verification exists to prove the importance of education, there is a common tendency to give the highest priorities to formal education systems and public health units in the accumulation and development of human resources. This has been further enhanced by the recognition of human resources as a substitute for natural resources on the margin, even though the principles

[4]This all-important question of measurement of the benefits of education, upon which the ultimate objective verification of modern human resource development depends, has stimulated many empirical attempts, especially in the U.S.A., at deriving an analytical formula which can be applied to the problem. Such aspects of measurement are included in a later chapter.

for developing and consuming this resource have not yet been precisely formulated. It is generally conceded that "Educated persons, working collectively, can extract a better living from a given environment than uneducated persons can."[5] The result has been that human capital has been sought to be accumulated by expanding the number of persons acquiring an education and by ensuring that the education received is relevant to the needs of society.

This emphasis of a need for education, however, represents a fundamental schism between the economic and social provision of education. The economist sees education as a means of resource development towards the accumulation of greater human capital. The sociologist (and associated disciplines) advocates education on moral grounds. The basis of the conflict thus stems from whether education should be viewed as an investment in human beings for its own sake.[6] The economist's arguments centre around the basic tenet that education, as an investment in human capital, must be orientated towards optimal productivity and material benefits which accrue both to the state and the individual. The moralists, however, believe this is the wrong reason and that human beings should be viewed as ends, not means. This conflict has resulted in the manipulation of Article 26 of the Universal Declaration of Human Rights (1948), which is a plea for more education, better facilities and greater finance,[7] to suit opposite objectives.

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[5] R.L. Meier, "Human Resources", Encyclopedia of Social Science, Vol. 12, p.141.

[6] The obvious solution would be that, if it is the people themselves that count, their talents must be conserved and enhanced via education. This would in effect reconcile the two approaches. This is not so simple, however, because although their ultimate aims may be reconciled by a common means (education), there tends to be further conflict over the form of education should take. In general, most economists support the view that a slender, tall, narrow-based education column is desirable as an educational system, as it is from secondary education that the greatest benefits are derived (though Vaizey has a contradictory opinion). The moralists, however, demand a broad-based, universal, education pyramid and this leads to a further dichotomy. The greatest relevance of this conflict is obviously to underdeveloped economics, where resources are generally such that they are inadequate to allow for investment in both universal and higher education facilities, and one choice is at the expense of the other.

[7] See Yearbook of the United Nations 1948-49 (New York, 1950), Article 26 of Universal Declaration of Human Rights, pp.536-37.

2.1.3. Health and Others

Education is commonly claimed to be the largest source of human capital in the form of acquired abilities, though there are other contributory sources. Other generally recognised forces are health, migration and knowledge of the labour market. Each of these enhances the value of human capital in its own way. The basic question of changes in the quality of people and its cause has aroused more than a pure academic curiosity and in the modern world it reflects certain desires in that action taken to improve quality is based on humanitarian motives as well as on its economic growth contribution.

The importance of health was not as prevalent in the writings of the Classical economists as was education and it is often claimed that it has only been brought to the forefront by the prestige enjoyed by education, to which it is associated. The basic assumption behind this association is that if it is economically beneficial for a country to invest in education, then surely one would expect the same for health.[8]

Health acts similarly to education in human resource development, because it renders such resources more effective. One method of investing in human capital is the improvement of emotional and physical health. Health is improved, and human resources developed, by increased facilities and expenditures which lead to a declining death rate, increased life expectancy, a better diet with improved stamina and strength, and better physical conditions under which a person lives and works. All of these have both a cost and a return, and are as such, investments in human capital.

As regards migration and knowledge of the labour market as activities creating human capital, the basic hypothesis is analogous to those of education and health. They entail costs and returns and thus have the attributes of an investment. Migration is an equilibrating force in a changing economy and creates human capital if it is assumed

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[8] This argument could easily be reversed and as convincingly expounded. The only condition that would then be derived is that 'people behave as they behave', and this argument therefore lays itself open to a charge of circularity of logic.

that it occurs in an appropriate direction.[9] Information about the market affects both sellers and labour, in the form of prices and wages respectively. Any betterment constitutes a return from an investment in information, which in Stigler's language can be referred to as a "search cost".

Both market information and migration are relatively insignificant aspects of investment in human capital when compared to education and health, but have been included to give the necessary comprehensive picture of the concept and to provide some form of measuring rod against which the importance of the other aspects can be guaged.

2.1.4. Conclusion

Altogether it can be seen that there is a close and direct connection between the forms of investment, human resource development and human capital. Education and health, in their many different facets, are a means whereby human resources are developed and improved, and the economics of education and health is the study of this development. Any improvement in human resources results, ceteris paribus, in a direct increase in the stock of human capital. Thus there exists a constellation comprised of these forces, with a direct causal-effect relationship between them. Any change in one variable will, via the circulatory process, affect the others. In this way education and health, being the factors most susceptible to manipulation by man, are taken as the key to human capital, for through them human abilities can be directly influenced.

2.2. CONSUMPTION OR INVESTMENT

The whole economic analysis of education and health and their role in human capital formation is based upon the seemingly controversial division of these into investment and consumption components. The modern belief is that they entail the attributes of an investment

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[9] T.W. Schultz bases his inclusion of migration in human capital on the fact that analytically a misplaced resource is equivalent to a less productive resource properly located.

in that they lead directly to human resource development, but that it is difficult to delineate which parts are in fact investment and which are consumption. This arises because education and health, like the other contributory elements to human capital, have the facility of providing both sumptuary satisfaction and a produced means of production.

In the era of material-orientated capital, education and health were considered consumption goods - social services which were provided without being subjected to any analysis under criteria relevant to investments. Contemporary economic thought, however, has singled out expenditure on human resources for special consideration, as it is adjudged crucial expenditure, with education being perhaps the most vital social investment of all.

Previously communities only 'spent' on social services that which they could afford and education and health expenditure was in some sense a residual left over after allowing for other expenditures. This approach was the result of an inherent belief that one can "invest" in physical capital, but only "spend" on health and education. When, however, these were seen as investments, they sanctioned much larger outlays, for an investment has a return and both health and education, like most other investments, were considered to pay for themselves in the long run. This new outlook necessitated a reformation of entrenched ideas on social expenditure and as Galbraith states on education expenditure, "The system was adequate, even admissible, so long as education was a socially provided service designed to insure ... rough equality of opportunity. It has ceased to be efficient as education has become a form of investment."[10] This change in attitude has rendered physical capital investment no longer the prime measure of progress, it has, in fact, become an obsolescent one due to the shift in recent years in the comparative importance of man and machine.

The less modern tendency was, therefore, to regard education as an end in itself and no importance was attached to its relevance to

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[10] J.K. Galbraith, The Liberal Hour (London, 1963), p.44.

the human capital concept.[11] Only recently have economists become aware of the economic effects of social expenditure on productivity and human capital. The result has been that no longer are education and health treated as a pure welfare expenditure, for which funds are grudgingly spared. It has become fashionable to compute measures of the "rate of return" on "investments" in health and education.[12]

The emphasis of importance attributed to such forms of expenditure as pure investment varies. Some economists regard them mainly as investments, while others hold the directly opposte view and as Vaizey has said on education, "most education is clearly an aspect of consumption ... yet ... can also be regarded, by analogy, as investment."[13]

As consumption expenditure, education and health relate to both the private and public sectors. Private individuals value them in themselves and spend on them for immediate satisfaction and benefit. Similarly the state spends income on them in the form of public welfare facilities. Such expenditures have a long standing bias in that they are treated wholly as consumption, because they in no way enhance the abilities of people as producers and consumers. This is indicated by the fact that "most of the notions for attaining an optimum rate of economic growth in poor countries are seriously biased because of their strong emphasis on investment in new steel mills ... with no comparable emphasis on provision for the complementary investment in human agents..."[14]

Education and health as investments have been seriously handicapped by such factors as length of time horizon, and the fact that returns are

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[11] As already mentioned this could be accounted for to some extent by the fact that human resources was regarded as a cant phrase with unpleasant overtones, which were contrary to contemporary democratic political philosophy.

[12] These measures, however, are generally based on inadequate theories, due to the unmeasurable aspects of many facets of both the investment and the return.

[13] J. Vaizey, The Control of Education (London, 1963), p.37.

[14] T.W. Schultz, "Human Capital", Encyclopaedia of Social Science, Vol.2, p.282.

both direct and indirect.[15] It can, however, be theoretically called an investment in that not all economic capabilities are inherent and many are developed via activities that have the attributes of an investment. Thus education, health and other human resource factors are investments by analogy to investments of material capital. All these require costs and people invest in themselves or their children, or the state does it for them, quite consciously and deliberately.

It can be concluded that social outlays, on such factors as health and education, contribute to both consumption and investment, resulting in both direct public and personal satisfaction and in future increases of reproducible output respectively. It is difficult to classify social expenditures as one or the other and as van den Haag has stated,"it is almost impossible to draw a line between the less tangible investment aspects and the consumption aspects of education."[16] Expenditure thus has to be regarded simultaneously as consumption and investment expenditure, and any effort to disentangle the two aspects may be completely futile. Although intellectually it makes little difference which it is, economically it is of vital importance, for the future promulgation of education and health depends on the determination of their relative importance to the economy. In practice no comprehensive study of such expenditures has revealed a simple way of determining what constitutes investment and what constitutes consumption, apart from the fact that both are inherently incorporated.

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[15] This has resulted in a reluctance to invest because of the length of time which elapses before returns accrue, which lessens knowledge of the investment period, and additionally, returns do not accrue solely to the person or body making the investment.

[16] E. van den Haag, Education as an Industry (New York, 1956), p.18

CHAPTER 3

ECONOMIC ANALYSIS OF HUMAN CAPITAL

The previous chapter dealt with the economic aspects of human capital. This chapter is centred around a general analysis of the investment components of human resource development. Such a general analysis, in economic terms, is a pre-requisite to the more specific analysis which follows in later chapters.

3.1. INVESTMENTS IN HUMAN CAPITAL

3.1.1. The Economics of Education

The economics of education is faced with a two-way problem manifest in the close relationship between such disparate sciences as pedagogy and economics. Yet it is clear that education has an economic aspect and can be analysed within the framework of economic theory.

The topic of the economics of education can be classified into an analysis of the economic value of education and an analysis of the economic aspects of education systems. Emphasis will be given largely to the former, but this is in no way meant to detract from the value of the latter. The motivation behind the virtual exclusion of education systems is that they are subsequential to the acceptance of the conviction that education is a desirable economic force. There appears to be a marked tendency among some economists to assume education is economically, apart from socially, justifiable and then to analyse which system is most beneficial. The essential problem is not so much which alternative system is preferable, but whether education is actually economically justifiable in itself.[1]

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[1] This implies that a tailor-made education system can only be implanted for optimal benefit once it has been ascertained exactly how, if at all, education encourages, or hinders, economic growth and development.

The education process[2] is a form of investment in human capital, producing a more economically valuable human being. In the broadest sense of the definition, education can be taken to consist of the formal, informal and self-educating facets. The first aspect includes primary and secondary school and institutions of higher learning. Informal education incorporates on-the-job training, adult education programmes, and political, social, religious and cultural groups. Self-education is essentially an informal process which overlaps to some extent with the latter aspect above.[3]

The process of education can be analysed as a system of flows, beginning as a very broad flow (at the general and lower level) and resulting in an increasing number of smaller flows at a specialised level. Thus it can be generalised that the education process undergone by human resources in any economy consists of a general stage followed by a more specific stage.

Also it can be classified into qualitative and quantitative aspects; the former being the methods of education and the latter being the totals (or aggregates) of factors engaged in the concept, (for example, funds invested or students). As mentioned earlier, emphasis will be given only to the quantitative aspect, though not to the deprecation of the importance of the latter,[4] for it is a well-established fact that "empirical results lend support to the hypothesis that education can be considered as a factor of production and that differences in school systems can affect the productivity of schooling."[5]

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[2]Education being defined as "the learning of socially approved behaviour". E. van den Haag, op.cit., p.1.

[3]This classification is adapted from F. Harbison and C. Myers, Education, Manpower and Economic Growth (New York, 1964), p.2. Though this classification was the most comprehensive encountered, it made no specific reference to retraining and refresher programmes and it is doubtful, in the writer's opinion, whether such can merely be assumed as part of on-the-job training.

[4]For an insight to the effect of the quality component in education, see Appendix II.

[5]F. Welch, "Measurement of the Quality of Schooling", American Economic Review, Vol. 56, (1966), p.391.

Education, as an economic activity affects both the distribution of knowledge and the stock of knowledge, and in this way affects human capital. The main element in any education system is the physical unit known as a "school". In economic analysis this is defined as "an institution specialising in the production of training, as distinct from a firm that offers training in conjunction with the production of goods."[6] This formal education and training imparted by the school creates human capital by adding to the economic value of a human being and the cost may be considered an investment in human resources.

3.1.1.1. Education as an Industry

Along such lines the activities of education can be regarded very much akin to an industry, for it absorbs inputs, both material and human, and creates a final product in the form of trained and educated people. It is questionable whether such traditional apparatus as the theory of the firm is applicable to education, but the general similarity between education and more conventional industry renders it useful and feasible to evaluate education in such terms. The economy of any country requires a spectrum of skills, all of which are developed by education either in its formal or informal state. The links between education and the supply of skills are very close, though it is questionable if this can be uniquely determined by technical considerations.

As an industry, education competes with all other activities for resources. The most noticeable field of competition is for skilled manpower, for "the scarcest resource used in the greatest quantity in education is ability."[7] Besides competing for such resources, where education is publicly financed it has to compete directly with other social services for expenditure. In external fields it would appear as if education is in a very similar position to other industries and that

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[6] G.S. Becker, "Investment in Human Capital : A Theoretical Analysis", Journal of Political Economy, Vol. 70 (1962), p.25.

[7] J. Vaizey, The Economics of Education (London, 1962), p.108.

it is justifiable in referring to it as such.

As concerns the internal operations of the education industry, it also has some common features, though it has some which are peculiar to itself. In general, like other industries, it is planned to operate at optimum efficiency with the binary objective of attaining a higher level of education and producing the educative means to further goals.[8] The operations to attain such objectives can best be shown in the following manner.[9]

In figure 1[10] output is measured in terms of numbers of students reaching the required academic level and is indicated on the ordinate; inputs of the variable factor of production (the intake of students) are measured on the abscissa. The amount of factors such as classrooms, teachers and so on is taken to be fixed, though it is necessary to realise that this fixed factor could become a bottleneck in practice.

The curve of total returns Q_1 can be expected to assume the shape of a normal growth curve, as indicated in the diagram. This means that the number of students "turned out" by the school as a productive unit can be expected to increase at an increasing rate, as the intake of pupils rises, up to the point M. This is the point of diminishing marginal returns, beyond which returns rise at a decreasing rate, becoming zero at point T.

The marginal returns to the fixed factor are actually negative up to point A, that is, with a relatively small number of students the number of classrooms with trained teachers is too large and cannot be efficiently utilised. Beyond point T the marginal returns to an additional intake of students are negative. In other words, classrooms become over-crowded and the student-teacher ratio so high that the

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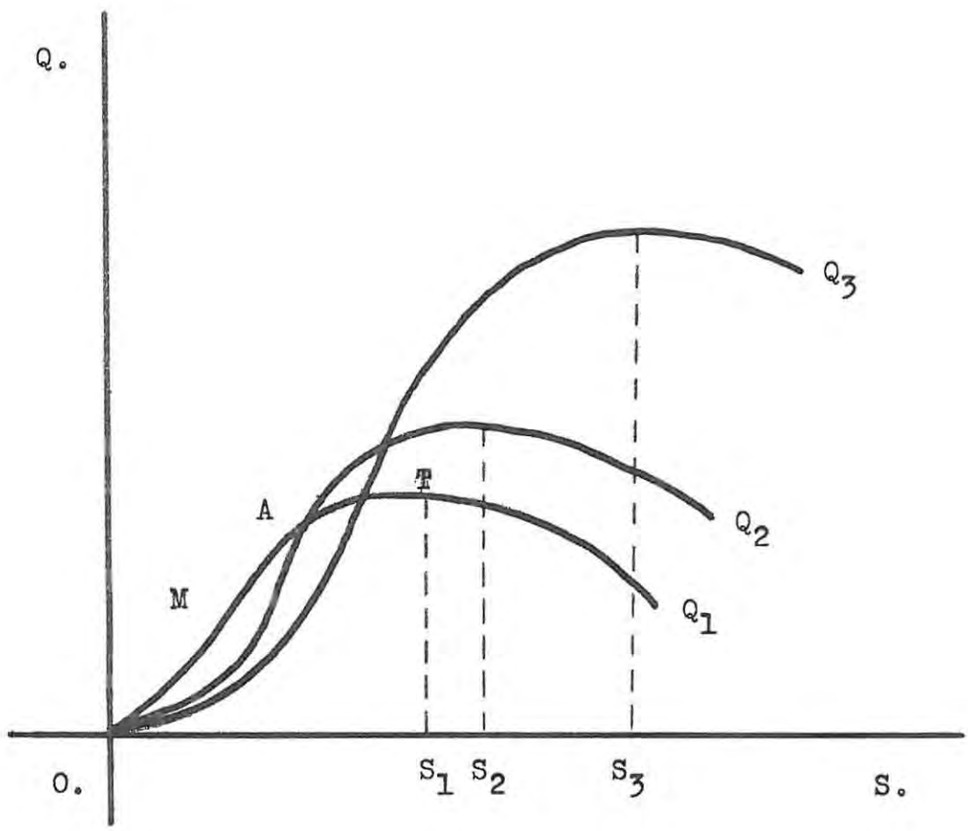
[8] The following analysis of education as an industry is largely taken from B. Higgins, Economic Development. Principles, Problems and Policies (London, 1968), pp. 437-442.

[9] Such an explanation overlooks any objections which may arise out of moral views which maintain human beings should not be subjected to the indignity of mathematical analysis.

[10] See B. Higgins, op.cit., p.437.

FIGURE ONE



S = intake of students
Q = output of students
$Q_1 \ldots 3$ = total product curve

EDUCATION AS AN INDUSTRY

overall number of students qualifying falls.

The efficient operation of the education system thus requires, with a given stock of educational capital, that the number of students admitted be between points A and T.

Changes in the stock of educational capital (that is, teachers, classrooms and suchlike), or the different levels of education such as primary, secondary and higher,[11] can be indicated by curves Q_1, Q_2, and Q_3. This means that with the stock limited to Q_1, only S_1 students can be admitted at the maximum. As the stock increases the curve shifts to Q_2 and then Q_3, increasing the number of pupils that can be absorbed to S_2 and S_3 respectively.

As applied to different levels of education, assuming the school-going population is divided equally amongst the different levels and is represented by S_3 in each category, then there is universal primary education, about half the current supply in secondary school and only a small fraction at university. In Figure 1 it would be wasteful to admit more than S_1 students with the stock of "capital" limited to Q_1, but this does not necessarily mean that this number should always be admitted. Though the optimal intake is between points A and T, the exact intake will depend upon the relative costs of providing the fixed factors and of the human inputs.

In this case an analysis of the school as an industry would have to be done in terms of the minimum cost combination applicable to the particular production function of the educational productive unit.[12] In Figure 2[13] the input of students is shown on the horizontal axis and the stock of capital, in the form of teachers and classrooms, on the

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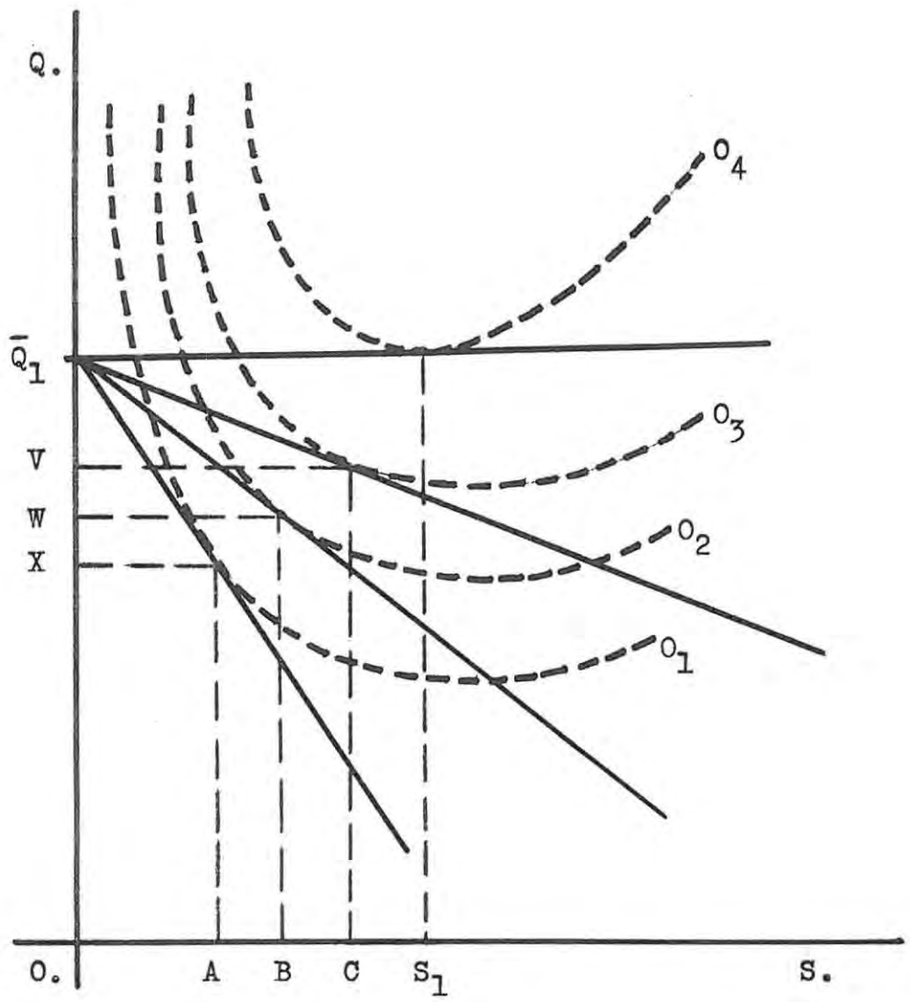
[11] Obviously the fixed factor is much scarcer for higher education than for secondary and scarcer for secondary than primary. Thus higher education total returns are shown by Q_1, secondary by Q_2, and primary by Q_3.

[12] See B. Higgins, op.cit., pp. 439-442 for an analysis of the optimal intake of students. See also E. Schneider, Pricing and Equilibrium (London, 1969), pp. 158-171 on the theory of continuously substitutable factors in production functions and the application of least cost combinations.

[13] Adapted from B. Higgins, op.cit.

FIGURE TWO



S = intake of students

Q = stock of capital

$O_1 \ldots O_4$ = output of students

INTAKE OF STUDENTS

vertical. Isoquants O_1 to O_4 show different levels of output attained by different combinations of input.

Assuming a given budget (in terms of the value of product forgone), the budget restraint line can be determined, knowing the relative prices of the inputs. The cost of educational capital is the direct cost of building classrooms and supplying teachers. The cost of input of students is their marginal product in employment.[14] With the expenditure of any particular amount on schooling, the optimal intake of students and provision of education facilities will be where the isocost line is tangential to the isoquant of greatest value. This means that for any given budget the least cost combination will determine the greatest output of qualified students, and by increasing the budget a supply curve can be constructed, indicating the optimal positions for different levels of output.

The analysis can be developed further by considering the different costs of the student input to primary, secondary and higher education. The increasing opportunity costs would mean a different budget line for each level of education. In the case of primary school, where the opportunity cost is relatively low, the budget line would have a less steep gradient than those of secondary school and university. The result would be that for the same budget, different combinations of input would be used and different levels of output attained. It would be feasible, therefore, to have an intake of S_1 students only where the cost of the student input is zero. Where there are positive costs, the intake will be less than the maximum.[15] In primary school the intake would be OC; in secondary OB; and in higher education OA (each with a corresponding level of "capital", OV, OW and OX respectively).

From a policy point of view, this analysis has important conclusions. It can be seen that the effect of a given budget is different

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[14] The opportunity cost is likely to be greater the higher the level of education considered, and the more traditional the society. In other words, university students have a higher opportunity cost than primary school pupils, and primary school pupils in a subsistence sector have a higher cost than those in an advanced sector.

[15] This would mean an intake between the points A and T on the respective total product curve.

according to the level of education to which it is applied. Also to reach a given output of qualified students would entail increasing costs[16] as the level of education rises.

From the above it can be seen that conventional analysis can be applied to education inputs and outputs. Schools can be regarded as productive units in a sense and an economic analysis of their optimal situation undertaken. There are, however, peculiarities attached to education as an industry. These are that the outputs are never sold, though the inputs are obtained at a cost; the production cycle is relatively long as education has a long time horizon; and it is questionable whether the maximisation of the rate of return would be adhered to, that is, whether other social objectives can be abstracted from. As an industry it is difficult to quantify just how efficient education is and how effectively it promotes resource allocation, but one important conclusion from this analysis is that it helps destroy the classical concept of homegeneity of labour, in that those students who do not enter the industry are considered relatively uneducated and less valuable, in terms of human capital, than those who are processed by education as an industry.

3.1.1.2. Education and Earnings

Gary Becker[17] supports the view that schools act as productive units and result in more valuable human agents. He believes the result is manifest in the final product and the difference between what could have, and what is, earned by pupils.[18] He postulates that net earnings are the differential between actual earnings and direct school costs, In symbols,

$$W = MP - k \qquad \ldots . \quad (1)$$

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[16] Such costs are those to the community as a whole in the form of national income sacrificed.

[17] G. Becker, "Investment in Human Capital : A Theoretical Analysis", op.cit., pp. 25-26.

[18] These relations are similar to those which will be derived for the human capital aspects of on-the-job training.

where MP = actual marginal product assumed equal to earnings

W = net earnings

k = direct costs of schooling

and MP $>$ k.

If the marginal product that could have been earned is MPo, then this can be re-written as,

$$W = MPo - (MPo - MP + k)$$

$$= MPo - C \quad \ldots\ldots (2)$$

where C = the sum of direct and forgone costs

and where net earnings = the difference between potential earnings and total costs.

Altogether the analysis of education as an industry shows that the economics of education, as applied to formal education, is a feasible and useful study. It indicates the process whereby investment is made in human resources, the optimal number of people entering schools and the effects of human capital formation via education.

3.1.2. On-the-Job Training

There is a prominent tendency amongst contemporary writers to treat on-the-job training separately from formal education. As it is considered the most important aspect of informal education, it is necessary to elucidate the specific functions incorporated within such training. As one economist has stated, "In the context of the economist's concern with education as a process of investment in manpower, it is important to be reminded that formal education is neither an exclusive nor a sufficient method of training the labour force."[19] In fact, all forms of formal education can be considered as a preparatory stage for informal training, which itself can be sub-divided into a formal and informal aspect, in the guise of organised programmes and "learning from experience" respectively.

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[19] J. Mincer, "On the-Job Training : Costs, Returns and Some Implications", Journal of Political Economy, Vol. 70 (1962), p. 50.

The basic tenet behind the human capital aspects of on-the-job training is that many workers increase their productivity by learning new skills on the job. Theories of the firm invariably ignored the effect of the productive process itself on the worker, but this has lately been recognised and attempts have been made to formally incorporate it in economic analysis and work out its implications.[20]

Theoretically on-the-job training can be defined as "a process that raises future productivity and differs from school training in that an investment is made on the job rather than in an institution that specialises in teaching."[21] Such training results in an increase in the future marginal product of the workers and Becker believes it can be classified into two types.[22] Specific training enhances the productivity of the worker in the firm providing it and general training enhances the marginal product in many other firms as well.

If all training was of the former type, the wage a person received would be independent of his training. Rational firms pay a generally trained employee the same wage and a specific trained employee a higher wage than he could get elsewhere. This is because the latter has to be induced to accept non-marketable training.[23] It can be deduced that specific on-the-job training results in a more stable labour force as both the firm and the employee want to derive the return on the investment.

Generally it can be concluded that on-the-job training is a form of investment in human capital just like formal school instruction.

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[20] In the forefront here stand the works of Gary S. Becker and Jacob Mincer, who carried out theoretical and empirical studies of the topic. See G.S. Becker, op.cit., and J. Mincer, op.cit., for detailed analyses.

[21] ibid., p. 11.

[22] See G.S. Becker, op.cit., pp. 12-25 for a comprehensive discussion and analysis of these two types.

[23] In this case the human capital is limited in its applicability, and shows how on-the-job training is a more specialised process than preparatory schooling. Although the firm may initially pay a higher wage to a specific trained employee, it could later pay a relatively lower wage due to the restrictions on the mobility of such labour, imposed on it by the form of training undergone.

To some extent the two are substitutable, but neither is sufficient, with both being necessary facets of training in the form of a preparatory and a more specialised process. Within the field of on-the-job training itself, the most advantageous type is specific training which has the effect of reducing labour mobility and migration and of securing the higher wages in the short run.

The effects of on-the-job training can be analytically represented as follows.[24] Assuming perfect competition a firm would be in equilibrium, maximising profits or minimising losses where marginal receipts equalled marginal expenditures. On-the-job training alters these equilibrium conditions by lowering current receipts and raising expenditures.[25] Yet firms would profitably provide training if future receipts were sufficiently raised (or future expenses sufficiently lowered).[26]

The firm would be in equilibrium where the present values of receipts and expenditures were equal. This is given by :-

$$\sum_{t=o}^{n-1} \frac{Rt}{(1+i)^{t+1}} = \sum_{t=o}^{n-1} \frac{Et}{(1+i)^{t-1}}$$

where Et, Rt = expenditure and receipts in period t

i = market discount rate

n = number of periods.

This illustrates the basic principle behind on-the-job training and applies to the individual as well as the firm. Becker modifies this by taking into account training only in the initial period and the loss of productivity during training (which is the opportunity cost of the

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[24] Adapted from G.S. Becker, op.cit., pp. 11-12.

[25] This is because it implies "costs" in the form of the value of time and effort of trainers, the "teaching" provided by others and equipment and materials used.

[26] This is, then, a Cost-Benefit appraisal approach.

training). He arrives at :-

$$MP_o^1 + G = W_o + C$$

where MP_o^1 = what could have been produced

C = sum of opportunity cost and outlays on training

W_o = wage earned

G = excess of future receipts over future outlays.

Here G is a measure of the return to the firm from the provision of training. The difference between C and G measures the differential between the cost of and return to the training.

It can be seen that this general analysis of on-the-job training has wide applicability in an economy and that this form of investment, like formal education, is an important contributor to investment in and the accumulation of human capital. Yet these are not the only methods of investment in human resources. Another important aspect in this connection is investment in health.

3.1.3. Health Economics

Health can be regarded as a subsidiary human resource component, which is the principal complement to education in human capital formation. Though it is not of as great importance as education, investments in health have a noticeable impact upon the quality of human factors of production. This has led to studies by economists such as Mushkin[27], Klarman,[28] and Weisbrod[29] amongst others, all of whom view it as investment in human capital.

The theory of health as an investment is couched in the same terms as that of education as an investment, and like education, health has not only an investment component, but also provides sumptuary satisfaction in the form of consumption.

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[27] S.J. Mushkin, "Health as an Investment", Journal of Political Economy, Vol. 70 (1962).

[28] H.E. Klarman, The Economics of Health (New York, 1965)

[29] B.A. Weisbrod, Economics of Public Health. Measuring the Economic Impact of Diseases (Philadelphia, 1961), and "Investing in Human Capital", Journal of Human Resources, (1966).

Health patently includes more than health services and related commodities in their provision,[30] and the general result is to improve the physical conditions under which a person lives. The effect of such improvements not only increases the real population, but also renders the actual population more effective. This double result has been analytically shown as follows.[31]

$$p^1 = H\frac{dp^1}{dL} \qquad \ldots\ldots (1)$$

where p^1 = extra effective, but not necessarily real,[32] population

$\frac{dp^1}{dL}$ = extra effective population co-efficient

H = a small health expenditure.

$$p = H\frac{dp}{dL} \qquad \ldots\ldots (2)$$

where p = real population.

Human capital formation can be seen to rest, to a large extent, on the twin notions that people improve as productive agents by investing both in education and health, and that such outlays may yield a continuing return in the future. On the complementarity of these forces, one of the best known economic writers in this respect has stated that "Health and Education are joint investments made in the same individual ... and often the return on the investment in health is attributed to education."[33] This could account for the fact that education is accorded more importance than health in human resource development theory. The confusion arises in attempting to separate the two. Education increases productivity and this renders more valuable the return on a lifesaving investment in health; and health has the effect of lengthening life

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[30] It is generally taken to include food, housing, clothing and recreation.

[31] Adapted from S. Enke, Economics for Development (London, 1964), p. 404.

[32] Where "real" population is the number of people.

[33] S. Mushkin, "Health as an Investment", Journal of Political Economy, Vol. 70 (1962), p. 130.

expectancy, which reduces the rate of depreciation on educational investments and increases their return. Thus a complete separation is impossible, as the same returns accrue partly to both.

The similarities between health and education are many; for example, a common division in costs (public and private) and in returns (individual and social). There are, however, important differences, which include the fact that health increases the numbers in the labour force as well as their quality, whereas education affects only quality. Also, though both have conceptual and practical problems in measurement, the fundamental approaches to quantification are diverse. Health is superior to education in one respect. All investments in human capital have the attribute of steepening the age-earnings profile by lowering earnings during the investment period and raising them later. Yet an expenditure on health improvement tends to have a more immediate impact on productivity and is preferable in some cases to the delayed impact of education investments.

Altogether it can be seen that one way to invest in human capital is the improvement of emotional and physical health via declining death rates, better diets, stamina and strength improvement, and better working conditions. Yet earnings are more closely geared to knowledge than health in Western countries and this detracts from the importance of health investments to some extent, though they still have a significant influence on income.

3.1.4. Migration and Market Information

As regards migration as a human capital creating activity, the basic hypothesis is that migration is an equilibriating force in a changing economy, if it is assumed that it occurs in the appropriate direction. This means that the value of a human resource is enhanced if it moves to a more suitable location and a misplaced resource can add to human capital and productivity if it becomes properly located. Migration is regarded as an investment by analogy, for it entails both a cost and a return, though the measurement of these suffers the same

difficulties as witnessed in a cost-benefit appraisal of education and health.

In general, migration is a method of resource re-allocation.[34] It is a means of promoting efficient resource allocation, but is an activity which requires resources. It is a response to spatial earning differentials and a search for opportunities in higher-paying occupations. The costs involve both direct money costs and non-monetary costs, in the form of opportunity costs (these being a function of distance and time). Returns are in similar form, both monetary and non-monetary.

It is along these lines that migration is considered in an investment context with regard to human capital. Another important aspect is the effect migration has on the stock of human capital in an economy. Here net, rather than total, migration is of relevance and then only where resources cross national boundaries. The theoretical framework is that human resources carry with them significant amounts of human capital and a net inflow or outflow can be beneficial or prejudicial to the economy as a whole.

The overall effect of migration is that the proper location of a human resource enhances its human capital value thus adding to the total stock of such capital, which may be further added to or depleted by immigration and emigration respectively.[35]

Information of the labour market is treated as an investment in a similar vein to migration. It has a cost component and is an income creating activity, thus falling within the confines of the concept of human capital. Complete knowledge of the labour market by either buyers or sellers, in the form of wages and prices respectively, is generally a myth and is very infrequently the case. There are, however, costs attached to the efforts of a worker searching for information

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[34] See L.A. Sjasstad, "The Costs and Returns of Human Migration", Journal of Political Economy, Vol. 70 (1962), pp. 80-93.

[35] This point leads directly to the related topic of the "Brain Drain". For a general summary of the economics of the brain drain see Appendix III.

about any specific factor, such as wage offers. A better job may be found by advertising, geographical movement and such activities. These expenses constitute an investment which yields a higher earnings return and may be considered "a search cost" in Stigler's language.[36]

As with other investments in human capital, it is assumed that such costs will be borne until they are equated with the expected marginal return. On the other side of the coin, gains are purely the reward for successful search.

Altogether, both market information and migration are usually relatively insignificant aspects of investment in human capital when compared to education and health. They are regarded as investments merely by analogy to the material capital investment process in that, "The information a man possesses on the labour market is capital; it was produced at the cost of search and it yields a higher wage rate than on average would be received in its absence."[37]

3.1.5. Conclusion

In conclusion it is apparent that a group of activities work in conjunction to effect an improvement in overall human capabilities. All are regarded as investments in human capital and as such contribute towards human resource development and to the total stock of human capital. It is, however, also apparent that some of these activities are more significant than others and education can be singled out as the key force amongst them and that the economics of education is the most applicable apparatus whereby human resource development can be motivated.

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[36] See G. Stigler, "Information in the Labour Market", Journal of Political Economy, Vol. 70 (1962), pp. 94-105.

[37] ibid., p. 103.

3.2. INVESTMENT, HUMAN CAPITAL AND EARNINGS

It has been shown that expenditures on human resources have both a consumption and investment component and that in the case of education there is a strong resemblance to the functioning of a firm. It is, however, a matter of some importance in respect of the concept of human capital to know the connection between investment, human capital and earnings. Some mention has already been made of the effect investments in human capital have on the future earning potential of human resources.[38]

Any society has to face the choice between investing in more health and education or in other sectors of the economy.[39] On the face of it such a choice would appear relatively easy in economic analysis, but it is made more difficult in that social expenditures have both a consumption and an investment component. The problem can be concentrated on the determination of an optimal time path of such investments, taking into account both their "capital good" and "consumption good" components.

In Figure 3[40] investment in education in the current year is measured on the abscissa and related gross national product (G.N.P.) on the ordinate. It is a well-known fact that the impact of education (or of health) on production in any one year is limited. A point is reached where the devotion of more resources to education gives a net reduction, that is, negative marginal returns (as opposed to diminishing marginal returns). This results in a fall in the G.N.P. curve as investment is increased. The full impact of an investment in education is, however, only felt after a relatively extensive time lag.[41] This can be shown analytically on the diagram. An investment increase in education in

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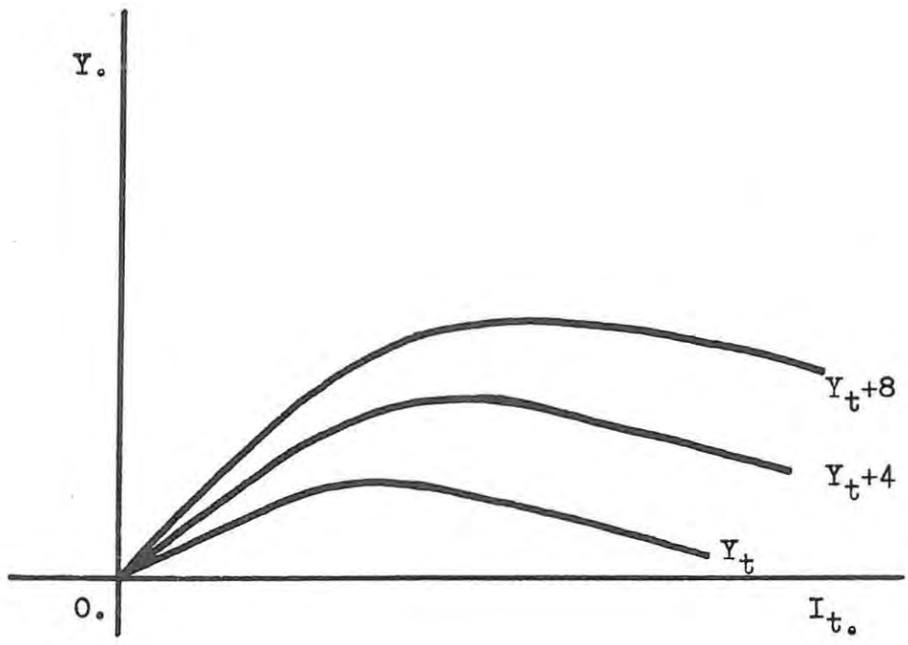
[38] This chapter is an attempt to indicate the general connections between the three concepts, prior to a detailed analysis of costs and benefits in the next chapter.

