

**Investment in Secondary and Tertiary Education for Economic  
Growth: Lessons for Rwanda from Selected Less Developed Countries**

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**A mini-thesis submitted in partial fulfilment of the requirements for the  
degree of Magister Commercii in the Department of Economics,  
University of the Western Cape.**

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# **Investment in Secondary and Tertiary Education for Economic Growth: Lessons for Rwanda from Selected Less Developed Countries**

**Sebuhuzu GISANABAGABO**

## **KEYWORDS:**

Human capital

Physical capital

Education

Legal institutions

Development strategy

Labour productivity

Growth theory

Poverty

Low-income economy

Rwanda



## **ABSTRACT**

# **Investment in Secondary and Tertiary Education for Economic Growth: Lessons for Rwanda from Selected Less Developed Countries**

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**M.Com Research Report, Department of Economics, University of the Western Cape.**

This research explores two interrelated issues in development economics. Firstly, it investigates the importance of secondary and tertiary education for long-run growth of low-income economies. Secondly, it examines possible ways to invest in these higher levels of education. It draws on insights on these two issues to highlight lessons for Rwanda where policy makers have set out plans to build a knowledge economy in which science and technology would form the basis of the modern enterprise.

Previous studies on low-income economies place heavy emphasis on investment in primary education, partly due to the primary sector orientation of these economies and high rates of returns associated with the primary schooling. However, human capital theory postulates a positive relationship between the levels of education, the main way of acquiring human capital, and labour productivity. That means higher levels of education, *ceteris paribus*, contribute more to economic growth than lower levels of schooling.

Findings from qualitative methods of inquiry applied to a select number of countries, (initially at levels similar to Rwanda) suggest that investment in higher levels of education focusing on technical subject (sciences, and technology) is an important ingredient for the success of these countries. Countries such as Mauritius, Taiwan and Singapore, succeeded to transform their economies from low-income agriculture based-economy to middle-income industrializing economies through expanding education at higher levels. While this is a necessary condition, it is not sufficient. Factors related to macroeconomic stability and economic policies as well as the adequate legal systems and institutions are complementary.

In the case of Rwanda, where there is an interest to invest in higher levels of education but the government budget is constrained, this research recommends the creation of an Education Bank Loan (EBL). This can partly be financed through borrowing at low interest rates from the International Development Association (IDA) of the World Bank Group.

April 2006

## DECLARATION

I declare that *Investment in Secondary and Tertiary Education for Economic Growth: Lessons for Rwanda from Selected Less Developed Countries* is my own work, that it has not been submitted for any degree or examination at any other University, and that all the sources used or quoted are indicated and acknowledged by complete references.

Sebuhuzu Gisanabagabo

April 2006

Signed:.....



## DEDICATION

To Françoise NYIRAGORE, my beloved wife

and

to our lovely children:

Clémence UTUJE,

Clément GISA,

Egide GABA,

Nelson HIMBAZA,

Peace BERWA,

Chris GENGA,

Still young, they endured my absence without complaining. I am happy to acknowledge that they contributed towards this achievement.

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**“For nothing is impossible with God” (Luke 1: 37).**

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## **ABBREVIATIONS AND ACRONYMS**

|            |   |
|------------|---|
| EPZ:       | Export Processing Zone                                |
| ESSP:      | Education Sector Strategic Plan                       |
| FDI:       | Foreign Direct Investment                             |
| GDP:       | Gross Domestic Product                                |
| GNP:       | Gross National Product                                |
| IADP:      | Intensive Agriculture District Program                |
| IDA:       | International Development Association                 |
| IMF:       | International Monetary Fund                           |
| ICT:       | Information and Communication Technology              |
| LDCs:      | Less Developed Countries                              |
| MINECOFIN: | Ministry of Finance and Economic Planning             |
| MINEDUC:   | Ministry of Education                                 |
| MINIPLAN:  | Ministère du Plan                                     |
| MNCs:      | Multinational Companies                               |
| MoE:       | Ministry of Education                                 |
| NICs:      | Newly Industrialised Countries                        |
| OECD:      | Organization of Economic- Cooperation and Development |
| R&D:       | Research and Development                              |
| SEPND:     | Secrétariat d'Etat au Plan National de Développement  |
| TFP :      | Total Factor Productivity                             |

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## CHAPTER ONE INTRODUCTION

### **1.1 Background**

Many studies, such as Gathak (1995), Gemmel (1996), Papageorgiou (2003) and Psacharopoulos (1985, 1994), emphasized primary education as a necessary and adequate ingredient for economic growth and development in developing countries, especially those with low-income. This argument is based on the economic structure of these countries and the estimated high rates of return on investment in primary education. With raw materials as their primary product, and a predominantly rural agricultural sector, low-income economies need the literacy and numeracy skills that are instilled at the primary school level. In these countries, the structural transformation towards modernization, increased production and capitalist development is either absent, very primitive, or dualistic. The bulk of the population lives in rural areas, with low levels of education Cypher and Dietz (1997:379). Jamison and Lau (1982); Lau, *et al.* (1991) and Psacharopoulos (1994), among others, argue that, based on the rate of returns, universal primary education is one of the most important factors enhancing economic development in low-income economies. Their studies find that the rates of return on primary education are higher in poor countries, because wages earned by additional years of schooling exceed by far the initial cost of schooling.

However, in a global context, economic competitiveness hinges on advanced knowledge and technical innovation, rather than on the elementary working skills acquired through the primary level of schooling. The focus on universal primary education as a strategy to achieve economic growth and to make a developing economy competitive in a modern

environment, is inadequate in view of rapid technological development (Kumar, 2003: 586).

This research, based on endogenous growth theory and empirical evidence, argues that secondary and tertiary levels of education are essential in order to develop human capital capable of driving economic growth. Endogenous growth models emphasize the importance of investment in human capital and the potential gains from the transfer of technology from countries with a more advanced research capacity to the low-income countries (Perkins *et al.*, 2001: 80). With regard to the situation in Rwanda, the current study argues that productivity should increase in accordance with the level of human capital. Primary schooling is inadequate for the purpose of adopting the sophisticated technology that characterises a modern economy. Secondary and tertiary education are of greater significance for technological innovation, absorption and diffusion (Engelbrecht, 2002: 831).

Secondary school graduates are qualified to cope with middle-level jobs, such as sales and services occupations, whereas graduates at tertiary level are equipped with technical knowledge, as well as the skills required to cope with logical and analytical reasoning tasks (Colclough, 1982: 171).

Most low-income economies, however, are characterised by poverty, low state investment, limited numbers and quality of educational and legal institutions, inadequate financial resources and capital market imperfections. These factors combine to prevent

adequate investment in human capital. Thus, the stock of skills and productive knowledge embodied in people remains low and consequently limits economic growth. Therefore, defining a financing policy for education that promotes the country's human capital at higher levels, together with complementary policies to enhance their effective use in a way that can make the system sustainable should address this problem in the long-run.

## **1.2 Problem statement**

In the current era of globalisation, economic growth and development will be stunted in low-income economies unless they invest adequately in higher levels of education and define economic policies that enhance the effective use of advanced skills within the economy. These skills are best acquired through higher levels of education, including the secondary and tertiary levels. Investment in secondary and tertiary levels of education has helped formerly low-income countries such as Mauritius, Taiwan, and Singapore to attain vast increases in economic growth. Low-income countries, such as Rwanda, should follow these success examples by investing in higher levels of education. This study addresses the problem by responding to research questions regarding lessons that Rwanda can learn from the success stories of Mauritius, Taiwan and Singapore of how investment in higher levels of education contributed to their economic growth. Further, it suggests an education-financing mechanism for Rwanda that can best implement the lessons learnt. It consequently suggests a framework that can be used by many low-income economies like Rwanda to design meaningful education policies that would sustain the growth of such countries.

### **1.3 Research questions**

The following research questions guided the study:

- i). How do the effects of education on economic growth vary at different levels of education?
- ii). What lessons can Rwanda learn from Mauritius, Taiwan and Singapore? How did investment in higher levels of education contributed to the positive economic growth of these countries?
- iii). What financing mechanism can be employed to overcome the resource constraints in respect of financing education in Rwanda?

### **1.4 Purpose**

This research highlights the role of secondary and tertiary levels of education in the economic growth and development of low-income economies. More specific objectives of this research are to:

- i). identify the conditions under which the expansion of education at higher levels would be fruitful and sustainable for low-income economies.
- ii). suggest an education-financing mechanism to overcome the constraints on financial resources, given the capital market imperfections that characterize Rwanda, as well as other typical low-income economies.

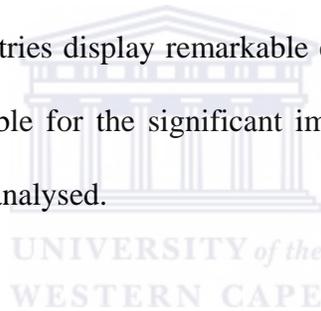
### **1.5 Methodology**

This research employs secondary data from previous researches. It draws on a variety of sources including books, theses, academic journals, institutional reports and the internet.

The study is based largely on qualitative methods of inquiry. This method has been

chosen because it is best suited to answer the research questions under scrutiny and to meet the demands given the purpose of the study.

The collection of data involves an extensive survey of the literature selected in accordance with the stated research questions and objectives. Existing literature on the contribution of education on long-term economic growth is generally reviewed. The research study focuses on other studies that deal with the relationship between education and economic growth in selected developing countries, using selected indicators, such as the level of GDP at different periods. Two periods in time are considered: the starting point, when the model economies were ranked as low-income economies, and a recent evaluation date, when the countries display remarkable economic growth. Investment in education and factors responsible for the significant impact of education on economic growth in these economies are analysed.



For this purpose, three countries, viz. Mauritius, Taiwan and Singapore were selected as case studies. Purposeful sampling of variables aimed at creating a situation best suited to achieving the stated goals and objectives of a study, as in this case, is an accepted research practice within the principles of qualitative methodology (Locke *et al.*, 2000: 100).

This study subsequently considers the situation in Rwanda and seeks to discover lessons that Rwanda can learn from these model economies as regards to the relevance of

education for economic growth. This is achieved by the historical perspective adopted on one hand, and the angle applied in planning future economic growth on the other.

