

Skills Formation and Labour Productivity in Jamaica*

Andrew S Downes PhD

Professor of Economics and Director

Sir Arthur Lewis Institute of Social and Economic Studies

University of the West Indies, Cave Hill Campus

St Michael, BARBADOS

asdownes@yahoo.com

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1 Introduction

Recent developments in the analysis of economic growth have emphasized the role of human resources development in the growth process. Lucas (1988) argued that human capital propels economic growth through the internal effects on workers' productivity. Through schooling, job training and learning-by-doing, workers are able to produce more output (goods and services) within a given period of time. Grossman and Helpman (1991) added that countries with a relatively larger high technology sector, which employs highly skilled human capital, tend to experience long-term gains in productivity and growth. Empirical research on economic growth has supported the positive role of human capital in the growth process, although the measurement of the human capital variable has been problematic [see Capolupo, 2009]. A recent study on economic growth within the Caribbean has indicated a positive and statistically significant role for secondary level schooling [see ECLAC, 2009].

The quality of the labour supplied to the labour market has an important bearing on the quantity and quality of the output produced in an economy. The demand for such quality labour depends on the nature of the production process. As labour demand is a derived demand, the quantity and type of output produced by firms determine the quality and quantity of labour demanded by firms. The challenge for labour market agents (households and firms) is ensuring that the quantity and quality of labour (human capital) is made available to meet the demands of the commodity market. The quantity and quality of human capital supplied and used by firms determine the level of output produced and the associated level of productivity. Improving the quantity and quality of the human capital base of a country is therefore vital to economic and productivity growth.

This study examines the impact, which improvements in the human capital base of Jamaica (that is, skill formation) have had on labour productivity over the past decade

(1995 to present). The Jamaican production system performed poorly over the period 1995-2008 with an average annual growth rate of 0.7 percent. The highest growth rate recorded was 3.5 percent in 2003, while negative growth rates were recorded over the 1996 to 1999 period. Although the overall unemployment rate declined gradually over the study period from 16.2 percent in 1995 to 10.6 percent in 2008, it has been a source of concern in the country. The youth unemployment rate (15-24 years) has been normally *twice* the national average. In addition, Jamaica has a significant informal sector estimated at over 45 percent of gross domestic product in 2001 [see GRADE, 2002]. A significant level of emigration of skilled labour over the past decades has also affected Jamaica. Between 1995 and 2008, an average of 20,000 persons migrated to the USA, UK and Canada annually. Approximately 20 percent of these emigrants can be classified as “skilled” workers. In return, Jamaica has been a significant recipient of remittances in the Caribbean. In 2008, private remittance inflows to Jamaica were US \$2.021billion.

The major challenge facing the country is to identify the factors which have inhibited economic growth over the past decades and implementing measures for overcoming these constraints. In addition, the current recession and the management of an IMF program have compounded the challenge.

This report analyzes the functioning of the education and training system and its impact on human capital formation and labour productivity in Jamaica over the 1995-2008 period. It examines the possible skills mismatch in the labour market and the role of the education and training system in fostering this mismatch. In addition, it analyzes which type of skills are under-provided in Jamaica and which part of the education and training system can be improved in order to enhance the skills needed by employers.

The structure of the report is as follows: in part 2, a brief overview of the nature of the skills mismatch and its relationship with human capital formation is presented. In part 3, the existence of a skills mismatch in the Jamaican labour market is determined and its relationship with labour productivity is explored. The returns to various forms of

education and training in Jamaica are analyzed in part 4, while in part 5, the link between educational policies and the skills mismatch is examined. The final part summarized the main conclusions of the study.

2 Human Capital Formations and Skills Mismatch: An Overview

The concept of “skills mismatch” has received some degree of attention from both economists and educationists. The first issue concerns the concept of “skill” - both its definition and measurement. Attewell (1990), Vallas (1990), Spenner (1990), Stasz (2001) and Esposto (2008) have sought to explore the meaning and measurement of “skill” so that the concept of “skills mismatch” can be clearly defined. Attewell (1990) notes that there are four different perspectives on the concept of “skill”: *positivist* (which sees skill as a measurable and objective concept defined in terms of the attribute of the job rather than of the person); *ethno-methodological* (which considers skill as dynamic and multi-dimensional); *Weberian* or *social constructionist* (which examines the social conditions which make certain occupations as skilled and others as not) and the *Marxist* (which views skill in the context of the labour theory of value and the theory of alienation and technological change). In short, the concept of “skill” is perceived to be multi-dimensional, socio-economic and dynamic.

Esposto (2008) offers a definition of “*skill*” as a “set of general procedures that underlie the effective acquisition and application of knowledge in different areas of endeavour” (p. 112). Based on this definition skills are:

- (i). innately linked to knowledge, learning, education and experience;
- (ii). procedures that are required for the performance of multiple tasks;
- (iii). dynamic and change over time.

The range of “skills” needed for the performance of tasks include:

- (i). *basic skills* which facilitate the acquisition of new knowledge. These basic or cognitive skills can be divided into *content skills* (literacy, numeracy,

listening, writing and comprehension) and *process skills* (critical thinking, active learning);

- (ii). *cross functional skills* which allow the individual to perform effectively in a range of job settings. These non-cognitive skills include *social skills* (ability to work with others), *technical skills* (related to the occupation and industry standards), *problem-solving skills* (ability to resolve issues when they arise), *resource management skills* (the ability to allocate resources efficiently, including time management) and *system skills* (visioning, perception, decision-making and monitoring ability) [see Esposto, 2008].

The demand for this range of skills varies according to the type of job performed by the individual in the workplace. For example, a clerical position would require basic skills along with social and some technical skills, while a senior manager would be expected to have a full range of basic and cross-functional skills.

This issue of “skills mismatch” occurs where the supply of skills offered by workers does not match those demanded by employers. As CEDEFOP (2009) indicates, “skills mismatch” refers to “various types of skill gaps or imbalances that may be quantitative or qualitative in nature (p. 4). “Skills mismatch” can be vertical or horizontal [CEDEFOP, 2009, 2010]. *Vertical skills mismatch (VSM)* occurs where the level of the skills a worker possesses is either greater or lesser than that required to effectively perform a job with multiple tasks (that is, a mismatch of the level of education and the job). *Horizontal skills mismatch (HSM)* relates to the situation where workers have the appropriate level of qualifications but different skills than are required to perform effectively on the job (that is, a mismatch between the field of study and the job).

The existence of VSM and HSM has resulted in a discussion of such issues as over- and under-education, over- and under-qualification, skill shortages, skill obsolescence, under-employment and skills under-utilisation. In the case of VSM, the discussion has centered around the issue of over-education where the job structure has not been able to absorb the

increased supply of educated workers in their traditional occupational rungs [Tsang and Levin, 1985]. Over-education is sometimes viewed as a short-term issue affecting new entrants (graduates) in the work place, but can become chronic in a low-growth economy where the demand for skills grows at a much slower rate than those supplied by education and training institutions [McGuinness, 2006]. HSM has been partly associated with the “diploma disease” whereby workers seek additional qualifications (academic) but not the appropriate skills to perform on the job. It is also associated with a form of signaling in the labor market.

The issue of “skills mismatch” is therefore an expression of the link between the labour market and the education and training system. It is also related to the issue of the transition from school to work. Several analytical frameworks exist which explore the linkage between the labour market and the education-training system.

Human capital theory indicates that investment in education and training (skill development) increases the productivity of workers within firms, provided “firms are willing to fully utilize the skills of their workforce by adapting their production processes in response to any changes in the relative supply of labour” [McGuinness, 2006, p. 389]. Firms would generally invest in the workers’ specific cross-functional skills, but not in their general basic skills. Where there is little adaptation, over-education can arise as the educational and training attainment of the workforce surpasses the requirements of employers.