[39] Such a choice is the essence of the science of economics and is the resultant of scarce means and alternative ends.

[40] Adapted from B. Higgins, op.cit., p.443.

[41] This is a direct consequence of the long time horizon and productivity cycle inherent in the education industry. It does not have such a delayed impact in the case of health investments.

FIGURE THREE



I_t = current investment in education

Y = related national income

EDUCATION AND INCOME

time period T will raise the G.N.P. more in four years than in one, and again, more in eight years than in four. The point of diminishing returns will be reached at higher and higher figures as future time is taken into account. Yet, theoretically, diminishing returns must eventually be reached and the inclusion of this phenomenon renders a quantitative analysis of investment in education a relatively complex affair.

Economists who have analysed the relationship between earnings, investment and human capital include Becker,[42] Chiswick,[43] Mincer,[44], Miller[45] and many others. These studies have been represented in many different analytical forms, but they all contain common essential elements and a representative classification is as follows.[46]

It is assumed total earnings after an education is complete equal the returns of the investment plus earnings derived from original capital (inherent abilities). If it is assumed they are constant for an indefinitely long period, then

$$Ei = Xi + \sum_{j=1}^{m} r_{ij} \quad C_{ij} \qquad \ldots\ldots (1)^{47}$$

where Ei = total earnings

Cij = amount spent by i^{th} person on j^{th} investment

rij = rate of return on investment

Xi = effects of original capital

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[42] See G.S. Becker, "Investment in Human Capital : A Theoretical Analysis", op.cit.

[43] See B. Chiswick and G.S. Becker, "Education and the Distribution of Earnings", American Economic Review, Vol. 56 (1966).

[44] See J. Mincer, "Investment in Human Capital and Income Distribution", Journal of Political Economy, Vol. 66 (1958).

[45] See A.P. Miller, "Annual and Lifetime Income in Relation to Education 1939-59", American Economic Review, Vol. 50 (1960).

[46] Adapted from G.S. Becker and B.R. Chiswick, op.cit., pp. 1-12.

[47] This applies only to monetary earnings, which form a dominant part of total income. It could be extended to include non-monetary earnings, but this would render it almost invalid due to the immeasurability of such earnings.

Using the two concepts described above, an amalgam of investment and earnings can be indicated, assuming investment decisions result from the rational behaviour of welfare maximisation.[48]

In Figure 4[49] the curve designated D is an individuals marginal rate of return, and S is the marginal "interest" cost. Equilibrium will be at point P, where the total amount invested will be OC, giving a gross income of O.D.P.C.[50] Then considering the distribution of curves and earnings it is seen that curve S depends upon the factors of income and wealth of parents; willingness to forego consumption; and availability of scholarships and loans. Such factors can obviously vary from person to person, thus the supply of funds can vary between S, Si and Sj in the diagram.

The demand curve, D, if it was the same for all, would give equilibrium points at P, Pi and Pj. Then the distribution of earnings would be dependent on the distribution of the supply curves, their shape, and the shape of D itself. More usually, however, the demand for funds would also vary, due to differences in ability, attitudes towards risk and other personal characteristics, giving curves Dk, D and Dl. The result would be numerous equilibrium positions at the various intersections of the relevant curves, thus affecting the income distribution according to each individual's (or country's) particular curves.

This analysis indicates inequalities of opportunity. These can be overcome by offsetting low parental wealth and income by other factors so as to attain a common S-curve for all (for example, by making education a free good). This, however, would not imply equality of investment, but merely equal opportunity to invest as the actual amount depends upon personal characteristics, which are inherently different.

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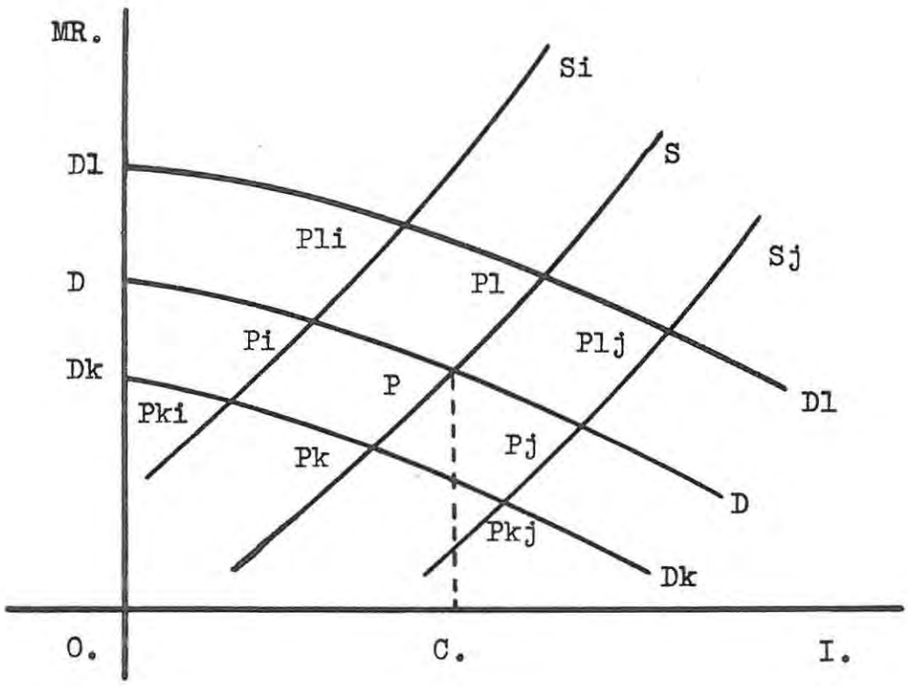
[48] Adapted from G.S. Becker and B.R. Chiswick, op.cit.

[49] See G.S. Becker and B.R. Chiswick, op.cit., p.359.

[50] This analysis is as applicable to individual investment and income as it is to national aggregates.

FIGURE FOUR



MR = marginal rate of return

I = amount invested

S = supply of funds

D = demand for funds

INVESTMENT, EDUCATION AND INCOME

The contribution of human capital to the distribution of earnings could be empirically calculated if the rates of investment in equation (1) were known. Such information is, however, lacking in both quantity and quality and this has reduced the scope of such analysis to a comparatively theoretical level only. Yet the concept of human capital and investment in human resources appears to resolve many otherwise puzzling observed phenomena in the field of earnings.

It explains differences in the earnings between persons, areas and periods, and the evident connection between ability and earnings. It explains why age-earning profiles tend to be steeper amongst skilled people and renders intelligible secular increases in average earnings.

As concerns earning differences between persons in given and in different areas and time periods, these are often believed to result from differences in physical capital, technological know-how and such like. Yet it is evident that human capital has an important effect on these observed earnings as they tend to be net of investment costs and gross of investment returns. Conventional ability tests do not reliably measure the talents required to succeed in the economic sphere and many economists believe the real measure is the earnings accruing to economic talent.[51] Becker[52] does an analysis on ability and earnings based on the hypothesis that

$$Y = X + rC$$

where Y = total earnings

C = total investment costs

r = average rate of return

X = earnings with no investment in human capital.

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[51] This has its limitations in that it does not distinguish between different human capital components and we are concerned with separating natural ability from acquired ability, that is, isolating the effects of education and health for example.

[52] G.S. Becker, "Investment in Human Capital : A Theoretical Analysis", op.cit.

This implies that earnings, which are gross of the return on human capital are affected by the amount of, and rate of return on, such investments. He deduces that with equal amounts of investment in the human capital of two persons, the one who earns more demonstrates greater economic talent.[53] Also if the distribution of X is ignored, Y would depend only on r if C is held constant, thus ability would be measured by the average rate of return on human capital. Other conclusions are that if ability was symmetrical, so would be earnings;[54] that the amount invested is a function of the expected rate of return; and that abler persons would invest more than others, resulting in a strong correlation between ability, investment and earnings.[55]

As regards the age-earnings profiles, human capital has an important effect. As mentioned, such profiles tend to be steeper in the case of people who invest-in-self. This is because initially earnings are low, but increase rapidly after the investment period. In terms of education investments this can be summarised as follows. "Since training costs would be deducted from earnings during the training period, the economic 'value' of a trainee would at first increase rather than decrease with age and only later would it begin to decrease."[56]

Figure 5[57] shows the relationship between training and the age-earnings profile. Assuming untrained persons received constant earnings, regardless of age, their profile would be represented by U-U. Trained persons would receive lower incomes during training periods,[58]

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[53]To be fair to Becker it must be stated that he regarded this as a reasonable first approximation only.

[54]The distribution of earnings would be exactly the same as the distribution of ability if everyone invested the same amount in human capital.

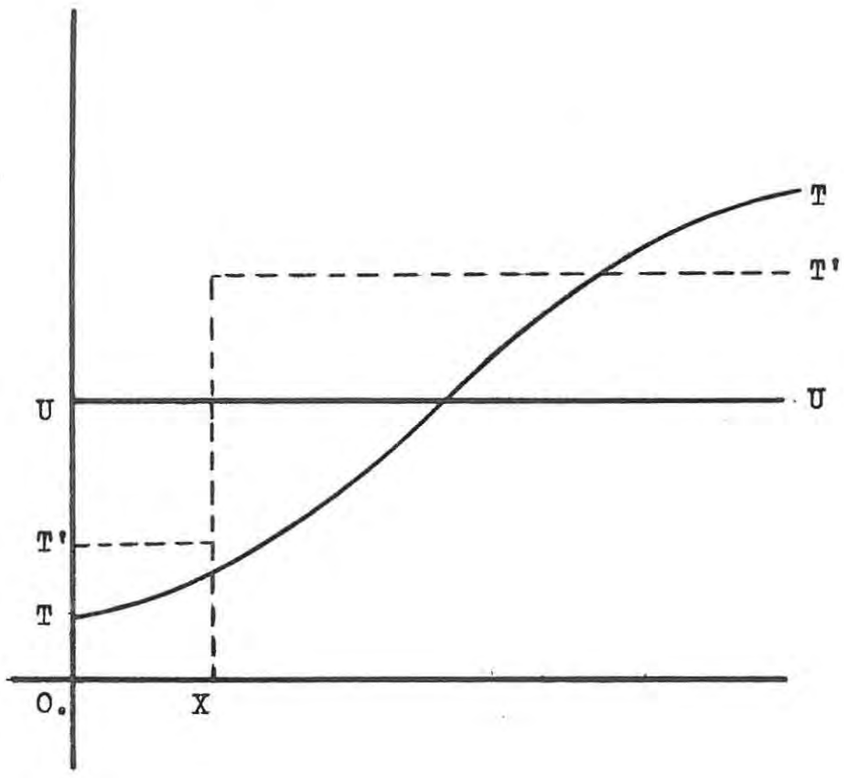
[55]For further discussion along these lines see J. Mincer, "Investment in Human Capital and Personal Income Distribution", op.cit.

[56]G.S. Becker, op.cit., p. 15.

[57]Adapted from G.S. Becker, ibid., p. 15.

[58]This is because that is the time when costs of training are incurred.

FIGURE FIVE



U-U = earnings profile of untrained persons

T-T = earnings profile of trained persons

AGE-EARNINGS PROFILE

but would receive higher incomes later when the return was collected.[59] This combined effect is shown by T-T. The difference between these two profiles depends upon the cost and the return to human capital. The T curve is not only more steep but concave, which indicates that an increase in earnings is effected more at a younger age than at an older.[60] The earnings at age j can be approximated, according to Becker[61] by,

$$Y_j = X_j + \sum_{k=o}^{k=j=1} r_k C_k - C_j$$

where X_j = earnings at j of persons who have not invested in themselves

C_k = investment at age k

r_k = rate of return on C_k

C_j = forgone earnings in j^{th} period.

As concerns the secular increase in average earnings, the former belief was that they were the result of increases in technological knowledge and physical capital per earner. The average earner was supposed to benefit indirectly from the activities of entrepreneurs, investors and others. The interpretation given by those who support the role of the concept of human capital is that earnings can rise because of direct investment in earners - "Instead of only benefitting from activities by others, the average earner is made a prime mover of development through the investment in himself."[62]

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[59] See also J.O. Kamm, "Investment in Self", Review of Economics and Statistics, Vol. 34 (1952).

[60] If training did not affect the slope of the curve, then assuming wages equalled marginal product, and was independent of age, then the T-curve would be parallel and higher than the U-curve, showing neither slope nor concavity. Here OX would represent the training period (with wages below marginal product) and at X earnings would rise sharply. Becker considers this an extreme case (p.15).

[61] See G.S. Becker, op.cit., p. 44.

[62] G.S. Becker, ibid., p. 45.

Altogether it can be concluded that there is a close and definite relationship between investment, human capital and earnings. Investments made in human resource development result in an increased amount of earnings accruing to the human agent. Empirical studies have also found a high correlation between education levels and income. This relationship is fundamental to the demand for investments in human capital and to the application of a cost-benefit analysis of such investments.

CHAPTER 4

COST-BENEFIT ANALYSIS OF HUMAN CAPITAL

4.1. INTRODUCTION

The previous chapter dealt with a general analysis of investment in human capital. A more specific analysis of such investments can be achieved through the application of a cost-benefit analysis. This approach is becoming an increasingly popular technique in investment appraisal and can be applied to the concept of human capital, both on a private and social level.[1] The measurement of relevant factors, however, is still inaccurate and the application of the theory is only in its earliest formative years. The general belief is that a systematic study of returns from investment in human capital would verify that such expenditures are economically justifiable and would offer a unified explanation of many phenomena which have thus far been given only ad hoc explanations. This desire has been fostered by the re-discovery of human capital and subsequent efforts to incorporate investment in human capital into the mainstream of economic analysis.

From the vantage point of a Paretian optimal resource allocation, it is essential to consider the "costs" and "benefits" of investment decisions, especially when taken by non-trading bodies such as education and health authorities, because "the enumeration and (if possible) the valuation of ... costs and benefits is the only means of assessing value for money in quantitative terms."[2]

Costs are any expenditure, or abstention from expenditure in an alternative project, which is motivated by the project under consider-

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[1] See M. Blaug, An Introduction to the Economics of Education (London, 1971), Chs. 6 and 7.

[2] J.L. Carr, Investment in Economics (London, 1969), p.75.

ation. They are thus an expense incurred by society. Benefits include anything that pushes outward the utility possibility function for the society, such as any productivity increase, cost reducing factor or direct welfare increase. Costs and returns (benefits) can be internal and external in part or in total. From this it can be seen that the economists vision of investment in human capital is as an aggregation of values relative to a schedule of marginal costs.

4.2. COSTS

Recent studies in the measurement of the many facets of investments in human capital have gone a long way towards clarifying certain cost components.[3] In general, costs can be classified as direct or indirect, monetary or non-monetary. Direct, money costs usually prove fairly easy to ascertain, quantify and correlate, but indirect, non-monetary costs are at the opposite end of the spectrum of difficulty. In such costs, opportunity costs are a large component and they provide both practical and conceptual problems in their measurement. Problems that arise in the determination of such costs are disagreements between economists as to the effects of unemployment, the nature of census data and suchlike. The concept of opportunity costs, in this instance, includes all earnings forgone by mature students, which have been found to be substantial, especially in more recent years. As Schultz claims for America, "For all levels of education taken together, earnings forgone were 26% of total (social) costs in 1900 and 43% in 1956."[4] He believes that by omitting these in decisions relating to planning and

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[3] See T.W. Schultz, "Resources for Higher Education", Journal of Political Economy, Vol. 76 (1968). Also, J. Mincer, "On-the--Job Training : Costs, Returns and Implications", op.cit., G.S. Becker, "Investment in Human Capital : A Theoretical Analysis", op.cit., J. Vaizey, The Costs of Education (London, 1958), and H.E. Klarman, op.cit., (New York, 1965).

[4] T.W. Schultz, "Capital Formation by Education", Journal of Political Economy, Vol. 68 (1970), p. 577.

finance, a distorted view of the economics of education is presented.[5]

Forgone earnings are thus an important conceptual part of costs, but present difficulties in estimation and measurement. The earnings of people not in school of a comparable age and sex tend to be used as a means of measuring forgone earnings, but are not a good yardstick as those in school may be more ambitious and able, and would therefore earn more than their "drop out" counterparts. Also the measuring of earnings forgone by the earnings of those presently employed is satisfactory only if there is little unemployment. It is necessary to consider that perhaps not all labour resources released from schools and made available by health improvements would find employment. Also a large influx onto the labour market would depress earnings. It is important to note that earnings forgone also includes alternative production by resources used by education and health institutions.

It would appear most satisfactory then to consider, when studying forgone earnings, what could have been earned and not what would or actually might be earned by such resources. The fact remains, however, that forgone earnings play an essential part in cost analysis. According to Mincer, "forgone costings constitute over half of total costs of schooling and about 75 per cent of costs borne by students."[6]

The inclusion of forgone earnings helps to some extent to delineate and clarify between private, social and total costs. The division between private and social costs helps explain differences in incentives to invest in human resource development and in ascertaining rates of return, an important factor in optimal investment decisions. "As a

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[5]This would apply equally to the economics of health. The implications of such omissions would be, for example, in the case of education, inefficient planning as about one-half of real costs are treated as free resources; so-called free education would actually be far from such; and there would be less incentive to economise on the long time horizon of education.

[6]J. Mincer, "On-the-Job Training : Costs, Returns and Implications", op.cit., p.52. In this study Mincer found that the most striking aspect was that opportunity costs per male were almost without exception higher than the costs of a comparable increment of schooling.

general rule, private costs ... are obviously below social costs because of contributions by governments, ..."[7] This implies that education and health impose costs upon society in more subtle ways.

The question of social costs is very pertinent to the concept of human capital, because it is an essential element in the costs of an investment made in human resources. Pigou summarises the concept of social costs by stating that "The essence of the matter is that one person A, in the course of rendering some service for which payment is made, to a second person B, incidentally also renders services or disservices to other persons, of such a sort that payment cannot be extracted from the benefitted parties or compensation forced on behalf of the injured parties."[8] In applying this to investments in health and education respectively, it would be difficult to calculate the total costs meticulously, due to the occurrence of these social costs.[9]

Altogether as regards the costs of investments in human capital, it has been seen that there arise conceptual and practical difficulties. Yet empirical studies of investment costs have been undertaken, mainly in the United States. Mincer[10] found that whilst per capita amounts of investment in formal schooling (measured in costs of constant dollars) grew between 1938 and 1958, the corresponding quantities of on-the-job training per capita grew mainly at higher education levels, that is, on-the-job training increases in quantity the higher the level of education.[11] He also found that the aggregate annual cost of formal and informal education increased over time at different rates.[12]

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[7] W.L. Miller, "Education as a Source of Economic Growth", Journal of Economic Issues, Vol. 1 (1957), p. 287.

[8] A.C. Pigou, The Economics of Welfare (London, 1950), p. 183.

[9] It is important to note that the quality of decisions would thus seem to depend upon the accuracy of information and its availability. This itself is a process of investment in human capital in the form of costs and returns in the collection and dissemination of information.

[10] J. Mincer, "On-the-Job Training : Costs, Returns and Some Implications", op.cit.

[11] See Table A1 in Statistical Appendix.

[12] See Table A2 in Statistical Appendix for details.

Generally on-the-job training costs were relatively less than schooling costs in 1939 and grew at a slower rate over the period until 1958. From this it can be seen that a cost-benefit analysis can be undertaken, as far as costs are concerned, if the problems of identifying and quantifying both direct and indirect monetary and non-monetary costs can be overcome.

4.3. BENEFITS

The benefits derived from investments in human capital pose problems similar to those involved in costs. They can be derived both at the present time of investment and in the future, accruing to the individual as well as to society. As yet there is little empirical verification of the assumed amount of benefits which accrue to others. Such benefits are in the form of pecuniary and non-pecuniary returns. Direct benefits to the individual are in the form of current consumption, ability to enjoy psychic satisfaction and abilities which increase productivity and earning power.

In the private sector, demand reflects the private benefits derived, but where there are significant social benefits, as with human capital investments, the private market is inadequate. This means that the measurement of benefits accruing from such investments can only be judged by consideration of both direct and indirect benefits. A most comprehensive survey of such benefits is that conducted by Burton Weisbrod[13] in relation to education and human capital investments. He classifies benefits or the return from education into the two broad categories of direct and indirect benefits arising from expenditure by an individual on education.

The former category deals with (i) a direct financial return, usually manifested by a positive correlation between earnings and

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[13] B.A. Weisbrod, "Education and Investment in Human Capital", op.cit., pp. 106-123. This approach is one of many alternatives and has the failing of not focussing on the time and location of costs and benefits. Yet it does give an insight to the identification of these factors and a determination of what is to be quantified enabling easier measurement.

educational attainment (ii) a financial option return, which is complementary to the direct financial return above. It takes the form of additional earnings and the value of an "option" to obtain still further education and the rewards accompanying it.[14] (iii) a non-financial option, which is a non-monetary return from education in the form of an additional choice available to educated people. (iv) a hedging option which is, in fact, merely a type of private hedge against the technological displacement of skills. (v) non-market returns, which are the consumption aspects such as any return, resulting from literacy, which the individual enjoys.

Benefits falling in the indirect class comprise those which motivate the public concern in expenditures on social activities. If all benefits accrued to the individual, there would be little reason for the public to consider whether further expenditures are warranted on the grounds of allocative efficiency. Persons receiving indirect benefits fall into one of three classes. (i) Residence - related beneficiaries enjoy immediate by-products.[15] These include the current and future family, neighbours and taxpayers.[16] (ii) Employment - related beneficiaries receive benefits when the education of health improvement of a worker affects the productivity of another favourably. Here each worker has a financial interest in the investments made in a fellow worker.[17] (iii) Society in general receives those benefits, outside the above groups, broadly distributed either spatially or in time. This is in fact, a residual category.

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[14]Here Weisbrod deals with a previously unconsidered return. See ibid., pp. 109-113.

[15]An example here is, in the case of elementary education, the release of a mother from child care, leaving her free to work. Weisbrod estimates a return of 25 per cent of cost in the by-product form of child-care services alone (ibid., p. 117). This tends to offset, to some extent, the income forgone as a cost to students.

[16]Lack of education necessitates costs in the form of crime, law enforcement and so on.

[17]This can be reflected in the worker's salary.

In summary, benefits from investment in human capital tend to be heterogeneous and the distribution of benefits differs substantially from the distribution of costs. This results in such expenditures either being over-supported or under-supported from the point of view of allocative efficiency. Like the costs, it is doubtful whether benefits could be quantified with any great degree of accuracy, but in general, even partial measurement discloses benefits of sufficient size to warrant profitable investment. Non-measured benefits would, thus, a fortiori support the expenditure decision.

4.4. RATE OF RETURN MEASUREMENT

Empirical studies of investments made in human capital support the contention that the rate of return from such expenditure is relatively high. The theoretical basis behind this is that persons are able to earn more if they become more skilled and productive via human capital formation.

Returns are related to the costs incurred in acquiring them and are generally high in respect of human capital investments, even with the most cautious and conservative methods of calculation. The cost-benefit approach has been used by economists such as Becker,[18] Bowman,[19] Blaug,[20] Wiseman,[21] Hansen[22] and others, and is based on the measurement of the income flow of an individual's earnings, assumed to result from

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[18] G.S. Becker, Human Capital. A Theoretical and Empirical Analysis with Special Reference to Education (Princeton, 1964); and "Investment in Human Capital : A Theoretical Analysis", op.cit., and "Underinvestment in College Education", American Economic Review, Vol. 50 (1960).

[19] M.J. Bowman, "Converging Concerns of Economists and Educationists", Comparative Education Review (1962).

[20] M. Blaug, "The Rate of Return on Investment in Education in Great Britain", in M. Blaug (ed.), Economics of Education, Vol. 1 (London, 1968).

[21] J. Wiseman, "Cost-Benefit Analysis and Health Service Policy", Scottish Journal of Political Economy (1963), pp. 128-145.

[22] W.L. Hansen, "Total and Private Rates of Return to Investment in Schooling", Journal of Political Economy, Vol. 71 (1963).

investments in human capital.[23]

When analysing the return to public and private investment in education, Becker found that the return was about 12 per cent on income invested by society, while it was over 14 per cent on that invested by private individuals and their families.[24] In measuring this rate of return, all earnings are taken into account, including future earnings, which are discounted to a present value. To enable the estimation of a rate of return Becker formulates two cases.[25]

In Case 1, the investment is restricted to the first period with returns accruing to all future periods. He assumes that Y is an activity providing a person entering at a particular age (zero) with a real net earnings stream of Y_o during the first period, Y_1 during the next and so on until Y_n is provided in the last period. The investment activity is any human capital creating activity such as health, schooling or on-the-job training. Net earnings are gross less costs plus returns, and real earnings are the sum of monetary earnings and the monetary equivalent of psychic earnings.

He determines that the present value of the net earnings stream of Y would be,

$$V(Y) = \sum_{j=o}^{n} \frac{Yi}{(1+c)^{j+1}}$$

where i = market discount rate.

From this Becker computes a rate of return, because the income flow from investments in human capital is known. Case 2 is merely an

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[23] This is often criticised in that some economists believe there is no definite causal relationship between higher incomes and greater investment in, for example, education. This relationship has been shown to be valid and that to a certain degree earnings and income are a system of returns to human capital (see Chapter 3.2).

[24] G.S. Becker, 38th Annual Report of the National Bureau of Economic Research (1958), p.11.

[25] G.S. Becker, "Investment in Human Capital : A Theoretical Analysis", op.cit., pp. 30-37.

elaboration of the above in that investment is permitted over a known group of periods, called the investment period.

If X is another activity providing a net earnings stream of Xo, Xl, ... Xn, with a present value of V(X), then the gain from choosing activity Y would be

$$d = V(Y) - V(X)$$

$$= \sum_{j=o}^{n} \frac{Yj - Xj}{(1+c)^{j+1}}$$

This can be reformulated to show the relation between costs and returns, where the costs of investing in human capital are the net earnings forgone by choosing to invest in human capital rather than in other things. If X and Y are both activities, and Y requires an investment only in the initial period, then the opportunity cost of that activity is simply the difference between their net earnings and the initial period. The total return would be the present value of the differences between net earnings in later periods.

The total gain from Y is as follows,

$$d = \sum_{j=1}^{n} \frac{kj}{(1+i)} j - C \quad = \quad R - C$$

where $C = Xo - Yo$

$kj = Yj - Xj$

$j = 1 .... n$

$k =$ total return.

This shows which activity (X or Y) has the higher rate of return and indicates, via the rate of return derived, the investment viability of expenditures in human capital formation.[26] In one particular article

[26]This has limitations in that it assumes a priori that nothing is invested in X. If this is not so, only the difference and not the total investment can be determined.

Becker estimated that for the years 1940 to 1950 the before tax return to college education was about 9 per cent.[27]

Although the above approach explicitly brings out the relation between costs and returns, Becker uses another approach which derives the relation in a different, and to some extent, preferable way. This is by defining the internal rate of return, which "is simply a rate of discount equating the present value of returns to the present value of costs."[28] This Becker expresses in the equation,

$$C = \sum_{1}^{n} \frac{kj}{(1+r)^{j}}$$

which implies,

$$\sum_{j=o}^{n} \frac{Yj}{(1+r)^{j+1}} - \sum_{o}^{n} \frac{Xj}{(1+r)^{j+1}} = d = 0$$

since $C = Xo - Yo$

$kj = Yj - Xj$.

Thus the internal rate is also a rate of discount equating the present value of earnings, and like the former, or income gain method, has drawbacks in the estimation of total costs and earnings.

4.5. APPLICABILITY

The other economists who applied a cost-benefit analysis to investment in human capital followed techniques similar to those described above, that is, the measurement of income flows as a rate of return on investment activities. Yet all such studies suffer the same inherent difficulties, manifest in the measurement of costs and returns, in deciding how much pertains to consumption and how much to investment,

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[27] G.S. Becker, "Under-investment in College Education", op.cit., p.347.

[28] G.S. Becker, "Investment in Human Capital : A Theoretical Analysis", op.cit., p. 31. A substantial literature has developed on the differences between what may be called the income gain and the internal return approaches. See F. and V. Lutz, The Theory of Investment of the Firm (Princeton, 1951).

and in differentiating between levels and types of investments. In many cases the estimation of costs and returns is more the result of guesswork than objective analysis, but the estimates of rates of return suggest that a significant "pay-off" is attributable to the accumulation of human capital.

Another argument against this form of appraisal of human resource development is that it cannot only be considered in economic terms, for the purpose of expenditure in education and health is not solely for the maximisation of material welfare. Yet it would be equally erroneous to ignore economic considerations in evaluating such activities since economic growth is today an important policy objective in most countries.

For this reason the cost-benefit approach is receiving an increasing amount of support amongst modern theorists on the subject of human resource development. Their basic belief is that expenditure on human resources can be analysed as effectively as other investments and that it is necessary to compute rates of return, or profitability, on human beings.

There are others, however, who strongly criticise this contention and H.G. Schaffer, in his critique of the concept of human capital, claims "any attempt to show that rational individuals tend to undertake expenditure on education up to a point where the marginal productivity of human capital produced by the process of education equals the rate of interest .... would be a mockery of economic theory."[29] He thus attempts to render invalid any investment decisions which could be based on a cost-benefit analysis and believes, therefore, that such analysis has no real purpose. Likewise Schumpeter[30] believed that even if such an analysis were carried out it would have little pragmatic value. He maintained that such activities as education increase the supply of skilled manpower, for example, beyond the point determined by cost-

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[29] H.G. Schaffer, "Investment in Human Capital : Comment", American Economic Review (1961), p.

[30] J.A. Schumpeter, Capitalism, Socialism and Democracy (London, 1944).

benefit considerations and justifies this by the occurrence of fractional unemployment.[31]

The criticisms of a cost-benefit approach as made by Schaffer and others led to rigorous support by writers for this type of analysis. Yet there still remain a number of very real objections to the application of a cost-benefit analysis to investment in human capital. The main objections are as follows.[32]

(i) It is difficult to determine what, if anything, is to be maximised. There is no clear "objective function" in human capital investments,[33] for they have both a consumption and an investment component, and there are goals other than that of maximising economic welfare.

(ii) Education, health, ability and individual motivation are all inter-related and the pure effect of any one cannot be satisfactorily isolated.

(iii) The measurement difficulties experienced to a large extent preclude the application of a cost-benefit analysis. Investment in human capital gives both direct and indirect benefits. The measurement of the latter, or repercussion effects as Eckstein prefers to call them,[34] creates problems. Also it is difficult to measure the non-pecuniary and consumption benefits. The measurement of costs is also beset by conceptual and practical difficulties.

Altogether it can be seen that the applicability of this technique to human capital investments is beset by both theoretical and practical

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[31] This is questionable as there are few historical examples of economies top heavy in skilled personnel, due mainly to the fact that higher education is a function of the lower levels and that the existence of the latter is a pre-condition for that of the former.

[32] M. Blaug, in his article, "The Rate of Return on Investment in Education in Great Britain", The Manchester School of Social and Economic Studies, Vol. 33 (1965), pp. 205-251, sums up the criticisms of cost-benefit analysis as applied to education in terms of six basic objections, which he attempts to meet in turn. O. Eckstein also deals with the difficulties and problems facing such an analysis in his "A Survey of the Theory of Public Expenditure Criteria" in R.W. Houghton (ed.), Public Finance (England, 1970).

[33] See O. Eckstein, op.cit., on the difficulties of determining an objective function for public expenditure.

[34] ibid., pp. 240 ff.

limitations. Also it is questionable what value such a technique would have in terms of human resource development policy, for it sheds little light on the role played by human capital in economic growth. Yet the above need not mean a complete abrogation of the cost-benefit approach, for as Blaug maintains, "Spill-overs, non-pecuniary economic returns and even non-economic objectives can all be incorporated into the framework, provided there is a firm commitment from the outset to the principle of quantification. To insist immediately on cardinal measurement of all the variables, however, is a counsel of perfection ... In consequence our answers will lack the quickly comprehended, numerical precision of something like a man-power forecast.... Still, it is better to be vaguely right than precisely wrong. Planning consists of choosing between alternatives and cost-benefit analysis has the virtue of never letting us forget this."[35]

[35] M. Blaug, An Introduction to the Economics of Education, op.cit., pp. 264-265.

CHAPTER 5

HUMAN CAPITAL AND ECONOMIC GROWTH

5.1. INTRODUCTION

The preceding chapter showed that by applying a cost-benefit approach to human capital investments a rate of return could be calculated. So far, however, nothing has been said about the extent to which human resource development has in fact contributed to the economic growth of any particular economy. This chapter is intended to consider the concept of human capital and its contribution to economic growth.

5.2. THE PRIMACY OF PHYSICAL CAPITAL

As mentioned in an earlier chapter, there is a controversy over the importance attached to physical and human capital as the crucial element in the development process of economics. The modern trend is to regard human capital as more important than physical capital.[1]

Yet despite the relegation of physical capital to a lower level of importance, it is widely agreed that large amounts of it are necessary in the development process of underdeveloped countries.[2] It is but one of a number of forces, though it is an important one in that it has a catalytic effect upon others. Those economists who regard it as the key factor base their beliefs upon the fact that "the accumulation of capital (physical) is the most effective way to create the

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[1] Although this is the "majority opinion" there are noticeable abstentions from such a viewpoint. See S.P. Schatz, "The Role of Capital Accumulation in Economic Development", Journal of Development Studies, Vol. 5 (1968), and H.G. Schaffer, op.cit.

[2] For example, Rostow estimates that for the achievement of regular growth (that is, "take-off") a necessary but not sufficient condition is "that the proportion of net investment to national income .... rises from, say, 5% to over 10%", The Stages of Economic Growth (Cambridge, 1965), p. 37.

other conditions required for economic growth; these requisites are created concurrently with and primarily by a high rate of capital formation."[3] This contention is thus based on a high regard for the external effects of physical capital and it stands or falls on the importance of these effects. Such effects, which result from physical capital acting as an "inducement mechanism"[4] to create scarce factors necessary in production, such as capital stock and entrepreneurship, are difficult to measure.[5] This places the question to some extent in the realms of a value judgment and it can be maintained that "the pivotal difference between the capital-emphasisers and the capital-deprecators on the 'sufficiency' of capital issues lies in their judgement of this slippery empirical question."[6] In such a predicament it is obvious that neither side can unequivocally be declared the victor.

Other arguments which support the case of the "capital-emphasisers" and the importance they attach to externalities, are that it is wrong to consider education as a direct investment in human capital, for it is the result of the effects of other investments, and that the application of the capital concept to man would more often than not, "confuse more than elucidate, it would create more problems than it would solve and ... it would be of questionable value."[7]

In contemporary times there has been a shift away from regarding physical capital as the general, though not universal, pre-condition for accelerated growth. In general it appears that the more radical economists are identified with the primacy-of-capital doctrine while

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[3] S.P. Schatz, op.cit., p. 40.

[4] On the theory underlying this, see A.O. Hirschman, op.cit., Ch. 1, pp. 24 - 28.

[5] This difficulty is in exactly the same mould as those difficulties arising from the measurability of external costs and benefits to investments in human capital.

[6] S.P. Schatz, op.cit. The strategic value of capital in economic growth theory can be illustrated, for example, by consideration of the Harrod-Domar growth model, where capital formation is interacting and cumulative.

[7] H.G. Schaffer, op.cit., p.56.

the emphasis on human capital accumulation has become the mainstream trend. It is often held that development may be retarded not by physical capital (in the form of savings and investment) but by the lack of human capital (in the form of skills, knowledge and organisation abilities). As Mountjoy states, "The supply of capital has so often been stressed as the key to development and prosperity for underdeveloped lands, but the supply of unlimited capital will not itself create development: Skill and willing hands are needed to turn the key to open the door."[8] The lack of human capital acts as a hindrance to the absorption of capital in productive investment. The result has been a shift "from capital to education, from investment in material capital to investment in human capital."[9] and the realisation that the solving of savings bottlenecks does not automatically result in the solving of developmental problems.[10]

5.3. THE CONTRIBUTION OF HUMAN CAPITAL

The importance of the concept of human capital in economic development has been tacitly proven by recent empirical studies. It has been shown to provide an acceptable explanation to many problems which were hitherto regarded as unexplainable economic phenomena in the realms of physical capital theory. Such verification of the part played by human capital in economic development process revolves around both the misinterpretation of the decline of the capital-income ratio and the seeming rise in factor productivity witnessed in many economies.

As regards the former, it was apprehensively viewed by developing economies that the more advanced nations experienced declining capital-

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[8] A.B. Mountjoy, Industrialisation and Underdeveloped Countries (London, 1966), pp. 83-84.

[9] H. Myint, The Economics of Developing Countries (London, 1969), p. 173.

[10] On this point Clark suggests that the causal-effect relationship is reversed, and that it is more correct to say that capital is created during growth than that growth is a creation of capital. See C. Clark, op.cit., p. 58.

income ratios. This was, however, the direct result of considering capital to consist only of physical capital. The movement away from this restrictive view has led to the inclusion of human capital to give a Fisherian concept of overall capital, which renders the apparent substantial decline in capital relative to income an illusion and not indicative of the real situation imposed by development. As Schultz states, "estimates of capital-income ratios refer to only a part of all capital. They exclude in particular, and most unfortunately, any human capital. Yet human capital has surely been increasing at a rate substantially greater than reproducible (nonhuman) capital. We cannot, therefore, infer from these estimates that the stock of all capital has been decreasing relative to income. On the contrary .... the decline ... is simply a signal that human capital has been increasing relative not only to conventional capital but also to income."[11]

The belief that the productivity of both capital and labour has risen substantially over time, especially as economies develop, is also explained by the human capital concept. The conclusion arrived at is that "there is no strong theoretical or empirical basis for believing that the production of all factors of production treated as an aggregate, where the economy grows at an even pace, should either rise or fall. A much more plausible hypothesis is that it remains approximately constant over time."[12]

The basis of this explanation is that many factors of production (especially human capital components), which are added to the resources of an economy over time, are not included among the inputs, but are merely swept aside under the carpet of "technological change". The productivity illusion which then arises, in the form of a higher rate of income increase relative to the combined increase in inputs, is in part due to the neglect of human capital and its contribution to production. Schultz believes that although economics of scale and improve-

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[11] T.W. Schultz, "Investment in Human Capital", op.cit., p. 5.

[12] T.W. Schultz, "Human Capital", op.cit., p. 281.

ments in the quality of material capital have no doubt contributed to the increase, these are minor compared to the increase in human capital.[13]

5.4. MEASUREMENT

Empirical studies have been conducted to ascertain the contribution of human capital to economic growth. A number of different approaches have been propounded, including those of the residual and the stock of capital. Both of these are based on the conviction that if human resources expenditures have an investment component, then they must have a return, which accrues to someone and can thus be measured.

