

ENHANCING PRODUCTIVITY AND GROWTH IN THE CARIBBEAN

WORKING PAPER



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Working Paper

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ABBREVIATIONS & ACRONYMS

ADB	Agricultural Development Bank
ARC	Atlantic Rally for Cruisers
BAH	The Bahamas
BAR	Barbados
BEL	Belize
BMC	Borrowing Member Country
CAD	Computer aided design
CANRWP	Caribbean Network of Rural Women Producers
CANTA	Caribbean Association of National Training Agencies
CARDI	Caribbean Agricultural Research & Development Institute
CARICOM	Caribbean Community
CARIRI	Caribbean Industrial Research Institute
CCP	Compete Caribbean Program
CDB	Caribbean Development Bank
CLA	Cannabis Licensing Authority (Jamaica)
CPTC	Creative Production Training Centre
CSME	Caribbean Single Market and Economy
DFID	Department for International Development
ECCU	Eastern Caribbean Currency Union
EU	European Union
FBIDC	Food and Beverage Industry Development Committee
FDI	Foreign Direct Investment
FRED	Federal Reserve Economic Data
GDP	Gross Domestic Product

GGB	Guyana Gold Board
GGMC	Guyana Geology and Mines Commission
GI	Geographical Indication
GII	Global Innovation Index
GUY	Guyana
HDI	Human Development Index
HR	Human Resources
HRD	Human Resources Development
ICT	Information and Communications Technology
IDB	Inter-American Development Bank
IDC	Industrial Development Corporation
IGY	International Global Yachting
IICA	Inter-American Institute for Cooperation on Agriculture
IMF	International Monetary Fund
JAM	Jamaica
JARIA	the Jamaican Reggae Industry Association
JCCP	Jamaica Cluster Competitiveness Project
JEA	Jamaica Exporters Association
LAC	Latin America and the Caribbean
LACES	Latin America and Caribbean Enterprise Survey
MCI	Microcredit Institution
MNCs	Multinational Corporations
MPEA	Motion Picture Encouragement Act
MSME	Micro, Small and Medium Enterprise
NAMDEVCO	National Agricultural Marketing and Development Company
NEDCO	National Entrepreneurship Development Company Limited
NIS	National Innovation System
NTA	National Training Agency
OAS	Organisation of American States
OECD	Organisation for Economic Cooperation and Development

OECS	Organisation of Eastern Caribbean States
PROTEqIN	Productivity, Technology and Innovation
R&D	Research and Development
R&I	Research and Innovation
RD&I	Research, Development and Innovation
SLASPA	Saint Lucia Air and Sea Ports Authority
SME	Small and Medium-sized Enterprise
SWOT	Strengths, Weaknesses, Opportunities and Threats
TFP	Total Factor Productivity
TKI	Technology and Knowledge Intensiveness
TNT	Trinidad and Tobago
TTABA	Trinidad and Tobago Agribusiness Association
TTMA	Trinidad and Tobago Manufacturing Association
UK	United Kingdom
UNDP	United Nations Development Programme
USA	United States of America
USAID	United States Agency for International Development
UTECH	Jamaica University of Technology
UTT	University of Trinidad and Tobago
UWI	University of the West Indies
WEF	World Economic Forum



FOREWORD

In the past four to five decades, various studies have drawn increasing attention to the low and uneven economic growth performance of Caribbean economies vis-à-vis other small island developing states. These studies have identified declining competitiveness linked to, *inter alia*, low growth in factor inputs; weak public sector institutions; poor governance arrangements; and limited improvements in technology, innovation and know-how as major impediments to economic growth in our Region.

The Study advances the discussion by setting out a core set of productivity enhancement strategies which can propel economic growth onto a higher and more sustainable path, and improve the lives of ordinary Caribbean people over the medium to long term.

The proposals set out in the Study are intended to provide a practical set of policy measures to advance the growth agenda.

It is my hope that Caribbean policymakers; the private sector; and other stakeholders will embrace these recommendations and be inspired to develop credible action programmes for immediate implementation.

Wm Warren Smith, Ph.D., C.D.

President

Caribbean Development Bank

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It is our hope that policymakers and other stakeholders will find this study a very useful guide in efforts to enhance regional productivity and growth performance throughout the Caribbean.

Dr. Justin Ram
Director, Economics Department
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EXECUTIVE SUMMARY

The countries in the Caribbean Region have experienced a significant improvement in their socio-economic development over the past three decades as measured by the UNDP's Human Development Index (HDI). Yet there are still economic challenges facing the Region – declining economic growth rates; high levels of unemployment; pockets of poverty; high level of public debt; and some degree of macroeconomic instability. The main challenge for regional planners and policy makers is trying to increase productivity and growth within the Region as the countries move to the innovation stage of development in the context of building a “knowledge economy”. The available research on productivity and growth in the Region points to the important role of capital investment, international trade in goods and services and to some extent human capital investment in the process. It has been argued that economic growth has stagnated in the Region with countries caught in a “middle income trap”. In effect, the Region has to identify new strategies for breaking out of the trap and moving to a higher income level associated with a “knowledge economy” and the “innovation stage of development”.

The main **objectives** of this study are to identify a set of initiatives which can strengthen the region's growth performance over the medium to long term and to assist the CDB and its Borrowing Member Countries (BMCs) in formulating productivity and growth initiatives as part of national and regional macroeconomic and development plans.

The study focuses on **four (4) main elements** in the productivity and growth process: foreign direct investment; information and communications technology especially in the context of micro, small and medium sized enterprises (MSMEs); research and development and innovation particularly at the enterprise level; and the adoption of industrial clustering to promote innovation and productivity. These elements constitute important components of a “knowledge economy” and underlie the productivity and growth process. The basic analytical framework of the study is the Schumpeterian model of growth and development within the context of an open economy. Such a framework incorporates the role of research and development and innovation in productivity and growth and also takes into consideration both macroeconomic and enterprise elements.