In the study, secondary data from Rwanda are analysed, covering the period between 1970 and 2002, because Rwandan data is easily accessible for this period only. These data comprise documents by UNESCO, the World Bank and other bodies or residents from Rwanda. Despite the variety of sources, the data is consistent, because it is drawn from the same sources that include census, surveys and annual reports. Reports for censuses conducted in Rwanda in 1978, 1991, and 2002, are used in this study. *Household Living Conditions Surveys* (HLCS) are also used. These included the most recent HLCS reports of 1999 and 2001 (MINECOFIN, 2002: 47-49). The HLCS includes comprehensive sets of information on large samples of households, covering consumption, income, education, health and other dimensions. The 1999 and 2001 HLCS surveys were conducted between October 1999 and December 2000 in urban areas and between July 2000 and July 2001 in rural areas.

## **1.6 Limitations**

Use of secondary data limits the ability to control for data collection errors, besides which it does not present an opportunity to apply data analysis techniques, such as frequency distributions, cross-tabulations and triangulation. Therefore, findings must be carefully interpreted for qualitative reliability (Mouton, 2001: 187). On the other hand, given the specific conditions that prevail in each country and the limited case study examples analysed in this study (three countries), findings are tentative and do not lend themselves to being generalized to apply to all the LDCs. A comprehensive exploration

of the relationship between education and economic growth falls beyond the scope of this study, which focuses on a few selected success cases. Therefore, further research, covering many countries, must be conducted in order to validate the findings.

### **1.7 Significance of the study**

The world economy is rapidly being transformed into a knowledge and information network economy. In this world, innovation, diffusion and adoption of new technologies are crucial for sustained competitiveness and profitability. Lall (2001:154) argues that coinciding with rapid globalisation and the spread of new information and communication technology, human capital development is viewed increasingly as a major engine of economic growth. Countries with higher levels of skill have certain distinct advantages. They can adjust more effectively to the challenges and opportunities of globalisation, because their enterprises are more flexible and better able to absorb new technologies and to work with new equipment.

Rwanda, through its vision 2020 (MINECOFIN, 2002:12), plans to transform its agriculture-based economy to an industrial and services-based one. Achieving this goal requires a higher level of human capital, because, to function well, a modern economy requires highly-trained workers. This study can be useful in policy orientation, by demonstrating that countries can change their economic conditions by investing in education, as emphasized by the endogenous growth theory.

## **1.8 Organisation of the report**

The following chapter provides a literature review regarding the link between human capital accumulation by levels of education and economic growth, with respect to developing countries. Special attention is given to the constraints that restrict human capital accumulation, particularly in LDCs. A conceptual framework is formulated, suggesting a strategy to invest in secondary and tertiary education and a method for implementing it in order to plan sustainable long-term economic growth in LDCs.

Chapter three presents empirical evidence of the impact of human capital accumulation on economic growth for selected developing countries. From this the study derives lessons for Rwanda.

Chapter four discusses how Rwanda can invest adequately in higher levels of education in order to improve its strategy for economic growth and development. In this chapter an alternative education-financing policy is proposed to overcome the financial constraints pointed out, while chapter five presents the conclusions and recommendations.

## CHAPTER TWO INVESTMENT IN EDUCATION AND ECONOMIC GROWTH

### **2.1 Introduction**

In this study, human capital is largely synonymous with education. The value of human capital is increased through skills acquired by formal education. Improved human capital increases productivity (Cohn and Geske, 1990: 34). A higher level of human capital at individual or country level is associated with a higher rate of economic growth, because it increases labour productivity. It is argued that labour productivity, which is an important engine in augmenting output growth, should increase in accordance with the level of human capital, notably through secondary and tertiary education, which is very necessary for technological innovation, absorption and diffusion (Engelbrecht, 2002: 831). Increasing productivity in the manufacturing sector, as well as its innumerable corollary services such as packing, marketing, distribution, inventory control, payment systems, information systems, transactions processing, quality control, etc, is an outcome of an increase in the level of human capital (Romer, 1993: 544).

The transformation of skills embedded in people to increase labour productivity in the production sector is achieved through the adoption of technology created elsewhere, which enables them to perform the tasks described earlier. Given that technological advances in any country are brought about either through endogenous research and development or by importing new or more advanced technology from other countries, most developing countries choose to import new technology because of the limited resources at their disposal for conducting scientific research (Kumar, 2003: 587).

However, for new and more advanced technology to be meaningful and effective, both methods require a certain level of human capital. These skills, acquired mainly through formal education, constitute the initial conditions required for creating and adopting technology. In turn, the ability to develop the management skills needed to utilize and organize the new technology increases productivity and hence also the economic growth of a country (Colclough, 1982:171).

However, low-income economies experience difficulties in investing in human capital on account of their inadequate financial resources, inadequate investment in physical capital, and the dysfunctional nature of their legal institutions. Such a lack of investment in human capital impacts on the individual level, as well as on the economy. At individual level, there will be an intergenerational transfer of poverty, because poor households will be unable to finance the education of their children. At macro-level, the economy will suffer because of the inability to adopt new technology. This will prevent the country from reaping the benefits of economic growth that originates from the increase in labour productivity associated with a high level of human capital. The need to find a potential solution to reverse the situation is clearly evident.

## **2.2 Contribution of Education to Economic Growth**

Education contributes to economic growth by raising the productivity of the labour force by increasing worker skills. It enhances the ability of an individual to receive and process new information, perform existing and new tasks, as well as to communicate and coordinate activities with others (Lau *et al.*, 1991: 2).

Different levels of education equip workers with different levels of skills. For labour-intensive jobs and manual labour in the primary sector, basic numeracy and literacy skills are required. Primary education is adequate for inculcating these basic skills. This means that primary education may be sufficient for labour-intensive agricultural and resources production and extraction sectors. Secondary education is required in the manufacturing and other semi-skilled and administrative jobs, whereas tertiary education develops skills at the level of performing managerial tasks, capable of adopting the imported technology and innovation (Perkins *et al.*, 2001: 332). To understand this scenario better, an elaboration of the role of education in economic growth is imperative.

Awareness of the role of education in economic growth dates far back (Platon, Smith, Marshall) but the incorporation of human capital in growth regressions was proposed as an alternative to the Solow model, also known as the 'neoclassical growth model'. The Solow model is based on the law of diminishing returns with regard to individual factors of production (Ray, 1998: 64). These factors are capital and labour that work together to produce total output. In his model, the capital-output and capital-labour ratios are not fixed, as assumed in the Harrod-Domar model, but vary according to the relative endowments of capital and labour in the economy (Perkins *et al.*, 2001: 52). Solow uses the Cobb-Douglas production function to estimate the share contributed to output by these factors, assuming exogenous technological progress. In his 1957's paper, using data for America for the period 1909-1949, he found that these factors explained only around 12,5 percent of the change in gross output per worker (man hours) (Solow, 1957: 320). What was disturbing in this model, was that about 87,5 percent of the output growth

could not be attributed to growth in capital and labour. Solow's model failed to explain what was in the black box (residual) that acted as the main driving force of economic growth (human capital and technological progress). Subsequently, new theories of economic growth (Romer, 1986; Lucas, 1988, Mankiw *et al*, 1992; among others) emerge, which do not rely on an assumption of exogenous technological change (Perkins *et al.*, 2001: 80). The new growth models are referred to as endogenous growth models. This alternative approach views economic growth as an endogenous outcome of economic forces working within the model, rather than being the product of exogenous forces over which the economy has no control (Sianesi and Reenen, 2005: 8).

The new theoretical explanations of Solow's (1957) residual refer to the human capital element. Human capital is the engine of the working mechanism and it is produced endogenously by the economy. Countries that develop human capital capable of producing up-to-date technology will experience accelerated economic growth. Such economies enjoy increasing returns to scale (Romer, 1986: 1002). That means their growth rates can increase unlimited over time, because they are based on an input which has increasing marginal productivity in the form of human capital.

However, economists supporting the endogenous growth theory are not unanimous in their perception of the contribution of human capital in the growth framework. Their points of departure are either theoretical or methodological. From the theoretical point of view, there are two basic frameworks, viz. the Lucas approach and the Nelson-Phelps

approach. From the methodological point of view, problems are related to different dependent variables, different human capital regressors and different samples.

### **2.2.1 Lucas's approach**

The Lucas approach claims that human capital enters the production function as an ordinary input. It assumes that growth is driven by the accumulation of human capital. Changes in growth rates across countries are assumed to be due primarily to change in rates of human capital accumulation (Engelbrecht, 2003: S40). Since the production function (the Cobb-Douglas production function according to Solow), including human capital as one of the inputs, is estimated at the economy level, it takes into account externalities that are associated with increases in the level of human capital. Such externalities include the possibility that educated workers may raise the productivity of their less-educated co-workers. The higher levels of human capital they possess cause a higher incidence of learning for others. Less-educated workers learn by doing.

### **2.2.2 Nelson-Phelps's approach**

The Nelson-Phelps approach claims that human capital works through its ability to innovate or to facilitate the adoption of technology. It relates growth to the stock of human capital through two channels: directly through the effect of human capital on a country's ability to innovate and indirectly through its ability to facilitate the adoption of technology (Engelbrecht, 2003: S40). The discovery of an innovation, undertaken by profit-maximizing individual firms or by the state, raises productivity and becomes the source of long-term growth. According to this view, increase in human capital will be associated with a permanent increase in the growth rate.

### 2.2.3 Methodological issues

Regarding methodological issues, there are many problems that make estimates of the impact of human capital on economic growth less comparable, due to different dependent variables, different human capital regressors and different samples. Most studies focus on explaining cross-country differences in real per capita GDP growth rates. Other choices include overall real GDP growth rates, growth of labour productivity or of total factor productivity and the log of the ratio of real (per capita or overall) GDP in two periods.

As for regressors, in some regressions, human capital stock (proxied by the average years of education in the labour force) is used as a regressor (de la Fuente and Doménech, 2000) while other regressions use the flow of investment in human capital (proxied by school enrolment rates) (Mankiw *et al.*, 1992). For sample difference, most studies integrate developing and developed countries in a single framework, while some focus only on countries of the Organization of Economic-Cooperation Development (OECD), and others split their samples into sub-samples according to the level of development of the countries.

Empirical literature is still divided on the issue of whether the level of education affects the long-term level of growth of the economy (Sianesi and Reenen, 2005: 41). For example, according to augmented neo-classical models (in the Mankiw *et al.*, 1992), increasing average education of the population by one year would raise the level of output per capita between 3 and 6 percent, whilst it would lead to a greater than 1 percentage point faster growth, according to estimates by the new growth theories.