The Signaling/Screening theory posits that human capital formation (education and skill development) forms the basis of individuals signaling the level and quality of their productivity to employers. Given the asymmetric information associated with the productivity of workers, the increase in educational attainment or credentials by individuals provides a basis for assessing their potential productivity. Employers use such credentials to screen workers. In an effort to “win a job”, individuals can over invest in education and training, thus resulting in some degree of over-education. The

increase in education and training need not increase the productivity of workers on the job.

The Job Competition theory claims that productivity is an attribute of the job and not of the person. For example, jobs associated with the use of modern capital equipment (such as bauxite industry) are generally high productivity jobs. Workers queue up for jobs, so that once a worker is hired, the skills necessary to raise his/her productivity to the productivity of the job are learnt through training and further skill development on the job. Trainability is the main criterion used in the hiring process. The competition for a limited set of jobs means that persons can invest in general education (basic skill development) in order to move higher in the queue and to demonstrate their trainability on the job.

According to the *Assignment theory*, both workers and jobs are heterogeneous and the fit between education/training and jobs depends on how workers are placed into available jobs. In effect, the output of a firm is determined by the supply of human capital, the demand for different kinds of jobs by firms and the mechanism which places or assigns each worker to a job (that is, some workers are better suited to selected jobs than others). Given the diversity of jobs, technologies and individuals, worker productivity varies according to the characteristics of the individuals and the jobs to which they are assigned. As Sattinger (1993) notes, the ‘amount a worker can contribute to production typically depends on the job the worker performs. This occurs because jobs require many different tasks, and human performances at those tasks are extremely diverse, because industrial sectors use different technologies that rely on different combinations of human skills, or because jobs vary in the amounts of resources combined with labour’ (p. 831). In such a situation, the worker can over-invest in education thus resulting in a skills mismatch via over-education [see McGuinness, 2006, p. 393].

In summary, the human capital and signaling/screening focus on education and training enhancing or signaling the productivity of workers, while the job competition and assignment theories indicate that the nature of the job largely determines productivity

levels. In all cases, some degree of mismatch (over-education) can occur. More education can therefore result in lower levels of productivity or no increase in labour productivity.

Skills mismatch can express itself in three ways in the labour market: unemployment or underemployment of skilled persons, vacancies for skilled persons (that is, a shortage of labour) or emigration of persons to other labour markets. The existence of a skills mismatch in the labour market results in a less than optimal level of labour productivity in enterprises. As the mismatch is reduced over time, the enterprises are able to move towards their optimal labour productivity levels. Hence, there is an inverse relationship between skills mismatch and labour productivity (that is, the better matching of skills to jobs in enterprises results in a higher the level of productivity).

The excess demand for skilled workers can reduce potential overall productivity growth if firms are forced to substitute unskilled workers on tasks that generally require skilled workers. In this case, under-education results as workers have less education/training than the jobs require. Where there is a high degree of emigration of highly skilled labour, those lesser skilled workers occupy jobs above their skill level (that is, a type of *Peter's Principle*). Where there is an excess supply of skilled labour, overall productivity is stymied as workers are under-employed as they undertake jobs which do not require their available education and skill set. Some degree of “bumping down” occurs as skilled workers occupy jobs previously done by less skilled workers. As the educational and training output increases and occupy jobs, which do not match their skill sets, less educated/trained workers find themselves unemployed.

Skills mismatch can be resolved in several ways:

- (i). ***internal and external mobility***: workers can move to different locations within a country to find jobs which match their skill sets thus resolving the over-education problem. Within the context of the CARICOM Single Market and Economy (CSME), the free mobility of labour can help to resolve the over-education problem that may exist in a country. In several small

developing countries, such as Jamaica, emigration of skilled labour has become a major concern.

- (ii). ***investment in education and training***: specialized training (technical, vocational, managerial, etc) can supply the skills needed for skills matching in an organisation.
- (iii). ***career counseling and information sharing***: the counseling of prospective job seekers and the provision of information on job vacancies and job requirements can help to resolve the mismatch issue.
- (iv). ***adapting jobs to reflect the skills available***: firms can make adjustments to their production operations to accommodate the supply of labour in the economy.

The challenge with the implementation of such measures is the time it takes to educate/train vis-à-vis the changing nature of the production process. Changes in technology have made new production systems increasingly more skill intensive. Education and training institutions sometimes find it difficult to respond to the ever-changing skills needs of firms. Furthermore, the existence of employment protection laws and regulations make the costs of adjustment (hiring and firing employees) very high so that firms are faced with a “skills mismatch” problem.

In an increasingly competitive economic environment, there is a need to match the knowledge, skills and competencies of the labour force to the needs of the production process. Skill-based technological change taking place within firms must be matched by appropriate investments in human capital formation (education and training). Acemoglu and Zilibotti (2001) observed that the technological systems used in developing countries are basically the same as those used in more developed countries, but differences in the supply of skills create a mismatch between the requirements of these technologies and the skills of (developing country) workers and lead to low productivity in such countries (p. 563-64). This is the so-called “technology-skill mismatch” which results in productivity and income differences across countries. The policy response is to increase the skill base

of developing countries (human capital formation) or utilize more skill-appropriate technologies.

In some developing countries, the social demand approach to educational planning has resulted in an imbalance of skills in the labour market as little emphasis is placed on the needs of employers. One of the main challenges associated with the issue of “skills mismatch” is its measurement or identification in practice. In determining the existence and degree of skills mismatch, one needs to ascertain the skills which workers possess and the skill needs of firms. Such information is usually obtained through surveys of enterprises, the conduct of job analyses and the survey of employees. Very few studies have adopted such an approach to “skills mismatch”.

A more aggregate approach to “skills mismatch” has been adopted in the literature. Three commonly used approaches to the measurement of “skills mismatch” between workers and firms are:

- (i). ***the Beveridge Curve*** which is an inverse relationship between vacancies and unemployment. It is argued that with sectoral shifts in the demand for labour, unemployment is created in the declining sectors and vacancies exist in expanding sectors. As part of the “creative destruction” process, there is de-skilling and re-skilling thus creating a skills mismatch problem at the aggregate level. As people are re-trained and re-allocated to new expanding sectors, the “skills mismatch” issue is lessened.
- (ii). ***the equilibrium rate of unemployment*** is also used as a measure of “skills mismatch”. Here a distinction is made between “equilibrium unemployment” and “mismatch unemployment” which relates to deviations from the equilibrium rate.
- (iii). ***the demand and supply wages*** measure how well the labour market is cleared (unemployment = vacancies), where there is a deviation between the two wages, a “skills mismatch” exists.

These tend to be model-based measures of “skills mismatch” which are generally applicable at the macro level. Several authors have used other proxy measures for the

nature and degree of “skills mismatch”: average years of education associated with a worker’s occupation, self-reporting of skill mismatch, a comparison of education level and job level of workers, the dispersion of wages and unemployment rates across education groups, a comparison of the growth rate of wages with the growth rate of skills [see Ochsen, 2004; Obadic, 2006 and Layard et al, 1991].

Most of the empirical research on the nature of “skills mismatch” has been undertaken on more developed countries in Europe and North America. Some papers have been written on the larger developing/emerging countries. Several of these studies have focused on “skills mismatch” directly or on “over-education”. Alba-Ramirez (1993) found evidence of over-education in the Spanish labour market in the mid-1980s. Over-educated workers tend to be younger, less experienced and subject to a higher degree of turnover (mobility) when compared with other workers. They also have less on-the-job training. Over-education was however considered as a short-term problem in Spain given the low rate of enrolment in higher education at that time. Groot and Maassen van der Brink (2000) using different measures of skills mismatch, found that although the measures gave conflicting results on the degree of “over-education”, it did exist in some measure in the Netherlands in the mid-1990s.