The study makes the following **observations**:

- While foreign direct investment (FDI) is important to the region, it has been declining over the past decade. Furthermore, the income loss associated with FDI has been significant and the technological spill-overs have not been great;
- FDI and also domestic investment have been constrained by the high costs (lack of ease) of doing business in the Region as shown by World Bank and World Economic Forum (WEF) indicators and the application of “growth diagnostics”;
- Some countries in the Region have been seeking to encourage foreign investment through special programmes such as “Citizenship by Investment”;
- While there has been the widespread use of the tools of information and communications technology (ICT) in the region, there is a digital divide with some countries with high levels of ICT penetration and others with low levels;
- ICT has been used mainly for basic consumption purposes and less for production and electronic commerce purposes;
- Relatively high charges have constrained the access and affordability of ICT services;
- In the case of MSMEs, there has been a relatively low usage of ICT due to cost and affordability, unreliability of services, lack of training, lack of access to finance and low levels of trust;
- In the case of R&D, there is limited formal R&D taking place in enterprises;
- R&D and innovation activities are rather ad hoc within enterprises and reflect the lack of incentives and finance for R&D;
- Public R&D has also taken place in a piecemeal fashion and has not been very effective. This situation reflects the lack of an effective innovation system within the countries of the region;
- While industrial clustering is an important vehicle to promote R&D and innovation, cluster development in the Region has not been comprehensive;
- Based on analysis of yachting in Saint Lucia, music in Jamaica, gold in Guyana and peppers in Trinidad & Tobago, indications are that cluster development in the Region has been affected by the lack of leadership, government support and strategic collaboration.

Given the importance of the four (4) elements discussed in this study to the future path of productivity and growth in the Caribbean Region and the current weaknesses and constraints affecting the elements, several recommendations have been made to strengthen the policy, institutional and regulatory frameworks.

Some of these **recommendations** include:

A regional strategic plan for improving the ease of doing business in the Region (some countries have established national plans already);

The provision of incentives and financial support to boost R&D and innovation and cluster development and access to ICT, while at the same time reducing regional competition in such areas;

Strengthening the human capital base of the Region by developing a strategic HRD which can be implemented in collaboration with regional and national educational and training institutions;

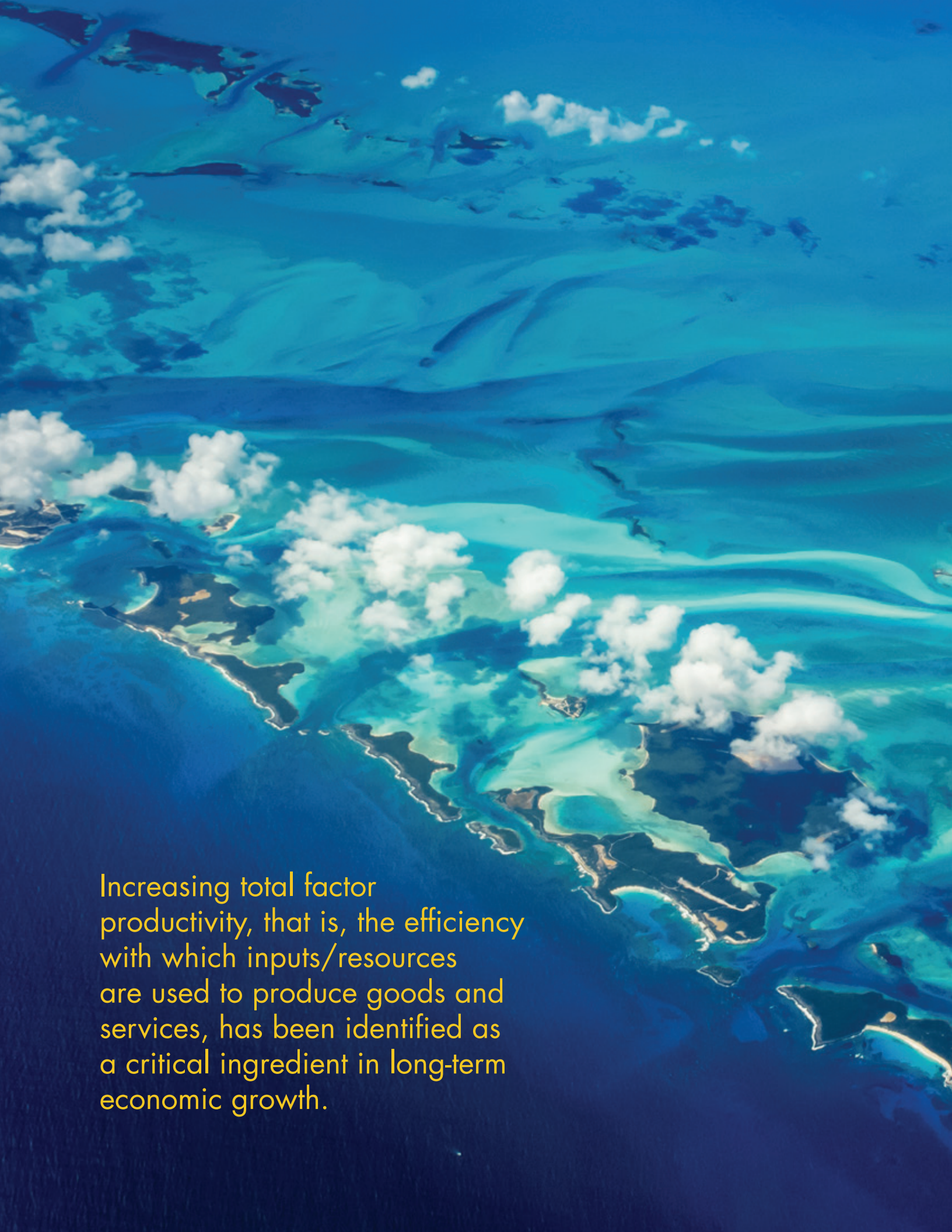
Engagement with the Caribbean Diaspora as source of skills and finance;

Reduction in the cost of ICT services in the Region to enable access and affordability by MSMEs;

Strengthening the regulatory framework governing R&D, intellectual property, tax incentives, access to finance and cluster development;

Extension of the range of institutions involved in innovation and productivity in the region. At present there are only four institutions directly promoting R&D in the region: Barbados, Jamaica, Saint Lucia and Trinidad & Tobago.

Incorporation of elements of this study in national and regional (CARICOM and OECS) strategic plans. Some countries have developed explicit growth strategies (e.g. Barbados, Jamaica and Trinidad & Tobago) and the OECS has a Growth and Development Strategy. These plans need to develop explicit initiatives for the four elements discussed in this study.