However, all economists do not agree about the notion that human capital acquired by formal education contributes positively to economic growth. Some authors, such as Pritchett (2001), Easterly (2001), Benhabib and Spiegel (1994) and others, argue that the empirical relationship between education and growth is weak. Pritchett (2001) uses measures of the growth rate of human capital and finds a negative impact on output growth. Easterly (2001) argues that human capital accumulation is not a panacea. He emphasizes indirect ways that explain technological progress and factors accumulation by looking at the features of economies that facilitate them, such as government policies and structural issues. Benhabib and Spiegel (1994), found that human capital figures insignificantly in explaining per capita growth rates.

Questioning whether the high growth rates of the East Asian countries, with specific reference to Singapore, were really an indication of good economic performance, Krugman (1994b) argued that there was no real miracle, because Singapore's growth was based largely on one-off changes in behaviour that cannot be repeated. He compared the Singaporean experience to that of the former Soviet Union in the 1950s, where growth was greatly driven by extraordinary growth in inputs, such as labour and capital. This emanated from high mobilization of resources (high savings rates) by the state, rather than from the efficiency of the economy. The increase in those inputs, without increase in efficiency, must lead to diminishing returns (Krugman, 1994b: 67).

The issue raised by Krugman in his paper concerns the total factor productivity (TFP) controversy, which is a topic of great debate in economic literature. The debate centres on

the question of whether the productivity growth in the economy is based on increasing the accumulation of capital (physical and human capital as inputs) or whether it is attributed to an increase in efficiency, which affects the TFP.

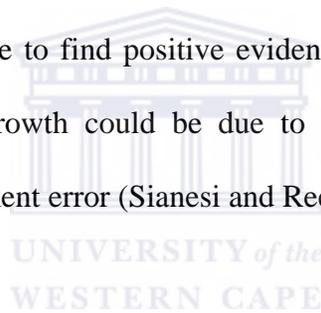
The question of determining the estimated contribution of TFP to economic growth has raised many controversies. In the case of Singapore in particular, some economists, such as Tsao (1985), Young (1995) and others, share the same view as Krugman (1994b), arguing that there was no TFP contribution to growth in Singapore. Others, such as Gapinski (1999) and Rao and Christopher (1995) challenge this view, claiming that the TFP contributed significantly to Singapore's economic growth (Peebles and Wilson, 2002: 58-66). Among other factors, they attribute these divergent views on TFP estimates to the specification of the production function representing the economy, the sample period and measurement errors (Wu, 2002: 170).

It follows then that, whatever the contribution of TFP or capital inputs to economic growth, the upgrading on each side depends on high levels of human capital. Human capital enhances the adoption and efficient use of new inputs and creates new techniques of production.

Romer (1993:562) points out that the industrialization of Taiwan did not come about as a result of a higher level of secondary school enrolment. The importance of joint-venture licensing agreements entered into with firms from the United States and Japan explains the impressive industrialisation of this country. The same explanation holds for the

development of the electronic industry in Taiwan, which was decisively influenced by the government's decision to induce foreign electronics firms to set up assembly operations in a free-trade zone opened specifically for this purpose. This argument seems to be supported by the example of India, a country with a large reserve of highly-skilled human capital, but where firms did not perform as well as those in Taiwan, because India placed constraints on the activities of foreign firms. To some extent, even Romer (1993), who doubts the central role of high levels of human capital in Taiwan, agrees on the role of government policy in the processes and, therefore, implicitly that those foreign firms, including the electronics firms, could not operate without skilled labour.

Others point out that the failure to find positive evidence regarding the contribution of human capital to economic growth could be due to poor proxies of the theoretical concepts, affected by measurement error (Sianesi and Reenen, 2005, Temple, 1999).



### ***2.3. Government Institutions, Human Capital and Economic growth***

The quality of institutions and government policies is highly rated in the relationship between human capital and economic growth, because they constitute initial conditions, inputs and incentives to attract foreign direct investment (FDI), and are complementary to human capital accumulation.

#### **2.3.1 Government Policies, Human Capital and Economic Growth**

Governments can play an important role in the production, utilisation and diffusion of new technologies. This can be effected through the creation of an economic environment that offers an adequate reward to multinational corporations when they bring technology

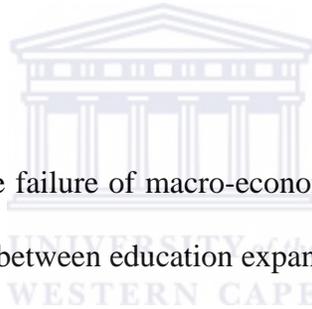
from the rest of the world and put it to use with domestic resources. Multinational firms can do this through direct foreign investment, joint ventures, marketing and licensing agreements or other formal or informal arrangements with domestic firms (Romer, 1993: 548). Countries that have developed local educational and technological infrastructures gain from this process (Kumar, 2003:587).

However, if the socio-political environment is weak, e.g. characterised by political instability, war, inequality in income distribution, corruption, etc., as observed in many developing countries, adoption of new technologies is handicapped by the accumulation of human capital at a low level. For example, Grier (2002) finds that past democratic experience in Latin America is positively associated with current educational attainment, as education is one of the major sources of human capital formation. Quoting Botswana as an example, Devarajan *et al.* (2003: 554) conclude that the relative political stability, relatively low corruption, and low level of ethnic division render Botswana a favourable location for investment. Easterly and Levine (1997) find that in the case of Sub-Saharan Africa, low economic growth is associated with a low level of schooling, political instability, an underdeveloped financial system, distorted foreign exchange markets, high government deficits and inadequate infrastructure.

McMahon (1998), who conducted his research on the economic growth of the East Asian countries with the purpose of understanding their growth miracle, identifies political stability as the key to the rapid growth rates, because it acts as an incentive for investment in physical capital from the high savings in place. As a result, human capital

investment followed. The demand for a skilled labour force for new firms in creation was now increasing.

Failure of institutions, for example the lack of good financial institutions, means that available capital may not be invested well. Lack of financial markets means that businesses cannot obtain some of the inputs they need and lack of a reliable legal system means that creditors find it difficult to force a recalcitrant borrower to repay, thereby obliging them to lend only at higher rates to compensate for the higher risk (Stiglitz and Walsh, 2002: 482). All these failures inhibit the entry of new firms and the expansion of old firms.



Among the consequences of the failure of macro-economic policies and socio-economic environment was the mismatch between education expansion and the economic growth of developing economies in the 1960s. Educational enrolment grew rapidly but the slowdown of economic growth was still noticeable. Pritchett (2001:382) suggests three possible reasons for these results:

- i). The newly-created educational capital went into piracy, that is, privately remunerative but socially unproductive activities.
- ii). There was slow growth in the demand for educated labour, so the supply of educational capital exceeded the demand and returns on schooling declined rapidly.
- iii). The education system had failed, so a year of schooling provided few (or no) skills.

Engelbrecht (2002: 832), comments that the explanation often put forward relates to the fact that many developing countries had rising human capital stock since the 1960s, but stable or declining output growth. This situation can be observed in many developing countries that adopted an import-substitution strategy, which was more capital-intensive and did not generate a strong demand for skilled labour. The strategy was based on the ideology of self-reliance, aimed at protecting local markets. Under these conditions, private enterprises, particularly small-scale businesses, did exist, but they were limited and controlled by the state. There was little encouragement of entrepreneurial initiative and limited experience of a competitive market, due essentially to the rent-seeking phenomenon (Perkins *et al.*, 2001: 162). Abundant skilled labour was in place, without making a significant contribution to the processes of production, or with little translation into improved income growth. Changes in production techniques that shifted demand towards skilled labour, favoured some developing countries (East Asian Countries) that had adopted an export-oriented strategy.

Another argument that can be taken into consideration is related to the fact that education during the colonization period was somehow unrelated to the economic needs of the local people (Tikly *et al.*, 2003: 31). The focus in education was to produce people who could help the colonial administration with elementary or technical jobs and was not oriented towards creativity and community problem-solving.

### **2.3.2 Physical Capital, Human Capital and Economic Growth**

In order to make a really significant contribution to economic growth, human capital investment necessitates investment in physical capital. Godo and Hayami (2002: 972) argue that improved skills and knowledge gained from education may not contribute much to productivity growth, unless they are combined appropriately with physical capital. For example, education would not increase productivity in simple manual work, such as digging a ditch with a shovel, but it would significantly increase efficiency in the operation of modern sophisticated earth-moving machinery.

As far as the effective adoption of technology is concerned, Edwards (2002) argues that investment in information technology plays a crucial role as the driving force that permits other innovations to take place. Successful adoption of information technology...“tends to take place in organizations that have a greater investment in human capital” (Edwards, 2002: 26). The studies of Heckman (2003) and Grier (2002) find a positive correlation between human capital and physical capital, because human capital is extremely valuable in working with high technology.

### **2.3.3 Domestic Human Capital and Foreign Direct Investment**

The argument here is that domestic human capital constitutes incentives to attract FDI. In attempting to test the effect of FDI on economic growth, Borensztein, De Gregorio and Lee (1998) revealed a strong complementary effect between FDI and human capital. The contribution of the FDI to economic growth is enhanced by its interaction with the level of human capital in the host country. FDI is highly productive only when the host

country has a stock of human capital that can adopt and adapt the new and advanced technologies. Therefore, the stock of human capital in the host country limits the absorptive capacity of a developing country, as explained in Nelson and Phelps (1966) and Benhabib and Spiegel (1994). Lall (2001: 131) argues that a shift up in the technology ranking of exports is the key ingredient of sustained competitiveness, which requires significant and continuous improvement in skills. Human capital employed within firms and those skills embedded in the labour force are, therefore, hypothesized to be part of an attractive investment environment (McMahon, 1998: 161).

#### **2.3.4 Quality of School Institutions and Human Capital Accumulation**

The quality of institutions in the educational sector influences the quality of human capital acquired. These institutions oversee, for example, the provision and monitoring of education, the financial planning and the induction of school leavers into an economically active life. Where the quality of these institutions is low, the whole economy suffers, because poor quality schooling is associated with low skills gain that will not make a significant contribution to adopting technology domestically (Pritchett, 2001). At individual level, if education does not yield the expected returns, individuals will no longer be interested in pursuing further studies. This will lead to a decline in human capital accumulation, which in turn will affect the economy. The reason for this is that, as a result of the low quality of human capital acquired, people will not obtain employment after completion of their studies.