5.4.1. Residual

The residual approach is based on a survey conducted by Odd Aukrust in 1959[14] in which he questioned the hypothesis that the national product of a country will increase at about the same rate as real capital. After examining the implications of the constant capital-output-ratio approach to economic growth, with empirical reference to Norway, he concluded that "the human factor", in the form of organisation, professional skills and technical knowledge, was at least as important as physical capital in generating growth. To reach this hypothesis he had to measure the contributions of the various factors of labour, physical capital and human capital to total output.

The inputs of physical capital and labour could be measured, though with some difficulty due to their dynamic nature, but that of the

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[13] See T.W. Schultz, "Investment in Human Capital", op.cit., p.6. This is supported by the fact that in recent years international trade theory has been shaken by findings that the U.S.A., said to have a relative abundance of capital and a labour scarcity, apparently exports relatively labour-intensive commodities and imports capital-intensive ones. This is known as the "Leontief paradox" in international trade theory. Schultz's argument would thus give an interpretation consistent with the Heckscher-Olin theory, for it argues that the U.S.A. has a relatively more abundant supply of human than physical capital. Also, under the assumption of factor-price equalisation, the so-called brain-drain is nothing more than a form of maximising economic behaviour.

[14] O. Aukrust, "Investment and Economic Growth", Productivity Measurement Review (1959), pp. 35 - 53.

third factor could not, by definition. By use of a standardised equation it was found that Aukrust's "third factor" could be given a residual value. The equation used was,

$$Rt = aKt^{\alpha} \; Nt^{\beta} \; (e^{ht})^{n}$$

where Rt = national product

Kt = real capital (at depreciated replacement cost)

Nt = employment (in man hours)

e^{ht} = index of organisation (assumed to increase by constant rate h)

a, α, β, n are constants.

This equation was found to give a residual trend in growth of national output which could not be explained by the accretion of physical capital and manpower and was attributed, by elimination, to the human factor.

The main exponents of this approach have been Kendrick,[15] Denison,[16], Kuznets,[17] Solow,[18] and Domar.[19] They paid particular attention to this production-function type approach, as did Bowman,[20] who attempted to bridge this with the rate of return approach. The general conclusion was that a proportion of the increase in G.N.P. of the United States over a period of time can be attributed to the

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[15] J.W. Kendrick, Productivity Trends in the United States (Princeton, 1964).

[16] E.F. Denison, "The Sources of Economic Growth in the United States and the Alternatives Before Us", in M.J. Bowman et al (eds.), Readings in the Economics of Education (Paris, 1968).

[17] S. Kuznets, National Income : A Summary of Findings (New York, 1946), pp. 42-49.

[18] R.M. Solow, "Technical Change in the Aggregate Production Function", Review of Economics and Statistics, Vol. 39 (1957), pp. 312-320.

[19] E.D. Domar, "On the Measurement of Technological Change", Economic Journal, Vol. 71 (1961), pp. 709-730.

[20] M.J. Bowman, "Schultz, Denison and the Contribution of 'Eds' to National Income Growth", Journal of Political Economy, Vol. 72 (1964), pp. 450-465.

measureable inputs of labour and capital, leaving a residual, which is a consequence of other things, especially the advance of knowledge.

In his study of productivity trends in the U.S.A., Kendrick estimated a residual attributable to human capital. His method was the use of labour input series, based on hours worked, and a constant price-input series per capital, which he combined, weighted by relative shares in the G.N.P., and compared with real national output. He found that the combined input index increased at an average per annum rate of 1.9% between 1889 and 1957. Output over the same period increased by about 3.5% per annum, leaving a residual increase of about 1.6% per annum.[21] This he attributed to the qualitative factors affecting inputs, which he called "total factor productivity increase" resulting from the direct and indirect effects of human capital. He maintained that the "growing relative outlays for education and for health have increased the average productive powers of the population ..."[22] and found that half the increase in real private domestic product was the result of increased efficiency with which outputs were utilised.[23]

Denison extended this analysis and attempted to divide the residual into parts. For the years 1929 to 1957 he estimated the contribution of various factors to U.S.A. economic growth as follows:[24]

increase in persons employed	34%
increase in education	23%
increase in returns to scale	8%
increase in capital involved	15%
advances in knowledge	20%

His statistics show that 47 per cent of the increase in output per man results from labour quality improvements, 27 per cent from

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[21] J.W. Kendrick, op.cit., p. 79.

[22] J.W. Kendrick, op.cit., p. 14.

[23] ibid., p. 60.

[24] E.F. Denison, op.cit., Ch. 23.

technological change, 16 per cent from economics of scale and 10 per cent from other sources.

Denison considered the sources of economic growth in the United States, with specific attention to the contribution resulting from the education of the labour force. He found that "Improved education has made a major contribution to economic growth ... From 1929 to 1957 ... 23 per cent of the 2.93 percentage point growth rate of national income was the direct contribution of more education."[25] He also found that from 1929 to 1957 the amount of education the average worker received increased by almost 2 per cent per annum, raising the average quality of labour by 0.97 per cent per annum, contributing significantly to the rate of growth of real national income, and that additional education contributed only a little more than half as much to growth between 1909 and 1929 as between 1929 and 1957.[26] His overall conclusion on the economic growth effects of education as a source of human capital is that "it was the source of 23 per cent of the growth of total real national income and 42 per cent of the growth of real national income per person employed."[27]

Kuznets, in his study, found that large gains were received by workers in inter-industry shifts. The shift account for about forty per cent of the total rise, leaving sixty per cent unexplained. He discards the possibility of these being a windfall or quasi-rent and postulates that they are, in fact, a return to investment in human capital.

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[25] E.F. Denison, "The Sources of Economic Growth in the United States and the Alternatives Before Us", op.cit., p. 73.

[26] For a more detailed examination of his empirical results, see Appendix IV.

[27] E.F. Denison, "Education, Economic Growth and Gaps in Information", op.cit., p. 127. Bowman, op.cit., p. 457 revised these calculations allowing for additional factors and indicated that about 18-19 per cent and not 23 per cent can be credited to increased education of the labour force. For policy purposes the important question would be whether formal or informal education, or what level of education, is the greater contributor to such growth. Denison makes no distinction between types or levels of education

Solow concluded his study with the fact that the gross output per capita in the United States had doubled over a forty year period, with over four-fifths of this increase attributable to technical change rather than increases in physical capital.

Although the residual approach has obvious limitations arising from the overlapping of components inherent in the residual, it has the advantage of generally indicating the magnitude of the evident contribution to national income made by health and education investments in human resources.

5.4.2. Stock of Capital

The stock of capital approach in essence is an analogy between returns to investment and additions to the stock of capital by measuring the amount of education and health available in the population at large. There are two ways of measuring the stock of capital : accumulating data on past investment in current prices and deflating the total by the price index or discounting the expected flow of future earnings from current investments. These two methods would yield identical results under perfect competition, but differing results in the real world. Conceptually the former, or backward view, appears more satisfactory than the latter, or forward view.

T.W. Schultz[28] has carried out studies of the stock of human capital in the United States employing the backward method. He estimated the total educational capital in human resources and the costs to society of its production,[29] enabling him to compute a return on the investment. He also found that for the U.S.A. during the years 1900 to 1956, "resources allocated to education rose about three and a half times (a) relative to consumer income in dollars, (b) relative to

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[28] T.W. Schultz, "Education and Economic Growth", Readings in the Economics of Education, in M.J. Bowman et al. (eds.), (Paris, 1968), "Reflections on Investment in Man", op.cit., and "Capital Formation by Education", op.cit.

[29] See Statistical Appendix, Tables A3 and A4 for detailed examples of his analysis of the costs and the stock of capital.

gross formation of physical capital in dollars."[30] This means that the income elasticity of demand for education was 3.5 overthe period, or that education as an investment was considered 3.5 times more attractive than investment in physical capital.

In measuring the stock of educational capital by costs and expenditures, Schultz found that the total stock rose from 63 billion to 1957 billion dollars over the period at constant 1956 prices,[31] giving a high rate of return on education relative to other investments. He maintains that the increase in education per person explains "between 30 and 70 per cent of the otherwise unexplained increase in earnings for labour."[32]

Schultz attempted to show, in his empirical studies, that human capital and investments in human resource development could not be disregarded, as had been the case in the past. He postulated[33] that they were by no means trivial and were of a proportion which altered the conventional measure and structure of capital formation. This, consequently, rendered inadequate the common measurement of inputs for studying growth.[34]

He also estimated that education, as a form of investment in human capital, accounted for 21 - 40 per cent of national income growth in the United States over the period 1929 to 1956 and that increases in education per member of the employed labour force accounted for 17 - 33

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[30] T.W. Schultz, "Education and Economic Growth", op.cit., p.73.

[31] ibid.

[32] ibid., pp. 79-80.

[33] See T.W. Schultz, "Reflections of Investment in Man", Journal of Political Economy, Vol. 70 (1962), pp. 1-8.

[34] Hypothetically his arguments are based on the supposition that if India, for example, received natural resources, equipment and structures equal to those of the U.S.A., the results would be insignificant taking existing skills of the people as given. There has to be, therefore, a balance between the stock of human and material capital for economic growth. The converse applies equally - Germany and Japan had an opposite imbalance to India, resulting in high returns to investment in physical capital and high growth rates in the post-war era.

per cent of income growth over the same period.[35] He also maintained that if a similar evaluation was carried out for the other forms of human capital investment, similar results would be obtained, indicating that human capital plays an important part in the economic growth experienced by economies such as the United States.

Others who employed this approach were Weisbrod[36] and Machlup.[37] Weisbrod estimated the capital value in terms of the forward view and also concludes with a figure far in excess of the value of physical capital. Machlup carried out research in the costs of education and attempted also to measure a return. The biggest failing of the stock of capital approach, however, is that it includes cultural values of education and knowledge given to non-producers, so that to some extent, it is not a true value of the economic contribution of education.[38]

The stock of capital approach has also been used in relation to health. In a study on investment in health, Mushkin and Weisbrod[39] applied this approach in measuring the stock of "health capital" in the United States labour force. They treated health expenditures made by, or on behalf of, persons in the labour force, during their lifetime, as investments in human capital and concluded that in 1960 the stock was 206 billion dollars,[40] representing 3,058 dollars per member of the work

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[35] T.W. Schultz, "Education and Economic Growth", op.cit. These findings were expressed in different form and the percentages cited here are as computed by M.J. Bowman in her work "Schultz, Denison and the Contribution of 'Eds' to National Income Growth", op.cit., p. 450.

[36] B.A. Weisbrod, "The Valuation of Human Capital", Journal of Political Economy, Vol. (1961), pp. 425-437.

[37] F. Machlup, The Production and Distribution of Knowledge in the United States (Princeton, 1962), Ch. 4, pp. 51-145.

[38] In all fairness to Schultz, the main proponent of this approach, it must be pointed out that he was aware of this factor and attempted to overcome it by stating that he seeked to measure the "stock" of education, whether utilised or not.

[39] S.J. Mushkin and B.A. Weisbrod, "Investment in Health : Lifetime Health Expenduture on the 1960 Work Force", Kyklos, Vol.16 (1963), pp. 583-599.

[40] ibid., Table 4, p. 594.

force.[41] This figure can be measured with the estimated 535 billion dollars of "educational capital" in the 1957 labour force,[42] resulting in the fact that "about 38 cents of health capital is embodied in the labour force for every $1 of educational capital."[43]

Generally whether the forward or backward view is used to compute the stock of capital, this method of evaluation of human capital accumulation serves a useful purpose. It can be applied to education, health, migration and labour market information investments, thus presenting a conceptually uniform approach to investments made human capital and to the measurement of this capital and its effects on growth in the economy.

5.5. CONCLUSION

The general conclusion is that human capital has played an important part in the economic growth and development of economies and that its role has only of late been realised. The validity of the empirical studies which have been conducted to evaluate the part played by human capital has been influenced by the conceptual problems arising and the immeasurability of many factors. Yet there is general consensus that favourable economic results flow from the accumulation of human capital and that it is a prime mover in economic growth.

It is obvious that both human and physical capital play an important part in economic development and to consider either as the sole causal factor, to the exclusion of the other, would be bad economics. It is, however, feasible to attribute to each a lesser or greater role, though this, of course, does not have universal applicability and could be reversed in any particular instance. In general it can be assumed that human capital is the more important, though by itself it is not a sufficient condition. As Cairncross maintains, "Development may be impossible without building the physical apparatus of advanced countries;

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[41] ibid., p.595.

[42] See T.W. Schultz, "Education and Economic Growth", op.cit., p.71.

[43] S.J. Mushkin and B.A. Weisbrod, op.cit., p. 597.

but it is still more impossible if it does not take place in the minds of the men who build."[44]

When determining the part of growth associated with one particular source, it would be a simple calculation if the income values of the products of such sources were known. But this is not the case, especially with human agents. This inability to allocate growth to sources, does not, however, mean that such an attribution should not be attempted, it just renders exact allocation impossible.[45] The modern and popular view is to "play up" the role of human capital and deprecate that of material capital. In some ways this bias is the result of a tendency prone in all innovations, for the concept of human capital is undoubtedly undergoing an innovational process. While admitting that human capital is perhaps a key to economic development and growth, care must be exercised so as not to lose sight of the relevance of physical capital.

5.6. HUMAN CAPITAL - THE "PRIMUM MOBILE"

While the studies mentioned in the preceding sections of this chapter attempt to provide a quantitative measure of the contribution of investment in capital to economic growth, they do not reveal the mechanism or actual process whereby human capital investment leads to economic growth. For the purposes of policy planning and decision making, however, it is essential to have an insight into the function or role of human capital in generating growth.

The role of human resource development in economic growth can be shown by a number of formulations. One such formulation is that known as the "Horvat Formulation"[46] which attempts to portray the critical

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[44] A.K. Cairncross, Factors in Economic Development (London, 1965), p. 31.

[45] On this point of the relative contributions to economic growth, see the general, but fairly comprehensive article by S.J. Terreblanche, "The Relative Contribution of Tangible and Human Capital Formation to Economic Growth", South African Journal of Economics, Vol. 38 (1970), pp.50-65.

[46] See B. Horvat, "The Optimum Rate of Investment", Economic Journal, Vol. 68 (1968).

role of human capital. Horvat regards this as the crucial element and his theory is representative of the fundamental ideas propounded by many other contemporary economists.[47]

In this formulation, two of the factors used are directly linked to human capital, namely health standards and knowledge. The former leads to an increase in the productivity of labour if standards are improved and it can be generalised that a "Westernisation" of the age composition and state of health of the people in underdeveloped countries would increase potential productivity by 20 to 30 per cent.[48]

The factor of knowledge comprises all degrees of skill, including research, and Horvat states that "The experience of planning seems to suggest that knowledge (and certainly not investment resources) is the most important scarce factor in underdeveloped countries with an otherwise favourable social climate. Thus growth of 'know-how' is likely to pose the limits to the general economic development."[49] This means that the absorption of investment into the economy depends upon the human factor. To show this Horvat derives the following formulation :-

$$IP = f\left[I, \frac{dI}{dt} \; ; \; A, \frac{dA}{dt}\right]. \qquad \ldots\ldots \quad (1)$$

where IP = investment production function

I = quantity of investment

A = absorptive capacity of the economy.

Thus the investment production function depends upon the quantity of investment, the absorptive capacity of the economy and the speed of their expansion. The factor A in the above equation (1) is complex and depends upon the four variables of personal consumption, health, knowledge, and economic and political organisation. All other relevant

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[47] For this reason the Horvat formulation has been included in the text. It portrays the essential credo of those who advocate the primacy of human capital. The analysis which follows is based on the main aspects of the article by Horvat.

[48] See J.J. Spengler, "The Population Obstacle to Economic Betterment", American Economic Review, Vol. 41 (1951), p. 344.

[49] B. Horvat, op.cit., p. 752.

factors are lumped together as a single exogenous factor (E).

Thus equation 1 can be re-written incorporating the following for factor A;

$$A, \frac{dA}{dt} = g\left[C, \frac{dC}{dt}; H, \frac{dH}{dt}; Kn, \frac{dK}{dt}; O, \frac{dO}{dt}; E, \frac{dE}{dt}\right] \ldots (2).$$

Horvat, then, believes that from this a maximisation of production can be obtained, which results in economic growth for underdeveloped countries, where an underdeveloped country is one in which the share of factor I is less than optimal, or where factor A is at a low level.

As the economy expands, the level of factors incorporated in A will rise, and this will change their productive functions. Horvat maintains[50] once poverty economics are left behind and people are well fed, have reasonable leisure time and enjoy a healthy life, factors G and H lose their place in the investment production function (that is, they are no longer productive agents, but ends in themselves). Further, when a stage of relative stability is reached, political and economic organisation is also reached, thus factor O can be eliminated. "In this way A will be reduced to Kn, which remains the only limitational factor on growth. The 'intellectual capacity' of a community will provide unsurpassable limits for the productive application of investment and so for the speed of expansion of its economy."[51] Thus Horvat believes, while knowledge and skill are always increasing, there are limits and lags on the speed of change, which will directly affect the speed of investment, via application of his formulation, and thus economic growth.

This attempt by Horvat to show the relevant role of human capital has both merit and failings. As a "primum mobile" this obviously falls under the attack upon which Hirschman based his whole strategy,[52]

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[50] ibid., pp. 760 ff.

[51] ibid., p. 761. It is interesting to note here that Horvat pays no further heed to his exogenous factor E. It can only be presumed he considered it to be a constant, which is a highly unrealistic assumption in this case.

[52] See A.O. Hirshman, op.cit.

in that development depends not so much upon finding the single factor, but upon finding the optimum combination with the greatest linkage to induce further growth. He believes one must not think in terms of a "missing agent", whose injection will solve the problem, but must instead concentrate on the need for a "binding agent."[53] As analysed by Horvat, human capital is seen as the missing agent, but it could also be viewed, quite feasibly, as a binding agent by a slight modification to the formulation to concentrate not on the lack of one, or several, "needed factors or elements that must be combined with other elements to produce economic development, but with the deficiency in the combining process itself."[54]

Altogether the role of human capital in economic growth and development is crucial, but, by itself is not sufficient, as "Economic development is the result of a combination of social, cultural, political and economic changes which in turn brings about further changes."[55] It thus seems impossible to isolate any one of these variables as the inevitable prime mover, though education has been seen as "the greatest single pace setter of development..."[56] Yet any attempt to indicate either human capital or any of its components as the only key to economic development would be erroneous, but it is apparent that its role has become acclaimed as more important, in the large majority of cases, than that of material capital as an inducement mechanism for economic growth.

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[53] ibid., p. 7.

[54] ibid., p. 25.

[55] P.T. Bauer and B.S. Young, The Economics of Underdeveloped Countries (Cambridge, 1960), p. 128.

[56] E.G. Malherbe, Bantu; Manpower and Education (Johannesburg, 1969), p. 32.

CHAPTER 6

HUMAN CAPITAL AND ECONOMIC METAMORPHOSIS

It has been shown how human capital plays an important role in economic growth and development. The foregoing analysis, however, makes no distinction between economic growth and economic development.[1] It is necessary to distinguish between these two concepts and show how human capital affects development directly and causes growth indirectly via the link between the two.

A growing body of economic theory tends to support the view that economic growth and development is not an automatic or inevitable process and that it has to be actively created and advanced. The role of human capital in initiating and sustaining development to enable an economy, or even a laggard sector of an economy, to transform itself from a traditional to a modern stage has been attributed various amounts of importance by different economists. It has been incorporated in both general and partial theories of development, but as yet no precise role can be universally attributed to it in the development process.

In order to evaluate this role it is necessary first to ascertain exactly what is meant by a traditional or underdeveloped economy. Hla Myint[2] formulated a valuable distinction between "underdeveloped" and "backward" which is relevant to the role of human capital.

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[1] Often the word "growth" is used in a lexical sense whereby it represents both economic growth and economic development. These concepts are not synonymous and it is important to distinguish between the two, especially in the light of the role played by human capital. The former concept is manifest by an increase in national output aggregates, while the latter entails, above this, structural changes, technical advance, the closing of regional and sectoral gaps, and so on. The relationship between the two is that growth is a function of development. On this distinction see C.P. Kindleberger, Economic Development (Tokyo, 1965), p. 3. Human resource development is an integral part of both concepts, though it does not have an equal impact on each.

[2] H. Myint, The Economics of Developing Countries (London, 1965).

He postulated that the terms underdeveloped and developed could be applied only in relation to the natural resources of a country, whereas those of backward and advanced were descriptive of the human resources in the country. It is thus a misconception when poor nations are variously described as backward, underdeveloped and developing in the same sense. With human resource development, especially education, it is, ironically, the most emotive word "backward" which gets closest to the essence of the problem.

Underdevelopment is therefore often a direct result of backwardness, and in this context the role of human capital can be seen as both vital and necessary in the metamorphosis of an economy. The task of education and health is made even more difficult where both backwardness and underdevelopment exist together, for under such circumstances its initiating role is heavily swamped. A common feature of underdevelopment and backward countries is the existence of "a vicious circle of poverty". In the words of Ragnar Nurske this "implies a circular constellation of forces tending to act and react upon one another in such a way as to keep a poor country in a state of poverty."[3] This concept explicitly entails the concept of human capital, for ill health and lack of training can reduce a workers productivity, which in turn induces poverty, which leads to under-nourishment and little human resource development, which perpetuates ill-health and lack of education.

Human capital is thus directly linked to the poverty of nations and many economists see it as the key to breaking the vicious circle, for the only way to breach the above circulatory process is to promote human resource development by education and health investments. In this way human capital, by raising labour productivity can be both a necessary and sufficient condition for development.[4] In such an

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[3] R. Nurske, Problems of the Capital Formation in Underdeveloped Countries (Oxford, 1958), p. 4.

[4] In terms of the Rostowian analysis of development, education and health in this case would become the key pre-condition to "take-off" from the traditional society with its production ceiling into the stage of self-sustained economic growth. See W.W. Rostow, op.cit.

instance education can be seen to be "not only a process for transmitting the values of a particular society, but also ... as an aid to rapid economic development."[5]

Human capital's most important facet as an inducement mechanism for economic growth is that it has the ability to increase the productivity of labour, as witnessed earlier. It achieves this movement of the production function by inducing the use of better techniques and methods, and by inducing a re-orientation of economic and social outlooks.

A common feature of many underdeveloped nations, especially in Africa, is that there is no "dynamism" blatantly present. Economically, the outstanding feature is a lack of the strategic factor of production-modern industrial entrepreneurship. This is bound up with the totality of factors which make up a way of life in underdeveloped economies. Education (and to some extent health also) by re-orientation, attempts to overcome this, but it cannot produce an adequate supply within a reasonably short time.[6] This is perhaps the greatest failing, for it has a relatively long time horizon, though shortcut methods can be attempted, according to psychologists, to develop the necessary "eta-achievement" in selected individuals.[7] It is feasible to import outside help to overcome the problem in the short run, but in the long run, the economics of importing skills does not solve the problem,[8] for unlike physical capital, human capital cannot be lent in unlimited quantities.

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[5] Phoenix Group, Planning for Progress (Salisbury, 1963), p. 49.

[6] This, according to Myint, is the essence of the problem. Investment in human capital thinks too much of applying material resources to increasehuman capital when "in most developing countries the really serious limitation to the formation of new human capital is the meagre initial supply of human capital." See The Economics of Developing Countries, op.cit., p. 175.

[7] On this point see D.C. McClelland, "The Achievement Motive in Economic Growth", in N. Novack and R. Lekachman, (eds.), Development and Society (New York, 1967), p. 180.

[8] See T.W. Schultz, Transforming Traditional Agriculture (New Haven, 1964), p. 190 ff.

Another aspect, in which human capital plays a crucial role in overcoming, is that of "dualism", which is the by-product of the uneven impact of modern culture and technology on backward and underdeveloped nations. Hirschman describes it as "the prolonged co-existence and cohabitation of modern industry and of preindustrial, sometimes neolithic, techniques."[9] This results in a striking contrast between islands of modern economy in a sea of subsistence, creating two separate economies, employing different techniques and having different values.

The critical role of human resource development in this instance is to narrow the gap between these economies both socially and economically. Such a change cannot merely be grafted on, but must be induced via re-orientation of the subsistence sector. As Professor Hobart-Houghton has stated, "To make a modern economy, you must make a modern man."[10]

The concept of dualism originated from a study by J.H. Boeke on the Indonesian economy, which he claimed had general applicability.[11] He envisaged social dualism as "the clashing of an imported social system with the indigenous social system of another style",[12] and used this to validate his rejection of "Western" economic theory and its applicability to dual economics.[13] He suggested that the existence of dualism is an incontrovertible fact, but Higgins refutes such ideas on the grounds that dualism is not natural to society per se; it is more readily explained in economic and technical terms. This means that it is not a

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[9] See A.O.Hirschman, op.cit., p. 125.

[10] D.H. Houghton, "Aspects of Economic Development in Africa", in J.F. Holleman, Problems of Transition (Natal, 1964), p. 161. This statement has been criticised in that the motives which characterise a fully-developed modern man differ from those necessary in a transition period.

[11] J.H. Boeke, Economics and Economic Policy of Dual Societies (New York, 1953).

[12] ibid., p. 4.

[13] In this view he propounds the same ideas as Gunnar Myrdal in his work Economic Theory and Underdeveloped Regions (London, 1957). Myrdal believed that the application of the policies of advanced economics did not fulfil the needs of underdeveloped ones, and that "accepted" theory was by no means universal in its applicability.

pure sociological phenomenon, otherwise development would never occur.

This belief, as postulated above, renders it possible for human capital, in the guise of education especially, to overcome dualism. Whilst it is not possible to merely graft on modern economic and technological methods, it is feasible to educate the inhabitants of the subsistence economy to incorporate them, for it is obvious that no single race has the monopoly of social development or any kind of labour skill. In this way, by educational re-orientation, a modern society can be built up to incorporate modern economic sectors. The type of education instituted, however, poses a severe problem, for as W.A. Lewis found in an empirical study of West Africa, the limited absorptive capacities of the economies, especially owing to the primitiveness of agriculture, made "frustration and dislocation inevitable if more than 50% of children enter school."[14] There thus exists a tolerance level which destroys certain aspects of the plea for universal education. The opposite extreme, however, is just as disasterous, for "the negative amount of human development in underdeveloped countries has done little to extend the capacity of the people to meet the challenge of accelerated development."[15] The result has been that the rich have been getting richer and the poor remaining poor.

There is a definite and close connection between culture and education, and it is obvious that education can change social and economic values by a re-orientation of outlook and custom. It is firmly believed by many economists that "the attitudes and social values of a people, their willingness to abandon traditional ways and values and to adopt a new way of life are essential, if not indeed the most important, ingredients of economic progress."[16]

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[14] W.A. Lewis, "Education and Economic Development", International Social Science Journal, Vol. 14 (1962), pp. 685-699.

[15] G.M. Miller, Leading Issues in Development Economics (New York, 1964), p. 268.

[16] S. Van der Horst, "The Effects of Industrialisation on Race Relations in South Africa", in G. Hunter (ed.), Industry and Race Relations (London, 1965).

Such a role has often been attributed to the impact of education and other forces in creating "key groups". Such groups have differed under analysis by technicians, politicians and economists, but as concerns the last, the emphasis on the key importance of a group has fallen on entrepreneurs and innovators. In the terms of Hirschman's analysis this group helps to overcome the scarce resource of decision-making ability in his absorptive capacity thesis. The economic key-group outlined above represent Schumpeter's "New Men", who are provided by the process of education and whose task consists of breaking up old and creating new tradition.[17]

Schumpeter's "New Men" may fulfil the role of entrepreneurs in the sense that they lead the means of production into different channels and draw people into these branches of production.[18] This does not imply that economic leadership necessitates "invention", but "innovation", and as Schumpeter states, "Economic leadership in particular must hence be distinguished from 'invention'. As long as they are not carried into practice inventions are economically irrelevant. And to carry any improvement into effect is a task entirely different from the inventing of it ..., requiring different kinds of aptitudes."[19]

Yet the problem arises that inventions can more easily be imported than entrepreneurial leadership into primitive society. The only alternative is to build up a pool of such leaders by education, for it is these people who are the key to stimulating growth and development. It is not enough to say that development is a function of land, labour, capital and technology - there must be some factor which combines these in the right proportions to accomplish it. It is this organisational ability which Schumpeter sees as the fundamental

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[17] J.A. Schumpeter, The Theory of Economic Development (Massachusetts, 1949).

[18] Leadership in this context does not connote any emphasis on the personality of the entrepreneur as a leader. See M.S. Khan, Schumpeter's Theory of Capitalist Development (India, 1957), for a detailed discussion of the concept of "New Men".

[19] J.A. Schumpeter, op.cit., p. 88.

phenomenon of economic development and as the characteristic of his "New Men". This view is supported by, amongst others, Harbison,[20] Gerschenkron,[21] and Hirschman,[22] who postulate that differences in organisation explain differences in labour productivity; organisational drive is necessary for development and is often provided by government in the early stages of development; and that decision-making talent is the limiting factor in development.[23] Such development as is initiated by these "New Men" tends to occur in leaps and bounds (known as Schumpeterian "tidal waves" or "clustered innovation") giving an ungradual and unharmonious process. In essence then, Schumpeter advocates the enlargement of reservoirs of entrepreneurs, (through human resource development), which will result in unstable growth, for his theory maintains that "Economic growth occurs when the social climate is conducive to the appearance of a sufficient flow of New Men."[24]

Other writers who attribute a high degree of economic development as the resultant of cultural determination are Hagen and McClelland. Like Schumpeter and many others they believe that social and cultural

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[20] F. Harbison, "Entrepreneurial Organisation as a Factor in Economic Development", Quarterly Journal of Economics, Vol. 70 (1956), pp. 364-379.

[21] A. Gerschenkron, "Economic Backwardness in Historial Perspective", in B.F. Hoselitz (ed.), The Progress of Underdeveloped Areas (Chicago, 1952), pp. 3-29.

[22] A.O. Hirschman, op.cit.

[23] Organisation can thus be included as a separate factor in a production function analysis. This could be written as

$Y = f(L, K, L_o, T, O)$ where Y = income/output
L = land
K = capital
L_o = labour
O = organisation

Here O is unlike the other inputs as it cannot be substituted (it is a complementary factor). In this case the production function becomes "linear limitational" and has certain properties, all of which result from the O factor. See on such properties, E. Schneider, Pricing and Equilibrium (London, 1962), pp. 140 - 144.

[24] B. Higgins, op.cit., p. 104.

conditions shape economic development and dispute the credo that economic development determines society and culture. Hagen,[25] for example, deals with the "creative" or "achieving" personality type, who is said to be the direct result of disruptive forces on a traditional, peasant-based economy. He regards economic variables "as mere parameters or conditioning circumstances within which cultural change of a fundamental sort brings about a change from economic stagnation to growth."[26] He thus basis his theory on the postulation that traditional society is perpetuated until the inculcated authoritarian personality in a people is broken by a group who develop an achievement need. This need is largely a result of education, in its broadest sense.

McClelland,[27] following basically the same line of thought, attempts to establish a chain of causality to show that high levels of "n-achievement" are associated with entrepreneurial endeavour and concludes that this achievement factor is a variable which actively promotes economic development and originates from education. Thus education, whilst not the only factor, is a prime mover in attaining n-achievement and hence in establishing economic development.[28]

The general conclusion of these writers, who deal with the "non-economic" aspects of development, is that where cultural stability is incompatible with rapid economic development and growth, education must

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[25] E.E. Hagen, On the Theory of Social Change : How Economic Growth Begins (Illinois, 1962).

[26] C.P. Kindleberger, Economic Development (Tokyo, 1965), p. 19

[27] D.C. McClelland, The Achieving Society (Princeton, 1962).

[28] These theories select cultural factors as causal in economic development and are as such significant. Yet cultural factors were never ignored by economists. Rostow, in The Process of Economic Growth (Oxford, 1960) included these in his propensities (Chapter II); and I. Adelman introduced a factor Ut. into her production function. (See Theories of Economic Growth and Development (California, 1961), p.13). This represented the social, cultural and institutional complex of society. The main difference is, therefore, that they considered cultural factors as one of many, whereas Hagen and McClelland considered them as the decisive ones.

accompany any economic "big push" for the optimum adaptation. In other words, a socio-cultural big push thesis is necessary as well as an economic one.

In the above analysis the role of human capital, in the form of education, has been indicated as the underlying factor in the metamorphosis of an economy from a primitive to an advanced stage. An attempt has been made to give a comprehensive treatment of a situation which does not lend itself to a systematic and integrated analysis to any great degree. Yet it is evident that education affects both man and society to produce economic development. It is necessary to motivate and change both, because development is essentially a process of continual change and would not occur if either of these was ignored. The importance of social change is real, for, as Kerr has stated, "The real problem is not the adaptability of man, which is almost infinitely greater than we once supposed, but the suitability of institutions and their policies ..."[29] And education is the fundamental means to this end. It is, however, not the panacea, for the existence of such phenomena as "intellectual unemployment" indicates that education can often be abortive and irrelevant to economic growth. Yet, in general, education facilitates the "abnormal" process of economic growth and indicates the vital role human capital plays in the economic metamorphosis of an economy.

CONCLUSION

The overall conclusions which can be derived from the foregoing theoretical analysis of the concept of human capital are;

1. The economics of education, health, migration and market information are no longer studies of secondary importance, tagged onto the general field of economic study.

2. Although no comprehensive version of the many facets and effects of human capital exists, it has become an integral part of

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[29] C. Kerr, "Changing Social Structures", in W.E. Moore and A.S. Feldman (eds.), Labour Commitment and Social Change in Developing Areas (New York, 1960), p. 350.

the science of economics and represents one of the fastest growing branches of contemporary economic theory.

3. The concept of human capital, as an addition to the all-inclusive capital concept, provides an insight into economic problems hitherto insoluble; and prevents an over-emphasis on material resources.

4. Material capital can induce growth to some extent, but in the long run this has to be augmented by the presence of human capital for self-sustained growth - the will as well as the means to succeed must be present.

5. Human capital results from an investment in human resources and is a factor of production by definition in that besides being a creation of human wealth, it is capable of creating wealth.

6. The costs and returns of investments in human capital are measurable to some extent, though there are severe limitations to this. Yet it is apparent that these investments have a high relative degree of profitability.

7. The role of human capital in economic growth and development is significant. It has a definite role in initiating and coercing development and hence growth, but care must be taken when prescribing human capital as the universal panacea for the problems of underdevelopment.

PART TWO

THE SOUTH AFRICAN ECONOMY

"If you are thinking a year ahead, sow seed,
If you are thinking 10 years ahead, plant a tree,
If you are thinking 100 years ahead, educate the people,
By sowing seed you will harvest once,
By planting a tree you will harvest tenfold
By educating the people you will harvest one hundred fold."

Kuan-Tzu (3rd. Cent. B.C.)

CHAPTER 7

THE SOUTH AFRICAN ECONOMY

7.1. INTRODUCTION

The application of the theory of human capital formation to an economy is beset by a number of problems, both conceptual and statistical. However, in this part of the study, an attempt will be made to give some indication of the size of the stock of human capital in South Africa, the rate at which it is increasing and its role in the growth and development of the economy.

Human capital is dependent upon two factors; the availability of human resources in the economy and the effective utilisation of such resources in the form of investments made in them. The former is directly linked to the demographic composition of the population and the latter to the relevant investment policies on both a private and a public level.

In this part of the study we first look at the size and characteristics of the South African population.

7.2. HUMAN RESOURCES

The people of the Republic have been described as "a mosiac of different ethnic groups living in a complex social structure."[1] The population is divided into four main groups, with many sub-groups, giving a broad racial structure of Whites, Africans, Coloureds and Asians.

Table 1 shows the broad demographic trends in terms of population estimates broken down into the four racial groups. Figure 6 indicates the same information graphically. In general, aggregate population figures are important to any economy, but in the case of South Africa,

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[1] N. Hurwitz and O. Williams, The Economic Framework of South Africa (Pietermaritzburg, 1962), p.26.

TABLE 1

ESTIMATES OF SOUTH AFRICAN POPULATION, 1955-1980
(Millions)

Year	Total	White	Coloured	Asian	African
1955	14.07	2.84	1.27	.42	9.54
1956	14.43	2.89	1.31	.43	9.80
1957	14.79	2.93	1.36	.44	10.06
1958	15.15	2.98	1.40	.45	10.32
1959	15.55	3.04	1.45	.46	10.60
1960	15.93	3.07	1.50	.48	10.88
1961	16.38	3.12	1.55	.49	11.22
1962	16.85	3.17	1.60	.50	11.58
1963	17.36	3.24	1.65	.51	11.96
1964	17.89	3.32	1.70	.52	12.35
1965	18.43	3.40	1.75	.53	12.75
1966	19.00	3.48	1.80	.55	13.17
1967	19.57	3.56	1.86	.56	13.59
1968	20.16	3.64	1.91	.57	14.04
1969	20.78	3.73	1.96	.59	14.49
1970	21.30	3.8	2.0	.6	14.90
1980	29.40	4.7	2.7	.8	21.2

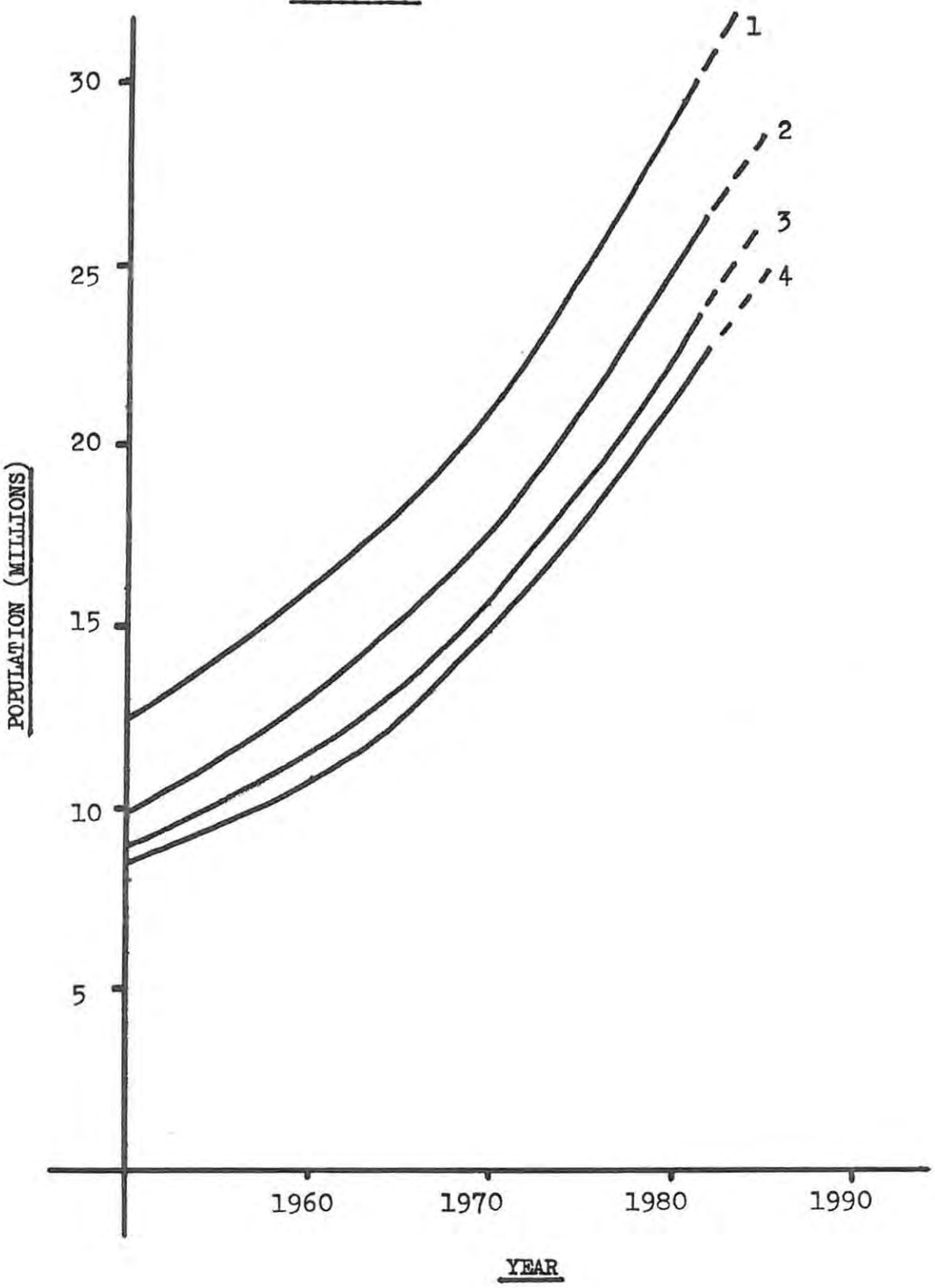
Notes : (a) Figures for 1955-1969 are mid-year estimates.