Increasing total factor productivity, that is, the efficiency with which inputs/resources are used to produce goods and services, has been identified as a critical ingredient in long-term economic growth.

1. INTRODUCTION

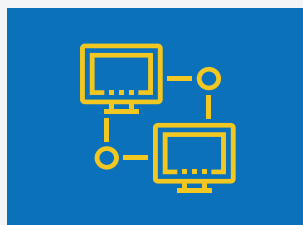
In a previous report on **Growth and Development Strategies for the Caribbean** published by the Caribbean Development Bank (2010), it was noted that the slowdown in economic growth over the past five decades required a detailed systematic study to identify underlying causes and to design appropriate strategies for accelerating the growth process. Since economic growth refers to the continuous increase in the production of goods and services, it is important for improving livelihoods, reducing poverty, creating employment opportunities, enhancing business profitability and boosting government revenue (Bourne, 2010). In short, economic growth is a *sine qua non* for improved social and economic development in a country or region. The growth process can involve the production of more existing goods and services and /or the production of new goods and services with the resources available to the country/region. Invariably, the economic growth process is tied up with the underlying productivity of the resources used in the production process. Indeed, increasing total factor productivity, that is, the efficiency with which inputs/resources are used to produce goods and services, has been identified as a critical ingredient in the long-term economic growth. There is also a need to operate on the production possibility frontier of the country so that resources are fully used.

This study examines new strategies for enhancing productivity and economic growth in the Caribbean by focusing on new areas that have not been fully explored in the Region to date. With the Region facing significant economic challenges associated with high levels of un- and under-employment and poverty, high fiscal deficits, high public debt, reliance on slow growing economic sectors, high levels of volatility, various economic and environmental threats, and the strain of maintaining adequate level of foreign reserves, there is an urgency to find new ways of propelling the economic growth process in the region. The study explores ways of enhancing productivity and economic growth by focusing on foreign direct investment (FDI), information and communications technology (ICT), research and development (R&D), innovation and technological adoption and adaptation and “industrial” clustering. It has been recognised that these elements are important ingredients in the development of a “knowledge economy” within the Caribbean Region. A “knowledge economy” is one in which the production of goods and services is based on the knowledge-intensive inputs or “intellectual capital” of the labour force. Such knowledge inputs reflect intangibles which are acquired through experience, education, training, “learning by doing” and research and development.

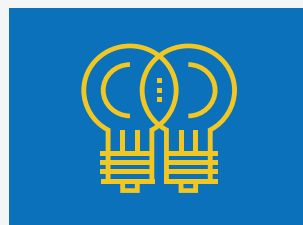
A “knowledge economy” is based on four (4) pillars namely:



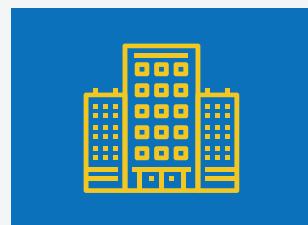
The quality of the education, training and skills of the labour force;



The information and telecommunications infrastructure which helps to facilitate the use of ICT in the production process (e.g. e-applications);



The innovation system of the country (that is, the firms, research centres and other institutions which engage in knowledge creation, dissemination and application);



The overall business and governance framework which provides the incentives and enabling environment for enterprises to operate.

(See World Bank, 2007)

These elements form the basis of current thinking in the economic and productivity growth literature, namely “endogenous economic growth”, following Schumpeter (1934/1983) and Romer (1990), and as outlined by Howitt (2004) and Aghion (2016). This approach views total factor productivity or endogenously determined technological change as the major factor affecting economic growth and also that such technological change is determined by such factors as R&D, innovation and human resources development (HRD). Greater emphasis is placed on the microeconomic aspect of economic growth and productivity as innovation takes place at the enterprise level (OECD, 2007).

The remainder of this introduction discusses the general development characteristics of the Caribbean Region and trends in economic growth and productivity. It also examines the factors—both micro and macro—which influence productivity and economic growth in the Caribbean and other selected small developing countries. It provides a framework for analysing the new strategies for the Region drawing on the Schumpeterian model of endogenous economic growth for an open economy. This framework permits both micro and macro elements to be considered in the growth and productivity process. In many respects, past research on economic growth in the Region has not examined the microeconomic dimension of economic growth and productivity (for a recent examination, see Dohnert et al. 2017). The chapter concludes by summarising the main elements of the subsequent chapters of the study.

1.2 CHARACTERISTICS OF CARIBBEAN ECONOMIES

The Caribbean is characterised by a number of small, open and developing economies. They are small in terms of the size of their domestic markets, open in terms of the critical role of international trade in the production and consumption processes and developing in terms of operations taking place within the production possibilities frontiers of these economies. Although these features may have constrained the growth process in some areas, these economies have been able to reach a relatively high level of social and economic development as measured by the UNDP’s Human Development Index (HDI).

The countries covered in this study, namely, Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Guyana, Jamaica, Grenada, Saint Lucia, St Kitts and Nevis, St Vincent and the Grenadines, and Trinidad and Tobago have achieved a relatively “high” level of human development [see Table 1.1]. The human development index goes beyond economic growth to consider the process of enlarging people’s choices in relation to living long healthy lives (life expectancy at birth), the acquisition of knowledge (years of schooling), and having a decent standard of living (income per capita). Over the 1990 to 2015 period, the HDI of Caribbean countries increased significantly. Prior to the “Great Recession” during the 2008/9 period, Barbados and Bahamas were classified as “very high” human developed countries. With increases in economic and productivity growth these countries can regain their former status.