Badillo-Amador et al (2005) make a distinction between an “education mismatch” and a “competence match” in their study of the Spanish labour market in 1998. They observed that several studies have focused on the “education match” defined primarily through self-assessment. While workers may be mismatched educationally, they may be matched from a competence perspective. They found that 70 percent of workers were ‘inconsistently classified in terms of the education match compared to the competence match’ (p. 104). In terms of human capital formation, they found that the ‘level of education completed by a worker has a greater influence on the probability of being over-educated than that on the probability of being over-competent (p. 104).

Liagouras et al (2003), in their study of mismatch in the Greek labour market in the late 1990s concluded that there was a mismatch between the significant demand for higher

education and the relatively weak demand for highly qualified/skilled workers. In addition, they found that the Greek higher education system responded rather slowly to the new demands of the Greek economy and that the satisfaction of the social demand for higher education made it difficult for the university system to efficiently transmit knowledge.

Burriel-Llombart and Thomas (2001) in their study of the UK labour market over the 1979-99 period, found that although traditional measures of skills mismatch are not very reliable, 'the gap between the demand for and the supply of educated labour' increased over the period especially for those with graduate level qualifications (p. 5). Mc Guinness and Sloane (2009) also found evidence of mismatch among graduates in the UK labour market in the late 1990s.

They indicated that it is important to distinguish between over and under-education and over- and under-skilling as their effects can differ. For example, they found that the wage penalty associated with a job for which the incumbent is over-educated is higher than one in which he/she is over-skilled. Male graduates in the sample suffered a significant wage loss as a result of their over-skilling. Over-skilling had a stronger negative impact on job satisfaction, whereas over-education was marginally significant for women.

Ito et al (2009) used the Beveridge Unemployment-Vacancy (UV) curve analysis to examine the nature of "employment mismatch" in the Japanese labour market during the late 1990s. They found that there was a 'steady and significant increase' in employment mismatch and an associated stagnation in labour productivity.

Boudarbat and Chernoff (2009) examined the determinants of the "education-job match" among Canadian university graduates in 2000. They found the 35.1 percent of the graduates of 2000 were in a job that did not closely relate to their education and that educational factors strongly influence the match. The field of study (for example,

education and health sciences), the level of education (post-graduate degree) and good grades were the main factors, which resulted in a “good match”.

In a study of clerical workers in the Pakistan public and private sectors, Farooq et al (2009) found that those workers who under-utilize their education and skills (over-education and over-skilled) were generally dissatisfied because their “surplus education/skills” were not adequately compensated for in the labour market (that is, they suffered an earning/wage penalty). In effect, their level of productivity was lower than matched workers. Similar results were found by Tsang et al (1991) for the USA in the late 1960s and early 1970s.

Mehta et al (2010) in their study of over-education in three developing countries (Philippines, India and Thailand) found substantial evidence of mismatch in the Philippines, mild evidence in India and none in Thailand using data for the 1990s and 2000s.

The brief review of a selection of studies of mismatch suggests that “skills mismatch” in the form of over-education, is generally pervasive in the developed and developing worlds. There are challenges associated with the measurement of skills mismatch, but alternative measures and approaches have indicated the ‘impacts of over-education are likely to be non-trivial and that the phenomenon may potentially be costly to individuals and firms, as well as the economy more generally’ [McGuinness, 2006, p.387]. In several instances, evidence was found that skills mismatch had a negative impact on labour productivity.

3 Skills Mismatch and Labour Productivity in the Jamaican Labour Market

The review of the literature on human capital formation and skills mismatch indicates that it is not easy to measure the nature and degree of skills mismatch in an economy. Measurement has taken place at several levels: national, sectoral and firm/enterprise.

National and sectoral measures of mismatch tend to use data on unemployment, vacancies and employment [see Entorf, 1996; Ochsen, 2004; Obadic, 2006]. Such aggregate measures reflect the view that high levels of unemployment in a country can be caused by some form of skill mismatch [see Layard et al, 1991, chapter 6]. In effect, some workers are unemployed because their labour services (skills/human capital) are not needed by employers. At the firm/enterprise level, skill mismatch is usually measured by a survey of employers and employees or studies undertaken by job analysts. The idea is to see how well the skills of employed workers match the skills required by the employer (or for effectively performing a job).

The challenge associated with analyzing skills mismatch in Jamaica and hence its effect on labour productivity is the lack of crucial information. While quarterly labour force surveys are undertaken, thus providing information on the degree of employment and unemployment by educational attainment and occupation, there is no corresponding data on vacancies. Furthermore, no direct studies of the extent and nature of skills mismatch using employer/employee survey exist.

There are few measures of aggregate mismatch, which can however be, used without the need for data on vacancies: The measures are Lilien (1982) index of industrial mismatch given as:

$$LI_t = \left(\sum_i l_{it} (\Delta \log L_{it} - \Delta \log L_t)^2 \right)^{1/2} \dots\dots\dots (1)$$

where L_{it} is employment in industry i at time t

L_t is total employment in the economy at time t

l_{it} is L_{it}/L_t

Layard et al (1991) have also suggested a measure of aggregate mismatch, which does not require data on vacancies (as in the case of traditional aggregate measures). This index is given as:

$$LNJI_t = \frac{1}{2} \text{Var} \left[\frac{U_{it}/L_{it}}{U_t/L_t} \right] \dots\dots\dots (2)$$

where Var is the variance

U_{it} is unemployment in industry i at time t

U_t is total unemployment at time t

Sneessens and Shadam-Metha (1995) have also suggested a measure of aggregate mismatch index based on unemployment data given as:

$$SSMI_t = \frac{(1 - u_{ht})}{(1 - u_t)} \dots\dots\dots (3)$$

where u_t is the aggregate unemployment rate at time t

u_{ht} is the unemployment rate of the highly skilled labour h at time t

These three aggregate measures can be used to get some idea of the degree of skills mismatch in Jamaica. Little or no research is available on firm/enterprise level mismatch using employer and employee surveys and job analysis although ad hoc surveys of employers indicate that the level of skills is a problem within enterprises.

Jamaica has a complex of education and training institutions, which cater to the human resources needs of the country. Furthermore, there are several Jamaicans in the diaspora who can be utilised given the appropriate incentives structure. The educational system in the country provides for early childhood education (age cohort 1 to 5 years), primary education (5 to 11 years), secondary education (11 to 18 years) and tertiary/post-secondary education (universities, colleges, institutes).

Although the quality of the early childhood and primary educational level forms the foundation of the higher ladder at the educational system, the quality and quantity of the output of secondary and tertiary level are vital to the long-term productivity of the country. The available evidence for Jamaica over the period 1995 to 2008, points to a significant improvement in the enrolment of students at the secondary and tertiary levels.

Secondary level enrolment increased from 222,900 students in 1995 to 250,800 in 2008, that is, 12.5 percent. The gross secondary enrolment rate rose from 63.4 percent in 1998 to 93.4 percent in 2007 [see Tables 1 and 2]. Jamaica basically has universal primary level education, although there has been some decline in the gross primary level enrolment rate since 2000. Importantly, the level and rate of enrolment at the tertiary level have risen significantly since the mid-1990s. The gross tertiary level enrolment increased almost fourfold between 1998 and 2007 [see Table 2].