(b) Figures for 1970 and 1980 are provisional estimates.

Sources : (1) 1955-1969, South African Statistics, 1970 (Pretoria, 1971), p. A-11.

(2) 1970, 1980, J.L. Sadie, "An Evaluation of Demographic Data Pertaining to the Non-White Population of South Africa", Parts I, II, III, South African Journal of Economics, Vol. 38 (1970); and 1970 Census (Department of Statistics).

FIGURE SIX



1 = total population

2 = African, Asian and Coloured

3 = African and Asian

4 = African

POPULATION ESTIMATES, 1950 - 1980

great importance must be attached to racial differences, due to the complexity of the social, political and economic make-up of the country.

Table 2 shows the composition of the South African population by race both in aggregates and percentages for 1951, 1960 and 1970. Table 3 shows the annual growth rate of the total population and of racial groups over selected periods.

From these tables it can be seen that there are important racial differences in the South African population.[2] The Africans form the most significant section in numbers, 14.9 million out of a total of 21.3 million in 1970, whilst the total numbers of Whites, Coloured and Asians are 3.8 million, 2.0 million and .6 million respectively.

From Table 2 it can be seen that the proportion of Africans in the total population has steadily increased from 67.6 per cent in 1951 to 70.0 per cent in 1970. That of the Whites has declined from 21 per cent to 17.8 per cent over the same period. The Asian and Coloured sections have remained relatively constant in size at about 9 and 3 per cent of total population respectively over the period 1951 to 1970, but it is important to note the tendencies shown in their annual growth rates.

The growth rates of the total population and the individual racial groups can be seen in Table 3. That of the Whites is relatively low compared to the other racial groups, with that of the Africans being the highest over the last decade (3.18 per cent per annum). In the next decade it is estimated that the growth rates of all races, except that of the White racial group, will increase, resulting in a considerable increase in the rate of growth of the total population (from 2.94 per cent per annum to 3.25 per cent per annum). Also, apart from the Whites, all the other racial groups have relatively explosive rates of growth, that is, around 3 per cent per annum or more.

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[2] It must be noted, however, that differences may be exaggerated because changes in population trends may not be explained only by natural changes, but also by more complete and accurate enumeration, and by immigration tendencies. This is particularly so with Non-White groups in the former case and with Whites in respect of immigration.

TABLE 2

SOUTH AFRICAN POPULATION BY RACE

	1951		1960		1970	
	Mil.	%	Mil.	%	Mil.	%
White	2.6	20.9	3.1	19.3	3.8	17.8
Coloured	1.1	8.7	1.5	9.4	2.0	9.4
Asian	.4	2.9	.5	3.0	.6	2.8
African	8.6	67.6	10.9	68.3	14.9	70.0
TOTAL	12.7	100	16.0	100	21.3	100

Sources : (1) South African Statistics (Pretoria, 1971), p. A-11.

(2) 1970 figures, Table 1.

TABLE 3

ANNUAL POPULATION GROWTH RATES
(Percentages)

	1951-1960	1960-1970	1970-1980
White	1.64	2.16	2.14
Coloured	3.40	2.91	3.04
Asian	2.93	2.24	2.91
African	2.67	3.18	3.58
TOTAL	2.52	2.94	3.25

Source : (1) South African Statistics 1970 (Pretoria, 1971), p. A-11.

(2) Table 1.

An important feature of the economy as a whole is the total annual growth rate of the population. It is estimated that the population will increase at about 3.25 per cent per annum for the coming decade. This is considerably greater than the present world rate[3] and is significant, for although human resources are necessary for economic development, they can have a depressive effect on per capita incomes if the rate of increase is too great.[4] The South African rate of increase of the total population does not appear to have a depressing effect on per capita incomes and appears to be relatively satisfactory, but this has to be qualified in that the largest increase is experienced by those groups which can least support it, especially the African group.

Table 4 shows the forecasted crude birth and death rates by race for the periods 1970-1975 and 1975-1980. It can be seen that the Coloured and African populations are undergoing population explosions and will, in the future, form a larger part of the labour force. Crude birth rates are declining for all sectors, but the "demographic gap" is being widened by the fact that death rates are declining more rapidly, resulting in relative increases. It is estimated, for example, that the African birth rate will decrease from 40.7 to 39.4 per cent, in the two periods stated, representing a fall of 1.3 per cent. It is also estimated that the death rate will fall from 14.1 to 12.6 per cent, a decline of 1.5 per cent, resulting in a net increase of 0.2 per cent.

Perhaps the most important aspect of the South African population trends is the increasing relative preponderance of children in the population. This is of paramount significance from the human capital

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[3]The present world rate is 1.9 to 2.0 per cent per annum, see J.L. Sadie, "Contemporary World Demographic Trends", South African International Affairs Conference (Johannesburg, 1970), p.1.

[4]According to J.J. Spengler in his paper "The Population Explosion: Implications", delivered at The South African International Affairs Conference (June, 1970), too fast a growth rate in the population can be disadvantageous in that its age composition is less favourable to production than when it is growing slowly; population growth absorbs inputs which might otherwise have been used to increase per capita productivity; and there is undue pressure upon the physical environment brought about by the increased aggregate size of the population. (pp. 8 - 10).

TABLE 4

CRUDE BIRTH AND DEATH RATES BY RACE
(PERCENTAGES)

	Birth Rate		Death Rate	
	1970-75	1975-80	1970-75	1975-80
White	23.2		8.3	
Coloured	44.5	43.8	11.1	10.1
Asian	30.5	28.4	6.1	5.4
African	40.7	39.4	14.1	12.6

Sources : (1) J.L. Sadie, op.cit.

(2) D.J.M. Vorster, Labour Requirements for 1970's (Address at National Development and Management Foundation 9th Business Outlook Conference, October, 1970) Table IV. (Original source of information being a private communication with J.L. Sadie).

viewpoint because of the long time horizon in its formation. Table 5 shows the estimated age distribution of the population by race for 1960, 1970 and 1980.

The Whites are the 'oldest' racial group, with approximately 7 per cent over 64 years of age. This is similar to Western European nations and is due to the low death rates and a high rate of immigration in the middle age group, which balance the higher birth rate, resulting in a smaller demographic gap. The Asians are emulating the Whites in population character. They have left the explosion phase and are relatively older, with a large percentage in the economically active group (15 - 64 years). The Coloured and African groups are experiencing explosions, and have as a result, a relatively younger and more mobile make-up.

The age composition of the labour force has a direct bearing on labour force participation. In turn, the age composition depends upon the rate of growth of the population and of the different sectors. Too young or too old a population can have harmful economic effects as it results in a relatively small percentage being in the economically active age groups.

In South Africa it can be seen that the different racial groups have different age compositions, resulting in different effects on labour force participation. The effects of human capital on the economy are a direct result of labour force participation, thus it can be seen that at present the impact of a racial group on the economy varies according to its age composition. The age compositions can be expected to change in the future, depending upon the rates of growth of the different racial groups, and the importance of the non-White racial groups is likely to increase as relatively more of them enter the economically active age group.

Table 6 shows the economically active population by race and sex. It can be seen that important racial discrepancies again occur. The schooling period for Whites is longer, resulting in a lower proportion of the population being economically active in the 15 - 19

TABLE 5

ESTIMATED AGE DISTRIBUTION OF SOUTH AFRICAN POPULATION BY RACE (PERCENTAGES)

	WHITE			COLOURED			ASIAN			AFRICAN		
Age Groups	1960	1970	1980	1960	1970	1980	1960	1970	1980	1960	1970	1980
0 - 14	41.2	37.7	32.9	54.6	46.2	46.0	56.3	38.1	36.1	-	40.9	40.8
15 - 64	52.0	61.7	59.6	42.1	51.0	51.1	41.9	59.2	61.0	-	55.9	55.8
65 +	6.8	6.6	7.5	3.3	2.8	2.9	1.8	2.0	2.9	-	3.2	3.4
TOTAL	100	100	100	100	100	100	100	100	100		100	100

Notes : The 1960 figures are for age groups divided into 0-19, 20-64 and 65+ years. They are thus not to be compared exactly with figures for 1970 and 1980.

Sources: (1) 1960 figures, F.E. Rädel, Marketing in the Seventies (Address at N.D.M.F. 9th Business Outlook Conference, October, 1970), Table 2, p.6. (Original source of information not disclosed).

(2) J.L. Sadie, op.cit.

(3) South African Statistics 1968 (Pretoria, 1968), p. A-13.

TABLE 6

ECONOMICALLY ACTIVE POPULATION WITHIN AGE GROUPS
BY RACE AND SEX, 1960 (PERCENTAGES)

	MALES				FEMALES			
	White	Coloured	Asian	African	White	Coloured	Asian	African
15-19	36.71	82.15	43.90	77.38	33.12	67.03	5.59	33.00
20-24	91.52	97.49	93.43	96.91	50.25	57.67	9.14	32.72
25-44	99.13	98.79	99.23	99.37	28.93	37.87	7.66	25.45
45-64	94.22	94.31	94.50	98.34	24.77	29.08	8.83	23.48
65 -	40.39	37.86	30.70	64.27	50.60	61.28	2.58	12.77

Sources : South African Statistics 1968 (Pretoria, 1968), pp. H-14 to H-29.

years age group - 36.71 per cent as opposed to 82.15, 43.90 and 77.38 per cent for Coloured, Asian and African males respectively. Similarly increased post-school education (and military training) has decreased the proportion economically active in the 20-24 age group.[5]

At the other end of the scale, the larger incomes earned by Whites results in earlier retirement and hence a lower proportion active in the oldest age group of 65 years or more - 40.39 per cent of the White population in this age group is economically active compared to 64.27 per cent of the African population.

Female participation differs greatly from that of the males, and is considerably less for all age groups, except that of the oldest, in the White, Coloured and African racial groups. Female participation has increased due to the greater availability of opportunities and changes in attitudes towards the employment of women. Although they form an important source of labour, it must be noted that participation is erratic and is highest in the pre-family (15-24) and post-family (45+) age groups.[6]

Table 7 shows the economically active population by race and sex for the years 1960, 1970 and 1980, both in absolute numbers and as a percentage of the respective total population groups. The changes in absolute terms appear favourable in the light of labour force participation and human capital potential in the economy. Over the decade from 1960 to 1970 there has been an apparent decrease in the numbers economically active, expressed as a percentage of the total population group, for all racial groups except that of the Whites. From 1970 to 1980, it is estimated, this trend will continue in the White, Asian and African male groups, with the increase in the Coloured group being

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[5]This, as has been indicated in the preceding part, is an economic cost of education, in the form of resources not being available for production purposes until the relatively long time period of education has been completed.

[6]South Africa's percentage economically active is much lower than for other industrial countries. See Statistical Appendix, Table A5, for comparisons.

TABLE 7

ECONOMICALLY ACTIVE POPULATION BY RACE AND SEX, 1960, 1970, 1980

	1960 (000's)	1970 (000's)	1980 (000's)	1960 %	1970 %	1980 %
White M.	855	1,073	1,310	55.7	56.1	55.1
F.	296	370	500	19.1	19.5	21.5
Coloured M.	376	470	650	50.1	45.0	46.0
F.	178	223	350	23.8	21.0	24.3
Asian M.	114	152	180	47.3	47.1	44.3
F.	12	23	40	8.6	7.3	9.9
African M.	3,051	3,813	4,800	55.4	51.0	50.2
F.	839	1,047	1,400	15.5	14.6	15.0

Sources : (1) Assembly; Hansard, 17.2.70, No. 3, Col. 1185.

(2) D.J.M. Vorster, op.cit., Table V.

(3) South African Statistics, 1970 (Pretoria, 1971), p.H-7.

so small as to be relatively insignificant. Such decreases can be explained by increases in the schooling period and the schooling population.

The total supply of labour in the economy is increasing and Table 8 shows the estimated increase and rate of growth for the period 1970 to 1980. It can be seen that the rate of growth is relatively high for all racial groups, especially in regard to females, whose growth rate surpasses that of the males in all groups.

From the above analysis of the economically active persons in South Africa, it is most apparent that women, especially the non-Whites, are an important source of labour which is still relatively unexploited, but will play a more important role in the future. Entry into the labour market of such resources will be the result of a strong demand, which is likely if a high growth rate in the economy is maintained.

7.3 CONCLUSION

The general conclusion from the above survey of demographic data is that South Africa is bound to experience a rapid increase in population over the next decade. Total population is expected to increase by 3.25 per cent per annum and the labour force by 2.8 per cent per annum. This will have important economic repercussions and as Hobart Houghton has stated, "This I believe to be the most important economic fact at the threshold of the Seventies, and one which economists, business men and politicians can ignore only at their peril."[7]

The population growth in South Africa has a dichotomous nature; increased human resources can provide a source of increased human capital, or they can be an additional burden on the economy depending upon whether they are effectively utilised or not. The above population figures are of great relevance from the viewpoint of human capital, for the supply and efficacy of human resources depends upon the absolute numbers of the population and the percentage economically active in the labour force.

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[7] D.H. Houghton, "A Perspective View of the South African Economy in the 1970's". Presidential Address to the Commerce and Economics Society (Rhodes University, May, 1971).

TABLE 8

ECONOMICALLY ACTIVE POPULATION BY RACE AND SEX. 1970, 1980

	1970 (000's)	1980 (000's)	Increase 1970-80	Rate of Growth %
White M.	1,073	1,310	237	2.4
F.	370	500	130	3.1
Coloured M.	470	650	180	3.3
F.	223	350	127	4.6
Asian M.	152	180	28	1.7
F.	23	40	17	5.7
African M.	3,813	4,800	987	2.4
F.	1,047	1,400	343	2.9

Source : Table 7.

CHAPTER 8

INVESTMENT IN HUMAN RESOURCES

8.1. INTRODUCTION

The previous chapter dealt with one aspect of the availability of human resources in South Africa, the size and characteristics of the country's population. This is fundamental to the formation and accumulation of human capital. The next logical step is to analyse the investments made in these human resources, and the emphasis here will be on physical facilities, numbers of people, and so on.[1]

Human capital is accumulated principally through investments in education and health, with migration and labour-market information being relatively less important. Education and health expenditures render labour more efficient by improvement in the quality and quantity of the population. They represent an application of capital to labour, resulting in the formation of a hybrid - human capital.

This chapter attempts to outline the education and health facilities available in the South African economy, and to give some indication of the magnitude of migration. It provides a statistical analysis of the extent of investments made in human resources in this country and considers likely future developments.

8.2. EDUCATION

8.2.1. Historical

Before any analysis of education in South Africa can be undertaken, it is necessary to have a brief historical sketch of the pattern leading up to the present situation.[2] The education structure in the Republic is, and has been, a very complicated one, split along both racial and spatial lines. This has created problems

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[1] This is the physical counterpart of monetary expenditure.

[2] For a more detailed analysis of early South African education see E.G. Malherbe, Education in South Africa (Cape Town, 1925) and M.E. McKerron, History of Education in South Africa (Pretoria, 1934).

in most aspects of education, including those of control and finance.

White education from as early as the 1830's was based on a pattern of state control. The Act of Union in 1910 provided for provincial council control of education other than higher education and this was entrenched by the Republic of South Africa Constitution Act in 1961. Thus White education was under decentralised provincial control in respect of general education and under centralised government control in respect of vocational and specialised training. In 1967 the passing of the National Educational Policy and the Educational Services Act had the effect of placing control of the educational policy of Whites in the hands of the central government, but leaving the administration of education in the hands of the provinces. There are many arguments for and against both centralisation and decentralisation of education control, but it appears that South Africa is tending to centralise in terms of educational philosophy and to decentralise administration.[3]

African education in South Africa has an intricate historical background[4] and falls into several distinct phases.[5] Prior to 1955 the arrangements for the administration of African education were complicated, with a division of control between state, provincial administration and the missions.[6] In 1945 the first step towards centralisation was taken when it was decided that all funds for African education would be drawn from the Consolidated Revenue Account. The control

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[3]For a more detailed analysis of the present day situation of White education, see R.G. Macmillan, "The Education of Whites in South Africa", in B. Rose (ed.), Education in Southern Africa (Johannesburg, 1970), Ch. 2.

[4]See J.J. Ross, "Bantu Education in Historical Perspective" in P.A. Duminy (ed.), Trends and Challenges in the Education of the South African Bantu (Pretoria, 1967).

[5]See M. Horrell, Bantu Education to 1968 (Johannesburg, 1968).

[6]See M. Horrell, African Education, Some Origins and Developments until 1953 (Johannesburg, 1963).

of education, however, remained with each province.

The Eiselin Commission recommendations in 1951[7] formed the basis of African education as introduced in 1954. African education was to become an integral part of a carefully planned policy of socio-economic development for the Africans.[8] To put this into effect the Government considered it necessary to remove African education from provincial control and for it to be administered by a Department of Bantu Education. The Bantu Education Act of 1953, as amended in 1954, 1956, 1959 and 1961, and the Bantu Education Act of 1964 dealt with the broad outlines of this new system.

There has, however, been a subsequent decentralisation of control. In terms of the Transkei Constitution Act, No. 48 of 1963, the African areas of the Transkei are eventually to become a separate territory and education control was transferred to the Transkei government in 1964. Further decentralisation of African education is planned for the future in the form of territorial education departments.[9]

Education for Asians and Coloureds in South Africa has followed the same general pattern.[10] In both cases the first effective schooling was provided by the missions and as late as 1964, four-fifths of Coloured schools in the Cape Province were mission schools, run mainly by the Dutch Reformed Church. In other parts of the Republic, Coloured education was linked to that of Africans, due to the small number of Coloureds.

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[7] Report of the Commission on Native Education 1949-1951, UG. 53/1951.

[8] See R.C. Jones, "The Education of the Bantu in South Africa", in B. Rose (ed.), op.cit., Ch. 3, pp. 56-64.

[9] See R.C. Jones, op.cit., and M. Horrell, Bantu Education to 1968, op.cit., p. 21.

[10] It must be noted, however, that there are important differences between these two racial groups which affect education, such as religion, culture and family structure.

Missionary control of Asian education quickly disappeared and gave way to a predominance of State aided schools. This feature of centralised government subsidisation linked with provincial education autonomy caused severe problems in many instances.[11]

Primary and secondary education for Coloureds was removed from provincial control by legislation in 1963 and Asian education in 1965 by means of The Coloured Persons Education Act (No. 47 of 1963) and The Indian Education Act (No. 61 of 1965) respectively. This resulted in a reorganisation of control, which has been vested in the Department of Coloured Affairs and the Department of Indian Affairs. This, it is said, has made possible relatively better planning, increased educational expenditure and more efficient control.[12]

The historical pattern of education for the different races in South Africa is complex[13] and the control for each is different. White school education is controlled by the provincial administrations and other forms of White education fall under the Department of National Education. African school education falls under the Department of Bantu Education, apart from that of the Transkei, and the official intention is that the Bantu Territorial Authorities should gradually take over the responsibilities for educational services in their own areas. Control of Coloured and Asian school education is in the hands of the Departments of Coloured and Indian Affairs respectively, but in due course is to be delegated to the Coloured and Indian Councils. School attendance is compulsory for Whites and Coloureds, but is not yet compulsory for Indian and African children.

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[11] See R. Tunmer, "The Education of Coloureds and Indians in South Africa", in B. Rose (ed.), op.cit., Ch. 4.

[12] See R. Tunmer, op.cit.

[13] A comprehensive summary of the statutory basis and developments can be found in G.H.A. Steyn, "The Main Features of Educational Development in the Republic of South Africa, 1910-1967", in South African Statistics (Pretoria, 1968), pp. 72-75.

University education has not undergone the same historical sequence of changes in control as school education. Each of the eleven White universities at present in South Africa has been instituted by private legislation and is controlled accordingly. The Extension of University Education Act (No. 45 of 1959) provided for the establishment of separate university colleges for Africans, Coloureds and Asians.[14] Five such colleges existed, but all became independent universities during 1971.

8.2.2. Statistical Analysis of South African Education

The aggregate number of people and their participation in the labour force are pertinent factors in the development of human capital and its impact on the economy. As stated above, however, the role played by these two factors is dependent upon the volume and types of investment made in human capital. Education is one such investment which helps determine the future effectiveness of human resources in the economy.

Three significant dimensions of an educational system are the amount of education received (the educational time span), the total number of persons receiving it, and the quality of the education received.[15] As Table 9 shows, in South Africa 35 per cent of the population receives 8 years of schooling, 13 per cent 12 years and only 1.1 per cent reach university or college. These figures compare most unfavourably with those shown in the table for Canada, the U.S.A., and Japan.

These South African statistics do not, of course, apply uniformly to all racial groups. Table 10 shows the racial breakdown of pupils at

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[14] All were connected to the University of South Africa with regard to academic matters, such as syllabuses, examinations and degrees.

[15] The quality aspect is the most difficult to quantify. Here emphasis will be placed on the quantity of education received by persons in the economy. On the quality component, see Appendix II.

TABLE 9

INTERNATIONAL COMPARISON OF PERCENTAGE OF POPULATION REACHING VARIOUS EDUCATION LEVELS

Level of Education	South Africa 1960	Canada 1961	U.S.A. 1960	Japan 1960
8 years	36.0	67.7	50.6	65.5
12 years	13.0	18.7	33.4	25.2
University and College	1.1	3.3	7.7	6.3

Source: Statistical Year Book 1964 (UNESCO, 1964) p. 63, Table 6.

TABLE 10

STUDENTS AT VARIOUS EDUCATIONAL LEVELS BY RACE. 1962. (PERCENTAGES)

	Total	White	Coloured	Asiatic	African
Post-Graduate	0.2	0.8	0.01	0.1	0.01
Post Std. X	1.8	5.7	0.8	1.8	0.1
Secondary	13.2	35.0	10.6	16.7	3.0
Primary	84.8	58.4	88.6	81.4	96.9
TOTAL	100	100	100	100	100

Notes: Figures include both full-time and part-time pupils.

Sources: E.G. Malherbe, Bantu Manpower and Education (Johannesburg, 1969), p. 37.

various levels of education.[16] From this it can be seen that the South African educational pyramid is broadly based, especially in the non-White racial groups. The greatest divergence is represented by the educational pyramids of the African and White groups, with 97 per cent of African pupils in the primary level compared to 58 per cent of Whites. In the post-school levels the relative positions are reversed. These marked racial differences which exist in educational structure have important economic consequences.

The development of human capital obviously depends upon the available basic facilities. Not only must there be a sufficient flow of pupils, there must also be adequate numbers of schools and teachers to maintain this flow. Table 11 shows the numbers of schools, teachers and pupils in 1967, the most recent year for which complete data is available.[17] Again, considerable racial differences exist but the same pattern predominates in that the Whites are in a relatively favourable position as compared to the non-White groups. The most important aspect is the considerable discrepancy between the proportion of Whites of school-going age receiving education and that of non-Whites. This has even greater relevance when it is considered that the numbers entering higher education levels are a function of those in the lower levels. The figures would suggest that the numbers of non-Whites qualified to enter universities and training colleges will be extremely limited in the foreseeable future.

Table 12 shows the numbers of pupils matriculating and qualifying at institutions of higher education. These figures can be closely correlated with the respective educational pyramids and the numbers of schools and teachers available for each racial group. The most

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[16] For a more detailed analysis of the respective school figures, see Statistical Appendix, Table A.6.

[17] More recent figures for Africans, in respect of Teachers, Pupils and Schools are published in the Bantu Education Journal (Pretoria), Vol. XVII, Nos. 4, 5, and 6.

TABLE 11

SCHOOLS, TEACHERS, PUPILS AND POPULATION OF SCHOOL-GOING AGE. 1967. (THOUSANDS)

	Total[a]	White	Coloured	Asian	African[b]
Schools[c]	12.4	2.7	1.8	.4	7.5
Teachers	82.7	36.1	11.9	4.4	30.3
Pupils	3186.9	793.2	431.5	154.6	1777.6
Population of School-going Age (5-19) (d)	6362.8	1008.0	644.0	210.0	4500.8[e]
Pupils as percent of Population of School-going Age (5-19) (d)	50.4	78.6	67.0	73.6	39.5

NOTES: (a) Totals do not necessarily balance, due to rounding off.

(b) African figures are for 1966.

(c) Schools include both private and public schools.

(d) Population figures are for those of school-going age - 5 to 19 years and are for 1965.

(e) Population figures were derived by taking the proportion of population in the relevant age groups as given in the 1960 census returns and applying this to the 1967 mid-year population estimate.

SOURCES:

(1) Statistical Year Book, 1964 (Pretoria, 1964), p. A-17.

(2) South African Statistics, 1968 (Pretoria, 1968), pp. A-11, A-12, A-16, A-19, E-13, E-21, E-27 and E-33.

TABLE 12

MATRICULATION AND HIGHER EDUCATION RESULTS BY RACE. 1966.

	White	Coloured	Asian	African
MATRICULATION:				
Total Candidates	49,590	1,425	1,555	1,547
Percentage passed	58.2	58.6	62.4	56.3
Percentage failed	41.8	41.4	37.6	43.7
HIGHER EDUCATION:				
Post-grad. degree	1,738	10	41	29
Bachelor degree	4,605	74	158	108
Post-grad. diploma	788	19	21	18
Non-grad. diploma	1,097	43	106	90

NOTES: Matriculation results for Whites are 1965 figures.

SOURCES: M. Horrell, Introduction to South Africa (Johannesburg, 1968), pp. 49, 52.

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striking feature is the low number and rate of Africans qualifying, especially when it is remembered that they constitute 70 per cent of the population of the Republic and that in the future this proportion will rise. In 1966 only 1547 Africans reached matriculation level, and of these 43.7 per cent failed, this being the highest failure rate of all the racial groups. In the White group, for example, 49,590 candidates sat the examination and the failure rate was 41.8 per cent.

In higher education institutions the Whites again have by far the greatest numbers qualifying, with the other racial groups being far behind in terms of numbers. For example, 4,605 Whites obtained a bachelor's degree in 1966, compared with 74 Coloureds, 158 Asians and

108 Africans. The same pattern prevails in the case of all other qualifications from higher education institutions.

The above figures have important implications when it is remembered that the supply of teachers, and hence the number of pupils reaching given levels of education, depends upon the number of persons qualifying from higher education institutions. The supply of trained teachers is often the limiting factor in the expansion of education, and this can be seen to be pertinent in the case of the African racial group, where the small numbers of persons qualifying at higher levels helps perpetuate the low numbers matriculating.

The provision of schools and the numbers of teachers obviously have a direct effect on the quantity of education available in South Africa for the different racial groups. Table 13 gives an indication of the way in which the number of schools, both in total and by race, has changed over the period 1960 to 1967.

TABLE 13

NUMBERS OF SCHOOLS. 1960-1967.

		1960	1961	1962	1963	1964	1965	1966	1967
WHITE:	Public	2565	2555	2559	2544	2529	2544	2492	2488
	Private	222	220	211	209	217	214	215	217
COLOURED:	Public	1567	1610	1667	1726	1736	1734	1793	1819
	Private	30	30	29	29	30	30	27	27
ASIAN:	Public	370	285	305	306	330	343	349	345
	Private	17	19	18	15	13	9	7	7
AFRICAN:	Public	6730	7001	7230	7476	8047	6709	6978	-
	Private	931	971	1118	1080	812	513	498	-
		12432	12691	13135	13385	13714	12096	12359	-

NOTES: Dashes signifying no available figures.

SOURCE: South African Statistics, 1968 (Pretoria, 1968), pp. E-13, E-21, E-27 and E-33.

The number of schools has actually declined in the period shown, due mainly to the effect of legislation passed in 1964, which can be seen to have affected African schooling most significantly. Yet even prior to this date, the number of schools from 1960 to 1964 only increased by just over 10 per cent.

Table 14 shows the changes that have occurred in the number of teachers over the period 1960 to 1967. Whilst the number of schools has declined, there has been a steady increase in the number of teachers in all racial groups. Over the period 1960 to 1963 the rate of increase in teacher numbers was 3.94 per cent per annum. Over the same period, the greatest increase in teachers has been in the Coloured racial group, with a total increase of 22.9 per cent. The corresponding increases in the White, Asian and African racial groups have been 6.2, 13.2 and 10.8 per cent respectively.

TABLE 14

NUMBER OF TEACHERS 1960-1967
(Thousands)

		1960	1961	1962	1963	1964	1965	1966	1967
WHITE:	Public	27.5	28.1	28.7	29.2	30.3	-	-	33.2
	Private	2.4	2.5	2.5	2.6	2.7	-	-	2.9
COLOURED:	Public	9.6	10.1	10.8	11.8	-	-	-	-
	Private	.1	.1	.1	.1	.1	-	-	-
ASIAN:	Public	3.8	3.9	4.1	4.3	-	-	-	-
	Private	.9	1.0	.8	.7	.7	-	-	-
AFRICAN:	Public	24.0	25.2	26.2	27.4	29.5	26.8	28.3	-
	Private	2.5	2.6	2.8	2.7	2.5	1.9	2.0	-
		70.8	73.5	76.0	78.8	-	-	-	-

NOTES: Dashes signify no available figures.

SOURCE: South African Statistics, 1968 (Pretoria, 1968), pp. E-13, E-21, E-27 and E-33.

Table 15 shows the numbers of pupils by race over the period 1960 to 1967. The rate of increase for the years 1960 to 1963 was 4.18 per cent per annum, which is considerably greater than the rate of increase in teacher numbers. The rate over the whole period 1960 to 1966 was 2.94 per cent per annum. It should be noted that the rate of increase of the population over the same period was 2.97 per cent per annum, which indicates a relatively unsatisfactory situation in respect of the intake of pupils into schools. These figures, however, again include all four racial groups, for which the rates of increase can be expected to differ considerably.[18]

TABLE 15

NUMBERS OF PUPILS. 1960-1967
(Thousands)

		1960	1961	1962	1963	1964	1965	1966	1967
WHITE:	Public	645.5	658.3	671.8	681.7	695.4	714.3	732.3	744.0
	Private	46.9	47.1	46.8	48.7	49.9	49.8	49.1	49.2
COLOURED:	Public	301.5	320.6	340.8	360.6	385.1	390.1	409.0	427.3
	Private	3.4	3.5	4.1	4.0	4.2	4.5	3.9	4.3
ASIAN:	Public	124.5	128.8	135.1	139.6	147.7	152.7	155.9	153.8
	Private	3.5	3.4	2.9	2.6	2.4	3.3	1.9	1.8
AFRICAN:	Public	1395.8	1476.7	1546.5	1635.3	1760.9	1572.0	1693.2	-
	Private	108.7	110.4	117.7	113.4	97.3	83.4	84.3	-
		2629.8	2748.8	2865.7	2985.9	3142.9	2970.1	3129.6	-

NOTES: No figures for African enrollments in 1967 are available.

SOURCE: South African Statistics, 1968 (Pretoria, 1968), pp. E-13, E-21, E-27 and E-33.

[18] It must be noted that the position may even be relatively advantageous for the African group as compared to the average, for as the White group, for example, reaches saturation point, its rate of increase will tend to lower the average and distort the true situation.

The foregoing tables indicate the numbers of schools, teachers and pupils over the given period. If any meaningful conclusions about the formal education system in South Africa are to be derived, these figures also have to be regarded in relative terms. Table 16 presents the age-specific rates of school attendance for the various racial groups in both private and public schools for 1960. As might be expected in view of the foregoing discussion, Table 16 shows significant differences in the rates of attendance amongst the various racial groups.

TABLE 16

AGE-SPECIFIC SCHOOL ATTENDANCE RATES, 1960.
(RATE PER 1000 OF POPULATION)

Age	Whites	Coloured and Asian	African
6	894	461	-
7	989	676	279
8	991	767	305
9	974	838	438
10	1,001	825	378
11	995	895	574
12	985	782	397
13	978	732	535
14	935	578	359
15	938	386	294
16	735	210	173
17	407	100	128
18	146	43	52

NOTES: No rate is given for the Africans in the 6-year age group.

SOURCE: Statistical Year Book, 1964 (Pretoria, 1964), p. E-27.

Table 17 shows the percentage of the various racial groups at school for the years 1960, 1965 and 1967. The percentage of the White population has remained relatively static over the given time period. The corresponding percentage for the Coloured group has increased quite significantly, whilst that of the Asians has fluctuated over time, but has remained at a higher level than the percentage for any other racial group. The African percentage appears to be relatively constant or marginally decreasing. This trend is of prime importance when it is considered that the rate of attendance of Africans, of just over 13.5 per cent, is approximately half that of the Coloureds and very much lower than that of any other racial group.

TABLE 17

PERCENTAGE OF POPULATION AT SCHOOL BY RACE; 1960, 1965, 1967. (THOUSANDS)

	1960			1965			1967		
	Pupils	Pop.	%	Pupils	Pop.	%	Pupils	Pop.	%
White	692.4	3069	22.5	764.1	3398	22.5	793.2	3563	22.3
Coloured	304.9	1500	20.3	394.6	1751	22.5	431.6	1859	23.3
Asian	128.0	476	27.7	156.0	533	29.3	155.6	561	27.5
African	1504.5	10880	13.9	1655.4	12186	13.6	-	12750	-

SOURCES: (1) Table 14.

(2) South African Statistics, 1968 (Pretoria, 1968), p. A-11.

A similar trend is shown in Table 18, which reflects the ratio of the total number of pupils in all Government schools to the total number of teachers. Allowing for the various types of special classes, the special function of certain teachers and the question of double sessions in African schools, the actual average size of a class may

differ widely from the ratios shown in the table. The ratio of 22 to 1 for Whites is considerably lower than that for the other racial groups and no acute shortage of teachers for White schools exists at present. The Coloured and Asian ratios are very similar to one another and have been showing signs of falling,[19] but that of the African group is high and appears to be rising. The fact that the African ratio is so high suggests a teacher shortage, and the movement to an even higher level indicates the emergence of an acute shortage in the future.

TABLE 18

GROSS PUPIL-TEACHER RATIOS (ALL SCHOOLS). 1967.
(THOUSANDS)

	Total	White	Coloured	Asian	African
Teachers	82.7	36.1	11.9	4.4	30.3
Pupils	3186.9	793.2	431.5	154.6	1777.6
Ratio	38.7	22.0	36.5	35.1	58.7

SOURCE: Table 10.

Table 19 indicates enrollments in institutions of higher learning for the years 1961, 1964 and 1980. It can be seen that the growth of university education has been rapid in recent years, but that the prevailing racial pattern is maintained in that the Whites are in a favourable position compared to the non-White groups, especially the African. An official estimate for 1980, designated (a) in the table, although not unattainable, seems highly improbable in practice for various reasons. It is more likely that the other estimate for 1980, (b), will be realised, that is, 37 per cent of Whites between the age of

[19] See The Education Panel 1961, Second Report, Education and The South African Economy (Johannesburg, 1966), Table 4.1., p. 57.

18 and 21 years will be at university as opposed to 56 per cent, and that 4.7 per cent and not only 1.3 per cent of non-Whites will be enrolled. It must be noted that the proportion of the non-White population receiving higher education in 1980 may need to be even higher than 4.7 per cent if the requirements of the economy are to be satisfied.

TABLE 19

ENROLMENTS IN INSTITUTIONS OF HIGHER LEARNING
1961, 1964, 1980.

YEAR	WHITE		NON-WHITE		TOTAL	
	Enrolment[1]	% Pop.[2]	Enrolment[1]	% Pop.[2]	Enrolment[1]	% Pop.[2]
1961	40,003	17.0	4,106	0.43	44,109	3.8
1964	48,117	18.6	6,003	0.55	54,180	4.0
1980(a)	180,000	56.0	20,000	1.3	200,000	10.5
1980(b)	118,000	37.0	82,000	4.7	200,000	10.5

NOTES: (1) Enrolments include all universities.

(2) Percentage of population refers to the population between 18 and 21 years of age.

(3) 1980(a) reflects the figures obtained by a straight projection of past trends, treating Whites and non-Whites separately.

(4) 1980(b) gives the figures which are regarded as reasonably probable, taking into account the considerations enumerated in the text.

SOURCES: (a) Union Statistics for Fifty Years (Pretoria, 1960), pp. E-3 and E-4.

(b) Statistical Year Book, 1965 (Pretoria, 1965), pp. E-3 and E-4.

The number of non-Whites will increase because at the present rate the supply of graduates will be too low for the future needs of the economy, even according to present policy, and presumably the authorities will modify the policy accordingly. The relatively slow growth of non-White enrolments in the past has been mainly due to the bottleneck at school level. It is clear that this problem must be overcome first if that of university attendance and qualification is also to be solved, which in turn will help alleviate the skilled labour shortage.

The South African economy is faced with a labour shortage problem, especially in respect of skilled labour. This is not a new phenomenon, as pointed out by Francis Wilson,[20] and is the result of the stresses and strains of economic growth.

Growth leads to an increased demand for more highly skilled and better qualified workers, and this is intensifying the skilled labour shortage experienced by the economy. Economic growth and the demand for skilled labour are closely linked and move together.[21] As Steenkamp maintains, the bottleneck to growth is not in the supply of capital, but in skills.[22]

According to a study carried out by Riekert[23] for the periods 1968 to 1980 and 1980 to 2000, the South African economy will from

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[20] See F. Wilson, "Bird's Eye View of Contemporary Labour Problems", Address given to National Labour Conference (Cape Town, 1971), pp. 1-2.

[21] See F. Wilson, ibid., p. 5 ff. The writer maintains that a consequence of economic growth is an increased demand for skilled labour -- "as an economy develops the proportion of labour that is needed in the skilled/educated category increases whilst the proportion needed in the unskilled/uneducated category decreases." (p.5). This is substantiated by reference to the United States Department of Labour, Manpower Report of the President 1965, which indicates this pattern.