Table 1.1: Human development index for the Caribbean countries 1990-2015 (Value)

Country	1990	2000	2010	2015	2015 (Rank)
Antigua & Barbuda	..	..	0.782	0.783	62 High
The Bahamas	..	0.778	0.778	0.792	58 High
Barbados	0.714	0.750	0.780	0.795	54 High
Belize	0.648	0.677	0.700	0.706	103 High
Dominica	..	0.695	0.722	0.726	96 High
Grenada	..	..	0.741	0.754	79 High
Guyana	0.541	0.606	0.624	0.638	127 Medium
Jamaica	0.651	0.680	0.722	0.730	94 High
St Kitts & Nevis	..	..	0.741	0.765	74 High
Saint Lucia	..	0.684	0.733	0.735	92 High
St Vincent & Grenadines	..	0.673	0.712	0.722	99 High
Suriname	...	...	0.704	0.725	97 High
Trinidad & Tobago	0.670	0.715	0.774	0.780	65 High

Source: UNDP: Human Development Report 2016, Table 2

The World Economic Forum (WEF) produces a *Global Competitiveness Report* which contains information on the degree of competitiveness and stages of development of selected Caribbean countries. The data indicate that there has been some loss in degree of competitiveness among the Caribbean countries covered in this study [Table 1.2]. There has been some improvement in Jamaica in recent years, but deterioration in Barbados and Trinidad and Tobago. Although a broad definition of country competitiveness is used by the Forum, the deterioration indicated that there is a need to enhance total factor productivity which in turn would improve the competitiveness of the region's economies.

The WEF also identifies three stages of development reached by a country, namely:

STAGE 1	Factor-driven – where the country relies on largely unskilled labour and its factor endowments (mainly its natural resources)
STAGE 2	Efficiency – where the country develops “more efficient production processes and increased product quality”
STAGE 3	Innovation-driven – where the country competes on the “most sophisticated processes” and innovates new ones.

In 2016/7, Jamaica and Guyana were in the efficiency stage, while Trinidad and Tobago was in the innovation stage and Barbados and Suriname were making the transition from the efficiency to the innovation stage. As the Region proceeds to the highest stage of development, innovation and business sophistication will play a critical role in the economic and productivity growth process. The innovation stage is driven by “an ecosystem where businesses, regulations, and social norms promote connectivity, creativity, entrepreneurship, collaboration and the adoption of the latest technologies to generate new ideas and bring new products and business models to market”¹ Such movement would require new strategies to enhance growth and productivity with the associated changes in the institutional, policy and regulatory environments within the context of a “knowledge economy”. As the global economy moves fully into the *Fourth Industrial Revolution* driven by technological breakthroughs in such areas as artificial intelligence, robotics, information technology, nanotechnology, and biotechnology inter alia, the operations in the Region would be affected by the velocity, breadth, depth, and system impact of technological change [Schwab, 2016]. The application of such technological developments is expected to result in significant change in productivity and economic growth within the innovation stage of development.

Table 1.2: Global competitiveness index for selected Caribbean countries 2006/7 to 2016/7 (Rank)

Country	2006-7 (121 countries)	2009-10 (131 countries)	2012-13 (144 countries)	2016-17 (138 countries)	Current stage of development
Barbados	41	44	44	72	Transition from 2 to 3
Jamaica	67	91	97	75	Efficiency
Trinidad & Tobago	76	88	84	94	Innovation
Guyana	113	104	109	n.a.	Efficiency
Suriname	104	102	114	–	Transition from 2 to 3

Source: WEF: *Global Economic Forum Report, various issues*

¹ World Economic Forum, *The Global Competitiveness Report*, (Geneva, Switzerland: 2017), 7.

The Global Competitiveness reports also identify areas which affect the conduct of business in respective countries and hence the constraints on enhancing productivity and economic growth. Over the period 2013 to 2015, the “most problematic factors for doing business” in the Region were:

BARBADOS	Poor work ethic in the national labour force, inefficient government bureaucracy, access to finance and tax rates;
GUYANA	Corruption, tax rates, crime and theft and inefficient government bureaucracy;
JAMAICA	Crime and theft, inefficient government bureaucracy, corruption and tax rates;
TRINIDAD AND TOBAGO	Poor work ethic among the national labour force, corruption, inefficient government bureaucracy, crime and theft and foreign currency regulations.
SURINAME	Inefficient government bureaucracy; corruption; access to finance inadequately educated workforce.

These factors point to the need to change or reform the administrative and social environments within which business is conducted within the region. Recent research undertaken by Compete Caribbean (2016) reinforces the significance of the factors with the cost and access to finance being a very significant factor, followed by high taxes and inadequately educated and skilled labour.

The World Bank’s Doing Business reports also indicate that the Region has significant challenges with respect to undertaking business transactions that contribute to economic growth in the region. The rankings for the Caribbean suggest some degree of deterioration over the 2008 to 2017 period with only Jamaica holding its own [see Table 1.3]. When compared with Singapore, which has been a top performer over the years, the Region has some way to go especially in the areas of registering property, resolving insolvency, getting credit, enforcing contracts, and protecting minority investors. The “distance to frontier score” measures “the distance of each economy to the ‘frontier’, which represents the best performance observed on each of the indicators across all economies in the Doing Business sample since 2005”.

The regional average rankings also indicate the specific constraints to business growth and productivity in the Region [see Table 1.4]. In 2013, the Region ranked poorly in the areas of registering a company, enforcing contracts, resolving insolvency and paying taxes but was relatively good at dealing with construction permits, getting electricity and protecting investors. There is however room for improvement in the areas in which the Region has been relatively good as the constraints which affect businesses adversely affect overall growth and productivity.

Table 1.3: Ranking on the “ease of doing business” in the Caribbean

Country	2008	2017	2017 Distance to Frontier Score
Antigua & Barbuda	41	113	58.04
The Bahamas	n.a	121	56.65
Barbados	n.a	117	57.42
Belize	59	112	58.06
Dominica	77	101	60.27
Grenada	70	138	53.75
Guyana	104	124	56.26
Jamaica	63	67	67.54
St Kitts & Nevis	64	134	53.96
Saint Lucia	34	86	63.13
St Vincent & Grenadines	54	125	56.01
Suriname	142	158	47.28
Trinidad & Tobago	67	96	61.00
Singapore	1	2	84.50

Source: World Bank’s Doing Business website

Table 1.4: Average ranking of doing business indicators for the Caribbean

INDICATOR	Rank in 2013	Rank in 2016	Distance to Frontier 2016
Starting a business	74	87	83.06
Dealing with construction permits	58	97	67.03
Getting electricity	53	74	72.00
Registering a property	139	144	47.47
Getting credit	92	112	39.62
Protecting investors	67	92	50.64
Paying taxes	100	112	68.55
Trading across borders	81	95	69.81
Enforcing contracts	123	90	57.22
Resolving insolvency	106	114	35.14
TOTAL NUMBER OF COUNTRIES	185	189	

Source: World Bank's Doing Business website.