Table 1:Enrolment in Education and Training Institutions, 1995-2009
(‘000 persons)

Level	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary	319.3	313.6	306.2	318.2	318.6	325.3	334.7	332.9	328.4	331.3	326.4	318.7	310.0	315.1
Secondary	222.9	221.8	219.3	227.2	228.5	226.4	227.5	226.5	231.2	236.9	237.2	236.4	247.3	250.8
Tertiary				27.1	28.5	31.1	33.0	33.2	33.8	48.2	46.5	61.6	65.9	61.1
TOTAL				572.5	575.6	582.8	595.2	592.6	598.4	616.4	610.1	616.7	623.2	627.0
Non-Formal Training				19.74	22.77	22.89	23.36	24.55	26.24	34.23	54.14	83.41	85.61	94.46

Source: Ministry of Labour: LMIS (Labour Exchange); PIOJ: Economic and Social Survey

Table 2: Gross Enrolment Rates for Different Levels of Education, 1998-2007
(%)

Level	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Primary	100.7	103	104.7	99.1	97.1	94.0	93.1	97.4	95.5	94.3
Secondary	63.4	68.7	64.0	75.0	88.7	88.2	86.2	84.8	90.4	93.4
Tertiary	9.7	13.9	14.5	14.5	14.7	18.7	21.2	20.7	26.0	31.5

Source: same as Table 1

Table 3: Jamaican Student Performance in the CXC General Proficiency for English Language and Mathematics, 1999-2008
Percent Passes

Year	English Language	Mathematics
1999	60.3	26.8
2000	50.7	37.4
2001	72.1	30.3
2002	54.0	36.0
2003	46.0	36.0
2004	41.0	23.0
2005	60.2	39.4
2006	50.1	35.7
2007	51.6	35.3
2008	54.4	43.0

Source : PIOJ: Economic and Social Survey

While there has been an increase in the quantity of persons accessing higher levels of education, there have been concerns regarding the quality of the output of the education system, which can have implications for the level, and growth of productivity. Since the education system is expected to provide the “basic skills” upon which the “cross-functional skills” are developed, it is important that the basic pre-requisites of skill development be in place. Using the performance of Jamaican students in the Caribbean Examination Council (CXC) general proficiency examination in English Language and Mathematics as an indicator of “basic skills” development, it is noted that the performance has been weak, especially in Mathematics [see Table 3]. While the average pass rate for English was marginally below 55 percent over the 1999-2008 period, the average pass rate for Mathematics was below 35 percent. The pass rates for older secondary high schools were consistently and significantly above those of upgraded and technical high schools.

The examination results suggest that those persons leaving the school system either for the labour market or higher education have a low level of educational attainment. For example, in 2008, 68.1 percent of the labour force had passed no formal examinations, while 9 percent had a degree. Approximately 6 percent of the labour force did not state the highest examination passed.

Although the educational attainment of the work force has increased over the years, the quality of the work force is still very weak. An examination of the labour force by training received over the 1995 to 2008 period also highlights fundamental weaknesses in its quality. While there has

been a decline in the number of those receiving vocational training without certification from 22,100 in 1995 to 19,875 in 2008, there has been a tremendous growth in the number with certified vocational training, from 47,500 in 1995 to 123,725 in 2008 [see Table 4]. Much of this growth has been due to the establishment of the Human Employment and Resource Training (HEART) Trust in 1982 and its expansion into the National Training Agency (NTA) in 1991. The HEART Trust/NTA program caters mainly to school leavers with low levels of certification or no certification at all.

The number of persons with professional certified training (degree or diploma) doubled over the 1995 to 2008 period. Those with apprenticeship training declined while those receiving on-the-job training remained relatively constant.

The worrisome aspect of the Jamaican workforce is the very high level of workers with no training. In 1995, 80 percent of the labour force indicated that they had no training, while in 2008, the percentage was 72, with an increase in the number of persons from 919,950 in 1995 to 930,325 in 2008. The combination of low level of educational attainment and low degree of training of the labour force in Jamaica suggest an overall low quality of the human capital, which has a negative impact on the level and growth of productivity.

Table 4: Labour Force by Training Received, 1995 - 2008

Type of Training	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Vocational without certificate	22100	17075	24175	18100	19125	15975	16600	24500	19163	21434	20800	17700	19375	19875
Vocational with certificate	47500	49850	57625	57400	56700	63400	59250	68400	76833	85100	95350	106725	112575	123725
Professional without degree/dip	6900	5825	7700	5300	4900	5100	5450	11600	7433	11433	11700	5150	5325	5550
Professional with degree/diploma	60650	60325	77075	79900	77875	79275	76750	86750	97900	82800	98225	104900	123375	130775
Apprenticeship	10925	10300	10550	14550	13500	4575	2150	6200	2733	4333	2950	1425	1775	1325
On-the-job Training	77125	69650	74275	79325	66650	65950	59900	77450	72100	66666	64350	54825	59750	64850
None	919950	924700	870750	862950	869650	820160	869250	830450	901600	906733	911900	945200	932650	930325
Not Stated	4875	5000	5625	11075	10675	50850	15450	19100	11900	16366	17825	17150	22025	19700
TOTAL	1150025	2242725	1127775	1128600	1119075	1105300	1104800	1124450	1189700	1194800	1223100	1253075	1276650	1296125

Source: STATIN: Labour Force Survey

The available data indicate a significant increase in the output of skilled labour over the 1995 to 2009 period from various post-secondary education and training institutions (especially colleges and universities). The number of skilled and semi-skilled persons (agricultural, hotel and hospitality, computing, cosmetology, secretarial/commercial, craft/production) rose from 17,000 in 1995 to 60,600 in 2009 primarily due to the work of HEART Trust/NTA (see Table 5). The output of technical, managerial and professional workers increased from 5,700 in 1995 to 14,200 in 2009. Such an output of persons seems insufficient to raise the level of overall productivity in a significant way. Indeed, a survey of research on labour productivity in Jamaica pointed to the inadequate quality of the human capital as a major factor in the relatively low level of labour productivity [see Downes, 2004].

An examination of advertised vacancies by occupational group over the 2002-8 period indicates that 46 percent of the vacancies were in the professional, senior official and technician group [see Table 6]. Clerical occupations accounted for 14 percent, while service/sales occupations represented 20 percent of total advertised jobs. These data suggest an ongoing demand for skilled labour in Jamaica in the highly skilled occupations.

The unemployment rates among professional, managerial and technical and skilled agricultural/fishery workers tend to be relatively low [see Table 7]. Using SSMI of mismatch, the degree of skill mismatch between these two broad categories is relatively low compared to the other occupational categories. The degree of mismatch declined from 10.9 percent (1.109) in 1995 for professional, managerial and technical persons to 7.3 percent (1.073) in 2008. This indicates an improved fit between the supply of and demand for skilled labour over the years.

Jamaica has experienced an emigration of its skilled persons to the USA and Canada. For example, an average of 5 percent of the migrants to the USA over the 2000-2008 period were in the management and professional occupations group, with an average of 17 percent of the migrants to Canada in the same group. In addition, the highest numbers of

work permits issued by the Jamaican authorities were in the professional and management occupational group. In 2008, for example, 59 percent of the work permits issued were for professional and managerial occupations, while 24 percent were in the craft and related occupations.