[22] W.F. Steenkamp, "Labour Policies for Growth During the 'Seventies: In the Established Industrial Areas", South African Journal of Economics, Vol. 39 (1971), p. 104.

[23] P.J. Riekert, "The Economy of the Republic with Special Reference to Homeland and Border Industrial Development and the Economics of Southern Africa", Address to the 40th Annual Council Meeting of the South African Institute of Race Relations (Johannesburg, 1971), p. 13.

internal sources generate sufficient savings to maintain an average real growth rate of 5.8 per cent and 5.6 per cent for the respective periods. Yet at these growth rates it is estimated that overall labour shortages of 5 per cent and 23 per cent of the projected demand for labour will occur in 1980 and 2000 respectively.[24] Looking at this from the supply side it is estimated that the total supply of labour will only allow an average real growth rate of 5.0 per cent and 4.6 per cent for the respective periods, provided that there is a sufficient supply of skilled labour to ensure the employment of the whole labour force.[25] This condition will only be fulfilled if the non-Whites are able to shift from the unskilled to the skilled groups.[26]

The general conclusion is that if the growth rate of the economy is to be maintained, better use has to be made of the available labour resources. This implies the withdrawal of discriminatory labour legislation and the provision of better education facilities. If the education structure is to keep pace with the economy's needs for skilled manpower and human capital accumulation, it is imperative that an expansion of the educational facilities be undertaken, especially for the non-White population. As the process of higher education is a direct function of the supply of pupils from the lower educational levels, it is obvious that the first step necessary to ensure an adequate flow of human capital into the labour force is the provision of sufficient facilities at the lower levels. This does not appear to be happening at present in South Africa, as the above statistical evidence indicates.

In South Africa 17.1 per cent[27] of the total population received some formal education in 1966. According to Malherbe, in

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[24] ibid., p. 13.

[25] ibid.

[26] ibid.

[27] Calculated from Tables 1 and 15.

1962 17.9 per cent of the total population and 52 per cent of the economically active population received some education.[28] He maintains that "These percentages compare very favourably with those in most other countries and are far superior, in respect of non-Whites, to any other country in Africa, Asia or South America which has a high proportion of 'undeveloped' peoples."[29]

To many this would suggest that the necessary educational foundation for an expanding accumulation of human capital exists in South Africa. Yet from the above discussion it is clear that although the Republic enjoys a relatively superior educational structure compared to many underdeveloped economies,[30] it does not provide sufficient facilities for non-Whites to ensure unimpeded future development and growth.

The labour force is perhaps the most important factor in economic development and has to be constantly upgraded if it is to perform its role effectively. As D.J.M. Vorster has said, "one of the primary pre-requisites for the transition towards increased industrialisation is improved education and training of the labour force."[31] Industrial training requires academic education as a foundation and from the tables presented it can be seen that the Whites have a much higher educational standard than the other racial groups. Since the educational standard of Whites is favourable compared to industrial populations elsewhere, this means that the educational standard of the non-Whites must of necessity be relatively unfavourable. There are vast reserves of productivity amongst the non-White

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[28] E.G. Malherbe, "Man power Training: Educational Requirements for Economic Expansion", South African Journal of Economics, Vol. 33 (1965), p. 35, Table 3.

[29] ibid., p. 35.

[30] See H. Kitchen (ed.), The Educated African (New York, 1962), for a country-by-country survey of educational development in Africa.

[31] D.J.M. Vorster, op.cit., p. 4.

groups if they can be more highly educated and trained. If the present trend continues, investment in Coloured, Asian and African people will increase the productivity of the labour force considerably in the future, but this trend is unlikely to satisfy the requirements of continued rapid economic growth.

Thus while the educational system of the Whites appears satisfactory, it seems that at present the non-White educational system does not provide the necessary educational foundation for the future.

8.3. HEALTH

Apart from education, which is the most important component in human capital formation, health, migration and knowledge of the labour market are all subsidiary forms of investment in human resources. Education has been dealt with in detail as it is particularly relevant to the South African economy, but it is necessary to give some indication of the existence of the other forms and their impact on human capital in the economy.

Health, like education, derives its importance in human resource development from the fact that it helps push outward the economy's production-possibility frontier.[32] Health expenditures result in both a greater quantity of human resources and an improvement in the quality of these resources. With education expenditures, health is the principal means by which human capital is formed and improved.

In South Africa the control of health services is complicated, being split onto three distinct levels. The central control is vested in the State Department of Health, which has overall control and responsibility. It gives financial assistance and advice to the regional and local authorities, as well as to missions and voluntary organisations. It deals with certain matters of national concern, such as malaria control, while the provincial administrations run

[32] For a detailed analysis of the economics of health see Chapter 3.1.3 in the preceding part of the thesis.

general hospital services. In rural African areas the Department of Bantu Administration and Development has undertaken the erection and equipment of hospitals.

Expenditures on health obviously partly determine the size of the population and life expectancy. It must be realised, however, that Government expenditure on health is only one determinant of the state of health in the economy. Other determinants which are directly applicable in this instance include the racial income differentials which exist in the economy. These affect both the personal expenditure on health and the standard of nutrition, especially amongst the non-White racial groups. On this point it is often argued that an increase in African wages, for example, will lead to increased health and productivity, resulting in a net gain to the employer and the economy.

The community's state of health has an effect on both birth and death rates, and consequently on the rate of growth of the population. Table 4 indicated the crude birth and death rates by race, and showed predicted population explosions for the African and Coloured racial groups, with an enlargement of the "demographic gap" for the overall South African population, which retards, to some extent, further health improvements.

Table 20 shows changes in the general mortality and mortality rates between 1965 and 1968. Such changes can be directly attributable to health conditions and expenditures. Although deaths have naturally increased in absolute terms for all races shown, death rates have decreased. Over the period stated, the White mortality rate fell from 9.0 to 8.8 deaths per 1000 people, the Coloured rate fell from 15.2 to 14.4 and the Asian rate from 7.7 to 7.5.

TABLE 20

MORTALITY AND MORTALITY RATES, 1965, 1968

	NUMBERS		RATE	
	1965	1968	1965	1968
White	30,478	32,024	9.0	8.8
Coloured	26,561	27,603	15.2	14.4
Asian	4,121	4,204	7.7	7.3

NOTES: (a) No figures given for Africans.

(b) Foetal deaths are excluded.

(c) Rates are per 1000 of corresponding population.

SOURCE: Demographic Year Book, 1969 (New York, 1970), p. 582.

Table 21 indicates the life expectancy by age for the different racial groups for the periods 1950 to 1952 and 1959 to 1961. The predominant facts which emerge are that, in general, expectation of life has increased quite markedly. Also it is noticeable that females tend to have a longer life expectancy than males at any given age.[33] Another important trend is the distinct racial differences which occur; the Whites are in the most favourable situation, followed by the Asian group, with the Coloureds in the worst position compared to these two racial groups.

[33]This is an important aspect, because greater life expectancy means a reduction in the rate of depreciation of human capital coupled with an increase in returns.

TABLE 21

LIFE EXPECTANCY BY RACE AND SEX
(AGE IN YEARS)

		0	10	20	30	40	50	60	70	80	90	100
WHITES:												
MALE	(a)	64.6	58.1	48.7	39.6	30.7	22.4	15.5	10.1	5.8	2.9	1.2
	(b)	64.7	57.5	48.0	39.1	30.2	22.0	15.0	9.7	5.7	3.0	1.5
FEMALE	(a)	70.1	63.1	53.5	44.1	34.9	26.3	18.4	11.6	6.5	3.4	1.6
	(b)	71.7	64.1	54.4	44.8	35.5	26.7	18.6	11.8	6.6	3.5	1.6
COLOURED:												
MALE	(a)	44.8	48.1	39.5	32.3	25.5	19.0	13.6	9.2	5.7	2.4	0.7
	(b)	49.6	52.2	43.0	34.8	27.0	19.9	13.8	9.3	5.5	2.9	1.4
FEMALE	(a)	47.8	51.1	42.9	36.2	29.2	22.1	15.8	10.4	6.2	2.6	0.8
	(b)	54.3	56.7	47.4	38.7	30.1	22.8	15.9	10.4	6.0	3.2	1.5
ASIAN:												
MALE	(a)	55.8	53.2	43.2	34.5	26.0	18.3	12.2	7.8	5.2	2.9	1.3
	(b)	57.7	53.9	44.5	35.4	26.5	18.6	12.5	8.0	4.8	2.8	1.4
FEMALE	(a)	54.8	51.3	42.4	34.2	26.1	18.4	11.8	7.4	4.3	2.2	1.0
	(b)	59.8	55.4	46.0	36.9	27.9	19.5	12.4	7.4	4.5	2.7	1.4

NOTES: (a) Figures given for (a) represent the period 1950 - 1952 and those for (b) represent 1959 - 1961.

(b) No figures for the African population group are available.

SOURCE: South African Statistics, 1968 (Pretoria, 1968), p. C-18.

Within each racial group there exist important features. The life expectancy of White males has declined between the two periods, whilst that of White females has risen. Coloured males and females have followed the general trend of increased life expectancy, but their life expectancy is still below that of Whites. The trend for the Asian population has been similar, but it is important to note that in the past it was the males who had the longer life expectancy. The increase experienced by Asian females, therefore, is relatively greater than that of the males over the same period. Similar information is not available for the African population but it seems likely that life expectancy has tended to increase in the case of all racial groups.

From the point of view of economic development it is the effect that health has on the economically active population that is most relevant. It increases the number of persons economically active and lengthens their life span, though it must be remembered that few people over the age of 60 years are economically active.

The above analysis has been cast purely in quantitative terms, but it must be remembered that health has a qualitative aspect as well. The effect of investments in improved health on the quality of human resources is difficult to measure, but can clearly be seen by consideration of the vicious circle of poverty. The state of health of the community influences not only population size and life expectancy but the efficiency of the labour force as well. People who are healthier can produce more and benefit more from education, and as Enke has stated on the quality component of health, "People in poor health will lack even the mental vigour to improve their lot."[34]

8.4. MIGRATION

Migration and migrant labour play important roles in the functioning of the South African economy. The effects of migration on the stock of human capital have been discussed in the first part

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[34] S. Enke, Economics for Development (London, 1964), p. 405.

of this thesis. The basic figures relating to the economy in respect of White immigration, permanent and temporary African migration, and urbanisation are given and discussed below.

Usually in South Africa migration is considered in terms of African manpower and is analysed in relation to the institution of migrant labour and its new variant, contract labour. From the standpoint of the concept of human capital the migration of all human resources is important, for the basic premise is that all migrants carry with them significant quantities of both physical and human capital. Therefore, although African migration is the most prevalent in the economy, that of the other racial groups, noticably the Whites,[35] is also of importance.

8.4.1. White Immigration

The net immigration of Whites over the periods 1951 to 1960 and 1961 to 1970 is shown in Table 22. It can be seen that the number of immigrants rose significantly over the two periods, that is, from 37,000 in the first period to 262,000 in the later period. It is also noticeable that the proportion of males is significantly higher than that of females, for example, 9.9 per cent of the increase in population over the 1951 to 1960 time period was due to male immigrants compared to the 6.9 per cent resulting from female immigration. The same trend is evident for the 1961 to 1970 period.

Besides the direct effect additional resources have on human capital, there is an indirect effect which can be guaged by considering the percentage of the increase in population represented by migrants. From the table it can be seen that White immigration has increased significantly over the two periods shown, both in aggregate numbers and as a percentage of the population increase.

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[35] This stems from the fact that the White migrants are mostly people with skills and the inflow or outflow of expertise directly affects the human capital position in the economy.

TABLE 22

NET IMMIGRATION, WHITES, 1951-60, 1961-70

	1951 - 1960		1961 - 1970	
	1.	2.	1.	2.
Males	21	9.9	143	41.8
Females	16	6.9	119	37.4
Total	37	8.4	262	39.6

NOTES: (a) Column 1 represents net immigration for the given period in thousands.

(b) Column 2 represents percentage of population increase over the given period.

SOURCES: (1) South African Statistics, 1968 (Pretoria, 1968), pp. A-8, B-13.

(2) Figures for 1968, 69, and 70 are estimates from D.J.M. Vorster, op.cit., Table II.

Migration into South Africa is influenced by both economic and political stability, as is suggested by the fact that only in 1960, the year of Sharpville, has net immigration into South Africa been negative.[36]

8.4.2. African Migration

African migration in relation to the South African

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[36] See Table A7 in the Statistical Appendix, which gives the comparative situations over the period 1958 to 1963. The 1960 reversal was most likely due to the Sharpville incident which worsened the political and economic climate.

economy can be divided into permanent and temporary migration. Both types affect the human capital position in the economy and are closely connected to the theory of dualism as applied to the South African economy.[37]

The South African economy can best be described as dualistic, comprising an "indigenous" or "traditional" society side by side with an "advanced" or "industrial" one. Growth can occur in either of these two economies, but development implies the absorption of the former by the latter -- it is the process of transition from a traditional society to a modern industrial one. This, it is evident, requires more than economic change, it necessitates social, cultural and political change as well. It is in this respect that migration plays its role, for it provides a link and form of connection between the two economies as well as affecting the human capital situation in each.[38] Those Africans who migrate permanently break down the separateness of the two economies and those who migrate temporarily help overcome the basic problem in the traditional sector, that is, the "backwardness" of the people with underdevelopment as the natural consequence.

3.4.2.1. Permanent African Migration

Permanent African migration into the South African economy does occur, but on a much smaller scale than temporary African migration. This form of migration has the same effects as that of White migration, that is, it adds to the stock of both physical and human capital, as well as influencing the dualistic nature of the economy.

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[37] See O.P.F. Horwood, "The Social Framework of Economic Development in a Dual Society - The Case of South Africa", in J.F. Holleman (ed.), op.cit.

[38] See Chapter 6.

8.4.2.2. Temporary African Migration

As already stated, temporary rather than permanent migration is of greater significance in the economy and the striking feature is the large proportion of the population involved. Houghton has described the temporary migrants as "two million men perpetually on the move -- men of two worlds, lacking the feeling of belonging anywhere."[39]

A cursory glance at the factual position reveals the extent of the system. In the case of the Transkei for example, in 1966 more than a quarter of a million workers sought employment outside the Transkeian borders, representing 85 per cent of wage earners of the territory. Table 23 indicates the aggregate number of migrant workers in South Africa for certain selected years. The figures represent temporary migrants from Bantu areas and to them must be added migrants from outside South Africa's borders. In 1951 it was estimated that there were some 420,000 migrant workers from adjacent countries.[40] The 1970 figure in the table is 610,000 which is only approximately one half of the total number of African migrant workers. The estimate for 1970 is in the region of 1,013,000 workers from African areas alone.

The sex-selective nature of migration is reflected by the fact that of the 1951 total, 503,000 were males and the co-efficient of absenteeism amongst men was 12 per cent of the African population, representing some 40 per cent of the economically active.[41] An important aspect of migratory labour from the Bantu areas is that nearly all able bodied males migrate at some stage of their economically

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[39] Quoted in P. Randall, Migratory Labour in South Africa (Johannesburg, 1967), p. 1.

[40] Tomlinson Commission Report (Summary), UG.16/1955, p. 40. The accuracy of this figure is questionable as large discrepancies can occur due to concealment of origin, incomplete surveys and so on. The 1951 census estimates the figure to be 606,000. See Population Census 1951, UG.38/1959, p. 100.

[41] D.H. Houghton, The Tomlinson Report (Johannesburg, 1956), p. 9.

active lives. Thus the number of migrants is considerably greater than the above figures suggest, since they indicate only the number of workers absent at any one time. As Houghton has said, "Over two million men spend their lives circulating between industrial employment and their tribal subsistence economy."[42]

TABLE 23

MIGRANT WORKERS (AFRICAN)

Year	Number
1936	447,000
1951	569,000
1970	610,000
1990	1,013,000

NOTES: (a) Figures represent migrants from Bantu areas only.

(b) 1970 and 1990 figures will be reasonably accurate only if the African homelands are developed.

SOURCES: (1) 1936 and 1951 estimates from Tomlinson Commission Report (Summary), UG.61/1955, p. 53.

(2) 1970 and 1990 estimates from P. Randall, Migratory Labour in South Africa (Johannesburg, 1967), p. 5.

The effects on the stock of human capital of migrant labour are clear. Permanent migration increases the number of human resources available in the economy, whilst temporary migration enables the economy to benefit from human resources which would otherwise be inaccessible to it. This increase in human resources provides increased

[42] D.H. Houghton, The South African Economy (Cape Town, 1964), p. 85.

potential for human capital accumulation, though the net effect on the stock of human capital will depend upon the extent of emigration and the number of trained workers returning to the Bantu areas.

8.4.3. The Economic Effects of Migration

The effects of migration and migrant labour on economic development and growth have attracted the attention of many writers, especially those interested in the theory of human capital. Two such writers are Miracle and Berry, who treat the effects of migrant labour on economic development as a special case of the movement of economically productive individuals.[43] This means they regard it as a human capital creating activity resulting in the better location of human resources, as explained in part one of this thesis.

The impact of migration is two-fold, affecting both the supplying economy and the host economy. The extent of the impact differs according to whether the migration is temporary or permanent. Miracle and Berry maintain that "the home area is likely on balance to gain rather than lose both physical and human capital so long as the migrant does not settle permanently outside his home area."[44] This means that from the viewpoint of the South African subsistence economy, temporary migration is in certain aspects preferable to permanent.

Migration affects economic development by influencing production, productivity and consumption in both the supplying and the host economy. These changes result from variations in the supply of factors of production and in consumer demand, plus "transfers of attitudes, institutions and techniques of production."[45]

In the South African context the study by Miracle and Berry can be applied to the Bantu areas in respect of the supplying economy

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[43] M.P. Miracle and S.S. Berry, "Migrant Labour and Economic Development", Oxford Economic Papers, Vol. 22 (1970).

[44] ibid., p. 85.

[45] ibid., p. 89.

and the rest of the Republic in respect of the host economy, though it must be remembered that not all of the migrant workers come from the Bantu areas, as explained above.

The impact on the supplying economy of the absence of labourers is "a function of how long they are gone, the amount and kind of work open to them during the same period in the supplying economy had they not left; the adequacy of the labour supply in their home area after departure; and the effect of the departure of migrants on real wages in the supplying area."[46] This, according to the authors, includes such factors as:

(i) whether or not the migrant's absence is adjusted to suit the time pattern of the supplying economy's demand for his labour.

(ii) whether the social organisation of labour is such that men can migrate for longer periods without causing a decrease in home production.

(iii) whether or not migrants send remittances home. These have a positive effect, especially where the effect of absence on per capita foods supplies is favourable.

(iv) whether or not the absence of labourers causes pressure for money wages in the home area to increase.

(v) social costs and benefits in the form of health, education, morale, and so on.

The above impact has been in terms of the migrant being absent from the economy. On his return, according to Miracle and Berry, the most important factors are:-

(a) the spread of new techniques and incentives to try new methods.

(b) the accumulation of capital, both physical and human, in the form of savings and skills he would not have gained had he not migrated.

(c) changes in consumption patterns and expectations.

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[46] ibid., p. 90.

The effects of emigration tend to have a negative impact on the supplying economy as they result in a reduction of the number of persons willing to implement new techniques, a loss of both human and physical capital,[47] and perhaps most important of all, "a loss of entrepreneurial talent, the supply of which always appears short of what is needed for rapid economic growth in developing countries."[48]

Migration tends to have positive economic effects on the host economy.[49] The major effect is generally an increase in the supply of unskilled labour, which helps keep down wages and helps increase output, provided that the supply of unskilled labour is not in excess of demand. Migration also adds, as shown above, to the supply of physical and human capital; it increases the stock of entrepreneurial talent available in the host economy and the amount of physical capital and savings available for investment.

Other effects on the host economy are, according to Miracle and Berry, the increasing of the average population density and its economic consequences, such as the opening of new agricultural areas or the over-crowding of areas, shortages in health and educational facilities, rising prices and so on. It can also create positive external effects in the form of competition, induced migration and suchlike.

From this study the authors conclude that the "common assumption that migrant labour is undesirable for economic as well as social reasons needs to be re-examined."[50] In the case of South Africa, migration does have some benefits, but it is safe to say that on balance it is a cost to the economy, especially in the form of

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[47]This is a very real loss in respect of human capital, for it is generally the more dynamic persons who migrate in search of opportunities. See ibid., p. 99.

[48]ibid., p. 99.

[49]See ibid., pp. 100-105.

[50]ibid., p. 104.

temporary migration. The benefits derived by the advanced economy tend to be more than offset by the disadvantages suffered in the traditional economy. The most serious disadvantage of migration is its disruptive influence on family life, and the creation of social and religious problems. This is due mainly to the prevalence of temporary migration. The overall effect is to render impossible the emergence of a stable social life, which is, to some extent, a pre-requisite of human capital formation, for the concept hinges on mental as well as physical capabilities and an informal as well as formal education and training.[51]

8.4.4. Urbanisation

In the light of the theoretical analysis of human capital accumulation, the urbanisation of the South African population and the rural depopulation can be considered in terms of human capital creating activities. Urbanisation results from a gravitation towards built up areas due to the gains to be derived from living and working there. As seen in the theoretical part of this thesis, the better placement of a resource adds to human capital accumulation in the economy.

The South African population is becoming increasingly urbanised, both in general and in respect of the different racial groups. Of the total population of 21.45 million, some 10.28 million live in urban areas and 11.17 million in rural areas.[52] The Whites are the most urbanised racial group, followed by the Asiatics, Coloureds and Africans. A total of 86.8 per cent of Whites, 86.7 per cent of Asiatics and 74.0 per cent of Coloureds live in urban areas.[53]

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[51] For a comprehensive analysis of some of the consequences of the migratory labour system, see D.H. Houghton, op.cit., pp. 87-96.

[52] Population Census, 1970 (Report 02-05-01 , Department of Statistics), Table 1, p. 2.

[53] Calculated from ibid., Table 1, p. 2.

In the Bantu areas, of the population of 7.03 million, only 593.6 thousand are urbanised, representing 8.5 per cent of that population.[54]

The effect of the urbanisation of the South African population has been an increase, to some extent, in the stock of human capital, due to the better distribution of human resources. Other effects have been rural depopulation and the over-population of industrial areas, resulting in higher costs and heightened social and political tension. Like migration, urbanisation has an impact on both the supplying and receiving areas, and has a direct influence on human capital accumulation and distribution in the economy.

8.5. CONCLUSION

The overall conclusions which emerge from the above statistical analysis of education, health and migration in the South African economy are:

(1) In general it appears that the provision of educational facilities will prove to be inadequate to meet the future needs of the economy.

(2) Although improvements in health have increased the size and efficiency of the population and the South African situation appears favourable relative to other under- or semi-developed economies, there is much room for further development. This appears particularly so in the case of the non-White population groups, who are in an inferior health position relative to the Whites.

(3) The South African situation in respect of migration is unique. The immigration of peoples into the country adds to human resources and thus to human capital in the economy. Both temporary and permanent migration have an economic impact, as does urbanisation. This economic impact has both favourable and unfavourable repercussions on the supplying and the host economies.

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[54] ibid.

CHAPTER 9

SOUTH AFRICAN ECONOMIC GROWTH AND DEVELOPMENT

9.1 INTRODUCTION

So far in this section on the South African economy we have discussed the size of the population, its characteristics, the number of persons receiving education in schools and universities, the number of schools and teachers, the effect of health on the population size and efficiency, and the extent and importance of migration in the economy. All these aspects have been discussed in non-financial terms.

Before a more detailed analysis of the economy in relation to human capital and the financial aspects of investments in human resources can be carried out, it is necessary to give a summary of some of the essential features of the South African economy.

9.2 ECONOMIC GROWTH

The economic growth of the Republic over the last decade and a half has been just over 5 per cent per annum in real terms and there are signs that it may become difficult to maintain such a rate in the future. Table 24 shows the national accounts for the period 1955 to 1970 and includes:-

(i) Gross Domestic Product (G.D.P.) at market prices

(ii) G.D.P. at constant (1963) prices

(iii) the annual growth rate of these over the period.

The table gives an indication of the economic growth of the Republic in both nominal and real terms. Over the last fifteen years to 1970, the G.D.P. at current prices has increased from R4025 million to R12404 million, representing a total increase of 208.2 per cent over the period, or 7.79 per cent per annum on the average. The real G.D.P. has increased from R4620 million in 1955 to R9797 million in 1970, representing an aggregate percentage increase of 112 per cent or an average annual increase of 5.14 per cent. The annual growth rates over the period are shown in Table 24 column 4.

TABLE 24

SOUTH AFRICA : GDP AND GDP GROWTH RATES, 1955-1970
(MILLIONS OF RAND)

Year	(1) GDP^{MP}	(2) % increase over previous year	(3) Real GDP (1963 Prices)	(4) % increase over previous year
1955	4,025	-	4,620	-
1956	4,339	7.8	4,861	5.2
1957	4,583	5.6	5,076	4.4
1958	4,711	2.8	5,186	2.2
1959	4,993	5.8	5,369	3.5
1960	5,274	5.6	5,551	3.4
1961	5,546	5.2	5,735	3.3
1962	5,912	6.6	6,054	5.6
1963	6,555	10.9	6,547	8.1
1964	7,209	10.0	6,986	6.7
1965	7,879	9.3	7,448	6.6
1966	8,555	8.6	7,799	4.7
1967	9,459	10.6	8,391	7.6
1968	10,152	7.3	8,712	3.8
1969	11,339	11.7	9,325	7.0
1970	12,404	9.4	9,797	5.1

NOTES: (a) Column 1 : Gross Domestic Product at market prices.

(b) Column 2 : % increase in Gross Domestic Product at market price over the previous year.

(c) Column 3 : Real Gross Domestic Product at 1963 prices.

(d) Column 4 : % increase in Real Gross Domestic Product over the previous year.

SOURCES: (1) Quarterly Bulletin, South African Reserve Bank (June, 1971), Table 1.

Perhaps the best single indicator of growth in the economy is that of real G.D.P. per capita. The figures pertaining to the period are shown in Table 25. It is evident that the increase has been substantial, with per capita income increasing from R320.4 in 1955 to R460 in 1970.[1] Figure 7 presents this information graphically. The per capita real G.D.P. has increased by 28.6 per cent over the period, at an average rate of 2.26 per cent per annum. Over the last decade alone, the real per capita G.D.P. has increased by 32.1 per cent, that is, at an average rate of 2.82 per cent per annum.[2]

By international standards the overall growth in the economy over the last decade and a half has been favourable.[3] For example, over the period 1960 to 1968 the average annual growth rate of the real G.D.P. was 6.4 per cent, giving a per capita rate of 4.0 per cent.[4] The corresponding figures for France, Germany, the United Kingdom and the United States were 5.6 and 4.4 per cent, 4.5 and 3.4 per cent, 3.0 and 2.3 per cent, and 5.1 and 3.7 per cent respectively.[5]

The growth of the South African economy, however, has not been equal in all sectors.[6] The contribution to national income has not been evenly distributed between sectors and this reflects a changing structure of the economy.[7] Especially pertinent is the fact that there

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[1]This does not imply that there has been an equal incidence and improvement of living standards over all sectors of the population. In fact, personal income differentials have been increasing rather than narrowing. See A. Spandau, Income Distribution and Economic Growth in South Africa (Unpublished Doctoral Thesis, Rhodes University, 1971), Vol. 2, chapter 12.

[2]Calculated from Table 25. This is considered a satisfactory increase when it is remembered that this is after deflating by the price index and taking into account a population increase of some 2.94 per cent per annum for the period (see Table 3).

[3]See Statistical Appendix, Table A.8.

[4]Table A.8.

[5]ibid.

[6]See Statistical Appendix, Table A.9.

[7]For a detailed discussion of this see J.J. Stadler, "Some Aspects of the Changing Structure of the South African Economy Since World War II", South African Statistics (Pretoria, 1969), pp. 7-21.

has been a decreasing importance of both mining and agriculture as the manufacturing sector has become more prominent.[8] Secondary industry has become the leading sector of the economy, both in respect of contribution to national income and to employment.[9]

TABLE 25

REAL GROSS DOMESTIC PRODUCT PER CAPITA, 1965-1970 (IN 1963 RANDS)

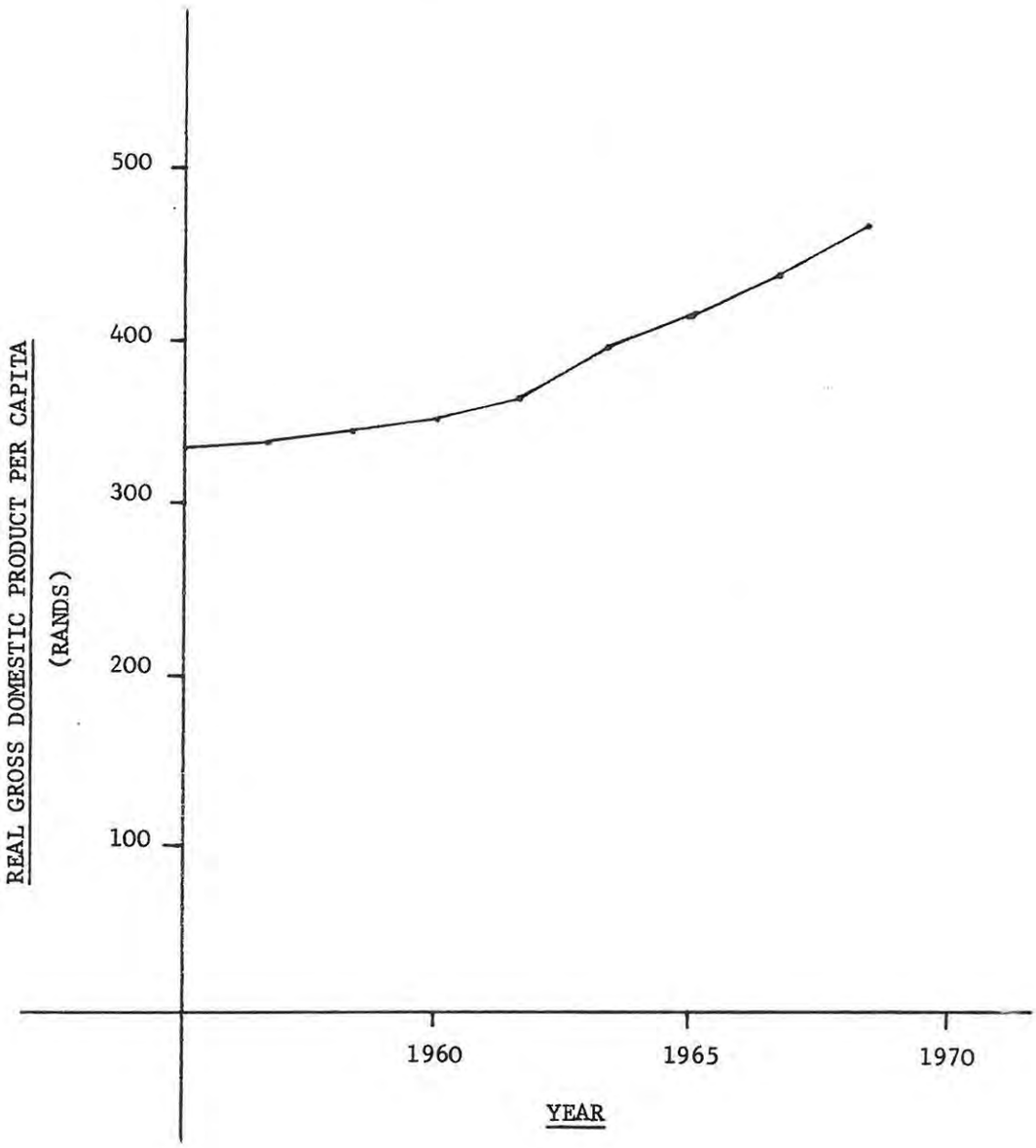
Year	G.D.P. (R.Millions)	Population (Millions)	Per capita G.D.P. (Rands)
1955	4,620	14.07	328.4
1956	4,821	14.42	334.3
1957	5,076	14.79	343.2
1958	5,186	15.16	342.1
1959	5,369	15.55	345.2
1960	5,551	15.94	348.2
1961	5,735	16.37	350.3
1962	6,054	16.85	359.3
1963	6,547	17.35	377.4
1964	6,986	17.89	390.5
1965	7,448	18.43	404.1
1966	7,799	19.00	410.5
1967	8,391	19.58	428.5
1968	8,712	20.16	432.2
1969	9,325	20.77	449.0
1970	9,797	21.30	460.0

SOURCES: 1. Tables 1 and 24.

[8] See Table A.9.

[9] See W.F. Steenkamp, op.cit., p. 100.

FIGURE SEVEN



REAL PER CAPITA GROSS DOMESTIC PRODUCT

9.3 IMPEDIMENTS TO GROWTH AND DEVELOPMENT AND THE ROLE OF HUMAN CAPITAL

9.3.1 Introduction

The growth of the South African economy has been indicated above. It is evident that growth in an economy must be related to the resources, both physical and human, of that economy. South Africa has a resource pattern that would appear to be able to sustain higher incomes, but has not done so due to the existence of certain impediments to growth and development.[10]

The main impediments are related to:-

(i) the extreme income inequalities which exist in the economy;[11]

(ii) the use and development of human resources.

The Economic Development Programme 1965-1970[12] has estimated a maximum potential growth rate of 5½ per cent per annum if undue pressures are not to be placed on the economy, but it appears that this is an under-estimation of South Africa's growth potential and that if all unnecessary impediments were removed, the "natural and human endowment is adequate to support a vast expansion of our economy and a dramatic rise in the standard of living."[13]

The impediments to growth and development we are concerned with here are those factors which prevent the country's potential supply of labour skills being more fully and productively utilised. In this regard the most serious hindrances are the inadequate supply of educational facilities, as shown in an earlier chapter,[14] and the structure of the labour force in terms of the supply of and demand for White and non-White labour in the economy.

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[10] See S.H. Frankel, "Whither South Africa", South African Journal of Economics, Vol. 15 (1947), pp. 27-39.

[11] See A. Spandau, op.cit.

[12] See Economic Development Programme for the Republic of South Africa for 1965-1970 (Department of Planning, Pretoria).

[13] D.H. Houghton, "A Perspective View of the South African Economy in the 1970's", op.cit., p. 2.

[14] See Chapter 3.

9.3.2 White and non-White Labour - Supply and Demand

It is generally agreed that human capital shortages, in the form of labour bottlenecks, especially in the skilled classes, are a major impediment to the progress of the economy. From this vantage point the present and predicted labour situation in the Republic can be analysed.

The most prominent feature of labour policy in South Africa is the inadequate utilisation of available labour resources due to the colour bar, both legal and customary.[15] As Houghton states, "The continued growth of the national economy depends upon the more effective use of non-Whites, in skilled occupations, and the provision of adequate training to make them efficient producers in an economic system where ever greater emphasis is placed on technical skill, and unskilled labour ceases to perform a major function."[16]

The labour situation in South Africa can be analysed in terms of the supply and demand for workers. This enables the aggregate position and the relative situations of the different racial groups to be studied. The supply of labour in the economy has been given in quantitative terms in the chapter on human resources,[17] especially with reference to the economically active population.[18] The economically active population, which forms the effective supply of labour, is closely related to the total population and in particular, to the age composition of the population. The demand for labour is largely determined by the increase in production in the economy, making allowances for labour productivity increases.

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[15]The legal colour bar is entrenched by legislation such as The Mines and Works Act (1911), The Apprenticeship Act (1944), and The Industrial Conciliation Act (1956).

[16]D.H. Houghton, op.cit., p. 4.

[17]See Chapter 7.

[18]See Tables 6, 7 and 8.

Table 26 gives an indication of the supply and demand for labour in the South African economy, as estimated in the Economic Development Programme,[19] for several selected years. It must be noted that these figures are estimates. They do, however, appear to be fairly accurate and indicate the major features and trends of the labour markets in South Africa.

Table 27 shows the estimated total percentage increase and annual average growth rate of the supply and demand for labour over the period 1964 to 1970.

From the estimated figures in the tables, it can be seen that the demand for and supply of labour was expected to increase quite markedly over the period. The total demand was estimated to increase by 16.47 per cent, that is, at an annual average rate of 2.58 per cent, whereas the predicted increase in supply was 13.95 per cent, or an annual rate of 2.15 per cent on the average. This means that the manpower demand during the period under consideration was estimated to increase at a slightly higher rate than the supply. This feature is apparent in both the White and the non-White racial sectors.

In respect of White labour, Table 27 shows an estimated decrease in the number employed, suggesting a growing shortage of such labour and that the White labour force was under greater pressure in 1970 than in 1964. The demand for White labour was estimated to increase by 16.6 per cent (a rate of 2.59 per cent per annum) over the period 1964 to 1970. The supply, in the form of economically active persons, was estimated to increase by 12.5 per cent over the same period (that is, at an average annual rate of 1.99 per cent).

The predicted non-White labour situation over the period shows the same trends as that of Whites in respect of increased demand and supply, but with a smaller disparity between the two. Supply was estimated to increase by 2.24 per cent per annum over the period with

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[19] See Economic Development Programme for the Republic of South Africa, for 1964-69, 1965-70, and 1968-73 (Department of Planning, Pretoria).

TABLE 26

SOUTH AFRICA : MANPOWER FOR SELECTED YEARS
(THOUSANDS)

	(1) 1964	(2) 1965	(3) 1967	(4) 1968	(5) 1970	(6) 1973
SUPPLY [a]						
Total	6,210.5	6,336	6,650	6,804	7,077.0	7,640
White	1,238.3	1,261	1,325	1,354	1,393.7	1,512
Non-White	4,972.2	5,075	5,325	5,450	5,683.3	6,128
DEMAND						
Total	5,925.0	6,015.0	6,442	6,603	6,901	7,485
White	1,221.7	1,253.8	1,315	1,351	1,424.3	1,540
Non-White	4,703.3	4,761.2	5,127	5,252	5,477.6	5,945
DIFFERENCE						
Total	285.5	321.0	208	202	-	-
White	16.6	7.2	10	4	-30.6	-28
Non-White	268.9	313.8	198	198	205.7	183

NOTES: (a) Supply represents total economically active population.

(b) All figures based on a net immigration of 20,000 Whites per annum.

(c) Columns 2, 3, 4 and 6 based on growth rate of 5½% p.a. Columns 1 and 5 based on growth rate of 5.4% p.a.

(d) 1964 and 1967 figures under demand represent employment in those specific years.

(e) Difference between supply and demand represents unemployed and unspecified.

SOURCES: (1) Columns 1 and 5, Economic Development Programme, 1965-70.

(2) Column 2, Economic Development Programme, 1964-69.

(3) Columns 3, 4 and 6, Economic Development Programme, 1968-73.

TABLE 27

LABOUR SUPPLY AND DEMAND, INCREASES
1964-1970

	Total %	Annual Average %
SUPPLY		
Total	13.95	2.18
White	12.54	1.99
Non-White	14.30	2.24
DEMAND		
Total	16.47	2.58
White	16.58	2.59
Non-White	16.46	2.57

SOURCE: Table 26.

a corresponding increase of 2.57 per cent per annum in demand. In absolute numbers the pool of unemployed non-Whites was expected to decrease over the six year period, but to remain relatively large.