1.3 TRENDS IN GROWTH AND PRODUCTIVITY

Over the period 1960 to 2015, there was a general decline in the average annual growth rate for the region. The average annual growth rate fell from approximately 6% in the 1960s to less than 1% in recent years. After the “golden age” of the 1960s, the Region has been subjected to various shocks which have adversely affected economic growth and productivity: oil price increases in the 1970s; the removal of trade preference in the 1980s; reduction in official development assistance; recessions in main trading partners of the “developed” world; along with hurricanes and other natural disasters. These shocks have resulted in a relatively high degree of volatility in economic growth rates (Carneiro and Odawara, 2016, Chapter 1). After a period of the “Great Moderation” in the global economy -1984 to 2007- when the average growth rates in the Region trended upwards, there was a “Great Recession” from 2007 to 2009 which has severely disrupted the growth process in the Region (Figure 1.1). The general slowdown over the years suggests that the economies of the Region are caught in a “middle income” trap where they are unable to push through to a higher level of income. This issue has been compounded by the macroeconomic challenge associated with fiscal deficits and high debt to GDP ratios.

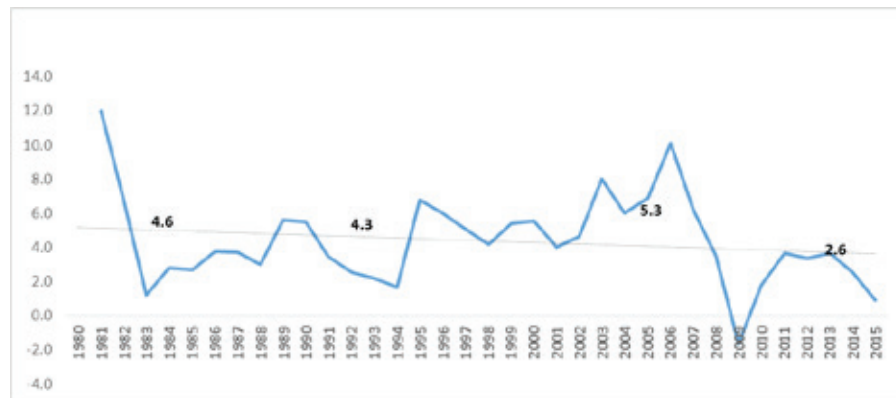
Although there has been a general decline in the rates of economic and productivity growth in the Region over the decades, there have been periods of “growth acceleration” in some countries. Werker (2013) has identified periods in the economic growth experience of the Region when a country recorded sustained growth episodes of more than 6% per annum over an extended period of time (eight years). Jamaica and Guyana are noticeably absent from the list of Caribbean countries (Table 1.5). Werker (2013) and Diao et al. (2017) have identified several factors responsible for such growth episodes: discovery and export of a natural resource; economic reforms; human and physical capital accumulation; and technological adaptation. These factors have resulted in both “structural change” (the reallocation of resources from low to high productivity sectors) and within-sector productivity growth, which in turn propelled aggregate output growth.

Table 1.5: Periods of sustained economic growth in the Caribbean

Country	Periods
Antigua and Barbuda	1978 to 1991
The Bahamas	1963 to 1971, 1978 to 1986
Barbados	1960 to 1972
Belize	1966 to 2006
Dominica	1979 to 1988
Grenada	1981 to 1991
St Kitts and Nevis	1981 to 1993
Saint Lucia	1988 to 1996 (1982-1990)*
St Vincent and the Grenadines	1980 to 1990
Trinidad and Tobago	1973 to 1982, 1995-2009

Notes: Figures are based on cases where a country experiences an eight year backward looking compound annual growth rate in real GDP of more than 6%.
 * indicates where the growth rate was over 10%
 Source: Werker (2013)

Figure 1.1: Average annual real GDP growth rates in the Caribbean 1980-2015



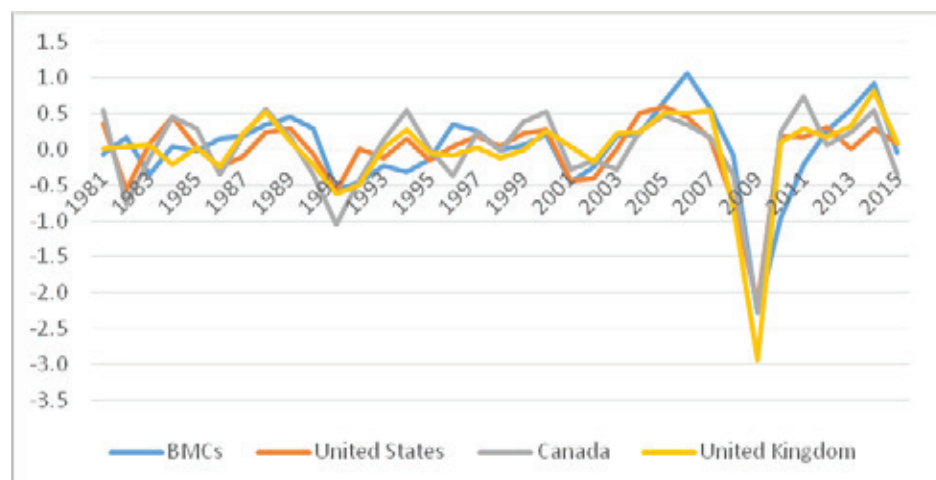
Source: Authors' analysis

The region's economic performance tends to mirror macroeconomic conditions within the United States, Canada, and the United Kingdom. Empirical studies such as Cashin (2004), and Kouame and Reyes (2015) examined the relationship between growth in the Caribbean and advanced economies such as the United States and the European Union, in addition to emerging economies such as Brazil and China given the close proximity and strong trade linkages between these countries. They found growth synchronisation between the borrowing member countries (BMCs) of the CDB and the United States, one of the major trading partners to the region. As illustrated in Figure 1.2 the co-movement between GDP growth in advanced economies and the BMCs was striking.