## **2.4 Indirect Effects of Human Capital on Economic Growth**

It is important to note that, besides supplying the economy with a labour force, investment in education produces other social benefits (Cypher and Dietz, 1997: 388). These can include, among other benefits, new knowledge, which may be created by better-educated individuals and which adds to the well-being of others through new products, new medicines and safer production processes. More efficient workers reduce the cost of production and prices paid by all consumers. Better-educated workers are able to co-operate better with other workers, so that the level of productivity of all workers rises, increasing the incomes of all involved. Highly-educated people enjoy better health and demonstrate a greater participation rate in community life. Lall (2001: 131) argues that knowledge-intensive sectors themselves are the most dynamic with respect to their learning potential, so that employees who can enter them benefit from a good cycle of skill creation and improvement.

Analyzing the interrelationships between population growth, human capital, and economic development, Rosenzweig (1990) notes that an inverse relationship exists between fertility rates and per capita incomes. In general, low fertility and high levels of human capital characterise higher-income countries. High fertility and low levels of human capital characterise low-income countries. This means that the more a country increases its human capital level, the more the fertility rate declines, leading to higher income levels (Rosenzweig, 1990: S56). However, in low-income countries, the lack of information about methods of fertility control impacts negatively on the resources allocation to children, on investment in education and hence the on level of income growth.

## **2.5 Primary Education and Economic Growth in Low-Income Economies**

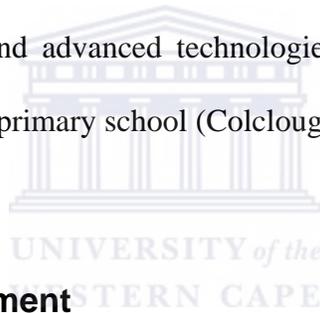
Returning to the argument supporting universal primary education as a sufficient ingredient to economic growth in low-income economies, the question should relate to its relevance. Answers depend on the structure of the economy in those countries, as well as the estimated returns, involving cost-benefits analysis undertaken by researchers.

### **2.5.1 Economy's structure argument**

By nature of their economic structures, these countries are historically dedicated to agriculture and the process of industrialisation is still in the early stages in many sectors of the economies (Gathak, 1995:28). In keeping with this structure and the concomitant job opportunities, the major part of the labour force is made up of farmers and agricultural labourers, who need only basic education, for example at the primary level (Perkins *et al.*, 2001:331-332). Whereas traditional industrial development simply required improving the quantity and quality of primary schooling, basic technical education and encouraging all on-the-job training (Lall, 2001: 408), modern industry requires high skills that are not provided through primary education.

Gemmel (1996) suggests that human capital originating from primary education appears to be important in the poorest LDCs, which are mostly primary-commodity producers (Gemmel, 1996: 21). Papagergiou (2003: 622) emphasize that primary education contributes mainly to the production of final output that corresponds to production in developing countries.

The rationale for focusing on the education of this part of the labour force must be meaningful; otherwise it would be a waste of scarce resources that characterise the LDCs. Because investment in education is a long-term strategy that cannot be judged by the current needs in the labour force, however, this argument can mislead policy-makers in their formulation of education policy, which has to change with time. The imitation and innovation associated with the current level of economic globalisation are only achievable if a country has sufficient people with a higher level of human capital. For low-income countries to adopt, imitate or otherwise introduce substantial improvements to imported technology, a skilled labour force is required, with organizational and technical skills that are acquired at secondary and tertiary levels of education. The skills required for the use of new and advanced technologies lie beyond the basic ones of numeracy and literacy learnt in primary school (Colclough, 1982:171).



### **2.5.2 Rate of return argument**

Regarding the returns related to investment in education at different levels as calculated by micro-economists using individual wage and educational attainment data, research findings point to the existence of high rates of returns associated with primary-level schooling in LDCs. For example, in a global-scale study on rates of return, Psacharopoulos (1994) demonstrated empirically that for developing countries, the educational effect of primary education in terms of returns was higher than for developed economies.

By the late 1970s, World Bank research concerned with poverty was fundamentally oriented towards population, education and health in developing countries. In its report on poverty and human resources in 1980, it emphasized the critical role of human resources in economic growth, consolidating the view that growth itself, particularly if based on human capital accumulation, would reduce poverty. In the light of this, its recommendations focused on re-allocation of public spending to primary education and primary health care (Birdsall and Londono, 1997:33). Samoff and Carrol (2003) argue that since the 1970s, the World Bank stressed the relative importance of primary education, especially for the poorest countries. It went on to launch a global campaign which led to the international conference on “Education for All” in Jomtien, Thailand, in March 1990, and the World Education Forum in Dakar, Senegal, in April 2000. As a consequence, the World Bank’s commitment to basic education reduced the resources allocated to higher education. Mankiw *et al.* (1992: 432) argue that the rates of return on primary education are higher in poor countries because both the explicit cost (school fees, transport...) and implicit cost (forgone wage during school lifetime) are still low compared to the wages earned through an additional year of schooling.

In their research on the returns on schooling in less-developed countries, Nielsen & Westergad-Nielsen (2001: 365) quote Zambia as an example. New evidence from Zambia indicates that returns on primary schooling were high in the rural areas, but nil in urban areas. There were higher returns on levels of education higher than primary school. As countries became more urbanized, however, the returns on primary education, that were

high in the rural areas, decrease, shifting towards secondary and tertiary education which are much more appropriate for urban occupational activities.

Concerning the returns, other factors remaining constant, Rosenzweig's findings (1990) on the contributions of schooling to gross income of farmers residing in a district where the Intensive Agricultural District Program (IADP) was implemented in India for the period 1970-1971, favoured primary school education. He finds that gross income is indeed higher at each schooling level among farm households in IADP districts, but more significantly so at primary school education level.

Nevertheless, it might be a mistake to base an education policy or a development strategy on the estimated returns on the primary level of education. These plans are based on cost-benefits analysis, rather than on the returns gained as a result of increased productivity through levels of human capital acquired at different levels of education. The element to which should receive more attention, is productivity associated with the level of schooling. Higher wages could be a result of sharing higher returns gained through increased productivity and not a result of the scarcity of highly-skilled labour. Lim's study (1999) of the Korea experience supports this view. Workers are paid more in industries where technology changes rapidly than in industries where the change is slow (Lim, 1999: 42).

## **2.6 Secondary and tertiary levels of education in developing countries.**

In developing countries, human capital enters the growth process by facilitating the adoption of technology from innovating countries. Countries with higher levels of human capital are the ones that benefit from the domestic use of imported technology. This means that, to benefit from the potential of economic globalisation, low-income economies have to invest in higher levels of human capital.

### **2.6.1 Potential Forces of Secondary and Tertiary Levels of Education in Fostering Economic Growth**

Education as a means of acquiring human capital is vital, because it provides people with a better understanding of the environment, including the production process. As already pointed out, different levels of education equip people with different skills, ranging from literacy and numeracy skills associated with the primary level of education, to research skills emerging from innovation and the adoption of technology associated with higher levels of education, viz. secondary and tertiary education. Findings of the following studies reveal forces associated with these high levels.

Regressing gross income on educational levels of farmers residing in a district where the Intensive Agricultural District Program (IADP) had been implemented in India for the period 1970-1971, Rosenzweig (1990: S53-S54), finds that farmers with higher levels of schooling are significantly more likely to have adopted the new seeds which yielded higher production. This is consistent with Nelson-Phelps's (1966:70) argument that an educated farmer has the ability to understand and evaluate information on new products and processes disseminated through journals, radio and seed and equipment companies,

whilst a less-educated farmer delays adopting the new techniques until he has concrete evidence of its profitability.

Romer (1993: 568) claims that there is a positive coefficient between secondary school enrolment and equipment imports as a share of GDP. A country benefits from interaction with the rest of the world in proportion to the level of human capital that it possesses. Secondary education permits the easy use of imported equipment to cope with the new service delivery process. The results of Comin and Hobijn's (2004) suggest that a three percent increase in secondary enrolment would lead to an approximately one percent increase in technology adoption.

Therefore, there is a need to expand secondary and tertiary education in order to provide a sounder basis for long-term global competitiveness. These levels of education can also contribute to the improvement of productivity in agriculture through the provision of agronomists, as well as public managers with essential skills (Tikly *et al.*, 2003:136). Although the secondary and tertiary levels of education are important, there are some fields that hold even more potential to stimulate the adoption of technology. Enrolment in technical subjects (natural science, mathematics and computing and engineering) is the most relevant indicator of high-level capability to absorb technological knowledge. Countries that lag behind in enrolment in these subjects remain in a low-income growth situation. For example, research indicates that in 1995 the four "Tigers" (Asian economies) which are leaders in development among developing countries, enrolled more than 33 times (1.34 percent) the proportion of their population in technical subjects

than did Sub-Saharan Africa (0.04 percent), including South Africa (Lall, 2001:145). This justifies the high emphasis placed on technical subjects in these countries.

## **2.6.2 Constraints to Investment in High Levels of Education in Low-Income Economies**

An effective stock of human capital accumulation depends on investment in education. In low-income countries, however, that investment is not easy to make, because they face constraints such as poverty, inequality in income and asset distribution, high population growth rates, low state investment, and imperfect financial capital markets (Glewwe and Jacoby, 2004: 33).

### **2.6.2.1 Poverty, Income Inequality, Asset Distribution and Human Capital**

Poor families often find themselves in a low-income, low-education, and low-skills situation. The higher the initial degree of inequality in income and asset distribution, the more likely that the gap will remain open and poverty will be self-perpetuating. The channel, through which poverty and inequality operate, is through constraining investment in human capital due to imperfections in the capital markets. This excludes those with low income from this profitable investment. Grier (2002) finds that income inequality has a negative effect on the average educational levels in Latin America and hence also on economic growth.

### **2.6.2.2 Low State Investment Lowers the Level of its Human Capital Stock**

Constrained also by resources at the country level, developing countries do not invest, as they should, in education. Penrose (1998) points out that, in most developing countries, government expenditure on education expressed as shares of GDP remains more or less constant. Some of these countries even borrow to finance expenditure on education

### **2.6.2.3 Imperfect Financial Capital Markets and Human Capital**

Liquidity constraints prohibit investment by poor families, especially in education, even when expected returns are high, because they do not have the collateral (Schultz, 1961:14). The impact of these constraints is an intergenerational transfer of a low level of human capital and slow economic growth in low-income economies.