If these figures are accepted as indicative of the real situation, the overall labour position in the Republic of South Africa is that demand has increased at a slightly faster rate than supply in respect of all racial groups. The result has been a growing shortage of White labour and a decline in the number of unemployed non-Whites. This trend is likely to continue in the future, but the overall situation could be improved in a number of ways, including the following :-

(i) an increase in the productivity of White labour;

(ii) the use of unemployed non-White labour to supplement the White labour shortage;

(iii) the creation of a higher net immigration rate in respect of Whites.

The obvious solution would appear to be the use of the readily available, unemployed non-White labour, but such utilisation is limited by the effects of legal colour bars and by the lack of skill and training of such labour. These legal colour bars, in the form of such Acts of Parliament as the Miners and Works Act (No. 12 of 1911 as amended), the Apprenticeship Act of 1922 (re-enacted in amended form as Act 37 of 1944), the Industrial Conciliation Act of 1924 (re-enacted in amended form in 1937 and 1956) and many others,[20] have outlived any purpose they may have had and it is doubtful if they can be maintained without proving to be a very real economic cost. As Steenkamp states: "The time has come . . . , to withdraw our discriminatory labour legislation. It no longer seems to serve a useful purpose. On the contrary, it is fast becoming a threat to progress in economic terms."[21] Better use of African labour resources has to be made, and this means greater mobility of such resources both vertically and horizontally. It is in this regard that investment in human capital plays its role, for it results in both an upgrading in the quality of existing labour and an increase in the skill and training of the unemployed resources to meet the economy's demand.

The most important feature arising from the above analysis of the labour force is its structure. It is evident that there exists an acute shortage of White labour simultaneously with a surplus of non-White labour and it appears that future trends will maintain this situation due to the slightly higher rate of growth of demand over that of supply.

It is important to note, however, that the labour situation can also be affected by changes in the overall growth rate of the economy and by changes in the net immigration rate. If, for example, the

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[20] See M. Horrell, Legislation and Race Relations (Johannesburg, 1966).

[21] W.F. Steenkamp, op.cit., p. 109.

overall growth rate fell and the net immigration rate rose in respect of Whites, the shortage of White labour would lessen and the demand for non-White labour would increase at a slower rate, resulting in a greater number being unemployed.

The implications of a higher growth rate in the economy would intensify the problems set out above. It is estimated that a growth rate of around 6 per cent per annum would give an absolute shortage of 65,000 and 40,000 White workers in 1973, assuming a net immigration figure of 20,000 and 30,000 per annum respectively.[22] The decrease in non-White employment is estimated at 100,000 over the period 1968 to 1973.[23]

The South African labour situation has so far been given in quantitative terms alone, with changes in supply and demand being referred to in aggregate. With regard to the quality and educational levels of the economically active population, a general insight is given in an earlier chapter.[24] With reference to the demand for labour, the greatest demand is likely to come from the expansion of the manufacturing sector, as maintained by Steenkamp.[25]

This will raise problems, for with greater industrialisation and a more sophisticated economy, the demand for more highly skilled labour and managerial ability will increase, necessitating a compensatory increase in the supply of labour. This can only be achieved by the upward movement of unskilled workers, which is difficult in South Africa. As Houghton states, "In all countries vertical mobility is impeded by the natural scarcity of men of above-average abilities, and by the time-lag necessary to train those who have the ability and the skills

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[22] Economic Development Programme 1968-1973, op.cit., p. 38.

[23] ibid.

[24] See Chapter 8.

[25] See W.F. Steenkamp, op.cit., pp. 104ff.

necessary to enable them to take more responsible posts. In South Africa, as we all know, there is also an element of what Professor Hutt has called 'Contrived Scarcity', arising from the customary and legal colour bar and the long established tradition that skilled and managerial work should be reserved for White people. The reason for this lies far back in our industrial history but its continuance today places an additional restraint upon the optimum use of our human resources."[26]

Table 28 shows the South African labour situation in 1969, with reference to both employment and manpower shortfall, as listed by the Department of Labour's Manpower Survey.[27] The total shortage of artisans and apprentices is made up of 16,500 Whites and 1,000 Coloureds. No mention of Africans or Asians is made. In the non-artisan categories of work there was a total shortage of some 40,000 Whites and 11,000 Coloureds, with apparently no shortage of Africans and Asians. In all, the total shortage was nearly 70,000 in 1969 for all four racial groups. Table 29 shows these shortages by occupational groups, as a percentage of the occupational total. There is a marked predominance of greater shortages amongst males than females, with the exception of the unskilled production category. The greatest shortage is in communication and transport group with a 13 per cent shortage of males and a 2 per cent shortage of females. This is followed by the professional and technical occupational group with shortages of 7 per cent for both males and females, and by the services group with shortages of 8 and 5 per cent respectively.

From the above analysis of the labour situation in quantitative and qualitative terms, it can be seen that the limiting factor in the

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[26] D.H. Houghton, "The South African Labour Force in the Year 2000", an address given to the 6th Annual A.I.E.S.E.C. Congress (University of Port Elizabeth, June 1971), p. 3.

[27] See Manpower Survey No. 8 (Department of Labour, tabled before Parliament, September 1970).

TABLE 28

SOUTH AFRICAN LABOUR : PRESENT PERSONNEL & SHORTAGES, 1969

	PRESENT PERSONNEL		SHORTAGES & VACANCIES	
	Males	Females	Males	Females
WHITES (a)	647,846	359,646	31,615	9,428
(b)	191,706	5,769	15,875	667
Total	839,552	365,415	47,490	10,095
COLOUREDS (a)	247,054	129,240	8,419	2,798
(b)	28,449	72	1,158	226
Total	275,503	129,312	9,577	3,024
ASIATICS (a)	106,317	18,732	-	-
(b)	3,091	14	-	-
Total	109,408	18,746	-	-
AFRICANS (a)	2,054,247	162,050	-	-
(b)	1,645	-	-	-
Total	2,055,892	162,050	-	-

NOTES: (a) represents all workers except artisans and apprentices.

(b) represents artisans and apprentices.

Dashes signify no figures given.

Data relates to total manpower in the Republic plus South West Africa as at 30th April, 1969.

SOURCE: Manpower Survey No. 8, Department of Labour, 1970.

TABLE 29

LABOUR SHORTAGE BY OCCUPATIONAL GROUPS, 1969

	Shortage as a percentage of occupational total	
	Males	Females
Professional and Technical	7	7
Managerial and Administrative	1	0
Clerical	3	2
Sales	1	1
Mining	3	0
Communication and Transport	13	2
Production - Skilled	6	2
- Unskilled	2	8
Services	8	5
Other	17	12

SOURCE: Manpower Survey No. 8, Department of Labour, 1970.

development of the economy is not manpower per se, but a shortage of the relevant skilled manpower. This shortage is likely to be aggravated in the future by the fact that as the economy develops and the manpower structure is brought into line with that of a developed country, the stress on skilled labour will be accentuated.

The labour market in South Africa has, to a large extent, artificially created problems and a shortage of skilled labour combined with a surplus of unskilled labour suggests a distortion of the workings of the market mechanism and a misuse of the potential human capital in the economy in that it has not been developed to meet the needs of the economy. It is likely that the present trends will persist

in the future, hindering the growth and development of the economy. It will become increasingly difficult for South Africa to maintain a level of real growth of around 5½ per cent per annum if the relatively small and relatively decreasing White population is to satisfy the increasing demand for skills in an industrialised economy. As Steenkamp maintains, "The blacks will not only have to provide a larger proportion of our manpower but they will also have to move up the occupational ladder."[28] To achieve this it will become necessary for greater investments to be made in the development and accumulation of human capital, especially in the non-White groups.

The essential features of the labour market in the South African economy are:

(i) an increased demand for skilled labour, resulting in a shortage of suitable manpower, which is forcing the acceptance of a real growth rate less than that to which the economy has grown accustomed;

(ii) a racial pattern in the labour force which reflects serious distortions in the use and availability of manpower, giving rise to the symptoms of rising labour costs, falling productivity, difficulty in filling vacancies and a high labour turnover.

These features will continue to exist in the future and the problems possibly increased unless the situation is improved. Such improvement can be achieved in a number of ways.[29]

Firstly, the rate of growth can be curtailed so that the demand for labour is in harmony with the supply of economically active persons. This is undesirable as growth in the economy is needed for a number of reasons. Also such a curtailment would lessen demand in the unskilled categories, adding to the already considerable unemployment of unskilled labour.

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[28] W.F. Steenkamp, op.cit., p. 106.

[29] See D.J.M. Vorster, op.cit., section 3.

Secondly, the demand for labour could be decreased without a growth curtailment. This would necessitate higher productivity rates amongst labour classes in which a shortage is experienced. This would have its inherent difficulties and added costs, but could be achieved in a number of ways, including mechanisation and automation (which would result in a change in the capital-labour ratio), greater organisational and management development, and increased training and skills of labour. All of these necessitate investment in human capital and an overall improvement in the quality of labour.

Thirdly, and lastly, the effective supply of labour could be increased to meet the demand at skilled levels. The overall supply is limited to some extent by demographic factors,[30] but could be increased further by immigration of the relevant types of skilled persons, by the use of females and non-Whites, and by the removal of restrictive legislation which provides an effective barrier to vertical labour mobility.[31]

Of the above three ways in which to improve South Africa's labour situation, the latter two appear the most acceptable economically. In this context human capital is of importance, for it is only by investing in human resources that existing labour can be rendered more efficient and the quantities of skilled labour can be increased to meet the shortage experienced at that level of manpower. The productivity of existing skilled labour can be raised and the available surplus of unskilled labour rendered more effective by human resource development, overcoming the two-fold problem of a growing shortage of skilled manpower in conjunction with a growing surplus of unskilled labour. It is thus obvious that the crucial element in the solution of the labour problem

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[30] See Chapter 7.

[31] Leaving social and political considerations aside, it is questionable whether the removal of restrictive legislation would solve the manpower problem in the short run. This is because of the time horizon inherent in investments made in human capital, that is, the period necessary for the acquisition of skills and the development of work attitudes, values and motives amongst the unskilled workers.

is human capital formation, especially amongst the non-Whites, in the form of increased schooling, health and labour mobility.

9.4 CONCLUSION

The economic growth of South Africa over the last decade and some of the impediments facing the economy, in the form of the labour situation, have been outlined in this chapter. It has been shown that the demand for labour is likely to exceed the supply, resulting in an increasing shortage of White labour and a decreasing number of unemployed non-Whites. It has also been shown that there is a growing shortage of skilled labour and a growing surplus of unskilled labour.

With regard to this situation, it has been suggested that human capital could be the key factor whereby the existing problems could be overcome and further economic growth and development promoted. It is the means whereby the supply of skilled labour can be supplemented and increased, the quality of existing labour improved and the productivity, and hence growth, of the economy enhanced.

The concept of human capital and its application to the South African economy appears to be a solution to some aspects of the economic problems facing the country. Economic growth and the labour situation are both directly related to human resource development, and human capital is the means whereby they can be improved.

CHAPTER 10

EXPENDITURE ON HUMAN CAPITAL FORMATION IN THE ECONOMY

10.1 INTRODUCTION

In the preceding chapters of this section of the thesis, the availability of human resources in the economy and the provision and effects of education and health facilities have been discussed. Also some insight has been given into the demand and supply of human capital in the labour market.

All these aspects, however, have been discussed in physical or non-monetary terms. This chapter attempts to discuss the investment made in human capital in the South African economy in terms of the money spent on education and health by the Central Government and the Provincial Authorities.

10.2 EDUCATION AND HEALTH EXPENDITURE

The control and financing of both education and health in South Africa was outlined in Chapter 8 and was shown to be divided between the Central Government and the Provincial Authorities. Table 30 shows the amounts spent on education and health by the former over the period 1955 to 1971. It also shows the total expenditure of the Central Government and the proportion of this represented by expenditure on education and health.

Over the whole period education expenditure has risen by 304.3 per cent, that is, at an annual average rate of 9.16 per cent. Health expenditure has risen at a slightly lower rate - 173.4 per cent over the period or 6.47 per cent per annum on the average. Taken together these expenditures have risen by 254.1 per cent, giving an annual average increase of 8.22 per cent. This must, however, be compared to the increase in total expenditure by the South African government, which has risen by 312.8 per cent, or 9.25 per cent per annum, over the period. Relative to this, the increase in health and education expenditure, though still significant, is rendered less spectacular.

TABLE 30

SOUTH AFRICA : EDUCATION AND HEALTH EXPENDITURE, 1955-1971 (MILLION RAND)

Year	Education	Health	(A) Sub-Total[1]	(B) Total[2]	% A/B
1955[3]	30.2	18.8	49.0	645.0	7.6
1956[3]	31.0	18.8	49.8	639.8	7.8
1957[3]	34.2	22.8	57.0	705.2	8.1
1958[3]	36.2	22.6	58.8	756.0	7.8
1959	37.6	24.4	62.0	816.4	7.6
1960	41.8	26.6	68.4	829.8	7.8
1961	44.4	28.3	72.7	829.8	8.8
1962	48.2	30.4	78.6	897.9	8.8
1963	48.7	32.9	81.6	995.9	8.2
1964	54.1	34.2	85.6	1112.3	7.7
1965	55.6	36.7	92.3	1373.6	6.7
1966	60.2	39.2	99.4	1498.3	6.6
1967	68.5	43.5	112.0	1724.3	6.5
1968	77.4	47.2	124.6	1921.5	6.5
1969[4]	75.5	49.6	125.1	2062.2	6.1
1970[4]	95.3	45.6	140.9	2361.6	6.0
1971[5]	122.7	51.4	175.5	2662.7	6.5

NOTES: (1) Represents total of education and health expenditure in given year.

(2) Represents total expenditure in economy.

(3) Calculated from figures given in South African pounds (at rate of £1 = R2).

(4) Revised estimates.

(5) Voted estimate.

SOURCES: Statistical Year Book, 1968; 1960; 1964; 1967; and 1970 (New York), pp. 467; 508; 585; 619; and 640.

The proportion that these two forms of investment in human capital have been of total expenditure has fluctuated fairly widely over the sixteen year period. The highest point was reached in 1962 and the lowest in 1970, with 8.8 per cent and 5.0 per cent respectively.

The important features that arise from this analysis of expenditure on human resource development are that although expenditure has increased, the rate of increase has been lower than the rate of increase in total government expenditure. Also there is a marked divergence between the amounts spent on each and the rate of increase experienced in health and education. Education, broadly speaking, receives between a third to a half as much again as does health. Further discrepancies occur within the education sector itself; these are on the lines of race and the level of education.

The above analysis of education and health expenditure has been in terms of central government expenditure only. To this expenditure must be added that of the provincial authorities. Health and education are the largest single items in the budgets of each of the four provinces of the Republic. Table 31 shows the expenditure by province on education over the period 1960 to 1969. It can be seen that although there are large differences in the amounts spent by each province, all have increased significantly over the period. The total expenditure on education by the provincial authorities increased from 98.38 million in 1960 to 163.31 million in 1969, representing an average annual rate of 5.3 per cent. It is also important to note how much larger provincial expenditure on education is than that by the central government.[1]

Table 32 shows provincial expenditure on health over the period 1960 to 1969. Once again it can be seen that substantial increases have occurred in all provinces. The total provincial expenditure increased from 67.1 million to 154.20 million over the given period, that

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[1]This has added relevance when it is remembered that the provinces are responsible only for White schooling whereas non-White and post-school education is financed by the central government.

TABLE 31

PROVINCIAL EXPENDITURE ON EDUCATION, 1960-1969
(MILLIONS OF RAND)

PROVINCE:	CAPE	NATAL	TRANSVAAL	O.F.S.	TOTAL
Year					
1960	41.97	13.65	33.92	8.84	98.38
1961	43.90	14.40	37.80	9.27	105.37
1962	45.75	15.09	40.31	9.69	110.56
1963	47.03	15.76	42.48	10.17	115.44
1964	51.25	18.16	46.91	11.27	127.59
1965	37.16	18.82	48.11	11.36	115.45
1966	40.49	21.35	53.08	12.47	127.37
1967	43.75	15.73	60.11	13.85	133.44
1968	45.66	17.07	62.83	14.55	140.11
1969	52.63	19.94	73.87	16.87	163.31

SOURCE: South African Statistics 1970 (Pretoria), T-17, T-18.

TABLE 32

PROVINCIAL EXPENDITURE ON HEALTH, 1960-1969
(MILLIONS OF RAND)

PROVINCE:	CAPE	NATAL	TRANSVAAL	O.F.S.	TOTAL
Year					
1960	23.22	12.66	28.06	3.16	67.10
1961	23.74	13.32	29.07	3.35	69.49
1962	25.74	14.27	32.24	3.76	76.01
1963	27.62	15.78	33.98	4.17	81.55
1964	30.49	18.02	37.35	4.58	90.44
1965	33.78	19.97	39.70	5.44	98.89
1966	38.43	22.84	42.98	6.45	110.70
1967	46.75	25.05	48.24	7.34	127.38
1968	51.20	26.32	52.60	7.88	138.00
1969	58.87	28.95	57.53	8.85	154.20

SOURCE: South African Statistics 1970 (Pretoria), T-17, T-18.

is, at an annual rate of 9.3 per cent on the average. Again it should be noted that this expenditure exceeds that of the central government quite considerably.

With reference to the different amounts of expenditure on the education of different racial groups, this is the direct result of the way in which education in the country is financed. The African group appears to be at the most serious disadvantage,[2] for their educational finance is made up of fees, a contribution from their general tax, and a fixed amount of R13 million per annum from the consolidated revenue account. Table 33 shows the education costs per pupil by race for 1960 and the estimated costs for 1980. Marked differences between racial groups are apparent, with the expenditure on Whites at R114.1 per capita being significantly higher than the R74.5 per capita for Coloureds and Asians, and the R13.5 per capita for Africans.

TABLE 33

EXPENDITURE ON EDUCATION BY RACE, 1960, 1980
(PER CAPITA RANDS)

	1960	1980(1)
Whites(2)	114.1	130.
Coloureds and Asians(2)	74.5	150.
African(2)	13.5	84.
Universities	326.	650.

NOTES: (1) Estimated figure, based on 1960 prices.

(2) Includes both primary and secondary schooling.

SOURCE: The 1961 Education Panel, Second Report, op.cit., Table 8.1.(B), p. 121.

[2] See B. Rose (ed.), op.cit., Chapters 2, 3, and 4; and Economic Survey of Africa, Vol. 1. (United Nations), pp. 200-201.

Expenditure differences relating to the different levels of education also occur. These are mainly the result of the fact that the higher the level of education, the greater the cost of provision.[3] From the theoretical analysis of education as an industry in Chapter 3, certain important issues arise in respect of the policy on the financing of education in the economy. It is evident that higher education is more costly than lower levels and that relatively greater amounts have to be invested to achieve the same level of output, where output is measured in terms of students qualifying. In South Africa there is a lack of skilled manpower and to overcome this shortage will require relatively larger outlays than would be required for identical increases at lower levels of skill. Yet it should be noted that the "budget" needed to increase the supply of qualified labour is not synonymous with the purely financial budget, for it entails opportunity costs of persons entering the education process. Thus an increase in the amount of expenditure by the government and provincial authorities on education has to be considered in conjunction with the costs of income forgone in educational planning.

The above analysis shows how much is spent on the human resource development components of health and education in South Africa. It does not deal with the adequacy, or inadequacy, of such expenditure. It is, however, pertinent to enquire how much should and could be spent on such investments in human capital. In this regard international comparisons of national income spent provide some indication.

10.2.1 International Comparisons

10.2.1.1 Education

International comparisons of expenditure on education can provide some indication of whether or not any economy is investing sufficient funds in this form of human capital creation.

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[3] See, on the financing of higher education, C.J. Trotter, The Economics of Higher Education in the Republic of South Africa (Unpublished M.A. Thesis, Duke University, 1966), Ch. 3, pp. 56-93.

There is no reason why all countries should devote the same proportion of resources to education, but there is a tendency for countries at similar levels of development to devote similar amounts to such investments. In this way it can be seen if the South African economy is moving in the right direction as regards its percentage expenditure on education.

Any system of international comparisons has inherent defects and caution is needed in interpreting the situation. As concerns international comparisons of expenditure on education, the main disadvantages are of three types - economic, educational and political. The disadvantages which arise include the following:

(i) At different stages of the development process, different economies invest different amounts in human capital

(ii) Per capita national income varies between economies, according to their level of development, affecting education expenditure

(iii) Countries at different stages of economic development have different stages of education development (especially in respect of higher education)

(iv) Different educational systems result in different costs and returns (higher education being the most costly)

(v) The political structure of the country affects investments in human capital due to the aspirations of the people. In South Africa separate development and the decentralisation of education control are examples of this. This, however, need not be a hindrance to international comparisons to any great extent.

These disadvantages, however, can be offset to some extent by the choice of countries for comparison which are closely related to South Africa in terms of human resource development, especially with regard to education. Also, comparison can be made with countries which are both inferior and superior in terms of this criterion. In this way the rankings as devised by Harbison and Myers[4] can be utilised.

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[4]See F. Harbison and C.A. Myers, op.cit.

South Africa falls in Level III, that is, the semi-advanced economies in terms of human resource development.

Table 34 shows several selected countries, their level of human resource development in terms of the "composite index", their per capita G.N.P. and their expenditure on education as a percentage of national income. In general, South Africa spends a higher proportion of her national income on education than do the majority of countries in Levels I and II,[5] though there are some economies (for example, Kenya and Uganda in Level I) which spend a relatively greater amount.

In Level III South Africa ranks seventh in terms of per capita G.N.P., but only tenth in terms of expenditure on education.[6] Compared to the advanced economies (Level IV), especially those of Japan, the United States and the United Kingdom, South Africa still has a long way to go before approaching their expenditure position.

Taking into account the discrepancies and defects inherent in international comparisons, the general conclusions which can be derived from the above are:

(i) The Republic is in a relatively favourable position in regard to educational expenditure when compared to countries at lower levels of development, but is in a relatively unfavourable position in comparison to countries of an equal or greater level of development.[7]

(ii) South Africa will have to invest more in education if it wants to reach as a long-term objective an expenditure situation equal

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[5] ibid., see Tables 5 and 6, pp. 45-46.

[6] ibid., Table 7,

[7] This is borne out by a study on higher education finance and expenditure conducted along very much the same lines by G.J. Trotter, op.cit., Chapter IV, pp. 93-112, who concludes

(i) that in terms of countries of equal development status, South Africa is not holding its own in regard to higher education, and
(ii) that in terms of the more advanced countries, "the Republic should devote proportionately more of its national resources to higher education, if it wishes to do any more than merely maintain its present position vis-a-vis the more advanced countries of the world." (p. 111).

to or better than the majority of developed economies, and even if it wants to hold its own amongst economies of equal development.

TABLE 34

INTERNATIONAL COMPARISONS OF EXPENDITURE ON EDUCATION

Country	Level(1)	Per Capita G.N.P.	%(2)
Kenya	I	87	3.3
Nigeria	I	78	1.9
Uganda	I	64	5.9
Brazil	II	293	2.6
Pakistan	II	70	1.2
India	III	73	1.7
South Africa	III	395	3.1
Costa Rica	III	357	4.0
Taiwan	III	161	3.3
Greece	III	340	1.6
Norway	III	1130	5.5
Denmark	IV	1057	2.9
Sweden	IV	1380	3.2
France	IV	943	3.0
Japan	IV	306	5.7
United Kingdom	IV	1189	4.2
United States	IV	2577	4.6

NOTES: (1) Level as ranked by Harbison and Myers.

(2) Expenditure on education as percentage of national income.

SOURCE: F. Harbison and C.A. Myers, op.cit., Tables 5, 6, 7, and 8, pp. 45-48.

10.2.1.2 Health

International comparisons of health expenditure, like those of education, can also be used to judge, in a general way, the relative situation in an economy. There are again significant defects which render invalid any direct comparison and the same difficulties and complications as in educational comparisons arise.

Table 35 provides an international comparison of expenditure on health as a percentage of national income for several randomly selected economies. From this it would seem that South Africa is in a relatively favourable situation in comparison to other economies, whether under-developed or advanced. Yet certain factors have to be borne in mind when comparing these relative positions of economies. These are,

(i) the demand for health expenditure is related to per capita income.[8] In low-income areas the demand can be expected to be higher and thus expenditure must be greater than in higher income areas where preventive medicine and such measures are practiced. In all, as per capita income rises the outlay on health can be expected to fall.

(ii) the costs of health provision vary from country to country.

(iii) the different environments and incidence of disease result in differences in the effectiveness of expenditures on combatting them.

(iv) health is of greater economic importance in some environments compared to others.

(v) There is a considerable substitution between public and private health expenditure,[9] thus it can be assumed that in low per capita income areas public expenditure would have to be greater to supplement the relatively lower private outlays.

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[8] See F.L. Pryor, Public Expenditures in Communist and Capitalist Nations (London, 1968), pp. 151ff.

[9] ibid., p. 171.

Notwithstanding the above factors, it is apparent that South Africa, in relative terms, has a satisfactory overall rate of investment in health. Discrepancies, however, do occur within the health sector itself, necessitating greater outlays. This is most apparent in the rural areas of the economy, where increased health provision is still of the highest priority.

TABLE 35

INTERNATIONAL COMPARISONS OF EXPENDITURE ON HEALTH

Country	Health Expenditure[1] (A)	National Income[2] (B)	A/B %
South Africa[3]	49.6	9460	5.2
United States[3]	11,696	775	1.5
Denmark[3]	2,973	80.1	3.7
United Kingdom[3]	1,813	35.0	5.2
India[4]	2,013	286	0.7
Australia[4]	623	21.4	2.9
Sweden[4]	1,741	115.6	1.5

NOTES: (1) In millions of currency unit.

(2) In thousand millions of currency unit.

(3) 1969 figures.

(4) 1968 figures.

1963 = 100.

SOURCE: Statistical Year Book, 1970 (New York, 1971) Tables 179 and 193.

10.2.1.3 Overview

From the above it may be seen that South Africa is generally under-investing in human resource development, especially in education, but that health expenditure is on a more satisfactory level. The adequacy or inadequacy of the amounts invested in education and health, however, can only accurately be determined by the application of an analysis of costs and returns on the margin, in accordance with the cost-benefit approach shown in an earlier chapter.[10] This, however, is precluded by the lack of available statistics as well as by conceptual problems. Also other complicating features would be different rates of return to different racial groups and to different levels and types of education, the different rates of return to health expenditure along racial and spatial lines, and the difficulty of ascertaining how much is consumption and how much is investment.

The application of a Paretian type of analysis to the economy to guage how much should be spent on human resource development thus seems impossible. The adequacy or inadequacy of such expenditures can only be judged in terms of how much the economy, under present circumstances, can afford not to spend. The shortage of educational facilities, labour bottlenecks and so on would suggest an inadequacy in terms of educational expenditure. Yet this does not necessarily mean that increased outlays are justified in relation to the demands from other sectors of the economy. In other words, the rate of return from education may be both positive and significant, but still lower than that from the alternative application of the funds.

Generally, it appears that it would be desirable to increase the rate of investment in human capital, especially in view of such problems as economic dualism, the shortage of skilled labour, and the rapid rate of population growth. Yet it is also evident that social services like education and health investments do not operate in a vacuum and cannot be increased regardless of the needs of other programmes and their demand for resources.

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[10] See Chapter 4.

10.3 THE HUMAN RESOURCE DEVELOPMENT POSITION

The human resource development position of South Africa has been outlined in both financial and non-financial terms in this thesis. It can best be shown in absolute terms and relative to other countries by use of the "quantitative indicators" as devised by Professors Harbison and Myers.[11] Their study consists of classifying seventy-five countries into four levels, or stages, of development in regard to human resources on the basis of an "index" of human resource development. To establish this index, seven "indicators" are used relating to human resources, plus two relating to "the orientation of higher education".[12]

The seven indicators used were:

1. Number of teachers (first and second levels) per 10,000 population.
2. Engineers and scientists per 10,000 population.
3. Physicians and dentists per 10,000 population.
4. Pupils enrolled at first level (primary) education as a percentage of the estimated population aged five to fourteen inclusive.
5. The adjusted school enrollment rates for first and second levels combined.
6. Pupils enrolled at second level (secondary) education as a percentage of the estimated population aged fifteen to nineteen inclusive, adjusted for length of schooling.
7. Enrollment in third level (higher) education as a percentage of the age group twenty to twenty-four.

The two indicators relating to the orientation of higher education were:

(i) The percentage of students enrolled in scientific and technical faculties in a recent year.

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[11] F. Harbison and C.A. Myers, Education, Manpower and Economic Growth (New York, 1964).

[12] ibid., p. 27.

(ii) The percentage of students enrolled in faculties of humanities, fine arts, and law in the same year.

From the indicators 6 and 7 above, a "composite index" is constructed by means of a weighted enrollment index, which is used to distinguish countries in terms of the four levels of human resource development, labelled as follows: Level I, underdeveloped; Level II, partially developed; Level III, semi-advanced; Level IV, advanced.[13]

The authors then study the relationship between the indicators and the economic development of the countries, and show a high correlation between the "index" and G.N.P. per capita,[14] contributing some clear economic meaning to this. They believe that it provides a basis, with a more detailed qualitative analysis of human resource development, for the consideration of appropriate strategies of investment in human capital. Though this study has much merit, it also has inherent weaknesses as pointed out by Bowman[15] and Sen.[16] Caution is needed in interpreting their findings, especially regarding the causal relationship between a high level of educational enrollment and a high per capita gross national product.

In terms of the above study, South Africa is ranked in the third, or semi-advanced, level of human resource development. It has a composite index of 40.0, which is relatively favourable in international comparisons and extremely favourable in African terms. The Republic is the highest ranking African country south of the Sahara. Table 36 shows the relative position of the country in comparison to some selected countries, as ranked by Harbison and Myers.

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[13] ibid., p. 31.

[14] ibid., pp. 34-35.

[15] M.J. Bowman, Review of F. Harbison and C.A. Myers, "Education, Manpower and Economic Growth", Journal of Political Economy, Vol. 73 (1966), pp. 315-17.

[16] A.K. Sen, "Economic Approaches to Education and Manpower Planning", India Economic Review, Vol. 1 (1966), pp. 11-21.

Yet judged by the potential of the economy as outlined in earlier chapters, South Africa still has a long way to go to reach the advanced stage with regard to the development of her human resources. As Harbison and Myers state, "In short, the average Level III country is 'over the hump' in human resource development. It is on the road to becoming an advanced country, and it can travel that road largely under its own power. Whether it does or not will depend upon its strategy of human resource development."[17]

TABLE 36

SELECTED COUNTRIES : HUMAN RESOURCE DEVELOPMENT INDEX AND LEVEL

Country	Index	Level
Kenya	4.5	I
Nigeria	4.95	I
Sudan	7.55	I
Brazil	20.9	II
Pakistan	25.2	II
India	35.2	III
South Africa	40.0	III
Greece	48.5	III
Norway	73.8	III
Denmark	77.1	IV
France	107.8	IV
Japan	111.4	IV
United Kingdom	121.6	IV
United States	261.3	IV

NOTES: Level 1 = underdeveloped.

Level 2 = partially developed.

Level 3 = semi-advanced.

Level 4 = advanced.

SOURCE: F. Harbison and C.A. Myers, op.cit., Table 1, p. 33.

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[17] F. Harbison and C.A. Myers, op.cit., p. 101. It is strange, however, that the authors have included India in this level, for it is doubtful if India is "over the hump" in regard to human resource development.

Many of the general characteristics which these authors attribute to a semi-advanced economy in terms of human capital are directly applicable to South Africa.[18] Such characteristics are divided into the categories of economic and political structure, manpower, and education. The relevant aims include:

1. The advance of secondary industry and the relative decline in the predominance of agriculture.
2. Well-developed transport, power and communications sectors.
3. A significant rate of growth over the last three decades.
4. The nature of political leadership directly affecting economic growth and the policy towards human resource development.
5. A rapid rate of population increase.
6. A shortage of skilled manpower and a surplus of unskilled labour.
7. The recognition of manpower problems and their effects on the economy.
8. Problems facing formal education on the primary, secondary and higher levels in the form of non-availability of facilities, declining enrolment rates and bottlenecks.
9. Need for expansion of informal as well as formal education to upgrade presently employed labour as well as overcoming skilled manpower shortages.

In terms of these characteristics, Harbison and Myers suggest a strategy of human resource development whereby a semi-advanced economy can move toward the level of advanced economies.[19] Such a strategy, in the case of South Africa, will be based upon the following considerations.

(i) the need for further rapid industrialisation, necessitating a supply of high level manpower.

(ii) the increasing demand for education, both formal and informal, which places greater pressure on the education structure and available facilities.

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[18] ibid., pp. 101-124.

[19] ibid., pp. 124-129.

These suggest, according to Harbison and Myers, the need for a qualitative and quantitative expansion of education at all levels; a re-orientation of education, especially at the higher levels; increased productivity of the labour force already employed through increased informal education; and an increased availability of human resource development facilities in general.

In relation to these requirements the human resource development situation in the Republic, as shown in quantitative terms in an earlier chapter, can be analysed indicating the strengths and weaknesses of the present system.

10.4. PRESCRIPTIVE RECOMMENDATIONS

10.4.1. Introduction

From an economic point of view the role of human resource development in the South African economy is two-fold. It has to provide an adequate supply of relevant manpower to prevent labour bottlenecks which limit economic growth, and has to break down institutional rigidity, providing the willingness and ability for change, which in turn helps overcome the dualistic nature of the economy. To this end the human resource development policy in the Republic has serious defects.

The actual situation, with regard to education, health and migration, has been analysed in an earlier chapter, indicating certain weaknesses and strengths. Before the needs and performance of the economy in respect of human capital can be compared, however, it is necessary to note that there are some complicating factors which affect human resource development. These are,

(i) few economies have resources enough to extend educational and health facilities to the whole population in the required amounts. This limitation is a very real one in the Republic.

(ii) the existing inequality of economic opportunity amongst different racial groups. This renders any educational or health system geared to these social and economic conditions liable to involve

further inequalities of opportunity.[20]

These factors, however, can be overcome to a large extent and their effects lessened by a more efficient situation as regards human resource development in South Africa. Yet in planning investment in human capital, the common difficulty of combining the economic with the social and political objectives is experienced.

10.4.2. Education

Like other economies, the Republic faces the choice between a utilitarian and a moralistic emphasis in its approach to education policy. It has been stated that: "Any theory of education, if it is to be complete and consistent, necessarily involves a theory of man and a theory of society, and in consequence any attempt to formulate an acceptable theory of education for South Africa faces the difficulty that there is no general agreement in the country on these matters."[21]

In most economies cognisance of both the functional and moral aspects of education is taken. In South Africa, according to the 1961 Education Panel, there are two minimum objectives in which the interests of society and of the individual coincide. These are the economic and social objectives, whereby the sufficient supply of skills and a sufficient degree of social adjustment are promoted respectively.

Bearing the above in mind, there exist basic weaknesses and incompatibilities within the South African education structure. If the required results are to be achieved through it, these flaws have to be overcome. Examples are as follows:

(i) The education pyramid is broad based, whereas it has been shown that in the future greater demands and emphasis will be on skilled labour and high level manpower. This incompatibility is greatest in the non-White racial groups, where the education pyramid is relatively more

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[20] It is important to note that the inequality of educational and health opportunities helps perpetuate the inequality of economic opportunity, resulting in a circular causality between the two.

[21] The 1961 Education Panel, Second Report (Johannesburg, 1963), p. 14.

broadly based and from which sectors, as shown above, the greatest increase in skilled workers will be demanded in the future.

(ii) There is a shortage of skilled labour in the economy, especially in relation to the demand for Whites, and the number of persons qualifying from school and university is not sufficient to meet the increasing demand. Yet the provision of education facilities is not expanding at a rapid enough rate to counter this, giving rise to such features as a greater rate of increase in terms of pupils relative to teachers, a declining pupil-teacher ratio, and a decreasing percentage of the population attending school.

(iii) The ideal situation from the social point of view, and a desirable one even from an economic point of view, would be compulsory education for all races. Yet this is impractical and impossible at present judging by the facilities available and the financing of education. The non-existence of compulsory education, however, is a waste of available resources and a future hindrance to the economy, for as the Education Panel (1961)[22] pointed out, universal compulsory education up to at least standard 6 would be necessary by 1975 to meet the economy's manpower needs. This hardly seems attainable judging by the present position of education, and the long term horizon of education necessitates action now for the future.

(iv) The overall demand for education, especially as estimated for the future, necessitates the expansion of the education structure at a rapid rate.[23] The past expansion rate has been too slow and the education structure, because of the backlog, will have to develop fast merely to maintain its present position. The result of too slow a growth rate will be bottlenecks at lower education levels, causing a lower enrolment at higher levels and intensifying the scarcity of skilled manpower, as well as aggravating the drop-out problem. This last problem is tied to the

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[22] 1961 Education Panel, Second Report, op.cit., p. 35.

[23] The demand for education is a function of increasing technology, higher incomes, changing aspirations and suchlike. See F.L. Pryor, Public Expenditures in Communist and Capitalist Nations (London, 1968), Ch. V. pp. 182ff.

lack of educational facilities and is uneconomical, because it is finance which could be used on higher education, to which level the returns are greater.

(v) The demand for education by non-Whites is likely to increase at a greater rate than that of the Whites. There is evidence of a dualistic tendency in education as regards the allocation of resources and the access to education facilities.[24] This manifests itself in the unequal per capita expenditure and unequal pupil-teacher ratios,[25] both of which help perpetuate the dualistic nature of education. The result of an increased non-White demand will increase this tendency, resulting in relative over-investment in Whites and under-investment in non-White human resources.

(vi) With regard to the finance of education, another discrepancy exists. Education for Whites, Coloureds and Indians is financed from general revenue, whereas African education, to a considerable extent depends on taxes paid by them. This is invidious considering that the Africans are generally at an economic disadvantage, have the highest population growth rate and demand for education, and will be expected to supply the greatest amounts of manpower in the future. Also the refusal by the State to subsidise church schools for Africans after 1954 (when they were given the choice of transferring such schools to the Bantu Education Department) has placed a greater financial burden on Africans.

(vii) Informal education, such as on-the-job training and adult education programmes, is necessary to upgrade present labour and increase efficiency. This is imperative if the vacancies in the skilled and semi-skilled categories of work are to be filled. The need for this is also indicated by the illiteracy amongst Africans, for which racial group the

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[24] See Education Beyond Apartheid, Report of the Spro-cas Education Commission (Johannesburg, 1971), pp. 14-40.

[25] The pupil-teacher ratio can also be used as a rough indication of the quality of education.

functional literacy rate in 1967 was calculated at 57.5 per cent for those aged 13 - 22 years.[26]

(viii) An expansion in vocational training is also necessary and the Spro-cas Commission has recommended - "That technical and vocational education for Africans, Coloureds and Indians be considerably expanded, and that the kinds of training given reflect the local as well as the country's needs."[27] This can be effected by increased apprenticeships for all races and greater emphasis on commercial or technical schools. The Eiselen Commission (UG.53/1951) recommended that the number of places in industrial training schools be stepped up from 2170 in 1949 to 6000 in 1959.[28] By 1970 not even half this total had been achieved.[29]

(ix) Other imperatives for the education system include the greater utilisation of female labour if the demands made on available human resources are to be met in the future, and the greatest effort in education planning, so as to provide the various kinds of qualified, skilled and trained labour at the right time, in the right numbers, to ensure the smooth development of society by avoiding both surpluses and shortages.