The correlation matrix presented in Table 1.6 shows strong evidence that the output gap of the ECCU co-moved with either the USA or Canada output gaps. The UK, USA, and Canada also showed evidence of synchronised outputs gaps. Four channels through which spill-overs from the advanced economies are transmitted to the Region are trade, capital and investment inflows (FDI), and remittances.²

² The OECD countries are an important emigrant destination for Caribbean nationals and account for sizeable share of remittance flows into the region; the UK, USA, and Canada account for a significant proportion of stay over tourists and visitor expenditure in the tourist-dependent countries and, Canadian-licensed banks are active in several countries.

Figure 1.2: The Caribbean and the trading partners business cycle



Source: IMF, World Economic Outlook, and authors' calculation.

Table 1.6: Correlation statistics real GDP output gap

	BMCs	Canada	Brazil	China	United Kingdom	United States
BMCs	1					
Canada	0.70	1.00				
Brazil	0.05	0.22	1.00			
China	0.14	0.27	0.22	1.00		
United Kingdom	0.83	0.90	0.06	0.29	1.00	
United States	0.79	0.88	0.03	0.27	0.92	1.00

Source: Authors' calculations

The correlation coefficients between growth in the Caribbean economies and economies such as the UK, USA, and Canada ranged consistently between 0.70–0.83 over the 35 years period. This observation suggests that the region's output growth is consistently dependent on world output, thus reinforcing the view that the Region is more vulnerable to external economic shocks than their comparators. On the other hand, it also means on the upside, that several of the Caribbean economies stand to benefit from growth acceleration in the U.S. and other developed economies.

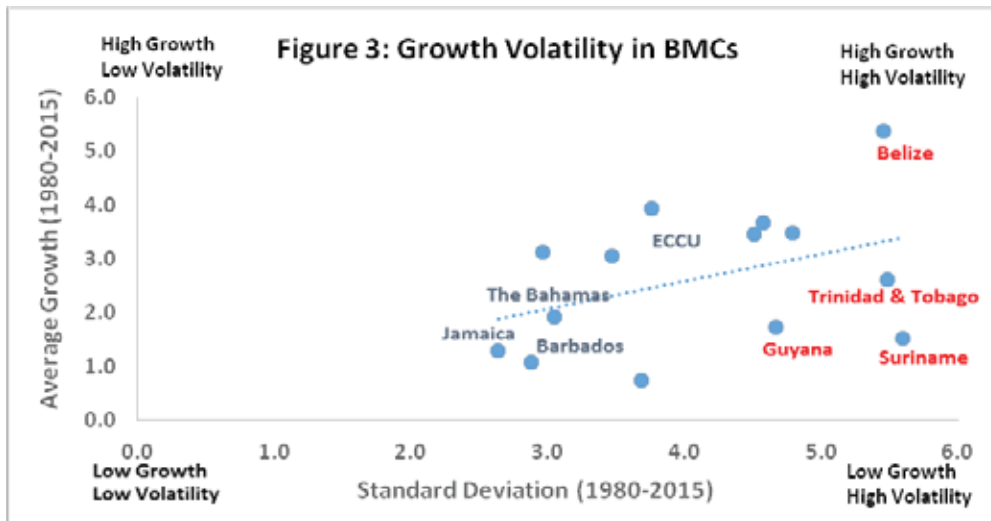
Economic growth volatility has been symptomatic throughout the Caribbean. The region witnessed higher growth volatilities (4.1%) to that of their counterparts in Latin America (2.3%) and emerging markets (1.8%) over the historical period (see Table 1.7). The outcome is corroborated by the countries' small size, high degree of openness, proneness to natural hazards and dependence on commodity exports and tourism services from a limited range of countries.

Table 1.7: GDP growth and volatility (%) 1980-2015

	No of countries	Average growth	Average std. dev
Emerging market and developing economies	152	4.6	1.8
Latin America and the Caribbean	32	2.8	2.3
Caribbean (BMCs of the CDB)	14	2.6	4.1
United States		2.6	1.9
Canada		2.4	2.0

Source: IMF, World Economic Outlook, and authors' calculation.

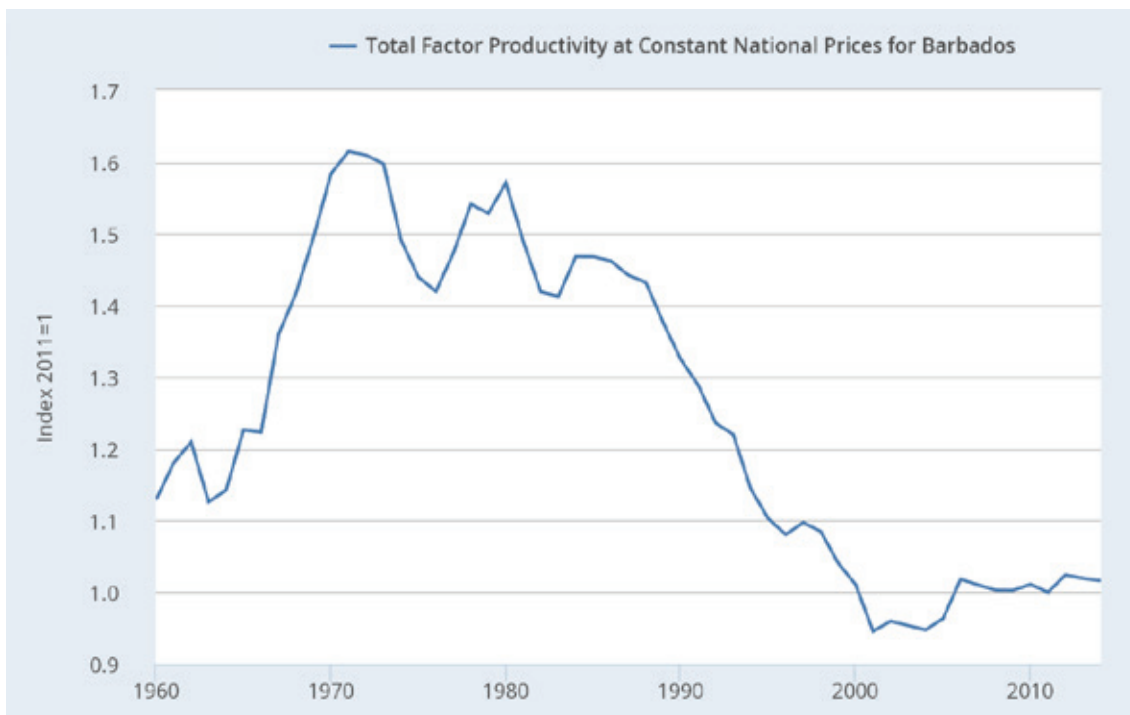
At the country level, the commodity exporting countries of Suriname, Trinidad and Tobago and Belize exhibited the highest levels of volatility, whereas the tourism intensive countries (particularly members of the Eastern Caribbean Currency Union) such as Antigua and Barbuda, Grenada, and Saint Lucia faced moderate volatility (Figure 1.3). These countries were the ones less diversified with heavy reliance on commodity exports and tourism as their major growth drivers. On the other hand, the countries with the least volatility in the Region were those with more diversified economic sectors and contributions from agriculture and industry to GDP growth.