**Note that if these constraints are removed low-income countries would be able to finance education either through private or public funding. That means by alleviating poverty, overcoming the market failure regarding the financing of education and reducing income and asset distribution, people would be able to finance education from private sources. Policies that aim to alleviate poverty and reduce income inequality, offer income opportunities to the poor that can be used to finance education for their children. Overcoming the market failure, Palacios (2004:53) suggests that human capital contracts can be an alternative to financing education without marginalizing the poorest in the process. Human capital contracts are contracts in which an individual commits part of his/her future income for a specified period of time in exchange for capital to finance his/her education.**

**Public funding can be done either through subsidies or loans. With the subsidies model, students receive free or nearly free education which is given according to the academic merit. As the state have to perform other functions like health, defence, public debt servicing, this model is hard to sustain in developing countries where budgets are usually insufficient to meet public expenditure. Hence, the loans model can be suggested as alternative solution.**

## ***2.7 Conceptual framework***

Consensus exists that investment in education is a critical element in a country's economic growth and development. Education contributes to economic growth through its ability to increase the productivity of the labour force. The expansion of the supply of educated labour is seen as being, in itself, a cause of technological change, so that it can raise the economic growth rate, thus maintaining or increasing the educational wage premium. This means that investment in human capital leads to higher productivity among workers, which, in turn, causes higher earnings. It is consistent with the "orthodox" economic theory, better known as the marginal productivity theory, which argues that wages are determined according to the worker's marginal contribution to the revenues of the firm. This implies that more productive workers will be paid more, other things being equal (Cohn and Geske, 1990: 34).

There are also indirect benefits or externalities associated with investment in education. Educated workers may raise the productivity of their less-educated co-workers through learning by doing. Educated people can transform the health environment of the rest of the population by applying new techniques to combat diseases.

However, not everyone is convinced of the relationship between education and growth. Some studies, such as those undertaken by Benhabib and Spiegel (1994), Pritchett (2001), Easterly (2001), and others, argue that the empirical relationship between education and growth is weak. As the debate continues, other studies, such as those by Temple (1999), Sianesi and Reenen (2005), etc., argue that the failure to find positive evidence on the contribution of human capital to economic growth may be due to poor proxies of the theoretical concepts, affected by measurement error.

The successful contribution by education to economic growth is subject to a combination of factors, including public economic policies, investment in public infrastructure and strong legal institutions. But how do different levels of education contribute to economic growth in low-income economies?

Many suggest that universal primary education may be one of the most important factors contributing towards economic development in developing countries. Jamison and Lau (1982), Lau, Jamison and Louat (1991) and Georges Psacharopoulos (1985, 1994), among others, find evidence that primary education is crucial to economic development in low-income economies.

However, an element that has received much less attention in the literature and which this research aims to analyse, is how education can contribute towards a move from low-income economies to middle and even high-income economies.

It draws lessons for Rwanda from successful examples, such as Mauritius, Taiwan and Singapore. In doing so, careful attention will be paid to the education policies, as well as complementary factors in these countries. GDP or GNP changes serve as an indicator of economic growth. Some evidence is presented, relating to the manner in which education contributed to the economic growth of the selected countries. Furthermore, suggestions are made on how to solve the problem, albeit partially, of financial constraints on education in Rwanda.



## CHAPTER THREE THE CONTRIBUTION OF EDUCATION ON ECONOMIC GROWTH IN SELECTED LOW-INCOME ECONOMIES

### 3.1 Introduction

Low-income countries share specific characteristics, such as a low per capita income, low life expectancy, widespread hunger, disease and illiteracy, and high rates of infant, child and maternal mortality. These countries have a low real income per capita, estimated in 2003 to be US\$ 440 (World Bank, 2005: 62). This is a reliable indicator of the socio-economic conditions of less-developed countries, which are also characterised by low productivity, low savings and investment and outdated technology and resources (Perkins *et al.*, 2001:7)

Historically, these countries are agricultural and modernization has not yet taken off. Agriculture generally accounts for 45 to 90 per cent of the total output and about 60 to 95 per cent of total employment (Ghatak, 1995: 28). UNCTAD (2004: 30-32) reports that in 2001, the life expectancy was 50.4 years as compared to 64.4 years in other developing countries, and 78.1 years in high-income OECD countries. During 1998-2000, 38 percent of the population was undernourished, compared to 18 per cent in other developing countries. In 2001, 33.7 percent of 15 to 24 year-olds were illiterate, compared to 15.2 percent in other developing countries.

However, some countries on the list of these low-incomes economies made successful transitions from low-income to middle-income economies while others, like Singapore, now compete in the ranks of high-income economies.

The aim of this chapter is to analyse to what extent investment in education, *ceteris paribus*, has been an engine in changing the economic conditions of these countries. It also analyses the factors complementary to this investment, which have contributed to the success. The chapter presents a detailed analysis of the model countries, focusing on lessons that Rwanda can derive from their experiences. A summary of the experiences of these countries is given towards the end of the chapter.

### **3.2 The Contribution of Education on Economic Growth-transition**

Three developing countries, Mauritius, Taiwan, and Singapore have been chosen to analyse how human capital contributed to their transition to growing economies and to determine the complementary factors.

Each economy grew at its own pace, depending on initial conditions and the type of public policy pursued. However, what accounts for the astonishing take-off in these economies in recent years seems to be high investment in advanced human capital. Mauritius, without abundant natural resources such as oil, diamonds, gold or sufficient land, etc., succeeded in transforming its economy from a low-income, agriculture-based economy to a middle-income economy. Taiwan, which was a low-income country in the 1950s, finds itself at present among the Newly-Industrialized Countries (NICs). Singapore, which was a low-income economy in the 1950s today strives to be classified as a high-income country.

## **3.2.1 Mauritius**

### **3.2.1.1 Economic Background**

Since independence in 1968, Mauritius has developed from a low-income, agriculture-based economy to a middle-income, diversified economy, with growing industrial, financial and tourist sectors. Its per capita income grew from US\$1,000 in 1982 to more than US\$3,000 in 1995 (Nath and Madhoo, 2004: 2). For most of this period, the annual economic growth was in the order of 5 percent. Tikly et al. (2003: 71) declare that its leapfrogging model is a prime success example of development strategy in Sub-Saharan Africa. The term “leapfrogging model” refers to an economic development strategy where development moves rapidly from an agriculture-based economy to one based on services industries. As posited earlier, one of the driving forces behind the success of Mauritius was its well-chosen education strategy.

### **3.2.1.2 Education and Economic Growth**

In Mauritius, free education at all levels was instituted in 1976. Thereafter, the country embarked on continuous efforts to upgrade its human resources. Under regulation 37 of the Education Act of 1993 (MoE, 2004: 2), education is compulsory up to the end of the primary cycle. Parents who, by withholding their children from primary schooling, fail to comply, may be fined or even face imprisonment.

Chapter two (Section 2.2), points out that education contributes to economic growth by raising the productivity of the labour force. Increased education per worker increases the output per worker. Nath and Madhoo, (2004: 4-7), in analysing the share contribution of

different inputs to real GDP per worker in Mauritius in the 1990s, determine that at 0.38. The share of education was more important than the share of physical capital at 0.18.

Mauritius centred its strategy around attracting foreign investment and advancing the information technology sector. It accelerated its economic growth through the strategy of developing an export-oriented manufacturing sector after 1982, continuously modernising its sugar industry and gradually diversifying into tourism and offshore services (Nath and Madhoo, 2004: 2). New technology and managerial skills were part of the diversification process, and as a result, a take off of the economy was observed. Further investment in human capital allowed the Mauritian population to absorb and develop effectively the technology which foreign firms had brought into the country in the first place. From an initial specialisation in simple assembly plants in the late 1970s, production processes became increasingly complex. Industrial development, therefore, became more and more human capital intensive and the rising demand for skilled labour was matched by a corresponding expansion in schooling (Michaelowa and Ehlert, 2004: 4).

### **3.2.1.3 Factors Complementary to Education**

Trade policies, macro-economic stability and well-functioning political institutions have enhanced the positive contribution of education to economic growth in Mauritius. Mauritius changed its strategy, based on import-substitution industries, to export-driven industries, creating an export processing zone (EPZ). This strategy made a major contribution towards solving the problem of unemployment and created an economic

boom. The EPZ sector, from a base of zero in 1971, accounted for 26 percent of GDP in 2001, 36 percent of employment, 19 percent of capital stock, and 66 percent of exports (Subramanian and Roy, 2001: 23).

High growth rates were achieved, along with macro-economic stability (Subramanian and Roy, 2001: 7). Between 1973 and 2000, consumer-price inflation averaged 7.8 percent per annum, compared to more than 25 percent in Africa. Well-functioning political and legal institutions ensured stability, thereby increasing investment incentives for national as well as foreign investors (Subramanian and Roy, 2001: 25). These factors, complementary to the high skills that were at the base of attracting FDI, allowed Mauritius to improve its economic performance (see also 2.3.3).



## **3.2.2 Taiwan**

### **3.2.2.1 Economic Background**

In the 1950s, Taiwan was a low-income country, where agriculture contributed 32 percent to the total output, which fell to around 3 percent of the total output in the 1990s. (Lin, 2003: 214). Nominal gross product per capita improved from approximately US\$160 in 1962 to US\$15,000 in 2000. Taiwan succeeded in transforming its economy from an agricultural to an industrial one within three decades.

### **3.2.2.2 Education and Economic Growth**

By the early 1960s, Taiwan had already embarked on universal primary education. In 1968, a reform of Taiwan's compulsory education system extended the duration of constitutionally-guaranteed, tuition-free education from 6 to 9 years (Spohr, 2003: 294).

The institution of this universal primary education, reports McMahon (1998: 166), has generated an excess demand for secondary and tertiary education. In 1979, the government introduced a science and technology program with the focus on high-level technologies (Lin, 2003: 215).

Lin's findings (2004) indicate that one additional percent of higher education stock is estimated to increase real output by approximately 0.19 percent. The positive relationship between higher education graduates by disciplines and the economic growth of Taiwan during the period 1965 to 2000 indicates that graduates in disciplines such as engineering and sciences meet the needs of the economy.

By investigating the causal relationship between human capital accumulation, exports and economic growth using data pertaining to Taiwan's real GDP, real exports and higher education attainment over the period 1952-1995, Chuang (2000) concluded that human capital accumulation fosters growth and stimulates exports. During the period 1952-1995, the average annual rate of real GDP in Taiwan was as high as 8.18 percent. The distribution of workers with primary school, secondary school and higher education qualifications was 54.95 percent, 14.87 percent and 3.93 percent respectively in 1964. In 1993, the figures were 26.0 percent, 51.8 percent and 18.04 percent respectively (Chuang, 2000: 713).

These results account partially for the transition of Taiwan from an agricultural economy to a newly-industrialized one in the 1950s. This lends credibility to the conclusion that higher levels of human capital trigger economic growth.