Table 5: Output of Human Resources from Educational and Training Institutions by Category, 1995-2009
(‘000)

Category	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Technical, Managerial and Professional	5.7	5.8	6.2	7.2	7.6	8.3	8.6	8.9	9.7	12.6	12.9	14.8	15.4	14.0	14.2
Skilled and Semi-skilled	17.0	20.6	30.6	12.8	15.7	17.5	17.9	28.9	21.7	34.2	41.8	55.6	49.9	53.8	60.6
TOTAL	22.7	26.4	36.8	20.0	23.3	25.8	26.5	37.8	31.4	46.8	54.7	70.4	65.3	67.8	74.8

Source: PIOJ: Economic and Social Survey

**Table 6: Advertised Vacancies by Occupational Group
May 2002 to September 2008, (number)**

Occupational Group and Main Jobs	Count
1 Professional, Senior Officials and Technicians	40,345
1.1 Teachers	8,051
1.2 Lecturers	2,069
1.3 Accountant/Accounting Officer	1,772
1.4 Engineers	1,027
1.5 Marketing/Sales	984
1.6 Principal	949
2 Clerical	12,144
2.1 Receptionist/Customer/Client Service Representative	2,683
2.2 Cashier	1,803
2.3 Typist/Secretary	1,271
3 Service Workers/Shop Workers	18,083
3.1 Sales Representative	5,580
3.2 Bartender/Barmaid	2,139
3.3 Cook/Chef	1,186
4 Craft and Related Trade Workers	3,368
4.1 Technician	1,019
4.2 Mechanic	627
4.3 Tailor/Dressmaker	439
5 Plant and Machine Operators and Assemblers	3,902
5.1 Driver/Dispatcher	3,003
5.2 Machine/Drill Operator	252
6 Elementary Occupations	9,732
6.1 Domestic Helper	4,185
6.2 Janitor/Handyman	1,589
6.3 Casual Worker	1,448
Total Vacancies	87,701

Source: Ministry of Labour, Labour Exchange

**Table 7: Unemployment Rates by Occupational Group in which the Person
Last Worked 1995-2008 (%)**

Occupational Group	October 1995	October 2000	October 2004	October 2008
Professional, Senior Official, Technicians	5.9	8.5	4.4	3.6
Clerks	17.0	14.0	14.1	10.7
Service/Shop/Sales Workers	16.1	15.9	12.2	12.7
Skilled Agricultural/Fishery Workers	1.8	1.0	1.3	1.3
Craft and Trade Workers	10.1	11.7	8.5	9.0
Plant/Machine Operators	8.2	15.3	6.8	7.9
Elementary Occupations	15.0	15.4	13.7	15.5
Unspecified Occupations	100.0	50.0	100.0	55.6
TOTAL	16.8	15.6	11.4	10.3

Source: STATIN, Labour Force Reports

The available data indicate that there have been significant deficiencies in the quality of the Jamaican workforce in terms of both education and training. Attempts have been made to supply the skills needed for the labour market by expanding the post-secondary education and training institutions. The country has however been confronted for several years by the emigration of skilled labour primarily to North America. In effect, the education/training institutions have been trying to catch up with the demand for skilled labour. While there is some evidence of a ‘skills mismatch’, especially among the professional, managerial and technical occupations, it is not very large and seems to have declined over the years. Using SSMI aggregate mismatch indicator based on the relative unemployment rates of the labour force and the professional/managerial/technical occupations, the degree of skills mismatch declined over the period from 10.9 percent in 1995 to 7.3 percent in 2008. Labour productivity however declined, rather than increased, over the same period, suggesting that the skills mismatch did not feature significantly in the productivity decline. The challenge for Jamaica is raising the *overall* quality of its human capital, starting from the early childhood education stage.

4 Human Capital Formation and Returns to Skills

Investment in education and training, according to human capital theory, is guided by the comparison of the present value of costs and benefits. The internal rate of return is that interest (discount) rate which equates the present value of costs to the present value of the benefits associated with the investment. The calculation of the rate of return is used to guide the investment in education and training. A ‘high’ rate suggests that greater investment should be undertaken, while a ‘low’ rate suggests that such investment should be reduced. The higher the investment in human capital, the greater is the degree of skill acquisition and the higher the level of labour productivity. The increased productivity is associated with higher wages/earnings. In effect, the higher the returns to the investment in human capital formation, the higher the wages/earnings of workers. This basic relationship has been used to estimate the return on different types of education and training using the so-called Becker-Mincer equation.

The rate of return on the investment in human capital can be viewed from two perspectives: private and social. The *private* rate of return considers the costs of education and training incurred by the individual and also the total benefits (increased gross wages/earnings) obtained by him/her. The *social* rate of return views costs and benefits from a societal perspective and therefore considers the government’s taxes and subsidies associated with education and training. In effect, the social rate of return adjusts the private rate of return to incorporate government provided tuition costs and tax liabilities.

Where the social rate is higher than the private rate, then it is likely that there are “positive externalities” arising from individual private investments, and where the social rate is lower, educational (and training) certification is being used as a signaling device [see Sianesi and van Reenen, 2003, p. 167]. Where credentials rather than years of education/training/schooling are used to determine the returns to education/training/schooling, then “sheepskin effects” arise, that is the individual receives a wage premium over and above that associated with the average years of education for attaining additional credentials.

There have been a few studies examining the rates of return to education in Jamaica. Using a random sample of the Labour Force Survey for 1989, Mackinnon-Scott (1992) estimated a basic Becker-Mincer function:

$$\ln E_i = \alpha_0 + \alpha_1 S_i + \alpha_2 EXP_i + \alpha_3 EXP_i^2 \dots\dots\dots(4)$$

where $\ln E$ is the natural logarithm of weekly earnings of workers, S is years of schooling, EXP is experience defined as (age *less* years at school *less* 6).

She found that the rate of return for male education was 12.3 percent, while for females it was 21.5 percent. Mackinnon-Scott concluded that ‘women who [were] less productive in the home [were] more likely to be in the labour force’ (p. 333).

Psacharopoulos and Chu Ng (1992) reported further results for Jamaica based on the 1989 labour force survey and using various forms of the Becker-Mincer equation, given above [see Table 8].

Table 8: Rates of Return to Education in Jamaica 1989

Item	Rate of Return (%)
1 Overall Rate	28.8
2.1 Male Rate	28.0
2.2 Female Rate	31.7
3.1 Private Sector Rate	24.9
3.2 Public Sector Rate	16.0
4.1 Primary Level Education	
Overall Rate	23.45
Social Rate	17.73
Private Rate	20.44
4.2 Secondary/Vocational	
Overall Rate	38.27
Social Rate	7.92
Private Rate	15.65
4.3 University	9.68

Source: Psacharopoulos and Chu Ng (1992)

The results confirmed the finding by Mackinnon-Scott (1992) that the overall rate of return to education for females was higher than that for males. The rate of return associated with private sector employment was also higher than that for persons working in the public sector. This partly reflects the higher wages paid in the private sector.

The overall private rate of return exceeded the social rate, thus suggesting some element of signaling especially at the secondary level, which was not universal in Jamaica. The private and social rates for primary level education were however higher than those for secondary level education. A comparison of the overall rates of return for primary, secondary and tertiary education in 1989, would suggest that greater investment in education should be made at the secondary level.

In an estimation of Becker-Mincer earnings functions for males and females for Jamaica using data for 1991, Alleyne (1993) found the following statistical significant results for education and training:

Males: specialized training, work experience and passing 'A' level and degree examination had a positive and significant effect on earnings;

Interestingly, the years of education at both primary and secondary levels were both statistically insignificant.

Females: specialized training, work experience and passing 'O' and 'A' levels examination had a positive and significant impact on earnings. The rates of return increased from 33 percent to 54 percent with increased educational attainment ('O' to 'A' level);

As in the case of males, years of schooling at both the primary and secondary levels were statistically insignificant.

In general, training, experience and educational attainment rather than years of schooling determined the earnings of workers. Rates of return for specialized training for both men and women were approximately 21 percent.

Handa (1995) used the employment module in the Survey of Living Conditions of 1993 to examine the factors, which affect the earnings of workers. Using the Becker-Mincer equation, he found that females enjoyed a significant rate of return to post-secondary education, that is, 48.3 percent compared with males (that is, 20.9 percent).

The results obtained by Mackinnon-Scott (1992), Psacharopoulos and Chu Ng (1992), Alleyne (1993) and Handa (1995) indicate a higher rate of return to capital formation for females. Handa (1995) argues that 'women face considerable barriers to conventional capital and so must resort to human capital in order to make gains in the labour market (p. 35).

James and Williams (2005) examined the rates of return to education in Jamaica over the period 1990 to 2002 [see Table 9a]. They observed that:

- (i). the private rate of return to tertiary education was higher than the rate for primary/secondary education;
- (ii). the private rate of return for tertiary level education exceeded the social rate over the period (hence some degree of signaling took place);
- (iii). there was a high degree of variability in the rates of return.