Source: IMF, World Economic Outlook, and authors' calculation.

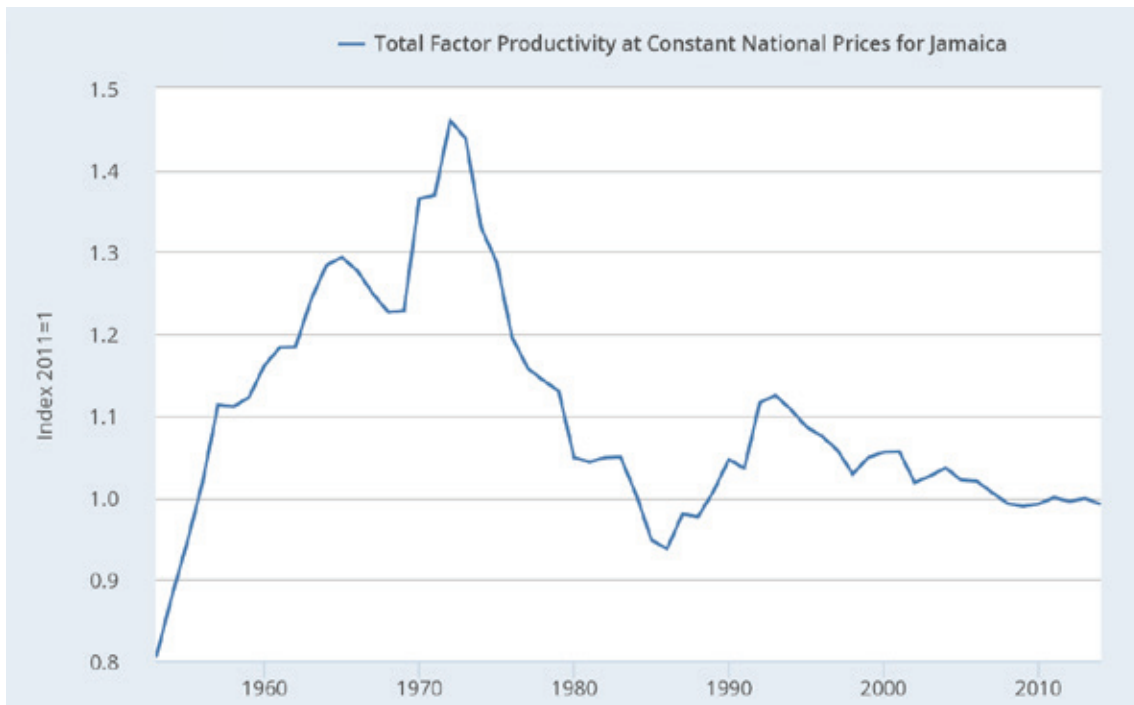
The total productivity trends have mirrored the economic growth trends in the region. Data for total factor productivity for Barbados over the 1960 to 2015 period indicate that while there was an increase between 1960 and 1972, there has been a decline since the 1970s (Figure 1.4a). In the case of Jamaica, total factor productivity rose up to 1972 and then became volatile since the 1970s with a declining trend since 1993 (Figure 1.4b). Trinidad and Tobago has displayed a cyclical pattern since the 1950s. It has exhibited an upwards trend since 1993 (Figure 1.4c).

Figure 1.4a: Total factor productivity for Barbados 1960-2014



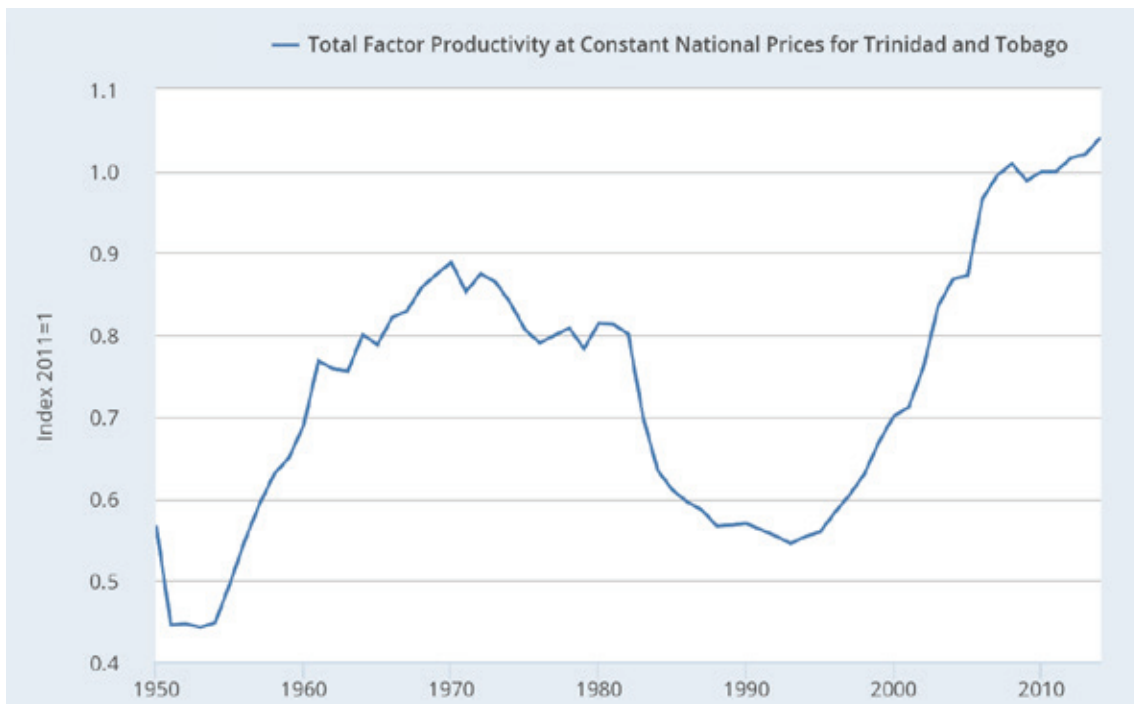
Source: University of Groningen, University of California, Davis