### **3.2.2.3 Factors Complementary to Education**

Foreign investment helped to introduce modern, labour-intensive technology that called for highly-skilled human capital in the 1960s. The emphasis shifted from the production of light-industry consumer goods for export to more sophisticated heavy and technology-intensive products.

## **3.2.3 Singapore**

### **3.2.3.1 Economic Background**

In the 1950s, Singapore, which is currently classified as a high-income economy, was a small city-state, underdeveloped agricultural sector (Peebles and Wilson 2002: 273). However, its Gross National Product (GNP), which was \$1,330 in 1960, rose to \$ 42,212 in 2000. Huff (1999: 34) describes the macroeconomic indicators of Singapore from the 1960s to the 1990s. From 1967 to 1989, the country's real GDP experienced a sixfold increase to an average of 8.8 percent per year. In the 1990s, its GDP grew at 8.2 percent annually, and continued to grow. During the 1970s, manufactured exports were the engine of Singapore's growth, but by the 1980s they were joined by financial and business services, due to multinational predominance. The ratio of direct manufactured exports to GDP rose from 9.4 percent for the period 1960 to 1966 to 66.5 percent for the period 1971 to 1979, before declining to 59.2 percent in the 1990s. The decrease was as a result of increases in services sectors contribution to GDP.

### **3.2.3.2 Education and Economic Growth**

As in Taiwan, universal primary education was instituted in Singapore in the 1960s and this generated an excess demand for secondary and tertiary education (Ray, 1998: 120). Afterwards, the government invested heavily in the creation of high-level skills to drive the targeted upgrading of the industrial structure. The university system was expanded and directed towards the needs of the country's industrial policy (Lall, 2001: 159). Its specialization changed from social studies to technology and science. For example, in 1996, 41 percent of its university graduates were from technical subject fields, such as natural science, mathematics, computing and engineering. The government oversaw the curriculum and quality, ensuring its relevance to the stated objectives.

As regards the quality of education, measured by performance, using tests in mathematics and science, Singapore and other East Asian countries outperformed American Students (Stiglitz and Walsh, 2002: 483). On the ranking scores for grade 8, in the Third International Mathematics and Science Study (TIMSS) assessment 1994-1995, Singapore scored highest in both mathematics and science, while South Korea was second in mathematics and fourth in science. Japan fared the best of the developed countries, coming third in both Lall (2001: 144).

In 1979, the government set up a Skills Development Fund (SDF), through which it collected a levy of 1 percent of the payroll from employers, to subsidise the training of low-paid workers. This was aimed at developing suitable human resources (Lall, 2001: 159). The SDF levy is disbursed to firms that send their low-paid employees to attend approved training courses.

Expanding the number of engineering and technical students at the tertiary level was an instrument to attract multinationals. Investing in human capital attracted foreign, as well as local investors, because those investors are interested in a large pool of skilled labour and continuous improvement in infrastructure (Wu, 2002: 162). Foreign investors brought capital, technology, training and access to foreign markets, but the incentive was the highly-skilled labour, which was readily available.

### **3.2.3.3 Factors Complementary to Education**

In investigating the engine that propelled the Singaporean economy in the last three decades, Wu (2002) identified trade as the present-day driver of its success engine. Multinational companies (MNCs) have contributed to Singapore's growth by providing capital, linkages to their home markets and joint ventures with institutions in both the public and private sectors. The MNCs were encouraged to treat Singapore as the home-base for their activities, so that local enterprises could be developed to world standards (Peebles and Wilson, 2002: 5).

Furthermore, government intervention in the form of forced savings played an important part (Huff, 1999: 36-39). The savings ratio, which is the highest in the world, rose from 6 percent in 1960-1966, to over 40 percent in the 1980s and climbed to 48.2 percent for the period 1990 to 1997. As a result, more funds were available for investment in growth-oriented activities. The government achieved high investments in areas such as the infrastructure, including sea ports, airports, telecommunications, roads, etc. These investments were sustained at over 40 percent of GDP during the 1970s and 1980s, and

averaged just below two-fifths of GDP in the 1990s. The most important contribution of high savings was towards fiscal stability. Borrowing by the government from the Central Provident Fund (CPF), the largest holder of government securities, provided a non-inflationary source of financing its activities, including large education and training subsidies.

### **3.3 Summary**

Trade policies (attracting FDI), public policies and investments (physical capital and human capital) have been the key macro-economic factors propelling the economic growth of the selected countries. In a variety of ways, including increased access to credit, often at subsidized rates, firms were encouraged to export. They were producing in accordance with their long-term comparative advantage, which was based on acquired skills and technology rather than on their endowment of natural resources. This export-led growth facilitated the transfer of advanced technology because, by exporting to developed countries, producers not only come into contact with the efficient producers within these countries, but also learn to adopt their standards and production techniques.

This chapter examined some of the details of human capital accumulation. The remarkable success of these countries and their educational effort are noted and can be attributed to education. The high educational levels increased the transfer and adoption of more advanced technology. Secondary and tertiary education, focusing on science and technology, were identified as engines of sustained economic growth in these countries, *ceteris paribus*. **Regarding the sources of finance, these countries used public funds in the take off stage to finance all primary education which was compulsory and**

**tuition-free. The science and technology programmes were also funded by the state.**

The critical role of the state in the creation of dynamic competitive advantage based on acquired skills and technology is highlighted.

This chapter also demonstrates that the forces underlying the success of the model economies discussed, include heavy investment in education at higher levels, good policies that led to macro-economic stability, strong institutions that channelled financial resources to good use, besides establishing relative equality in income distribution (Stiglitz and Walsh, 2002:483). Political and social stability in these countries provided an environment conducive to investment.

While it is true that the mechanics that brought success to these countries cannot be duplicated exactly by other countries, they can still serve as true examples to provide important lessons for LDCs, and particularly for Rwanda, which is the purpose of this study.

The following chapter applies the above findings in an attempt to derive lessons and to make policy recommendations to the government of Rwanda with respect to its education and economic growth strategies.

## **CHAPTER FOUR INVESTMENT IN SECONDARY AND TERTIARY EDUCATION IN RWANDA**

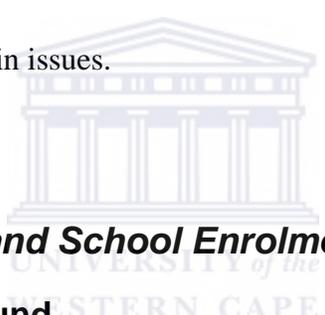
### **4.1 Introduction**

For a long time, the development of human capital was regarded as a requirement for the growth and development of any economy (Schultz, 1961: 2). The course an economy will take in future depends on the kind of educational investment made at present. It is from this vantage point that Rwanda centres its economic development strategy on investment in human capital, as it sees its human resources as the most important resource of the country (MINECOFIN, 2002: 3). Not only is education important for economic growth, it also holds considerable private benefits for individuals. These benefits are either directly or indirectly accrued (See 2.4).

This chapter focuses on investment in secondary and tertiary levels of education, because economic theory suggests that these levels of education help a country to make the transition from a low-income to a high-income economy. Empirical evidence from Mauritius, Taiwan and Singapore, as reported in the previous chapter, generally supports this proposition. These countries have been chosen because, when they started off on their economic growth and development path, they initially displayed some characteristics in common with the present-day Rwanda. These characteristics include the small size of the land, agriculture-based economy, and only limited or no natural resources such as minerals, oil, etc. The study draws important lessons for Rwanda from

the impressive investment in human capital and the economic growth achieved by the selected model countries.

This chapter is divided into five sections. The next section presents Rwanda's economic policy and school enrolment background. Section three discusses the arrangements for financing of education in Rwanda, and section four reviews the core issues of this research in investment in secondary and tertiary levels of education in Rwanda, drawing lessons from the experience of selected countries, as discussed in the previous chapter. In this section an alternative policy for financing education in Rwanda, is suggested in order to overcome the constraints related to sources of finance for high levels of education. Section five summarises the main issues.



## **4.2 *Economic Policy and School Enrolments in Rwanda***

### **4.2.1 Economic Background**

Rwanda is an agriculture-based economy, consisting mainly of small and increasingly fragmented portions of land and marginal plots, producing barely enough to meet subsistence needs. The agricultural sector accounts for nearly 90 percent of the labour force (MINECOFIN, 2004: 175). Its share contribution to GDP has been decreasing but still remains at relatively high levels. For example, it was 66 percent in 1970 and 41 percent in 2000 (World Bank, 2002). Coffee and tea are the country's main exports, and, since the price of coffee plummeted in the 1980s, economic growth has been unreliable. The country's GDP per capita expanded at only 1.1 percent a year between 1980 and 2000. The per capita GDP in 2000 (US\$ 242) was only about three-quarters of the

amount in 1980 (World Bank, 2004: 20-25). The manufacturing sector accounts for 20 percent of GDP and is characterised by import-substitution industries. This sector is constrained by high transport costs due to poor communication and transport infrastructure, which was severely damaged by the war and the 1994 genocide. These factors limited the growth potential of the manufacturing sector.

Since 1997, the GDP has again been growing progressively under a program of improved tax collection, accelerated privatisation of state enterprises and continued improvements in crop and food production. In real terms the country is recovering in all sectors after the 1994 genocide.

#### **4.2.2 Education in Rwanda**

Trends in the educational history of Rwanda in the post-independence period can be subdivided into two principal periods: the pre-war period (before 1990) and the post-war and genocide period (World Bank, 2004:180).

Primary school enrolment, which was around 419,059 during the period 1970 to 1971, grew to 1, 058,529 during 1989 to 1990, with an average growth in enrolment rate of 5.4 percent a year. From 1994/1995 to 2000/2001, enrolment grew from 938,368 to 1, 475,572, with an average growth in enrolment rate of 8.1 percent a year. However, while enrolment seems to have been growing over the years, the country has not yet achieved universal primary education. The cohort survival in the primary level of education at around 73 percent is acceptable compared to rates in other low-income countries.

However, given the extremely high rates of grade repetition, at around 34 percent, this is probably not sustainable (World Bank, 2004: 49).

Regarding secondary education, the number of students has grown by 9.5 percent a year, from 10,117 to 39,118 students in the period 1970-1971 and 1989-1990 respectively. This rose to 41.1 percent a year for the period 1996 to 1997 (20,533) to 2000-2001 (79,699), which is a fourfold increase.