Table 9a: Rates of Return to Education in Jamaica, 1990-2002

(%)

Year	Private Rate - Primary and Secondary	Private Rate – Tertiary	Social Rate - Tertiary
1990	9.99	29.08	18.34
1991	13.19	38.85	24.51
1992	10.40	18.47	11.65
1993	10.73	33.77	21.30
1994	10.49	17.52	11.05
1995	12.43	21.16	13.35
1996	8.68	26.00	16.40
1997	8.71	13.55	8.55
1998	10.45	21.41	13.51
1999	20.61	21.27	13.42
2000	11.59	27.34	17.45
2001	10.01	37.65	23.75
2002	12.15	19.45	12.27

Source: James and Williams (2005)

Previous research by James, Williams and Hamilton (2003) indicated that, using the labour force survey for 2001, the overall private rate of return to schooling/education was 14.9 percent. The primary/secondary rate of return was 12.2 percent, while the rate for tertiary level education was 19.45 percent and the rate for general vocational training was 36.1 percent. The relatively high rates for vocational training and tertiary level education partly explain the rapid growth in the enrolment and output of persons in tertiary and vocational training.

Further research by James, Williams and Hamilton (2005) provides additional information on the rates of return to education and training (especially the HEART

Trust/NTA program). They reached 4 basic conclusions regarding investment in TVET in Jamaica:

- (i). the private and social rates of return to technical and vocational education were greater than the opportunity cost of providing such education;
- (ii). the private and social rates of return to technical and vocational education matched or exceeded those to traditional education, after adjusting for the period of training during the period of education;
- (iii). the rates of return to technical and vocational education were highest when students have performed well in the traditional educational system;
- (iv). technical and vocational education was under-funded given the small percentage of persons receiving technical and vocational education and the comparable rates of return.

The rates of return for education were estimated for the period 2002-2008 using the labour force data for the period. The Becker-Mincer equation (4) was used with the logarithm of the earnings from employment being the dependent variable and the independent variables (regressors) given as follows: *male*, *educ10* or tertiary education, *edyrs* or combined primary and secondary years of schooling, *exp* or experience and *hours* worked (see *Appendix 1*). Following Chiswick (1997), the coefficient for ‘edyrs’ measures the rate of return to schooling assuming that the investment in education at the two levels is equal to potential earnings if the investments were not made, while the rate of return to tertiary education is given as the coefficient for ‘educ10’ divided by the average length of time for this level of education (degree or diploma) which is assumed to be 3 years.

The regression results indicate that the rate of return to primary and secondary level schooling combined varied between 8.4 and 14.8 percent, with a general decline over the 2002 to 2008 period [see Table 9b]. The average private rates of return to tertiary level education varied between 18.3 and 45.5 percent, suggesting a significant under-investment in tertiary level education. There was a general upward trend over the 2002-8 period.

Table 9b: Private Rates of Return to Education in Jamaica

2002-2003 (%)*

Year	Rate of Return to Primary and Secondary	Rate of Return to Tertiary**
2002	14.6	18.3
2003	14.8	26.5
2004	8.4	37.0
2005	11.3	34.2
2006	10.1	31.5
2007	11.0	33.7
2008	11.2	45.5

Note: *calculated from the Labour Force Surveys 2002-8

** assuming an average of 3 years of education at this level (degree and diploma)

The available rate of return studies for Jamaica indicate that while there is some evidence of signaling (where the private rates exceed the social rates), there is generally an under-investment in education and training especially at the post-secondary level. This situation may be due to the low educational attainment of the workforce as discussed in the previous section. The challenges for Jamaica are improving the quality of the school system and increasing investment in tertiary education and technical/vocational education and training.

5 Institutional and Policy Aspects of Human Capital Formation

The previous sections have indicated the following:

- (i). the existence of a skills mismatch can have an adverse effect on realized labour productivity, but there is no evidence of such an effect in Jamaica;
- (ii). Jamaica has a major deficit in terms of the quality of its human capital base, with over 70 percent of the workforce being uncertified or untrained;
- (iii). the existence of an under-investment in education and training in Jamaica, especially at the post-secondary level.

These human capital problems have long been recognized in Jamaica. Over the years several institutional and policy measures have been implemented to overcome these

problems. In a report of a task force established to examine educational reform in Jamaica (2004), it was observed that although there have been achievements in the school system; there were poor performances which had implications for those entering the labour market. Poor performances were observed in:

- (i). the proportion of children entering the school system at the primary level (i.e., early childhood education)
- (ii). the literacy rate at Grade 4 (9 to 10 years of age)
- (iii). the Achievement test at Grade 6 (11-12 years of age)
- (iv). the CXC examinations especially English Language and Mathematics.

The Government of Jamaica has sought to address both the long and short term issues associated with the quality of the human capital base by strengthening the early childhood, technical/vocational training and tertiary level education systems. Early childhood education is provided in a range of institutions: “day-care centres, community-run basic schools, government infants schools and infant departments in primary and all-age schools and kindergarten departments of privately-owned preparatory schools” [UNESCO, 2006]. The majority of the young children are enrolled in basic schools. The early childhood education program started in the 1970s. In recent years, the Government, recognizing the importance of early childhood education to the long-term development of the country and the unequal quality of early childhood education system, established an Early Childhood Commission in 2003 to enhance the performance of students and boost the quality of the vast network of institutions. Enrolment rates have been over 90 percent. Indeed, the gross enrolment rate at the pre-school level (3-5 years of age) is estimated to have increased from 81 percent in 1995 to 92.5 percent in 2005.

The Government has sought to have at least one college-trained teacher in every recognized basic school and to ensure that persons working in the day care centres have technical and vocational education and training certification. An Early Childhood Fund provides resources for school equipment, materials, training, curriculum development and plant improvement. The early childhood education thrust, which has been designed to provide essential foundation skills to children between the ages of 3 and 5 years, has

received financial assistance from international and regional financial agencies such as the Inter-American Development Bank and the Caribbean Development Bank.

Although there has been an effort to improve the quality of early childhood education as a foundation for the other levels of education, the enrolment levels in infant and basic schools along with the infants departments of primary schools have declined in recent years [see Table 10]. The Jamaican Survey of Living Conditions also indicates a fall in enrolment in private preparatory schools, from 22,504 in 2004 to 14,779 in 2007. This fall in the number of students enrolled may be partly due to the decline in the crude birth rate which fell from 25.1 in 1991 to 16.7 in 2008.

The primary level education system provides the feeder into the secondary level, so that the quality of the primary level education is critical to performance at the secondary level, especially in relation to numeracy and literacy. As indicated previously, Jamaica enjoys universal primary level education with gross and net enrolment rates at approximately 100 percent.

Table 10: Enrolment in Early Childhood Education (Infant Schools and Departments)

Year	Number
1995/6	134 458
1996/7	131 245
1997/8	140 186
1998/9	139 961
1999/2000	135 918
2000/1	134 792
2001/2	141 227
2002/3	132 655
2003/4	123 531
2004/5	134 758
2005/6	131 395
2006/7	113 172
2007/8	111 050

Source: PIOJ: Economic and Social Surveys

Jamaica dispensed with the Common Entrance Examination process and adopted a National Assessment-based program in 1999 in moving students from the primary to secondary level. The National Assessment program consists of 4 elements:

1. Grade 1: Readiness Inventory (Replaced by an Individual Learning Profile in 2008)
2. Grade 3: Diagnostic Test
3. Grade 4: Literacy Test
4. Grade 6: Achievement Test (GSAT)

A General Achievement in Numeracy (GAIN) test was introduced in 2008. This continuous assessment program was designed to examine the skills and abilities of students as they pass through the primary level of education and to reduce the need to rely on one examination at the end of the primary level to determine entry into the secondary level (as happened under the previous system)

.