From this it can be seen that certain improvements have to be made in the education structure if it is to perform the role accorded it in the overall manpower strategy of the economy. There are, however, certain problems which face an expansion of education facilities and an "open-door" policy of education opportunities in South Africa.

The first of these problems is the high drop-out rate prevalent through all stages of African education.[30] Before the first standard in

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[26] F.E. Auerbach, in Transvaal Education News (April, 1970). The overall figure for the entire population is probably much lower.

[27] Education Beyond Apartheid, op.cit., Recommendation 28, p. 51. See also pp. 34-35.

[28] Report of the Commission on Native Education 1949-1951, UG.53/1951, p. 161, Table CXL.

[29] See Education Beyond Apartheid, op.cit., p. 34.

[30] See Statistical Appendix, Table A.10.

primary school is reached, one third of the pupils leave, and the rate remains steady throughout primary school, with a sharp increase in drop-outs at the end of primary education. Only about 28 per cent of the last standard at primary school reach secondary school.

The overall outcome is that from an annual intake of some half a million pupils into the first year of schooling, less than two thousand complete secondary school. The reasons for this high drop-out rate are that the time span of African education is relatively long (it is thirteen years and one year longer than that of other racial groups) and that the traditional African society does not place as much value on education as would, for example, a Westernised society. This means that the opportunity cost of education is relatively higher to an African student, resulting in a relatively high drop-out rate in African schooling.

The second problem is that of "educated unemployment". This is the feature which arises when education is out of balance with the man-power needs of an economy, resulting in misplaced expectations amongst educated persons. Unlike the situation in countries such as India where there is a tendency for people with a high level of skill to be in excess supply relative to demand and vacancies,[31] the problem in South Africa is that many non-Whites may not find suitable employment due to the rigidity of the employment structure.

In the Republic "educated unemployment" could occur in the sub-sistence economy if African education was expanded at too rapid a pace and the policy of separate development precluded the entry of skilled non-White labour to fill the shortage of skilled White labour experienced in the labour market. Yet it is unlikely to happen, due to the slow rate of increase in education facilities and the fact that in South

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[31] See F. Harbison and C.A. Myers, op.cit., pp. 104ff; and Memorandum to the Permanent Inter-departmental Committee on the Co-ordination of Education of All Races, submitted by the Trade Union Council of South Africa (November, 1968), addendum, p. V.
where it is stated that in India an estimated one million people with secondary school certificates and university degrees would be seeking employment during the Third Five Year Plan period, but would remain unemployed.

Africa there is a shortage of educators, for education is the greatest user of skilled capital and often the expansion of education is limited by the human factor itself. Also the high drop-out rate prevents a rapid increase in the supply of skilled labour in the African group.

10.4.3. Health and Migration

The effects of health expenditures and activities in the economy manifest themselves in the quantity and the quality of human resources available. In the South African case it appears that human resource development via health investments is performing this role satisfactorily. There is evidence of an increasing birth rate, a declining death rate, a longer life expectancy, and a more efficient economically active population.

Yet it is apparent that malnutrition and disease, bad working conditions, and low productivity still exist in certain sectors of the economy and could be improved by further health investments. From a purely quantitative analysis this may be a case for increase investment in health facilities, but it is difficult to establish this in view of the problems involved in carrying out the cost-benefit analysis which would be necessary for this purpose. Without knowing the percentage rate of return on investments in health it is not possible to tell whether or not the optimal situation in this regard has been satisfied. The conceptual problems linked to the measurement of a rate of return to health investments and the lack of adequate statistical data preclude any statement as to the adequacy, or inadequacy, of investment in human capital via health expenditures in the South African economy.

With regard to migration, it has been indicated that this form of investment in human capital is important in the economy, especially due to its prevalence amongst the Africans. Again the lack of suitable statistical data prevents any analysis in depth and comments regarding migration tend to be general. The main weaknesses in the system as it now exists tend to be of a social and moral nature.

The economic arguments against migration, especially temporary migration, rest on the following points:[32]

(a) There is considerable manpower wastage due to time spent on travel, periods of rest and unemployment, and the like.[33]

(b) That: "from its very nature the migrant system tends to inhibit the acquisition of skills and tends to condemn the workers to being in perpetuity merely indifferentiated units of unskilled labour."[34]

(c) It is indirectly the cause for much labour instability in the economy, due to such factors as intermittent employment, social disruption and reluctance to train temporary workers.

These arguments indicate the economic inefficiency of the migrant system. Yet under the circumstances existing in the South African economy it can be argued that there are some beneficial aspects to the system. To the individual, migration results in a higher income received in the advanced economy and is a return to human capital, though it has a very real cost in the form of productivity lost in the homelands. The overall economic effects to the supplying and host economies have been discussed in an earlier chapter.

10.5. SUMMARY AND CONCLUSIONS

This chapter outlined the human capital formation situation of the economy in terms of expenditure on human capital investment components and in terms of the level of human resource development, as devised in the study by Harbison and Myers.

The analysis of expenditure on human capital, both in absolute terms and relative to other economies, gave rise to the general conclusion that there is a relative under-investment in human resource development

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[32] See D.H. Houghton, op.cit., pp. 87-90.

[33] The Tomlinson Commission calculated that on average 600,000 man years of available labour are wasted, ibid., p. 87.

[34] ibid., p. 88.

in South Africa. No quantitatively priced analysis of the optimal expenditure position is possible due to lack of adequate data and conceptual problems in the application of a cost-benefit approach to such investments.

With regard to the human resource development position of the economy, the main characteristics and a development strategy for human capital accumulation were indicated in the form of a quantitative and qualitative expansion of all forms of education at all levels. In relation to this strategy the strengths and weaknesses of the education, health, and migration structures were enumerated, indicating the required prescriptive changes necessary if a more effective role for human capital in the economy was to be attained.

The major conclusions from this chapter are:-

(i) Expenditure on health and education appears insufficient, but there is no way of measuring the inadequacy with any significant degree of accuracy.

(ii) The South African economy has a long way to go to reach an advanced stage of human resource development.

(iii) There are fundamental defects in the education structure which are imposing unnecessary limitations upon human captal formation in the economy. The situation regarding health and migration appears more satisfactory, but also leaves room for improvement.

CHAPTER 11

A.E. AND C.I. CASE STUDY

11.1. INTRODUCTION

It has been indicated in the first part of this thesis that the economics of education and health have become popular subjects for study, and are beset by both conceptual and practical problems. For these reasons the tendency has often been to omit the practical approach and concentrate on overcoming the conceptual problems first. Little research has been done on data obtained from individual firms because of the difficulties in measuring costs and returns to investments in human capital. Mincer[1] was a leader in propounding this outlook and maintained that the complexity of costing, the unreliability of data, and the areas of ignorance in the theory would prevent any worthwhile study of this type for the economy.

Other writers, including Thomas, Moxham and Jones,[2] believe that whereas a macro study may be impossible, a micro study can be carried out on the information gleaned from a single firm under certain conditions.[3] This case study of the economics of training at two of the A.E. & C.I. Limited[4] plants aims at shedding some light on the costs and benefits arising from the training of African workers and on some of the issues discussed in the preceding chapters.

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[1] J. Mincer, "On-the-job Training : Costs, Returns and Some Implications", op.cit.

[2] B. Thomas, J. Moxham and J.A.G. Jones, "A Cost-Benefit Analysis of Industrial Training", British Journal of Industrial Relations, Vol.7, (1969), pp. 231ff.

[3] These include the assumptions of the investment being a once-and-for-all expenditure and the existence of a relatively short term period (4 years). See ibid., p. 232.

[4] Formerly known as African Explosives and Chemical Industries Limited.

11.1.2. Approach

The two particular plants under consideration were chosen for a number of reasons, which include the following:

(i) They employ a total of 93 African workers, which is considered a representative sample of the Company as a whole.

(ii) Data pertaining to the employees in these two plants is fairly accessible and is considered to be reliable and accurate.

(iii) The Black Powder and Cordtex plants are considered to be two of the most progressive in the Company in regard to labour policy and training methods.

(iv) Security and safety reasons in an explosives factory render these two plants the most accessible for study.

Altogether this study of the investment in human capital, via expenditure on training, attempts to form a link between the theoretical analysis in the first part of the thesis and the application of the theory to South African economic development. It relates to such matters as the role played by training, worker mobility, education levels, and so on. It is, however, a micro study as pointed out above, but it does give an indication that an analysis of investment in training can be carried out and can be transferred, to some extent, to the macro level.

The approach to this study is divided into a part dealing with the background of the Company and one dealing with the analysis of the facts emerging from the study itself.

11.2. BACKROUND

11.2.1. Historical

The discovery of gold on the reef in 1886 led to a demand for blasting explosives and the formation of the first explosives factory at Modderfontein. In 1896 the "Zuid Afrikaansche Fabricken voor Ontplofbare Stoffen" began full production, and in 1924 African Explosives and Chemical Industries Limited (A.E. & C.I.) was formed, with its interests going beyond explosives into all spheres of the chemical

industry.[5]

The year 1971 marked the 75th anniversary of the commencement of manufacturing at Modderfontein farm. Over the period the Company had undergone rapid growth. The planned output of 80,000 cases (each containing 50 lb.) of dynamite in 1896 had reached over 5,500,000 cases by 1966. Capital utilised had reached the R175 million mark, annual sales were of the order of R150 million, yielding a net profit of some R18 million per annum.[6]

The present total labour force of the Company is around 13,700,[7] of whom 2,700 are white-collar staff, 2,000 blue-collar staff, and 9,300 non-Whites. The total wage bill is approximately R30 million per annum. Initially the company worked along the lines of labour intensive production, but with technological improvements and certain restrictive legislation there has been a move of emphasis to capital intensive projects. Coupled to this there has been an effort to utilise labour with maximum effectiveness.

The first efforts to ensure greater efficiency of both White and non-White labour in the Company came with the introduction of work measurement techniques in 1951. This was followed by the introduction of the Productivity Development Plan (P.D.P.) in 1966. Both aimed at reaping the advantages of increased labour productivity,[8] especially in the light of the continuing shortage of skilled manpower in the economy.

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[5]For a detailed history of the Company, see A.P. Cartwright, The Dynamite Company (Johannesburg, 1964), and D.P. Tidy, "Modderfontein over Seventy Years", A.E. & C.I. Report (1966).

[6]See "Top Companies", Financial Mail Special Survey, (Supplement, 1972).

[7]This figure represents a considerable decrease from the 1971 total of 17,400. The change is mainly the result of the merger between A.E. & C.I. and Triomf Fertilisers.

[8]See A.J. de Beer, "The Role of Management in Improving Productivity", address given to the N.D.M.F. (1972).

11.2.2. The Productivity Development Plan

The aims of the P.D.P. are "to make optimum contribution to the efficiency of operations of the signatory employers by the more effective use of people, plant and materials";[9] The prime motivation behind the P.D.P. was that the Company could no longer afford the unprofitable employment of skilled workers on work that could be done by lesser skilled workers. This meant that barriers to vertical labour mobility had to be removed to allow people to work more productively. As the Company Personnel Manager stated: "Better use must be made of potential occupational abilities and acquired skills of available labour resources irrespective of academic qualifications or colour."[10]

To achieve these aims the Company embarked on a programme of work re-distribution and the advancement of employees to the highest level of activity which they could perform satisfactorily. This necessitated the establishment of Joint Productivity Advisory Committees to operate in each department and the introduction of Job Categorisation and Classification via a job appraisal system applicable to the whole company.

The job appraisal system approves each job under the different mainheads of:

A. Mental requirements

B. Physical requirements

C. Acquired skills and knowledge

D. Working conditions

Points are allotted under each heading, weighted, and the total relative values of jobs are attained. This then enables the Category and Salary/Wage Class of a particular job to be determined. (See Table 37.)

The effects of the re-organisation introduced by the P.D.P. manifest themselves in what has come to be termed "job enrichment". Job

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[9]The Central Industrial Council for the Explosives and Allied Industries, Agreement (1971), p. 9.

[10]A.J. de Beer, op.cit., p. 6.

TABLE 37

CATEGORIES AND SALARY/WAGE CLASSES

Category	Sum of Weighted Points under Headings A & C	Sum of Weighted Points under All Headings	Salary/ Wage Class
Unskilled	up to 60	up to 104	Y
		105 and above	Z
Semi-skilled	from 71 to 125 (inclusive)	up to 124	P
		125 to 144	Q
		145 to 174	R
		175 to 204	S
		205 and above	T
Skilled	141 and above	up to 214	G
		215 to 244	H
		245 to 274	I
		275 to 314	J
		315 and above	K

SOURCE: The Central Industrial Council for the Explosives and Allied Industries Agreement, (1971), p. 43.

enrichment means that each level of the hierarchy accepts higher skilled elements of work from those above and passes down lower skilled elements of work to those beneath.[11] This concept can be applied throughout an organisation, resulting in increased productivity and job satisfaction.[12] An example of job enrichment being applied in A.E. & C.I. is where operators with suitable training carry out certain tasks previously performed only by journeymen.

Generally it is claimed that job enrichment in the company has resulted in "greater job satisfaction, greater employee commitment, improved understanding between management and men, and many other unmeasurable factors."[13] This is substantiated by the fact that, taking 1966 as the base year, by 1971 volume of production had risen from 100 to 135, total employment had dropped to 94, total wage costs had risen to 120, and production per unit of labour had increased to over 140. The result has been that labour cost per unit of production has dropped to 87 and the average cost per unit of labour (wages) has risen considerably faster than the Consumer Price Index over the same period.[14]

The success of job enrichment is dependent upon the quality of the labour resources available to the Company and the type and amount of training such labour receives. This is especially pertinent in respect of the non-White labour, because unless this labour can accept some of the work elements of more skilled jobs, the whole cycle of job enrichment is restricted. For this reason A.E. & C.I. places particular emphasis on the training of its non-White employees.

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[11] "Job enrichment" should not be confused with "job enlargement", which is simply making a job structurally bigger.

[12] See W.J. Paul and K.B. Robertson, Job Enrichment and Employee Motivation (London, 1970).

[13] A.J. de Beer, op.cit., p. 10.

[14] See ibid., p. 11.

11.2.3. Non-White Labour

The full complement of non-White employees of A.E. & C.I. is around 9,300. The majority are Africans, with just over 250 Coloureds employed in the Western Cape area and a small number of Indians employed in Natal.

At Modderfontein the total number of non-Whites housed in the A.E. & C.I. compound is of the order of 5,300.[15] Of these, only about 600 (11.3%) are classified as semi-skilled workers; the remainder are unskilled. This means they fall into the T, S, R, Q and P, and Z and Y job classes respectively. The individual job class complements are given below:

CLASS	NO. OF EMPLOYEES[16]
Y	3,600
Z	750
P	350
Q	300
R	200
S	30
T	40
TOTAL	5 270

The A.E. & C.I. plants at Modderfontein employ about 4,600 African workers. Management aims to reduce this substantially and the target reduction figure for the end of 1972 is just over 4,000. The Company realises, however, that this can only be fulfilled by the introduction of greater efficiency and increased productivity amongst the remaining labour. This has resulted in a greater emphasis being placed on the training and upgrading of the labour resources available to the Company.

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[15] Of these 500 to 600 are employed by Triomf Fertilisers and are not direct A.E. & C.I. employees though they are supplied from the same pool of workers. Variances in the total number of Africans employed are due to seasonal fluctuations in certain lines of production, especially fertilisers.

[16] Estimates.

African workers employed at Modderfontein fall into two different categories, each of which affects their employment, placement and training. Firstly, there are those workers engaged under the "re-call" system. These are employees signed on before the 1st April 1968. They are contracted to the Company for a year, after which they are compelled to return to their homelands. The Company can then recall them and does so automatically if they are semi-skilled workers or holders of key jobs. The second category comprises "new" African employees. These are employed through the Bantu Affairs Commissioner and have no prior experience with the Company. When these workers' contracts expire, they are not re-called. Both of these categories of employees have training problems as will be shown later.

The formal education levels of the African employees at Modderfontein are low and bear out the general trends of African education as shown in the earlier chapters of this section of the thesis. Of the 5,300 African workers, only 35 have matriculation passes, about 350 have reached standard eight or above, and about 450 standard six and above. This means that only approximately 16 per cent of the total African labour force has reached the education level of standard six (i.e. high school level).[17]

11.2.4. Company Structure

This study is concerned with the economics of training African workers in the Black Powder and Cordtex plants of A.E. & C.I. These are two of the production plants in the Explosives Group of the Company (see Figure 8). Each plant has its organisational structure, incorporating both White and non-White workers (see Figure 9). The Training Department, which is responsible for the training and up-grading of the African employees in these particular plants falls under the direct responsibility of the Section Manager (Safety Fuse) and is organised as shown in the chart.

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[17] Changes have been taking place in the education standard of the African labour force. In a group of nearly 4,000 workers who came to the factory before 1965, nearly 50 per cent had had no formal education at all. In a sample of 1,700 who arrived between 1965 and 1969, 27 per cent had no formal education.

FIGURE 8

A.E. & C.I. ORGANISATIONAL CHART 1

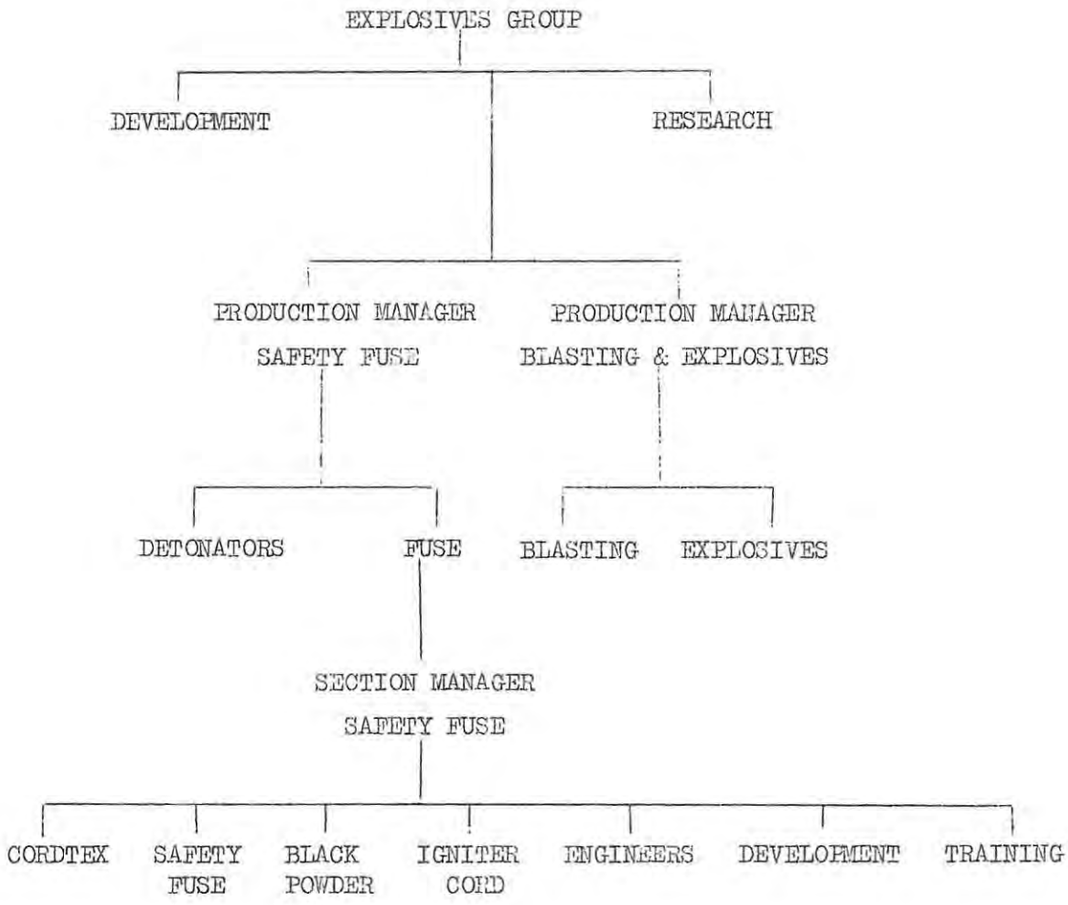
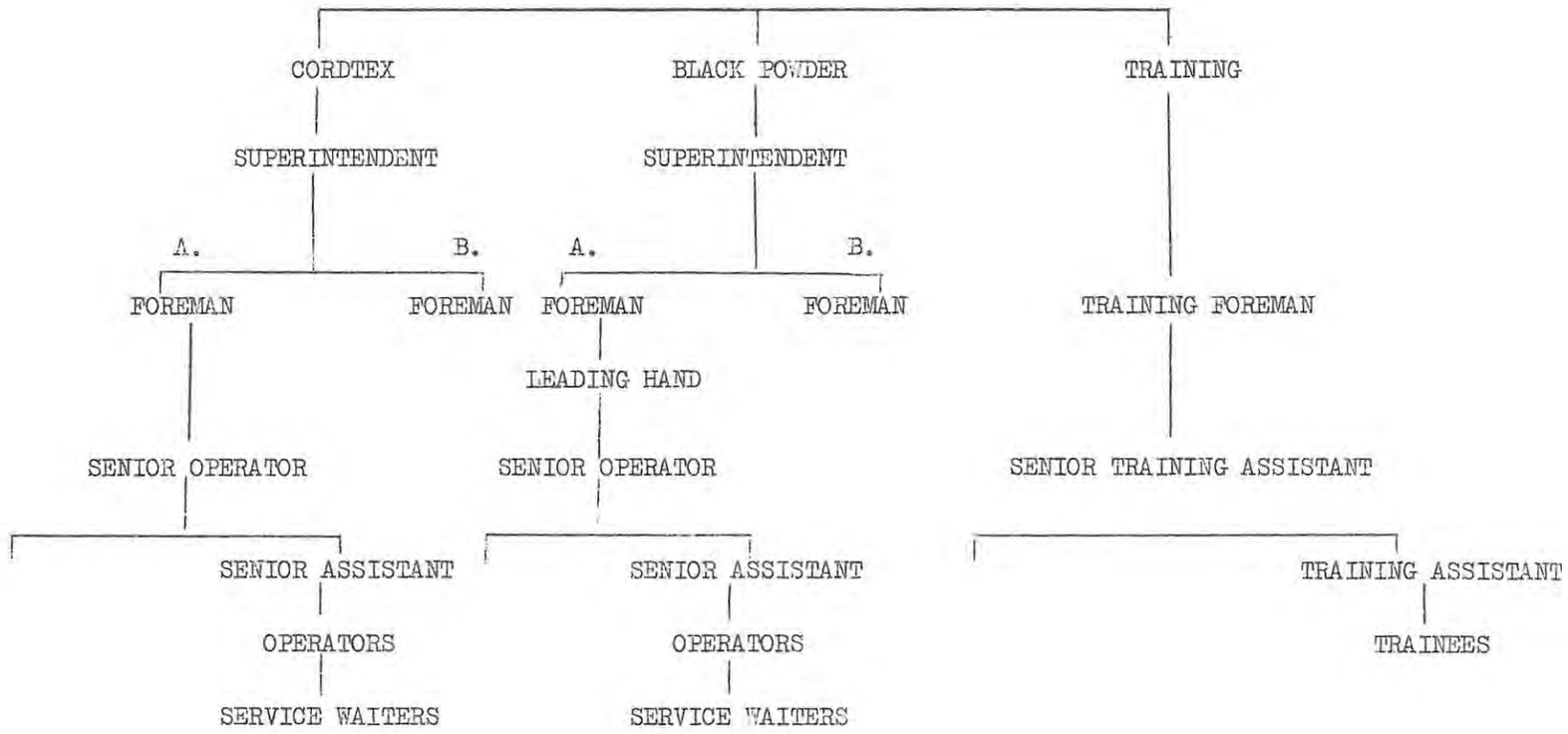


FIGURE 9

A.E. & C.I. ORGANISATIONAL CHART 2



Notes: A = Day Shift
B = Night Shift

11.3. THE BLACK POWDER AND CORDTEX PLANTS

11.3.1. Training

The Black Powder and Cordtex plants of A.E. & C.I. at Modderfontein employ a total of 93 Africans.[18] The agreed complements[19] of these plants are 62 and 36 respectively, with the actual complements being 53 and 40. The training of these employees is designed to implement the broad aims and objectives of Company policy as outlined above. The framework of the training programmes in these plants is similar and can be divided into both a general and a specific component.

11.3.1.1. General Training

The general training received by African workers comprises mainly induction training. The initial induction training occurs when the employee first arrives at the compound and includes compound procedures, security and so on. All African employees undergo this induction training irrespective of whether they have been "recalled" or are "new starts" in the Company.

A more specific induction training is then undergone at the plants. This "plant induction" varies according to the type of plant and is emphasised especially in the case of plants manufacturing explosives. It usually incorporates such factors as the rules and regulations of the particular plant, and in many cases it is felt a considerable amount of duplication of the general induction occurs.

In the Black Powder and Cordtex plants, plant induction includes the following:

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[18] Table 38 shows the relevant facts which relate to these employees. It shows employee number, year engaged, educational level, employee category, training received, wage class history, and the number of work breaks.

[19] The agreed complement of workers for any single plant is the total number considered necessary to man that plant effectively, taking into consideration such factors as leave, absenteeism, resignations, etc. The agreed complements are calculated in accordance with legislation such as The Physical Planning and Utilisation of Persons Act, though it is maintained that the Company has, to a very large extent, a free hand in its manning policy.

(i) welcome

(ii) daily routine

(iii) facilities

(iv) plant organisation

(v) cleanliness

(vi) safety

(vii) discussion

(viii) rule reading.

The responsibility for induction training in these plants rests with the Training Foreman, assisted by his African Training Assistants.

This form of training is a "general" type of training in terms of Becker's[20] useful distinction. It is applicable to employees throughout the factory and enhances both their value and use to the company, as well as increasing their private returns.

11.3.1.2. Specific Training

Specific training incorporates "on-the-job" training techniques and is less generally applicable than is the type of training outlined above. It increases the value of a worker in a particular plant, but does not increase his mobility between plants. In both the Black Powder and Cordtex plants this form of training is the responsibility of the Plant Foreman and his assistants. In the case of White trainees, the Senior Operators and Leading Hands aid the Plant Foreman. In the case of African trainees, all the above have a direct involvement, but are also aided by African Training Assistants who provide the direct link, helping to overcome problems of communication, customs and so on. The role of the Training Foreman and the African Training Assistants is to render the service of assisting, checking

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[20] See G.S. Becker, Human Capital : a Theoretical and Empirical Analysis with Special Reference to Education, op.cit., Chapter II, where he postulates that general training raises the marginal productivity of a trainee both inside and outside the firm equally. Specific training, on the other hand, equips the trainee with a skill which is useful only to the firm providing it.

and advising on the progress of the training, but the overall responsibility lies with the Plant Foreman.

On-the-job training of Africans in the two plants under consideration commences when the trainee becomes the responsibility of the Training Assistant in that particular plant. The African Training Assistant shows the trainee the layout, describes the operation and explains how to operate the machinery. The trainee is then "attached" to an experienced operator for a period and works with him, under the frequent surveillance of the Plant Foreman, Senior Operator or Senior Assistant.

When it is considered that the trainee is competent, he is "passed out" (examined) by both the Plant Supervision and the Training Department. Periodically the trainees are re-checked and even re-trained, for the Company believes regular checks are essential, not only during training, but also after the pass out.

The same system of training is applicable to workers who are being promoted within a plant, or who are being transferred to another plant.

TABLE 38

AFRICAN EMPLOYEES - COMPOSITE TABLE

Employee Number	Engaged (Year)	Education (Std.)	Employee Category	Training [2]	Wage Class [1]			Work Breaks [3]
					Initial	Present	Changes	
2619	1962	10	A	1	Q	S	2	2
7861	1971	0	D	0	Y	Y	0	7
1081	1971	1	D	0	Y	Y	0	2
6513	1967	0	D	-	Y	Y	0	13
7206	1972	2	D	0	Y	Y	0	0
5771	1964	0	D	1	Y	Y	0	5
462	1962	0	D	1	Y	Z	1	5
6970	1964	5	B	2	P	S	3	5
817	1964	8	A	4	Y	S	5	7
5293	1963	6	C	2	Y	S	5	5
6466	1971	1	D	0	Y	Z	1	2
3286	1963	3	D	2	Y	Z	1	3
7875	1966	Sub B	D	-	Y	Z	1	15
419	1965	0	D	4	Y	Z	1	7
4156	1965	0	D	-	Y	Z	1	6
4953	1964	3	D	1	Y	P	2	11
3484	1961	8	D	2	Q	S	2	4
3616	1964	4	A	2	Y	Z	1	5
1925	-	0	D	-	-	-	3	-
945	1959	0	D	0	Y	Y	0	15
5439	-	4	D	-	-	-	-	-
3022	1969	8	A	2	Y	S	5	7
2183	1971	1	D	0	Y	Y	0	2
3154	1967	2	D	1	Y	Y	0	6
5858	1964	0	D	1	Y	Y	0	-
6446	1964	0	D	1	Y	Z	1	5
3401	1967	0	D	2	Y	Z	1	2
387	1964	2	B	2	P	S	3	4
7320	1964	0	D	1	Y	Y	0	8
433	1964	0	D	0	Y	Z	1	8
521	1963	6	B	-	Z	S	4	7
483	1963	6	B	-	Z	S	4	7
2248	1971	0	D	0	Y	Y	0	2
6481	1968	3	D	1	Y	Y	0	4
4451	1962	0	C	2	Y	S	5	5
2947	1966	4	D	3	Y	Z	1	6
1693	1963	6	A	2	Q	S	2	7

Employee Number	Engaged (Year)	Education (Std.)	Employee Category	Training [2]	Wage Class [1]			Work Breaks [3]
					Initial	Present	Changes	
3243	1962	0	D	2	Y	Y	0	4
1397	1971	3	D	0	Y	Y	0	1
2570	1964	0	D	1	Y	Y	0	7
1994	1962	0	D	1	P	Y	-2	7
1283	1971	4	C	0	Z	Z	0	1
7567	1972	4	D	0	Y	Y	0	1
4237	1965	6	C	0	Y	R	4	5
6344	1964	0	D	2	Y	Z	1	2
1348	1964	3	D	3	Y	Z	1	5
2591	1964	0	D	2	Y	Y	0	8
3070	1966	2	D	3	Y	Y	0	9
6513	1965	0	D	1	Y	Y	0	10
1290	1964	0	D	2	Y	Y	0	14
4684	1961	2	D	3	Y	Y	0	4
4532	1963	0	D	3	Y	Y	0	3
5676	1964	2	D	1	Y	Y	0	3
2714	1963	0	D	1	Y	P	2	
2299	1971	4	D	1	Z	P	1	
5818	1964	0	D	1	Y	P	2	
6242	1959	0	D	1	Y	Y	0	
7292	1967	0	D	0	Y	P	2	
4659	1963	3	D	1	Y	P	2	
4612	1965	6	D	0	Y	P	2	
6252	1966	0	D	2	Y	P	2	
7657	1970	Sub B	D	0	Y	P	2	
2780	1964	5	B	4	Y	P	2	
6111	1963	3	D	2	Z	P	1	
6505	1964	3	D	1	Y	P	2	
4362	1962	4	D	2	Y	Q	3	
2682	1964	0	D	2	Y	P	2	
2099	1967	5	D	1	Y	Q	3	
5323	1963	4	D	2	Y	P	2	
662	1963	2	D	2	Y	P	2	
6806	1971	3	D	0	P	P	0	
6977	1965	1	D	1	Y	P	2	
578	1963	1	D	2	Y	P	2	
4008	1965	3	D	2	Y	P	2	
4597	1964	0	C	3	Y	Q	3	
7570	1963	2	D	2	Y	P	2	
1349	1964	0	D	1	Y	P	2	
2837	1964	4	D	4	Z	P	1	

Employee Number	Engaged (Year)	Education (Std.)	Employee Category	Training [2]	Wage Class [1]			Work Breaks [3]
					Initial	Present	Changes	
1751	-	1	D	-	-	-	-	
4098	1962	5	D	2	Y	P	2	
6078	1965	6	D	3	Y	Q	3	
4976	1965	0	D	2	Y	Q	3	
5331	-	6	C	-	-	-	-	
7553	1965	6	D	5	Y	P	2	
4244	1969	4	C	-	Y	P	2	
5786	1962	3	D	5	Y	Q	3	
5259	1963	3	D	3	Y	Q	3	
1179	1964	6	B	2	Y	Q	3	
626	1964	0	D	0	Y	Y	0	
4032	1969	4	D	-	Y	Y	0	
1754	1962	0	D	1	Y	P	2	
1984	1967	0	D	2	Y	Y	0	
1578	1966	3	D	1	Y	P	2	

NOTES:

1. Prior to 1969 wage classes were numerical. These have been adjusted to alphabetic classes corresponding to the numerical classes.
2. This represents the number of times an employee has been "passed out" apart from initial training.
3. This represents the number of work breaks an employee has had. It includes expired contracts, leave, transfers and discharges.
4. Dashes indicate no information available.

11.4. ANALYSIS OF AFRICAN LABOUR

11.4.1. Introduction

The adaptability of the African for regular factory work is a much discussed subject and has been the focal point of many studies.[21] It has been asserted that the African is "culture-bound" in such a way as to prevent his adaptation to modern factory conditions,[22] and much anthropological evidence exists to support this contention that tribal life hinders adaptability. On the other hand, however, there is much evidence which suggests change and detribalisation amongst the Africans. This manifests itself in the emergence of an urbanised African society.[23]

The general belief is that the work performance of Africans is unsatisfactory. A typical example of opinion in this respect is the following: "the African's work performance is at present unsatisfactory in many respects by European standards; that in quantity and quality it is often inferior; that the African sometimes lacks pride in his work; that he is often unstable and restless and prone to absent himself apparently without valid reasons . . ."[24] There is obviously some truth in a general statement such as this, but it is an over-siplification of the situation. Like all generalisations it fails the test of specific application. Contrary opinions on the ability of African labour have

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[21] See for example H.S. Alverson, "The Social and Organisational Antecedents of Job Satisfaction among Black South African Industrial Workers: A Multivariate Analysis", Ph.D. (Yale University, 1968).

[22] The A.E. & C.I. Training Foreman supports this contention, claiming that their effectiveness is hindered by:

(i) unfamiliarity with factory routine and machinery;
(ii) lack of decision making ability coupled with low educational levels;
(iii) lack of awareness of such factors as productivity, waste, efficiency, cost-consciousness, etc.

Yet all agree that education and training is an effective way of overcoming these factors.

[23] See P. Mayer, Townsmen or Tribesmen, Conservatism and the Process of Urbanization in a South African City (Cape Town, 1961), Chs. 1, 2.

[24] International Labour Office, African Labour Survey, Number 48, (Geneva, 1948), p. 169.

also been widely expressed. These are usually in relation to the suitability and competence of African workers in a semi-automatic production process.[25]

In general, neither of these conflicting opinions relate to the effects of education and training on the African, which it has been shown in the earlier part of this thesis can inculcate the required abilities and knowledge. This means that often the quality of African workers is closely related to the amount of education, both formal and informal, received. This will become apparent later in this particular case study.

11.4.2. Labour Quality

11.4.2.1. General

One of the most important factors in regard to the quality of African workers at A.E. & C.I. is that the company does not have complete control over the quality aspect of its labour. With regard to re-called workers, the Compound Manager has a certain degree of control, but can exercise little control over the quality of newly recruited labour for a number of reasons. These include the fact that selection procedures are not carried out at recruitment points and that the system of recruitment enforced by the government is one of engagement prior to assessment and selection.[26]

Newly recruited Africans arriving at the A.E. & C.I. compound are subjected to a series of aptitude tests in order to assign each an employee category. These categories, (A, B, C, and D), reflect the

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[25] See S. Biesheuvel , "The Occupational Abilities of Africans", Optima, Vol. 2 (1952), pp. 18-22; Board of Trade and Industries, report 282, "Investigation into Manufacturing Industries in the Union of South Africa" (Cape Town, 1945), paragraph 134; and R. Berman, "The African as Industrial Worker", Race Relations Journal, Vol. 12 (1945), pp. 28-32.

[26] The Company is optimistic that in the future selection before engagement will be possible, especially when the labour requirements of the Company, and of industry as a whole, become more exacting and the present system cannot satisfy the needs.

relative aptitudes of the workers and are utilised to determine the selection and placement of the employees in the Company.[27]

At the plants under consideration 81.7 per cent of the African employees are in the D, or lowest, category (see Table 39). This means that they can only perform the lower grade jobs, and this is a very real hindrance to the Company in many instances, especially where there is no method of controlling the quality of labour being recruited to fill vacancies in the higher grade jobs.

TABLE 39

NUMBERS OF EMPLOYEES BY LEVEL OF EDUCATION, PERIODS OF TRAINING, AND CATEGORY

Level of Education	Number of Employees	Training Periods[1]	Number of Employees	Employee Category	Number of Employees
Std.					
10	1	5	2	A	5
9	0	4	4	B	5
8	3	3	8	C	7
7	0	2	27	D	76
6	10	1	24		
5	4	0	18		
4	11	Unknown	10		
3	13				
2	8				
1	6				
Sub B	2				
0	35				

NOTES: 1. This is in addition to the initial training period and pass out.

SOURCE: Table 38.

[27] The aptitude tests cover mental ability, arithmetic ability, manual dexterity and comprehension. Only those workers with a formal education level of at least standard five are usually tested, the remainder being automatically assigned a D category.

In the case of the Black Powder and Cordtex plants, the Company is in the relatively fortunate position of having a high proportion of its African workers (77.4 per cent) on the re-call system.[28] The result is that the quality of the labour force is known and remains fairly constant (compared to labour which cannot be recalled to previous jobs) and the rate of employee turnover is minimised.

11.4.2.2. Educational Levels

The formal education standards of the African employees at the two plants is extremely low, though the fact that many have been in the employ of the Company for a number of years suggests that they have received a significant amount of training, which can substitute for formal education in some way. Table 39 shows the levels of education and the number of employees reaching them. It is noteworthy that 37.6 per cent of the workers have had no formal education whatsoever, and that only 19.5 per cent have reached the level of standard 5 or higher (of which only one has matriculated).

The informal education received by the African employees varies quite considerably. All receive initial on-the-job training at the plant as stated above. Many, however, receive further training (or even re-training) to upgrade them or to allow for transfers to other plants. Table 39 shows the number of workers receiving additional training. This additional training takes the form of a full training programme as outlined earlier and does not include periodic checks, partial re-training or refresher training. The additional training is carried out under the supervision of both the training department and of the particular plant in which the trainee is placed. From the table it can be seen that the majority of workers receive at least one, and more usually two, additional training periods after completion of their initial training. Quite a substantial number (19.5 per cent of the whole sample) receive no further training.

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[28] This means that these workers were employed before 1st April 1968 and have been with the Company for at least four years.