In higher education, enrolment grew at about 22.3 percent a year between 1970-1971 (390) and 1989-1990 (3,009) but growth in the post-genocide years averages 41.3 percent a year between 1996-1997 and 2001-2002 (from 4,791 to 16,668 students). It is approaching the norm of about 200 students per 100,000 people for low-income Sub-Saharan Africa (World Bank, 2004: 3).

Explanations for the pre-war trends can be related to a combination of many factors, including high drop-out and repetition rates and economic policies of the past. The aftermath of the war and genocide is a period of catching-up, aimed at the replenishing of the skilled labour force killed in the genocide. However, since the year 2000, promoting education in Rwanda is considered a key factor in the economic and development strategy (MINECOFIN, 2002: 17). While not entirely ignoring other factors, this research focuses in particular on the explanation of educational trends related to past economic policies.

### 4.2.3 Past Economic Policies

As regards the economic policies of the past, Rwanda had three economic development plans from 1966 to 1986, each covering a five-year period. The first five-year period of economic and social development covered the period from 1966 to 1971. Its objective was based on an analysis of economic and social conditions and problems that Rwanda had to face in order to define its economic development (SEPND, 1971: 70). In particular, this document highlights the problems related to small and marginal land, soil erosion, absence of land policy, trade matters, the country's landlocked situation and low administration capacity. During this period, the focus on the education sector was aimed at producing graduates at secondary and tertiary levels who could fill the gap left in the administration sector by the departure of colonial staff after independence in 1962 (Tikly *et al.*, 2003: 28).

The second five-year period of the economic, social and cultural development plan covered the period from 1977 to 1981. This plan had four missions (MINIPLAN, 1977: 23):

- i). Ensuring food security of the population and the population growth rate.
- ii). Promotion of human resources management.
- iii). Improvement of the social conditions of individuals and the community.
- iv). Improvement of the Rwandan position vis-à-vis external relations.

The objective of this five-year development plan was the creation of many jobs, especially in the secondary sector, in order to provide young people in rural areas with opportunities to participate in the social and economic life of the country. The other aim

of the focus on social and economic conditions by this plan was to construct important communication infrastructures, such as roads, airports, and telecom-munications. The underlying human resources management was a follow-up of the one started in the first plan, which had focused on new entrants in the administration and other sectors who lacked management experience. The strategy was not really designed to promote human resources at high levels, but to deal with the management of existing, as well as incoming human resources in the administration sector.

Towards the end of this period (1980-1981), the primary cycle changed from a six-year period to an eight-year period (World Bank, 2004: 31). This reform managed to create professional schools known under the Centre de l'Enseignement Rural et Artisanal Intégré (CERAI) appellation. These professional schools admitted students who had missed secondary enrolment for a three-year period. They could learn professional skills in areas such as woodworking, electricity, plumbing etc.

The aims of the third five-year period of the economic, social and cultural development plan, covering the period 1982 to 1986 (MINIPLAN, 1983: 22) were to:

- i). Improve food security for the population in terms of both quality and quantity;
- ii). Promote jobs at sustainable wage levels that cover the basic needs, while emphasizing training programs in order to increase labour productivity.;
- iii). Improve the population's health conditions, promote access to shelter and produce goods for mass consumption.

iv). Develop external relations and foster the equilibrium of international trade conditions.

Nevertheless, while the second development plan aimed to promote human resource management and the third emphasised training programs to increase productivity, there was no specific goal for the higher levels in the education sector in the long-term perspective. Admission to secondary schools was governed by the available places in public schools and at tertiary level the policy was to admit those who would obtain employment after completion of their studies. This policy meant that the system was highly regulated.

In addition, policy-makers of the past did not develop institutions and systems that produced highly-skilled people. They continued to rely on technical assistance that was costly and indifferent to domestic long-term needs (MINECOFIN, 2000a: 14). Consequently, the country did not bring forth the appropriate institutional capacity to develop and utilise internally-developed human resources. The current strategy of economic growth and development based on investment in high levels of education will be discussed in section four of this chapter. The following section discusses the education- financing mechanism in Rwanda.

### ***4.3 Education financing in Rwanda***

Successful implementation of any development strategy depends to a very large extent on the financing policy of the implementing agent. Sources of finance for education in

Rwanda include the government, donors and private individuals. In past years, public spending on education and training as a proportion of GDP, which has averaged 3.4, has remained low in comparison to the average of 5.1 for Sub-Saharan Africa (Tikly *et al.*, 2003: 43). However, the growth in public spending on education increased from 1999, reaching an all-time high of 5.5 percent of GDP in 2001. This resulted from the convergence of international and domestic commitment to education (World Bank, 2004: 29). The government is still the predominant source of education financing in Rwanda (MINEDUC, 2005: 64). For example, the government expects to fund 65 percent of all recurrent costs for the years 2005 and 2006 and to raise this to 70 percent from 2007.

In this financing arrangement, the higher-education sub-sector absorbs nearly 40 percent of total public recurrent expenditure on education, the rest being reserved for primary and secondary levels of education (World Bank, 2004: 162). Concerning the cost by level of education, each secondary student costs 8.6 times as much to enrol as does a primary school child. In higher education, the corresponding ratio is 95 times for local studies, and 275 times for study abroad. This means that, locally, each higher-education student is 11.0 times as costly as each secondary student; abroad, each higher-education student is 31.9 times as costly as each secondary student (World Bank, 2004: 66). Despite the cost, higher education in Rwanda yields high private returns. A study by the World Bank (2004) estimated these returns at 46.9 percent (World Bank, 2004: 170). According to the same study, general secondary, secondary vocational and technical, and primary education levels yield, 21.3 percent, 18.4 percent, and 13.2 percent respectively. These findings differ from others, because most findings report the primary level as the one

yielding high returns, as expressed by Psacharopoulos, (1994: 1328), among others discussed (see 2.5.2). Even so, these results confirm once again that private incentives for investing in high levels of education are strong in Rwanda.

The explanations put forward for Rwanda are based on the fact that after the genocide highly-educated people were scarce, and to attract them, high wages were proposed as an incentive (World Bank, 2004: 170). The question now is how long this situation can last?

On the income and assets side, more than 60 percent of the population lives under the poverty line. With regard to land as an asset, especially in the rural areas, 43 percent of the population has small land plots of less than 0.5 hectare. The productivity of these plots is very low (MINECOFIN, 2003: 33). As a result, parents earn very little income from the sale of agricultural products, which makes them unable to finance education at the costly secondary and tertiary levels. The government itself, faced with competing financing priorities such as security, health and infrastructure, cannot fill the gap. One can argue that these costs, coupled with a high poverty rate among the population, partially explain the lower level of enrolment rates at secondary and tertiary levels of education in Rwanda.

Therefore, faced with the above constraints, parents and government need to devise strategies to achieve high enrolments at the secondary and tertiary levels. The possibilities available are discussed in the following section.

#### **4.4 Higher Level of Education as a Strategy for Future Economic Growth in Rwanda**

The Rwandan government plans to transform Rwanda from a low-income economy based on agriculture to a middle-income economy that will act as a communication hub and service-provider for the region by the year 2020 (Tikly *et al.*, 2003: 65). This objective is laudable, but demands a combination of many factors to be achieved. Among these factors are: good governance and rule of law, macro-economic stability to make the economy more competitive, investment in physical infrastructure to cope with the requirements of the vision, investment in human capital etc.(MINECOFIN, 2002: 12).

Given its small land size and marginal agricultural plots, high population density and growth, high transport costs, and the absence of many raw materials, coupled with difficulties associated with the development of the industrial sector, it is evident that the country can no longer sustain itself on the strength of the agricultural sector. In this respect, the vision 2020 document seems justified in claiming that Rwanda must develop its service sector, such as its information and communication technology (ICT). It also indicates that Rwanda is capable of developing its dynamic competitive advantage by exploiting its comparative advantage in languages. Rwanda is at the centre of the French-speaking countries in the West and the English-speaking countries in the East of the region. Both languages are spoken in Rwanda.

Therefore, there is an urgent need to put in place appropriate scientific and technological skills to exploit ICT capabilities that can facilitate a rapid change to a knowledge

economy. This calls for adequate investment in human capital, especially in science and technology-based education and training at higher levels of education.

This strategy is supported by the findings of Lin (2004) which reveal that the Taiwanese government succeeded in transforming its agricultural economic structure into a high-technology and knowledge-intensive environment, because it supported a science and technology program since 1979. For the period under study (1965-2000), one percent of higher education stock is estimated to increase the real output by approximately 0.19 percent (Lin, 2004: 371). Engineering/natural sciences majors played the most prominent role. One additional percent of graduates from business/social sciences, agricultural and engineering/natural sciences, is estimated to increase the real output by approximately 0.04, 0.07, and 0.09 percent (Lin, 2004:357).

The context of technological progress, coupled with Rwanda's ambitious program to become an ICT hub in the region (Tikly *et al.*, 2003), calls for directing more students towards the areas of mathematics and natural sciences. This is because students who perform better in mathematics and sciences have more potential to become the future engineers and scientists who are needed in research and development. In other words, the concentration on mathematics and science corresponds to the theoretical emphasis on the importance of research and development activities as the source of economic growth (Fedderke, 2001; Hanushek and Kimko, 2000). The case of Singapore, discussed earlier (See 3.2.3), provides an example of how important it is to invest heavily in technical

subjects. The impressive economic growth of Singapore can be attributed to this initial investment in technical skills.

On the path towards the achievement of the vision 2020, the government of Rwanda, through the Ministry of Education, Science, Technology and Scientific Research, sets medium-term objectives for 2005-2010, according to the Education Sector Strategic Plan (ESSP) document. This provides a forward-looking plan with strategies, key activities and related indicators that have been evaluated on the basis of policy goals identified in the Education Sector Policy (MINEDUC, 2005: 7). Unfortunately, this document lacks projections for output in terms of engineers and scientists that need to be provided in order to drive the development of ICT. The plans are aimed at increasing the number of students in scientific and technological streams (MINEDUC, 2005: 55), but there is no indication of when and how this target is to be reached. Plans for expanding the number of engineering and technical students at the tertiary level, aim to attract the MNCs in higher value-added and technology-based sectors, as did Singapore. Even Mauritius has centred its strategy on attracting foreign investment, presenting the information technology sector as discussed in the previous chapter.