Whilst girls have generally out-performed boys in the sequence of tests, especially in the GSAT, the mean percentage scores were generally low. For example, over the period 2003 to 2008, the mean percentage scores for Mathematics and Language Arts were generally below those for Social Studies, Science and Communications Tasks [see Table 11]. These results are reflected in the pass rates in exit examinations at the secondary level. The results, though suggesting some slight improvement over the years, point to serious deficiencies, which spill over into the secondary school system.

The quality of the output of the secondary school level is critical to the quality of labour supplied to the labour market in both the short and long run. As indicated earlier, the numeracy and literacy skills of secondary school-leavers, as evidenced by passes at the CXC level Mathematics and English Language have not been outstanding. This is partly reflected in the input coming from the primary level system. With gross and net enrolment rates averaging in the mid-80 percent over the past decade, a significant percent of the workforce have low or no certification at the secondary level and in several cases, only primary level education which is deficient.

Table 11:GSAT: Mean Scores, 2003-2008

Subject	2003	2004	2005	2006	2007	2008
Mathematics	47.7	44.2	57.8	53.0	46.0	55.0
Language Arts	52.0	48.0	53.9	54.0	48.0	53.0
Social Studies	54.2	50.2	56.9	51.0	51.0	56.0
Science	47.6	46.1	51.6	55.0	52.0	58.3
Communication Tasks ¹	66.7	53.3	40.0	50.0	66.0	

Note: ¹Based on a rating of 12

Source: PIOJ: *ESSJ*, various issues

Jamaica has a mix of secondary level schools: traditional, technical, vocational/agricultural and all-age (grades 7 to 10) and junior high (grades 7 to 11). There are public and private secondary schools with public schools accounting for a significant majority of the enrolment.

The technical and vocational schools accounted for approximately 8 percent of total enrolment, while traditional secondary schools accounted for 75 percent in 2008. The establishment of technical and vocational high schools was part of the vocationalisation process in the school system. As noted before, passes at the CXC level in Mathematics and English Language have been well below the traditional secondary schools. For example, the pass rate in English Language over the 2006-8 period averaged 74 percent in traditional secondary schools, while it was 34 percent in the technical schools. In Mathematics, the corresponding rates were 53 percent and 24 percent, respectively.

Interestingly, the pass rates were consistently high for such subjects as: Religious Education (78%), Agricultural Science (89%), Building Technology (79%), Clothing and Textiles (80%), Food and Nutrition (85%), Home Management (86%), Physical Education (92%), Theatre Arts (78%) and Office Procedures (84%). These rates suggest a high preference for technical and vocational subjects at the high school level, which is probably in keeping with the entry level needs of the labour market. The Government had introduced a Reform of Secondary Education (ROSE) project in 1993 to improve the

provision of secondary level education initially at the lower grades and then at the upper grades. Part of the ROSE project was the reform of the curricula to include technical and vocational subjects [see Morris, 1995]. The project also contained provisions for improved teacher training, upgrading of the school plant, enhancing the quality of education and ensuring equity in access and strengthening the administration of the school system.

While there has been significant improvement over the years, there are still challenges associated with the output of the school system and its interface with the labour market. These challenges relate to absenteeism from school (associated with poverty), the performance of students (especially boys), the provision of universal access and meeting the entry-level skill needs of the labour market.

Attempts have been made to study and resolve the ‘mismatch problem’ associated with the transition from school to work. Kerr et al (2006) found that 26 percent of the youth (15-24 years of age) had gained work experience as part of their education and training while 78 percent planned to further their education in the future. Approximately 60 percent of the out-of-school youth (mainly males) had no passes in formal examinations. The main obstacles to finding a suitable job were unsuitable general education and training opportunities, lack of certification and unsuitable vocational education. Regression analysis undertaken by Kerr et al (2006) pointed to the importance of certification and work experience in determining the employability of the youth. Sives et al (2005) found that the emigration of experienced and trained teachers had a significant adverse effect on the provision of educational services in Jamaica.

Probably the most significant arrangement to satisfy the skill needs of the Jamaican labour market is the establishment of the Human Employment and Resource Training (HEART) Trust and the National Training Agency (NTA) to provide technical and vocational training. The HEART Trust/NTA caters to post-secondary students who need training in technical and vocational subjects. The entry level is very low, so that school leavers can get a second chance at improving their human capital. The agency is funded

through a 3 percent payroll levy on all employers (except ‘small’ employers) and the Government. Private donations also assist with the financing of operations. HEART Trust/NTA consists of 28 training institutions and over 100 community-based training programs. Work-based training is provided through traineeships, traditional apprenticeships and workforce development (WFD) programs within enterprises. Firms that accept trainees for on-the-job training receive a tax exemption [see Cowell and Gregory, 2001; McArdle, 2008].

Training takes place in a variety of subject areas: agriculture, construction, mechanics, information technology, hospitality, and cosmetology, inter alia. A National Qualification Framework (NQF) is used to certify students. The NQF is standards-driven and competency-based. There are five (5) levels of training competency and the HEART Trust/NTA focuses mainly on levels 1 to 3: directly supervised worker (gardener, waiter, housekeeper), supervised skilled worker (tiler, receptionist, bartender) and skilled independent or autonomous worker (mason, plumber, electrician). The programs require all graduates to be IT literate. Indeed, the HEART Trust/NTA Vision Statement points to ***“A Jamaican workforce, trained and certified to international standards, stimulating employment-creating investments, contributing to the improved productivity, competitiveness and prosperity of individuals, enterprises and the nation”***.

McArdle (2008) has argued that the HEART Trust/NTA has contributed significantly to the human capital formation process and as a result to improved productivity in Jamaica. It is estimated that between 1982 and 2008, approximately 380,000 persons were trained by the agency. Focusing on competencies and enterprise-based training have better matched workers in the labour market. Hutton (2009) has however argued that although there is vocational/technical programming in the school system and the HEART Trust/NTA has made a significant contribution to the training of the workforce, there is still a formidable skills gap in Jamaica, especially given the technologically driven age. Furthermore, the emigration of skilled persons means that the training system is continuously being forced to catch up to replace lost workers.

Jamaica has also emphasized life-long learning as part of the process of human capital development. The Jamaica Foundation for Life-long Learning (JFLLL) was established in 2006 as a transformation of the Jamaican Movement for Advancement of Literacy (JAMAL) to bridge the gap between the school system and the educational and training facilities, which were established to make persons more productive. As an offspring of a national literacy program, JFLLL caters largely to persons who did not complete secondary level education by designing a High School Equivalency Program (HISEP). This program has been developed to reduce the gap between educational attainment and employment skill requirements.

In addition to the above programs aimed at skill formation, Jamaica also has a conditional transfer (social protection) program called the Program for Advancement of Health and Education (PATH). This program provides a cash transfer to vulnerable groups (children, elderly, disabled mothers) and seeks to improve the health and educational levels of the poor. Studies of poverty in Jamaica point to a lack of human capital as a major causal factor. The PATH has been designed to reduce child labour and to boost school attendance by requiring the children in beneficiary households to attend school regularly and obtain medical check-ups. The PATH arrangement is being strengthened as part of a welfare-to-work program. A Step-to-Work program provides counseling and referral services to adults in households receiving conditional cash transfers through the PATH and also seeks to encourage participants to take up existing employment-related services.