11.4.3. Occupational Mobility

The occupational advances made by African workers has been the subject of numerous studies, and a myriad of reasons have been forwarded to account for their singular lack of advance. It has been shown that there is a divergence of opinion on the quality of African labour and this could, if the argument regarding the relatively lower quality of African labour is valid, be a partial cause of the situation. A more plausible reason, however, is the existence of the legal and customary colour bars.[29]

The legal colour bar is entrenched by legislation such as The Mines and Works Act of 1911, The Apprenticeship Act of 1944, and The Industrial Conciliation Act of 1956. These acts ensured a disproportionate allocation of skilled jobs to Whites, the prevention of non-Whites from acquiring skills by apprenticeship, and the lack of trade union bargaining power amongst non-Whites.[30]

The customary colour bar is also a very effective hindrance to African occupational advancement, for due to its existence many employers are loathe to employ Africans in jobs formerly held by Whites or in supervisory positions over White workers. The threat of White reaction reinforces the customary colour bar and ensures the continued existence of occupational inequality in the economy.

In the A.E. & C.I. plants, occupational mobility amongst African workers is measured by changes in wage classes. As pointed out earlier, there are seven wage classes applicable to African employees (that is, the aggregate number of classes in the semi-skilled and unskilled categories). The distribution of the 93 employees in the Black Powder and Cordtex plants amongst these classes is as follows :

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[29] Other causes often given include health and educational levels. Both of these are included in the quality component of African labour.

[30] See M. Horrell, South Africa's Workers, op.cit.

CLASS	NO. OF EMPLOYEES
T	0
S	11
R	1
Q	8
P	27
Z	14
Y	28
Unknown	4
TOTAL	93

From these figures it can be seen that the majority fall into classes Y and P, the lowest classes of the unskilled and semi-skilled categories respectively (see Table 38). Class T, the highest in the semi-skilled category has no African employees classified within it in these two plants. There are, however, a small number of class T African workers employed at Modderfontein. This number is likely to increase in the near future, owing to the effects of the job enrichment programme and the fact that the S and T categories were only introduced in 1971.

In the first part of this thesis it was postulated that investment in human capital, via both formal and informal education, led to the increased occupational mobility of the person receiving it, and that the advantages accruing from such mobility could be included in the returns/benefits to the investment. This appears to be borne out by the facts pertaining to the mobility of the African employees at A.E. & C.I.

In Table 38 the initial wage class, the present wage class, and the change in wage classes is given for each employee. From this data the link between the education received by an employee and his occupational mobility can be studied. There is little evidence to suggest that changes in wage classes (i.e. occupational mobility within the firm) is linked to the amount of on-the-job training received. The reverse appears more correct, and it is more feasible that training is received once it has been decided to promote an employee. This suggests that

training is the consequence of mobility and not vice versa.[31]

There does, however, appear to be a link between the change in an employee's wage class and his formal education level. Table 40 shows the educational levels of the whole sample of African workers, the total numbers falling within each level, the total number of work class changes within each level, and the average change in wage class per worker in each level. Assuming occupational advance is linked in some way to formal education levels, the amount of informal training received and the number of years employed in the company, the average change in wage class per worker has to be qualified to be meaningful.

As stated above, there appears to be little direct influence of training on advancement. The effects of experience (measured by the number of years employed) can be compensated for by taking the average number of years a worker has been employed in each educational level. Then by relating the average change in wage class to the average number of years employed, an "index of change" can be derived. This index shows, for each level of education, the relative change in wage class per worker per annum on the average. In other words, it is a measure of the correlation between formal education and occupational advance of African employees.

The index of change, as shown in Table 40, suggests that Africans with a fairly high educational level can expect, on the average, to progress more rapidly than those with lower formal educational standards. The effects of education on mobility seem most apparent from Standard 2 upwards. The index is .21 for Standard 3, .24 for Standard 4, .33 for Standard 5, .40 for Standard 6, and .55 for Standard 8. The critical level of education appears to be Standard 5, for employees with that qualification or above, tend to advance considerably more rapidly than those with lower qualifications. This is undoubtedly due to the fact

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[31] It can be argued though, that promotion is dependent upon the "learning from experience" aspects of informal training.

that there is a shortage of African employees in the higher educational levels to fill the jobs requiring such qualifications - only 18 of the 93 Africans employed have Standard 5 or better - and that with the introduction of the P.D.P. there is greater scope for qualified workers.

TABLE 40

WAGE CLASS CHANGES BY LEVEL OF EDUCATION

Education Level	Total of Changes	Total Employee Numbers[1]	Average Change	Average Years Employed	Index of Change
0	30	34	0.88	7.71	.1141
Sub B	3	2	1.50	4.00	.3750
1	5	5	1.00	3.80	.2632
2	7	8	0.88	7.00	.1257
3	19	13	1.46	6.85	.2131
4	11	10	1.10	4.55	.2418
5	10	4	2.50	7.67	.3259
6	29	9	3.22	8.13	.3961
7	0	0	--	-	-
8	12	3	4.00	7.33	.5451
9	0	0	-	-	-
10	2	1	2.00	10.0	.2000

NOTES: 1. The total number of employees considered is 89 and not 93. This is because no information was available in respect of 4 African employees.

11.5. COST-BENEFIT ANALYSIS OF A.E.&C.I. TRAINING

1. Introduction

In the first part of this thesis the theoretical aspects of investment in human capital were discussed and some insight into the difficulties of attempting a cost-benefit analysis was given. Whilst the literature on the theoretical aspects of human capital is expanding rapidly in volume, there appears to be little work outside the purely restrictive theoretical framework. The statement that training secures a high pay-off and return on funds invested has not been fully illustrated and few firms are prepared to undertake detailed investigations into the economics of their training programmes.

Several writers, however, have attempted to lay down certain guidelines whereby such an exercise could be undertaken by a firm and the returns to investment in education evaluated. Leaders in this field include Dr[illegible]et,[32] Oatey,[33] Thomas,[34] and others.

This study of A.E. & C.I. attempts to indicate how a cost-benefit analysis could be applied to the particular situation of the firm and does not attempt to carry out a detailed appraisal of the training of African workers. The classification of costs and benefits as expounded by Thomas[35] is used as a guideline and the relevant details as witnessed at the A.E. & C.I. plants are included. It should be noted that the measurement of both costs and benefits can be carried out for the company as a whole as well as for individual trainees.

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[32] See P. Dr[illegible]et, "Vocational Training Costs : Results of a Pilot Study and an Essay in Methodology", International Labour Review, Vol. 97 (1968), pp. 115-133.

[33] See M. Oatey, "The Economics of Training with Respect to the Firm", British Journal of Industrial Relations, Vol. 8 (1972).

[34] See B. Thomas, et al., op.cit.

[35] ibid.

11.5.2. Costs

To enable an empirical analysis of costs, the total cost can be sub-divided into the seven different classes as indicated by Thomas.[36] They are as follows :-

1. Cost of initiating the training function.
2. Cost of servicing and co-ordinating the training function.
3. Cost of fixed training capital.
4. Cost of working training capital.
5. Cost of providing instruction.
6. Cost of giving instruction.
7. Cost of the wages of trainees - net of trainee output value.

Each of these in turn can be applied to the case of A.E. & C.I.

1. The cost of initiating the training function includes the cost of establishing the Training Department, or the relevant costs associated with an existing department. In the particular case of A.E. & C.I. it is difficult to isolate those costs applicable to the Black Powder and Cordtex plants and such allocation of costs would have to be done on a pro rata basis between all the plants in the Safety Fuse Section (see Organisation Charts), which utilise the facilities of the department for training their employees. To cost in respect of an individual, the costs would have to be further apportioned and the same would apply to any individual training programme.

2. The cost of servicing and co-ordinating the training function includes all costs of the Training Department except as stated in 1. above. At A.E. & C.I. this would include salaries paid to the Training Foreman, the Senior Training Assistant and the Training Assistants, outlays on equipment, overheads and all other internal costs to that particular department. This cost is obviously a variable one, being dependent upon the amount and type of training being undertaken.

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[36] ibid., p. 236.

3. The cost of fixed training capital includes the capital outlay necessary for training to take place. Relevant items include buildings, machinery, and so on. At A.E. & C.I. this cost class is relatively small because most of the training is done on-the-job and not off-the-job. There is mention of setting up facilities for the latter type of training, but this would increase fixed training costs considerably. It would complicate the costing of training in that such capital expenditure would have to be apportioned over its length of useful life.

4. The cost of working training capital includes the cost of training supplies and materials, for example, raw materials and non-durable training equipment. It is extremely unlikely that a complete assessment of this cost class could be made.

5. The cost of providing instruction includes costs incurred in training instructors, which raises the problems associated in attempting to estimate these costs, for example, the opportunity cost of trainee-instructor being away from his job.

6. The cost of giving instruction is complex. Instruction is given by members of the Company in the form of both formal and informal instruction. Formal instruction is given by salaried instructors, which includes all members of the Training Department in the case of A.E. & C.I. Informal instruction is given by staff normally employed on other duties, that is, where a trainee is attached to a more experienced worker. The formal instruction cost would be the total salaries paid to instruction staff apportioned over the trainees. The informal instruction cost is the output forgone during instruction. This latter cost component is difficult to measure, especially where there is some degree of slack in production.

7. The cost of the wages of trainees, net of trainee output value, is the difference between the wage paid to a trainee and the value of the output produced by the trainee. In normal circumstances the difference will be a net cost to the firm, but an exact calculation of this cost is

usually difficult.[37] In the A.E. & C.I. plants the very nature of the production process would render such a valuation almost impossible.

The above classification of costs in respect of A.E. & C.I. is reasonably comprehensive and operational, but distinction has to be made between the costs involved in the introduction of a new training scheme and the initial introduction of training into the Company. Where a new scheme is introduced, the increase in costs is relevant.[38] At the Black Powder and Cordtex plants the cost of training differs according to the type of training, that is, costs would vary between initial training, re-training, checking and so on.

Another important factor in the overall costing of training to the individual and to the Company as a whole, which is not emphasised in the above classification, is that of private costs. Private costs in this sense would include all those incurred by the individual (as explained in the theoretical part of this thesis), but not reflected in the overall costs to the Company. Likewise, private benefits would also exist and these two have to be included in the above analysis to give a complete picture of the total costs and benefits of training. As stated, the above scheme does not emphasise these costs or benefits because it aims to enable the calculation of costs relevant to the firm only and is a micro, not a macro, analysis.

11.5.3. Benefits

The benefits of training can also be measured,[39] and this is usually achieved by quantifying the results produced by training. In respect of the training of African workers at A.E. & C.I. the measurement of benefits can be achieved using Oatey's classification.[40] Again

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[37] See B. Thomas, et al., op.cit., pp. 240-241.

[38] See ibid., pp. 241-242.

[39] See Chapter 4 in the theoretical section.

[40] See M. Oatey, "The Economics of Training with Respect to the Firm", British Journal of Industrial Relations, Vol. 8 (1970), pp. 1-21.

distinction has to be made between the benefits accruing from the introduction of a new scheme as opposed to the setting up of a new department, and between the benefits to the firm and those to the individual. Oatey believes that there are direct benefits and "side-benefits" accruing from training, and that if the direct benefits do not justify the training cost-wise, consideration of the side-benefits may do so.[41]

The benefits arising from training include the following:[42] increased employee satisfaction; less waste and spoilage; lower absenteeism and turnover; improved methods and systems; increased level of output; less supervisory burden; lower overtime costs; lower machinery maintenance costs; fewer grievances; lower personal injury rates; better communications; greater employee versatility; improved morale; and greater co-operation.

Many of these are intangible benefits which cannot be directly evaluated economically. The firm can, however, evaluate the total effects of training in terms of profitability and it can measure, in money terms, the benefits accruing to training programmes with operational objectives. For example, it can evaluate any cost-saving resulting from training designed to reduce spoilage, increase skills, reduce turnover, and so on. This means that the "spill-over" effects are not ignored, but are encompassed in the overall benefits accruing to an investment in training.

11.5.4. The Relation of Benefits to Cost

The aggregate costs and benefits of training can be calculated for the A.E. & C.I. plants in the manner outlined above. A ratio of total benefits to total cost can then be derived and the effects of the training of African employees evaluated. It should be noted that the above classification of both costs and benefits includes

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[41] ibid., p. 10.

[42] See J.H. Proctor and W.M. Thornton, Training : A Handbook for Line Managers (New York, 1961), p. 23.

only those costs and benefits relevant to the firm; it does not include private or social costs and benefits, and as such is a micro-analysis. It can be extended to a macro level by the inclusion of those costs and benefits discussed in an earlier chapter. In this way the return to investment in human capital can be measured for the firm, for the individual, and for the economy as a whole.

11.6. CASE-STUDY FINDINGS

The above case-study of the Black Powder and Cordtex plants at A.E. & C.I. reveals some interesting findings in respect to the economics of education, especially in relation to the training of African workers. In many ways the findings provide empirical evidence for some of the theoretical ideas propounded in earlier chapters and they have relevance to the individual, the company and the economy.

1. It is apparent that using the above approach and the theoretical framework described in the first section of the dissertation it is feasible to conduct a cost-benefit analysis of the investment made in human capital through such activities as both informal and formal education.

2. African formal education levels are extremely low and those of the A.E. & C.I. workers tend to verify the general situation as shown by the statistical analysis of South African education. It is also evident that occupational mobility amongst the African workers is more dependent upon formal than informal education; the former tends to be the cause of a wage-class advance and the latter the result of such an advance. This means that the return to investment in formal education by African workers is extremely high both in the long and the short run periods and it helps explain why there is an ever-increasing demand for education amongst the Africans.[43]

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[43] A.E. & C.I. run a night school to help further formal education levels and the attendance figures indicate that the demand for such facilities is high.

3. The cost of training workers appears to be significantly high. The Company estimated in 1971 that the cost of training a European non-staff worker was in the range of R400 to R500. The cost applicable to African workers is likely to be less,[44] though the existence of certain irregularities tend to be cost-inducing forces. Firstly, there is a considerable degree of duplication of training at the compound and at the plant. Also the Company follows a policy of rigorous re-training and checking of workers (prompted by both security and safety reasons as well as by the traditional opinion towards African labour), which increases costs considerably. Another important cost component is the training required whenever an employee is transferred from a department or has a break in service for any reason. As seen in Table 38, some employees have had up to fifteen work breaks, each of which entails additional training. All re-called labour is checked and then re-trained if it is considered necessary.

The contract labour system also adds to costs, especially where it leads to the misplacing of trained labour. For example, a worker may finish his contract period and return home, leaving his job to be filled by another. The replacement is then trained in the job and when the former incumbent is re-called and returns, he is placed in another job, depending upon the vacancies at the time. It has been the Company's experience that workers are often placed in jobs of a lower grade than those for which they are qualified. This increases costs as the trained worker is receiving a wage out of line with his job and also the return to his training is not being optimised as his talents are not being fully utilised.

4. The benefits derived from training African workers are wide and varied. Perhaps the most outstanding are those in respect of reduced labour turnover and absenteeism. The situation regarding African

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[44] For example, the cost of unproductive time in terms of wages paid would be less.

workers is in direct contrast to that of European workers. Before the European workers were replaced by Africans in the two plants under consideration, labour turnover for certain jobs was approximately 250 per cent per annum. With the upgrading of African labour to fill some of these positions, the labour turnover for operators fell to around 64 per cent over the first eight months. This is a direct result of the Company's job enrichment policy and is a return to education.

The level of absenteeism has also dropped noticeably amongst African workers since the introduction of the P.D.P.; for example, in the months of January and February the Black Powder and Cordtex plants recorded only one worker on sick leave and one absent without leave. Over the same period labour turnover included five transfers, six resignations, three new starts and two dismissals, a rate considered extremely favourable by the management. It must be noted, however, that though much of this is because of job enrichment, the contract labour system and the compound system also play their part in this connection.

5. The private return to African workers is also enhanced by training. The management of A.E. & C.I. believes that the most important factor in the African employee's order of preferences is his wage, followed by job security, working conditions, communications, and so forth. The basic wage earned by an employee is dependent upon the job category in which he is placed, which it has been shown is dependent upon both formal and informal education. Besides this basic wage, employees also receive payment in kind, in the form of food, accommodation, hospitalisation and transport. The value of payment in kind is dependent upon, and varies with, job category.[45] The real income received by an employee is thus a function of his job level, which in turn is dependent upon his formal training, to a large degree, and his informal training to a lesser extent. Changes in job levels do occur for reasons such as

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[45] It is estimated to be worth between R140 and R390 per annum, depending upon whether the worker is in a Y or a T job class respectively.

long service, experience and unforeseen opportunities, but the most important factor is that of formal education.

6. The case study also reveals some important findings relevant to the training system employed by A.E. & C.I. At present the system is one of selection, placement and then training. The ideal would be selection followed by training and then placement, but this would increase costs; for example, replica equipment would have to be provided. Yet in some respects it would reduce costs, for example, it would reduce operating time wastage and rejection levels. In many cases it has been found by supervision that off-the-job training has led to greater efficiency amongst trainees, but it is still agreed by all that some on-the-job training is still necessary.

The use of African Training Assistants by A.E. & C.I. has obvious advantages. Although it is not usual for the European supervisors to be unwilling to train African workers, African Training Assistants are more able to overcome language and custom difficulties.[46] Also it was obvious that the African trainees tended to be more submissive and docile in the presence of European training instructors. The use of Africans here increases the two-way communication which results in better training. There is, however, one major drawback in this system : it has been found in these two plants that the benefits derived by using African instructors are often reduced by the effects of tribe loyalty, that is, a member of a particular tribe is often reluctant to train to the best of his ability a member from a different tribe. This results in the misallocation of labour, but it can be overcome to some extent by careful selection of trainers.

7. The results achieved by the P.D.P. and the training methods employed at A.E. & C.I. indicate that investment in education can have important consequences. Firstly, it is evident that training can overcome

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[46] All the Training Assistants are able to speak at least three African languages.

the "backwardness" of workers. Obviously many new African workers are unfamiliar with industry and have to adjust and adapt to new and strange living and working conditions. The training received by workers at A.E. & C.I. definitely aids and helps short-cut this process. Also it is apparent that with training the African workers do have increased job vigour and become more efficient and productive. In effect, training helps overcome their traditional, culture-bound outlook.

8. The training of African workers is an important factor in A.E. & C.I.'s future policy. All the foremen spoken to at the plants believe that eventually African employees will take over certain jobs presently held by Europeans. They base this belief on a number of factors, including the fact that in many cases Europeans are not prepared to do the job. For example, in the case of a certain type of operator, of 21 Whites who started only two completed the three-month probationary period. It is generally believed that the African employees are more anxious to be trained and up-graded than the lower rung Europeans, mainly because it increases their job mobility and income.

It is obvious then that a company like A.E. & C.I. has a great deal to gain by implementing the training methods it has. Yet it has to be remembered that under the labour policy existing in South Africa, it is questionable if it is expedient for employers to invest in costly training without assurances of greater flexibility in such matters as job reservation and influx control.

9. Besides education, A.E. & C.I. invests in human capital through expenditure on health. Malnutrition amongst African workers has a direct effect on output and A.E. & C.I., like many other firms, attempts to overcome these effects by means of industrial feeding schemes. By providing subsidised meals, payment in kind, hospitalisation, and decent living conditions, A.E. & C.I. are helping to overcome the debilitating consequences of malnutrition. Two direct actions in this matter are (1) the medical examination of aged African employees and the retirement of those who are no longer fit or who are deemed necessary

to be retired, and (2) the examination for "cracked feet" of all employees new to the Company. Malnutrition amongst Africans often causes cracked feet, which renders them unable to work in certain areas. For this reason an initial medical examination is given at the compound and, if necessary, a full examination at the Company's hospital.

11.7. OVERVIEW

Altogether, the case study of African labour at two of A.E. & C.I's Modderfontein plants, with special reference to their training, sheds some light on certain aspects of investment in human capital. It supports the contention that the theory of investment in human capital can be applied to the every-day world and that by means of cost-benefit appraisals on the plant-floor, the return to such investments can be calculated.

With reference to the South African economy it adds weight to the belief that the general level of investment in human capital, through both health and education expenditure, is low, especially in the case of the non-Whites. It is apparent that there is a relatively high rate of return to be derived on the margin from investment in human capital in the South African economy, and also that both the individual and the company benefit from such investments.

CONCLUSION

The second part of this thesis set out to consider, firstly, the availability of human resources in the economy and the quantitative investments made in them in the form of numbers of shools, teachers, pupils and so on. Secondly, it attempted to indicate the role human resource development could play in the growth and development of the South African economy.

The above analysis has shown that the economy has a relatively favourable situation in respect of the aggregate supply of human resources, the age structure of the population, the birth and death rates, and the percentage economically active. Yet the effective utilisation of these resources has certain weaknesses. The human resource development level of the economy appears unsatisfactory and improvements in the policy regarding investment in human capital via education, health, and migration are essential if the potential of the existing reservoir of human resources is to be rendered effective.

The role of human capital accumulation has been shown to be directly applicable to overcoming the perpetuation and intensification of the dualistic nature of the economy and the present labour situation, both of which are major economic problems. It is obvious that human capital has played an important part in the past performance of the economy and that the removal of defects in the system regarding its accumulation and utilisation would mean even greater growth and development potential for the South African economy.

The case study of the Black Powder and Cordtex plants at A.E. & C.I. helped substantiate many of the points expressed in both parts of this thesis. It showed how the theory of investment in human capital could be applied in respect of a single company, and how the costs and benefits could be measured. It also shed some light on the economic effects of the existing labour and educational policies in regard to African workers, and how through training the individual

worker, the company, and hence the economy, all benefit. In this way it indicates the importance of the theory of human capital to such underdeveloped economies as that of South Africa and the role that investment in human resource development can play in the future growth and development of the economy.

APPENDICES

APPENDIX I

TABLE A 1

LIFETIME INVESTMENT IN TRAINING PER CAPITA
AT SCHOOL AND ON-THE-JOB, UNITED STATES (MALES),
BY LEVEL OF SCHOOLING, 1939, 1949, 1958. (000's OF DOLLARS)

Education Level	Marginal Cost			Total Cost		
	1	2	3	1	2	3
1939:						
College	4.9	3.5	8.4	7.7	7.9	15.6
High School	2.0	2.4	4.4	2.8	4.4	7.2
Elementary School	.8	2.0	2.8	.8	2.0	2.8
1949:						
College	10.2	15.7	25.9	15.9	24.3	40.2
High School	4.1	4.7	8.8	5.7	8.6	14.2
Elementary School	1.6	3.9	5.5	1.6	3.9	5.5
1958:						
College	16.4	22.5	38.9	26.0	30.7	56.7
High School	7.1	2.9	10.0	9.5	8.2	17.7
Elementary School	2.4	5.3	7.7	2.4	5.3	7.7

Notes: (a) The figures in columns numbered 1, 2 and 3 represent costs of school education, on-the-job education and the sum of these respectively.

(b) All measurements in current (1958) dollars.

Source : J. Mincer, "On-the-Job Training : Costs, Returns and Some Implications", op.cit., p.55, Table 1.

TABLE A 2

AGGREGATE ANNUAL INVESTMENT IN TRAINING AT SCHOOL AND ON-THE-JOB, UNITED STATES (MALES), BY LEVEL OF SCHOOLING, 1939, 1949, 1958. (BILLIONS OF DOLLARS)

Educational Level	1939			1949			1958		
	1	2	3	1	2	3	1	2	3
College	1.1	1.0	2.1	3.8	4.3	8.1	8.7	8.7	17.4
High School	1.8	1.4	3.2	3.4	3.8	7.2	8.4	3.8	12.2
Elementary	.9	.6	1.5	2.9	.9	3.0	4.5	1.0	5.5
All Levels	3.8	3.0	6.8	9.3	9.0	18.3	21.6	13.5	35.1

Notes: (a) Columns numbered 1, 2, 3 represent school, on-the-job and total figures respectively.

(b) In current (1958) dollars.

Source : J. Mincer, "On-the-Job Training : Costs, Returns and Some Implications", op.cit., p.55, Table 2.

TABLE A 3

TOTAL COSTS OF ELEMENTARY, HIGH-SCHOOL, AND COLLEGE AND UNIVERSITY EDUCATION IN THE UNITED STATES, 1900-1956, IN CURRENT PRICES

(MILLIONS OF DOLLARS)

Year	Elementary School	High School	College and University	Total
1900	230	80	90	400
1910	450	180	180	810
1920	970	940	600	2,510
1930	1,950	1,870	1,150	4,970
1940	1,810	2,900	1,620	6,330
1950	4,220	6,490	6,290	17,000
1956	7,850	10,950	9,900	28,700

Source : T.W. Schultz, "Capital Formation by Education", op.cit., p.582, Table 7.

TABLE A 4

ESTIMATES OF VARIOUS STOCKS OF CAPITAL AND ANNUAL RATES OF INCREASE BETWEEN 1929-1957, IN THE UNITED STATES IN 1956 DOLLARS

	Billions of Dollars		Annual Rate of Growth	Rate Applied to 1957 (2)x(3)
	1929 (1)	1957 (2)	% (3)	($ billions) (4)
1. Reproducible Tangible Wealth	727	1,270	2.01	25.5
2. Educational Capital in Population	317	848	3.87	30.3
3. Educational Capital in Labour Force	173	535	4.09	21.9
4. On-the-Job Training of Males in Labour Force	136(a)	347	5.36	18.6
5. Total of lines 3 and 4				40.5

Notes : (a) This represents the 1939 estimate.

Source : T.W. Schultz, "Reflections on Investment in Man", op.cit., p.6, Table 1.

TABLE A 5

INTERNATIONAL COMPARISONS OF AGE GROUPS ECONOMICALLY ACTIVE. (PERCENTAGES)

Country:	South Africa		Australia		U.S.A.		U.K.		Japan	
Date:	1960		1966		1960		1966		1965	
	M	F	M	F	M	F	M	F	M	F
15 - 19	69	35	66	62	44	28	70	66	37	37
20 - 24	96	38	94	59	86	45			85	68
25 - 49	99	27	97	36	95	41	96	48	97	54
50 -64	97	24	90	27	87	40			91	50
65 -	54	10	25	5	30	10	23	7	54	18
Total	55	17	59	25	54	25	63	33	61	38

Sources : (1) South African Statistics 1968 (Pretoria, 1968).

(2) I.L.O. Yearbook of Labour Statistics.

TABLE A 6

PUPILS AT VARIOUS LEVELS OF SCHOOLING BY RACE
(PERCENTAGES)

	White 1964	Coloured 1967	Indian[a] 1967	African[b] 1966
Sub. A - Std. II	38.63	66.18	48.48	71.82
Std. III - Std. V	25.61	24.49	31.35	24.22
Unclassified Primary	1.96	0.10	-	-
Total Primary	66.20	90.77	79.83	96.04
Form I - Form III	24.29	8.35	16.81	3.38
Form IV - Form V	8.98	0.88	3.36	0.25
Unclassified Secondary	0.53	-	-	-
Total Secondary	33.80	9.23	20.17	3.63
Combined Totals	100	100	100	100

Notes : (a) Indian figures refer to Natal only.

(b) African figures include the Transkei.

Source : M. Horrell, Introduction to South Africa (Johannesburg, 1969), pp. 47-48.

TABLE A 7

MIGRATION OF WHITES, 1958-1963

(THOUSANDS)

	1958	1959	1960	1961	1962	1963
Immigration	14.7	12.6	9.8	16.3	20.9	38.0
Emigration	8.8	9.4	12.6	14.9	8.9	7.2
Net Immigration	5.9	3.2	- 2.8	1.4	12.0	30.8

Source : Economic Survey of Africa, Vol. 1. (United Nations), Table 38, p.206.

TABLE A 8

AVERAGE ANNUAL RATES OF GROWTH OF REAL G.D.P.
AT MARKET PRICES FOR SELECTED COUNTRIES
(PERCENTAGES)

Country	Time Period	Total	Per Capita
South Africa	1950-1960	4.4	1.9
	1960-1968	6.4	4.0
Australia	1953-1960	4.3	2.0
	1960-1968	5.2	3.2
France	1950-1960	4.4	3.5
	1960-1968	5.6	4.4
Germany	1950-1960	7.7	6.6
	1960-1969	4.5	3.4
United Kingdom	1950-1960	2.7	2.3
	1960-1968	3.0	2.3
United States	1950-1960	2.9	1.2
	1960-1968	5.1	3.7
Sweden	1950-1960	3.6	2.9
	1960-1969	4.6	3.8

Source : Statistical Yearbook 1970 (New York, 1971), Table 181.

TABLE A. 9

GROSS DOMESTIC PRODUCT BY KIND OF ACTIVITY
1956-1969. (R. MILLIONS)

Year	G.D.P.	1	2	3	4	5	6	7	8	9	10	11
1955	3819	578	470	780	83	109	583	373	314	69	301	159
1956	4123	619	531	843	90	123	624	390	335	73	328	167
1957	4342	620	572	875	97	134	654	415	370	77	354	174
1958	4445	561	576	912	105	149	674	436	392	82	379	179
1959	4694	589	630	942	114	155	684	469	431	87	406	187
1960	4953	601	684	1023	123	152	696	506	459	92	421	197
1961	5234	664	710	1111	134	147	708	512	486	99	450	212
1962	5577	682	742	1191	144	157	777	554	513	107	483	228
1963	6178	753	790	1363	157	184	869	613	560	115	530	245
1964	6772	711	882	1542	169	237	962	677	621	127	577	267
1965	7430	760	947	1745	181	299	1055	710	683	136	624	291
1966	8073	834	1024	1875	200	325	1116	756	751	151	722	318
1967	8917	1047	1050	2010	228	353	1241	861	827	165	793	344
1968	9540	963	1114	2143	253	395	1378	910	946	183	883	373
1969	10540	1005	1231	2390	281	470	1509	993	1093	201	961	408

G.D.P. is at factor cost

NOTES: Column 1 = agriculture, forestry and fishing

Column 2 = mining and quarrying

Column 3 = manufacturing

Column 4 = electricity, gas and water

Column 5 = construction

Column 6 = wholesale and retail trade, catering and accommodation

Column 7 = transport, storage and communication

Column 8 = financing, insurance, real estate and business services

Column 9 = community, social and personal services

Column 10 = general government

Column 11 = other producers (non-profit institutions, domestic servants)

SOURCE: Quarterly Bulletin, South African Reserve Bank (June, 1971), Table 7.

TABLE A 10

THE DROP-OUT RATE : PROGRESS OF 1955 ENTRANTS TO SCHOOL
(THOUSANDS)

Primary School (by Standard)						Secondary School (by Form)				
1955 I	1956 II	1957 III	1958 IV	1959 V	1960 VI	1961 I	1962 II	1963 III	1964 IV	1965 V
151	123	106	80	63	54	16.1	10.2	8.7	1.8	0.9

Source : Economic Survey of Africa, Vol. 1 (United Nations), p.176.

APPENDIX II

THE QUALITY OF EDUCATION

Investment in human resources via expenditure on education can be dichotomised into a quantitative and a qualitative aspect. Both render human agents more productive, and education in general may be said to be a result of both quantity and quality investments. Yet empirical research has tended to avoid measurement of the qualitative aspects and has concentrated on the impact of the quantity of education on human capital formation. This is probably due to the fact that although the effects of both aspects are difficult to measure, those of the quality component are even more so.

From the viewpoint of social policy, however, it is necessary to know which has a higher return - more years at school or more expenditure per year. It is obvious that both lead to human capital formation and are thus desirable, and from the vantage point of a cost-benefit appraisal it is possible to show the effects of both quantity and quality of education received.

Several economists have undertaken studies of the quality component of education and made comparisons between different school systems in the light of human capital formation. In one such study, Welch[1] concluded that "It is gratifying that superior teacher quality does apparently enhance the productivity of schooling."[2] Welch based his analysis upon the proposition that quality differentials are reflected in differential returns to the recipients of education, after having adjusted for differences in marginal product. Using multiple regression he found that incomes varied, *ceteris paribus*, with differences in school quality.[3]

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[1] See F. Welch, "Measurement of the Quality of Schooling", American Economic Review, Vol. 56 (1966), pp. 379-392.

[2] *ibid.*, p. 391.

[3] For a detailed description of his research approach, see pp. 380-391. The general impression, however, is that he raises more problems than he solves.

Another study, by Morgan and Sirageldin,[4] attempts to show that the quality of education affects human capital formation by means of examining the relationship between expenditure on education and the earnings of recipients. They believed that the quality of education was a function of the amount spent on it; that is, quality is education deepening whereas quantity is education widening. They found a strong relation between investment and earnings, after having removed the effects of education quantity, age, sex, race and so forth.

They attempted to show the effect of expenditure on education on the unexplained differences in peoples' earnings (relative to the group average) by relating the differential with the annual expenditure on primary and secondary education for such persons. The positive correlation resulting explained that in the U.S.A. inter-state differences in expenditure (the qualitycomponent) accounted for 7 per cent of individual residual earning differences, or 51 per cent of the variance between state averages.[5]

The overall result of these studies is that a significant contribution to the formation of human capital arises from improving the quality as well as the quantity of education, as measured in terms of returns to education investments. This means that when analysing education as an investment in human capital, reference must be made to both the quantity and quality of education. In most instances, however, the latter is regarded as less important and is often ignored. This stems from the fact that quality is only significant once it has been established that the quantity of education has an effect on human capital formation. Thus an analysis of the quality component in education is a refinement of the general analysis of education as an investment in human capital, though it is evident that a relatively high return to the quality of education exists.

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[4] J. Morgan and I. Sirageldin, "A Note on the Quality Dimension in Education", Journal of Political Economy, Vol. 76 (1968), pp. 1069ff.

[5] ibid., p. 1074.

APPENDIX III

ECONOMICS OF "BRAIN DRAIN"

The economics of the "brain drain" is a study which appears to be gaining momentum, especially in view of the contemporary trends witnessed in economic theory. Writers who have previewed this aspect of economics include Johnson,[1] Grubel and Scott,[2] and Thomas.[3] All of these use the traditional tools of welfare economics and show that the movement of human capital is nothing more than maximising economic behaviour in the form of increased resource allocation efficiency.

The "brain drain" is connected to human capital theory in that migration implies the movement of human resources. This affects the stock of human capital in an economy and assuming it leads to a betterment in the situation of a person, it can be analysed under a cost-benefit type approach, for it has both a cost and a return component.

The term itself ("brain drain") is a loaded one and relates to the emigration of human capital, in the form of skilled and educated human resources. In some way it implies a loss. The costs of migration are both private and social. The former relate to the direct cost of movement, and the latter to the loss sustained by society in general in the form of education received by the immigrant plus the lack of presence of the emigrant as manifested by loss of services rendered.

The returns are also divisible into private and social categories. Migration is usually a voluntary movement in the expectation of betterment, otherwise it would not occur. Private benefits are in the form

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[1] H.G. Johnson, Seminar on Canadian American Relations (University of Windsor, 1964).

[2] A.G. Grubel and A.D. Scott, "The International Flow of Human Capital", American Economic Review, Vol.14 (1966), and "The Immigration of Scientists and Engineers to the United States, 1949-61", Journal of Political Economy, Vol.74 (1966).

[3] B. Thomas, "The International Circulation of Human Capital", Minerva, (1967).

of a higher marketable value for services, assuming factor-price equalisation, and generally a net gain in welfare of the individual. Social benefits are incorporated in the social and cultural change engendered by migrants. The loosening of built-in resistances in the economy is the cause of much economic development and growth.[4] Other non-marketable benefits arise in the form of both consumption and investment components, for example, prestige and productivity increases.

The magnitude of this phenomenon depends upon the economy under consideration, for some prove to be the drains, rather than the brains, for the rest of the world. Yet in most instances losses are lessened by compensatory inflows, often in the form of returning emigrants with greater human capital. The net effect, in terms of a cost-benefit appraisal, is that a "brain drain" has a significant impact on human capital and represents an investment made in human resources by analogy.

[4] On this, see chapter on human capital and economic metamorphosis.

APPENDIX IV

DENISON'S EMPIRICAL APPROACH

Denison, in his paper on "Education, Economic Growth and Gaps in Information" (1962)[1] focused on three questions; (a) what have been the past sources of economic growth, (b) what will be the probable future growth rate, (c) how much can this future rate be altered.

Tables A.11 and A.12 show the estimates to be derived.[2] His general approach[3] is conventional, in that if all inputs increase by 1%, output should increase proportionally,[4] and this allows for percentage points to be attributed to inputs. These are derived, in theory, in the following way; if labour inputs increase by 1 per cent and labour earnings averaged 73 per cent of national income in that period, then labour inputs contributed 0.73 percentage points to the growth rate of real national income.[5] He treats changes in quality of labour in the same way. If the average quality of labour increased by 1 per cent per annum, 0.73 points in the growth rate could be ascribed to this factor. In this way he derived his estimates as shown in the tables.

His results as summarised are:-[6]

1. From 1929 to 1957 education for the average worker increased by about 2% per annum, raising the quality of labour by 0.97% a year, contributing

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[1] E.F. Denison, op.cit. This appendix is taken directly from his article.

[2] These are not as he showed them, and only selected sources of growth have been shown here. He indicated 26 growth points, whereas the tables here portray only the eight most significant and relevant. Also figures for the period 1909-1929 have been omitted.

[3] See E.F. Denison, op.cit., p. 124.

[4] This implies a Cobb-Douglas production function; that is, one which is homogeneous to the degree zero.

[5] E.F. Denison, ibid.

[6] ibid., p. 122.

TABLE A 11

ALLOCATION OF GROWTH RATE OF TOTAL REAL NATIONAL INCOME AMONG SELECTED SOURCES OF GROWTH

	Percentage Points		Per cent	
Selected Growth Source	1929-57	1960-80 (a)	1929-57	1960-80 (a)
Real National Income	2.93	3.33	100	100
Increase in Total Inputs	2.00	2.19	68	66
Labour (b)	1.57	1.70	54	51
Education	.67	.64	23	19
Land	.00	.00	0	0
Capital	.43	.49	15	15
Increase per Input Unit (c)	.93	1.14	32	34
Advance of Knowledge	.58	.75	20	23

Notes : (a) Growth rate based on high employment projection.

(b) Labour is adjusted for quality change.

(c) Represents increase in output per unit of input.

Source : E.F. Denison, "Education, Economic Growth and Gaps in Information", op.cit., Table 1.

TABLE A 12

ALLOCATION OF GROWTH RATE OF REAL NATIONAL INCOME PER PERSON EMPLOYED AMONG SELECTED SOURCES OF GROWTH

	Percentage Points		Per cent	
Selected Growth Source	1929-57	1960-80[a]	1929-57	1960-80[a]
Real National Income	1.60	1.62	100	100
Increase in Total Inputs[d]	.67	.48	42	30
Labour[b]	.57	.37	36	23
Education	.67	.64	42	40
Land	- .05	- .04	- 3	- 2
Capital	.15	.15	9	9
Increase per Input Unit[c]	.93	1.14	58	70
Advance of Knowledge	.58	.75	36	46

Notes : (a) Growth rate based on high-employment projection.

(b) Labour is adjusted for quality change.

(c) Represents increase in output per unit of input.

(d) Input is per person employed.

Source : E.F. Denison, "Education, Economic Growth and Gaps in Information", op.cit., Table 2.

0.67 percentage growth points to national income. Thus it was the source of 23% of growth of total real national income and 42% of real national income per person employed.

2. From 1960 to 1980, education will contribute less to growth than over the period 1929 to 1957.

3. In the long run, it appears impossible to maintain the past rate of increase in the quantity of education offered the young. This could be offset by educational quality increases.

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