As Rwanda aims to become a hub of ICT in the region, the need to investigate means of obtaining many computers and highly trained teachers to make the system operational and sustainable is daunting. Increasingly, computer literacy, according to Perkins *et al.* (2001: 328), is becoming a basic need in the global education systems. For most people in developing countries, computer literacy is a distant dream. Only the wealthy few can

afford personal computers, and the introduction of computers into public schools is still in its infancy. In Rwanda, for example, the current ratio of people that have access to computers is 0.12 percent and that of those who have access to a computer and internet is 0.06 percent (MINECOFIN, 2004: 47). 99 percent of the population does not have access to computers. To cope with the requirements of the vision 2020, investment in physical capital and infrastructure, especially in computer provision, is essential as a complementary service to human capital accumulation. For example, Rwanda can encourage foreign firms to set up computer assembly operations in a free-trade zone that it plans to open, as did Taiwan for the development of its electronic industry. Then computers will be cheaper - affordable and available throughout the country. Government intervention by investing in human capital and infrastructure has attracted foreign investors, as well as local investors because, as Wu (2002: 162), argues, those investors have a great interest in a large pool of skilled labour and continuous improvement in infrastructure. Foreign investors bring capital, technology, training and access to foreign markets but highly-skilled labour is an incentive. The government has invested heavily in developing high-level skills to drive the targeted upgrading of the industrial structure. The university system in Singapore was expanded and directed towards the needs of its industrial policy (Lall, 2001: 159).

However admirable this strategy towards sustainable economic growth, the ability to compete in the current era of globalisation sounds, the important question concerning the financing of the huge costs of an all-inclusive education system remains. New ways of financing must be found in defiance of the many constraints and priorities faced by the

government. This financing will have to provide large amounts of funds, not only to finance a new strategy, oriented towards a higher education level, but also to ensure that those who are still excluded from education are brought on board.

Finding affordable and sustainable sources of funding at both individual and Government level in Rwanda is imperative. One possible way is to afford credit to individuals who currently cannot afford the high cost of secondary and tertiary education. Due to their limited sources of income and low level of savings, the loan must be granted at affordable terms, conditions and interest rates.

Rwanda currently relies on donor support, which is costly and unreliable. Therefore an affordable education-financing policy must be devised. Such a policy should bear in mind that, under capital market imperfections, poor households are unable to obtain loans from the conventional banking system, because they do not have collateral. Consequently, many children from poor families do not gain access to higher levels of education.

In order to provide more funds to augment the existing means of finance for education, and to make it accessible even to the poor, this study suggests the creation of an Education Bank Loan that will replace the current Student Financing Agency for Rwanda (SFAR).

**This bank was proposed due to the limitations from other sources of funding presented in Chapter Two (2.6.2). Firstly, a private model using human capital**

contracts can not be applied in the Rwandan context because private investors can not easily finance education which is very risky as borrowers do not have collateral. It would be difficult in case where the owner of the credit refuses to continue payments for whatever the reasons. The lender can also find it difficult to trace the student borrower, since more educated individuals have high mobility (Palacios, 2004: 27). The problem is aggravated by the “brain drain” phenomenon which developing countries are experiencing. Many highly educated individuals leave their countries in search of better opportunities offered in developed countries. Under such conditions, the lender would not get back the credit offered to such students.

Secondly, the subsidies model is also limited by its sustainability as the state has limited resources and has to perform other functions which compete with education. The feasible way to ensure more funds to education financing in Rwanda is to replace the existing system of a financing agency with the creation of the Education Bank Loan. It is also exposed to the risk of non-recovery, but the state can put measures in place to track the borrowers who are unwilling to repay.

The importance of this bank would be fourfold: firstly, in contrast to the existing agency (SFAR), backed by the Government, the bank could contract a long-term loan from the International Development Association (IDA), which offers loans to low-income countries at the lowest global interest rates. This could benefit more students than the SFAR does.

Secondly, functioning as a Bank, it will require the beneficiary of loans to repay at low interest rates, and to generate resources that can be used to pay its personnel besides realising a surplus in order to allow for more loans to more needy students.

Thirdly, a larger fraction of the funds from the 40 percent (of total public recurrent expenditure on education), previously set aside for higher education; will be directed to primary or secondary education. This derives from the East Asia's extraordinary performance, where the allocation of public expenditure between basic and higher education was a major public policy issue (Cypher and Dietz, 1997: 390).

Lastly, the bank, while representing an original approach proposed for Rwanda, could meet the new approach of the World Bank's policy to find mechanisms that can sustain higher education by proposing the charging of student fees and by privatisation (Samoff and Carrol, 2003: 33).

#### **4.5 Summary**

Education in Rwanda expanded slowly during the pre-war and the 1994 genocide period and rapidly from 1994-1995 onwards. To date, universal primary education has not been reached. The proportion of primary school students going on to secondary school, even from secondary schools to higher institutions, remained very small. This was a deliberate policy by the government. The constraints identified which are related to economic policies of the past and to the poverty structure of the population, are real but not

insurmountable. At present, the policy strategy envisages the transformation of Rwanda into a hub of ICT by 2020.

This vision is based on high levels of human capital as a key factor, especially in science and technology, a lesson learnt from the selected countries. However, resource constraints on the acquisition of the high levels of human capital continue to impede the achievement of this objective. As part of an alternative solution to the problem, an Education Bank Loan is proposed. Its advantages and potential limitations are highlighted and summarized in the following chapter.



## **CHAPTER FIVE CONCLUSIONS AND RECOMMENDATIONS**

The purpose of this research was to highlight the role of secondary and tertiary education in the stimulation of economic growth for low-income economies, and of Rwanda in particular. More specifically, the research intended to identify the conditions under which expanding education at higher levels has been fruitful and sustainable for three selected developing countries (Mauritius, Taiwan and Singapore) and indicate what lessons Rwanda can learn from them to improve its strategy for economic growth. The lessons learnt would help the government to draw policy recommendations on measures of how to raise the level of human capital accumulation, given the inadequate financial resources and capital market imperfections that characterize Rwanda as a low-income economy.

The study used qualitative methods of inquiry to gather data for the selected countries and Rwanda. One of the key findings of the study relates to the increasing importance of secondary and tertiary levels of education in the economic development of low-income economies. Empirical evidence from Mauritius, Taiwan and Singapore confirms this point of view. These countries invested heavily in secondary and tertiary levels of education, with an emphasis on the science and technology fields, which enabled them to make the transition to middle-income economies.

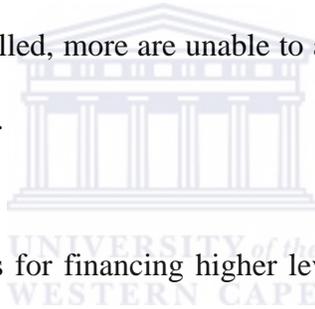
Secondary school graduates gain skills to cope with the ‘middle-jobs’, while at tertiary level, the graduates acquire skills to cope with logical and analytical reasoning tasks, as well as the technical knowledge required in the current era of globalisation (Colclough, 1982: 171). The skills required for the use of the new and advanced technologies go

beyond the basic ones of numeracy and literacy acquired in primary school. It is not possible to have modern agriculture and industry without investing in human capital at higher levels, because higher levels of human capital allow for higher levels of technology use (Schultz, 1961; Bils and Klenow, 2000).

The study further found that, although investment in human capital, through investment in secondary and tertiary education, is a necessary ingredient to economic growth and development, it is not sufficient (Cypher and Dietz, 1997: 385). Factors such as macro-economic stability and economic policies, as well as adequate legal systems and institutions also play a role. The macro-economic policies and legal institutions provided great support for successful economic growth. Their policy improvements included the institution of practices related to good governance, quality education that locked the workforce into a high level of productivity and the creation of incentives to foreign investment. This reversed the paradoxical situation that other developing countries experienced during the period after their independence, where the continuing demand for schooling was accompanied by unemployment among the educated people and an apparent decline in economic growth (Devarajan *et al* 2003;, Pritchett, 2001; Perkins *et al.*, 2001; among others).

These findings suggest several policy recommendations for Rwanda in this area as it sets out to build a knowledge-based economy in which science and technology form the basis of modern enterprise. Rwanda must invest in knowledge creation in order to provide an adequate supply of science and technology skills to the competitive future market. Above

all, there is a need for strong legal institutions that create a conducive environment and hold out hope of long-term rewards to highly-educated people. In brief, good governance, macro-economic policies, a developed financial sector, and other factors constitute a good basis for the successful outcome of embarking on a promising path for economic growth and development. A country that is able to maintain and improve its institutions and economic policies, which are conducive to a sound institutional environment, ensures the potential for sustained economic growth. Failure to invest in human capital has long-term consequences for individuals, as well as for the economy. At the individual level, if poor households are unable to finance the education of their children, their poverty is transmitted across generations. Considering the economy as a whole, if more people are unskilled, more are unable to adopt technology, and hence, the economy cannot be competitive.



A large proportion of resources for financing higher levels of education in low-income economies, such as in Rwanda, is still incumbent on the government, which often has other priorities that constrain its investment in education. A partial solution to this is to consider the creation of an Education Bank Loan for Rwanda.

The importance of this bank is fourfold: Firstly, in contrast to the existing agency (SFAR), backed by the Government, it can contract a long-term loan from the International Development Association (IDA), which offers loans to low-income countries at the lowest global interest rates.

Secondly, functioning as a Bank, it will require the beneficiary of loans to repay at low interest rates, reflecting the value of money, and to generate resources that can be used to pay its personnel, besides realizing some surplus that can permit the extension of loans to as many students as possible.

Thirdly, a larger fraction of funds from the 40 percent (of total public recurrent expenditure on education) previously budgeted for higher education, will be directed to primary or secondary education. As was the case in East Asia's extraordinary performance, the allocation of public expenditure between basic and higher education was the major public policy (Cypher and Dietz, 1997: 390). The government will then concentrate efforts on investing more in lower levels to improve the quality of basic education and make investment in education more progressive.

Lastly, the bank, while constituting an original approach proposed for Rwanda, meets the new approach of the World Bank's policy to find mechanisms that can sustain higher education by proposing charging student fees and privatization (Samoff and Carrol, 2003: 33).

Addressing the problem of investment in higher levels of education today through the suggested sustainable mechanism, will allow further accumulation tomorrow, resulting in an increase of the economy's productivity, with the ability to adopt, adapt, or improve the technology update, and hence ensure sustainable economic growth.

Future research should focus on the functioning of the suggested Education Bank Loan, exploring its status; the potential collateral, as well as how to retrieve its money in the event of the death of the student borrower. It shall ensure that students at all levels make adequate progress in acquiring the knowledge and skills to equip them for adult life; and that the mix and number of graduates from the education system corresponds to the economy's demand for skilled labour.



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