The higher order skill needs of the labour market are met through the tertiary level system (university and colleges). As indicated in Table 5, the output of technical, managerial and professional persons almost tripled over the period 1995 to 2008 period. Tertiary level education and training is provided by a number of public and private institutions including the University of the West Indies (UWI), Mona Campus, the University of Technology, a number of teacher training institutions, the Vocational Training Development Institute (a HEART Trust/NTA tertiary level institution catering to level 4 and 5 competencies), health institutions, the Caribbean Maritime Institute, the

Northern Caribbean University, the University College of the Caribbean and branches of several overseas universities. Jamaica has signed on to the World Trade Organisation, General Agreement on the Trade in Services (GATS) which allows educational institutions to compete in the provision of services. The UWI (Mona Campus) is by far the major supplier of higher order skills in the country. The Government provides the bulk of the financing of public tertiary level institutions, with students contributing via the payment of selected fees. A student loan system exists which allows qualified students to access to funds to finance their education.

Recent tracer studies have been undertaken of graduates from the UWI (Mona Campus), the University of Technology (UTech) and HEART Trust/NTA [see PIOJ, 2010]. In the case of the graduates from UWI (Mona Campus), for the year 2007/8, 90 percent of the respondents were employed within the first year of graduation mainly in the areas of education, health, finance and banking. Forty-nine (49) percent of the respondents indicated that their first degree was the minimum requirement for the job especially in the private sector. Fifty-one (51) percent indicated that their field of study was related to their job. Several respondents (56 percent) indicated that they planned to engage in graduate studies in fields other than the subject of their first degree. Some areas include human resource management, business management, marketing, law and education. The majority of the respondents was in the 19 to 24 years of age cohort and was generally satisfied with the skills and competencies provided by the UWI (critical thinking, ability to work independently). The basic results suggest that while there might be some degree of over-education (over-qualification) for entry-level jobs, some degree of labour market assimilation takes place over time.

Responding graduates from the UTech for the years 2004/5 were quickly absorbed into the labour market since they were regarded as technically competent and “job ready”. Ninety-eight percent of the respondents were employed by 2008, with 83 percent employed within the first six months of graduation. UTech students generally benefited from work-related knowledge and experience in their programs, which make them readily suitable to the labour market with a lower learning curve. It is estimated that the “real

return to investment in the first three years post-graduation is 37.0 percent” [PIOJ, 2010, p. 16]. Approximately 80 percent of the responding graduates were in knowledge-intensive, problem-solving work which requires ongoing training in new technological developments. Both UWI and UTech graduates received a grade of 7.5 out of 10 for their work-related knowledge from the responding employers.

The graduates of the HEART Trust/NTA programs also received a favourable rating in the labour market. Although tracer studies of graduates from their training programs have been ongoing since 2005, the most recent study (2008/9) of the 2006/7 cohort indicated that 93 percent were employed in the labour market, especially in agriculture, construction, hospitality and ICT. Persons trained at the higher levels (3 and 4) were more likely to be employed than those at lower levels (1 and 2).

In all three cases, the percentage of graduates who were self-employed was small, between 3 and 9 percent. In effect, graduates from these institutions obtained their education and training and then opted for salaried employment. The degree of entrepreneurial activity was low among the responding graduates.

An attempt has been made to obtain the pressing training and skills needs for the Jamaican labour market which can be provided by the tertiary sector. Peters and Whittington (2009) report that in focus group exercises held for students, employers and tertiary level institutions, the main jobs/skills which are regarded as the drivers of national development were ICT, hospitality and technical (especially health). The stakeholders indicated that there was a need to promote training in ICT, entrepreneurship and social skills.

In summary, the Jamaican authorities have introduced a number of policy and institutional measures to address the severe skills gap facing the country. The existence of a large group of uncertified and untrained workers needed measures which start at the primary level and going up to the tertiary/post-secondary level. There have been some improvement, but there is need for more work at all levels of the education and training

system so that realized labour productivity can be increased. In addition to the improvement in education and training system, the nature of the social relations needs to be changed as Carter (1997) pointed out that the degree of distrust between workers and employers in Jamaican enterprises is a barrier to the increase in labour productivity in Jamaican enterprises. Both human resource management and social relations policies would be needed to overcome the degree of distrust.

6 Conclusion

It is generally recognized that the quantity and quality of the human capital of a country are vital to long-term productivity growth. Where there are deficiencies in the human capital base, productivity growth can be stymied. Some attention has been paid to the issue of a 'skills mismatch' and its effect on labour productivity in the literature. It has been argued that the inability to obtain the necessary skills can lower both the level and growth of productivity. There is some empirical evidence to indicate that the existence of skills gaps or imbalances has adversely affected labour productivity.

This study of the Jamaican case points to the poor quality of the human capital base which results in a lower productivity level than expected. There is a high percentage of the workforce that is uncertified and untrained. The degree of 'skills mismatch' at the higher levels is not significant as unemployment levels are relatively low. Furthermore, Jamaica has faced an emigration of skilled labour over the years. Estimates of the return to investment in education and training suggest an under-investment at the post-secondary level. The government has sought over the years to expand the supply of certified and trained persons, but the extent of the skills gap still remains formidable. The establishment of a *National Productivity Centre* in 2003 was expected to raise public awareness and education about the need to raise productivity in Jamaica. While such an initiative is welcomed and deserved, there is need to resolve the endemic issues of a poor quality human capital base (from the early childhood stage) and the degree of distrust in order to raise productivity in Jamaica.

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APPENDIX 1: RATE OR RETURN TO EDUCATION REGRESSIONS FOR JAMAICA 2002-2008

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2002	2003	2004	2005	2006	2007	2008
VARIABLES	LYWAGE2	LYWAGE2	LYWAGE2	LYWAGE2	LYWAGE2	LYWAGE2	LYWAGE2
MALE	0.222*** -0.0305	0.199*** -0.0363	0.207*** -0.0227	0.215*** -0.0245	0.206*** -0.0206	0.228*** -0.0249	0.279*** -0.0297
EDUC10	0.550*** -0.101	0.796*** -0.132	1.111*** -0.0462	1.025*** -0.0525	0.945*** -0.0358	1.012*** -0.038	1.366*** -0.0472
EDYRS	0.146*** -0.00912	0.148*** -0.011	0.0836*** -0.00793	0.113*** -0.00869	0.101*** -0.00922	0.110*** -0.0108	0.112*** -0.0113
EXP	0.0303*** -0.00415	0.0262*** -0.00465	0.0209*** -0.00324	0.0201*** -0.00328	0.0193*** -0.00292	0.0161*** -0.00356	0.0216*** -0.00387
EXP2	-0.000306*** -8.75E-05	-0.000263*** -9.57E-05	-0.000261*** -7.07E-05	-0.000248*** -7.13E-05	-0.000260*** -6.59E-05	-0.000166** -8.38E-05	-0.000250*** -8.85E-05
HOURS	0.0119*** -0.00224	0.0118*** -0.00349	0.0123*** -0.00139	0.00983*** -0.0013	0.0101*** -0.00125	0.0109*** -0.00158	0.00715*** -0.00146
Constant	9.680*** -0.14	9.758*** -0.195	10.47*** -0.103	10.35*** -0.115	10.60*** -0.112	10.56*** -0.136	10.19*** -0.138
Observations	2,984	2,640	3,504	3,056	3,382	2,982	3,577
R-squared	0.194	0.158	0.276	0.296	0.306	0.293	0.315

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

1) LYWAGE=ln(YWAGE) where YWAGE is the average gross annual income from employment, calculated as (income from employment)*(pay period).

2) MALE= dummy equal to 1 if male, 0 otherwise

3) EDUC10= dummy equal to 1 if the highest (academic) examination passed was a Degree (defined as degree or diploma from a recognized tertiary institution in the LFS).

4) EDYRS= the sum of primary and secondary years of education. [6 years of primary education were assumed in the case the value was missing and the individual had positive years of secondary education.]

5) EXP = years of experience measured as age minus EDYRS minus 6 if no tertiary degree; and age minus EDYRS minus 6 minus 4 if tertiary degree. i.e. tertiary degrees were assumed to take 4 years

6) EXP2=EXP squared

7) HOURS is the number of hours worked