Figure 1.4b: Total factor productivity for Jamaica 1953-2014



Source: University of Groningen, University of California, Davis

Figure 1.4c: Total factor productivity for Trinidad & Tobago 1955-2014



Source: University of Groningen, University of California, Davis

1.4 DETERMINANTS OF ECONOMIC GROWTH AND PRODUCTIVITY

1.4.1 GENERAL FACTORS

Over the history of economics there has been an ongoing investigation of the factors which propel the economic growth process of countries. The classical economists such as Smith, Malthus, Mills, and Ricardo identified the rate of capital accumulation as the main factor determining the rate of economic growth, with the rate of capital accumulation (investment) being influenced by the rate of profit earned by investors. Diminishing returns to capital and population growth can however constrain the growth process, while international trade and technological developments were seen as the main elements which can overcome the constraints and prevent the economy from reaching a “stationary state”.

Indeed, Lewis (1955) writing in the classical tradition emphasised the following factors in propelling economic growth in the developing world:



The Harrod-Domar Keynesian type growth model indicates that higher economic growth depends on higher saving (and hence capital accumulation) and the productivity of the stock of capital. One implication of this formulation is that the savings rate can be enhanced via financial development. As Lewis notes, the problem of development is how to raise the savings rate of a country to about 20%. In an open economy formulation of this growth model, foreign borrowing can close the savings-investment gap, while international trade can expand total demand and increase productivity. Indeed Verdoon’s law indicates that long-run (labour) productivity can be increased by the expansion of output driven by exports (i.e. export-led economic growth).

The neoclassical model of economic growth developed by Solow and Swan assumes that the factors of production can be substituted in the production process. While capital accumulation is an important source of growth, the critical source of economic growth is technological change that is exogenously determined. Since the capital stock is subject to decreasing returns, technological changes can forestall such a decline and boost economic growth and productivity in the economy.

The neoclassical model does not indicate the sources of technical change (assumed to be exogenous), thus giving rise to the identification of the sources of such change. Endogenous growth models constitute a new vintage currently discussed in the literature. Romer (1990), Lucas (1988), Grossman and Helpman (1991) and others have identified such factors as learning by doing, human capital formation, ideas and knowledge accumulation, research and development, and innovation as important elements in propelling productivity and output growth.

Based on the theoretical literature, the underlying “causes” of economic growth can be classified into:

- **Proximate causes:** capital (physical/human/research) accumulation and technical change and its determinants; and
- **Fundamental causes:** structures, institutions and policies

Several empirical studies have been undertaken to identify these causes for individual and groups of countries. Some of the main conclusions emerging from the empirical literature on economic growth are provided in Table 1.8.

Table 1.8: Summary factors affecting economic growth

POSITIVE IMPACT	NEGATIVE IMPACT
Human capital formation	Inflation
Openness to trade	Population growth
Institutions-rule of law, social capital, political rights, civil liberties	Institutions – coups, wars, political instability
Investment in plant and equipment	Policy uncertainty
Better developed financial markets	Deterioration in the terms of trade
Innovations	Market distortions (real exchange rate, negative interest rates, labour market rigidities)
Productivity growth	Debt accumulation

Source: Authors' summary

Surveys of the factors which affect productivity also highlight a set of factors which indirectly affect economic growth (Bartelsman and Doms, 2000, Eichler et al 2006, Loko and Diouf 2009, Pages 2010, and Syverson 2010). Syverson distinguishes between “within business” factors and external or environmental factors which affect productivity growth. “Within business” factors include: managerial talent and practice; the quality of labour and capital inputs; information technology and research and development which represent investment in the stock of knowledge; learning by doing; product quality innovations; and the organisational structure of the business’s production units. The “environmental” or external factors include the degree of competition in the market, the flexibility of the input markets, the extent of de-regulation and the nature of productivity spill-overs. Loko and Diouf (2009) also added such environmental factors as the size of government, inflation, trade openness, foreign direct investment, the nature of institutions, and the degree of resource allocation among sectors.

In a study of Latin American and Caribbean countries, Pages (2010) identified the causes of low productivity as the high degree of informality of firms, high transportation costs, lack of credit and innovation, discriminatory tax regimes and macroeconomic volatility.

1.4.2 CARIBBEAN FACTORS

There have been three general approaches used to identify the factors affecting economic growth in the region: econometric regression analysis; decomposition growth accounting analysis; and the Hausmann-Rodrik-Velasco (HRV) growth diagnostic approach. These approaches have largely focused on macroeconomic variables which have affected economic growth and also productivity.

Several studies have been undertaken on the determinants of economic growth using the regression approach (Annex 1.1). The main conclusions arising from such econometric analyses are as follows: exports of goods and services (including tourism), physical investment including foreign direct investment, financial development and human capital investment have a positive impact on economic growth. On the other hand, inflation, volatility in the terms of trade, debt accumulation, and external shocks such as hurricanes and price shocks have a negative impact on the growth process. The institutional and regulatory environments also have a bearing on the growth process in the region, but these elements have not been satisfactorily established within the regression analysis framework.

The growth accounting framework is an important tool for policymakers (at the aggregated level) to help diagnose the contributions of labour growth, capital accumulation and total factor productivity (TFP) to economic growth, as well as the design of policies to enhance it.³ Total factor productivity (TFP) has been an important determinant of growth in the BMCs during the last 35 years albeit on a declining path, coinciding with the fall in average real GDP. The growth accounting exercise revealed that TFP explains the majority of the changes (declining) in real GDP growth in the BMCs. Whereas the TFP contribution explained approximately 45% of regional GDP growth in the 1980s to mid-1990s, the contribution fell three-folds to 15% by 2010-2015.

³ The growth accounting framework has some important limitations. TFP is measured as an unexplained residual and picks up measurement errors in the data, including the difficulty of accounting for improvements in the quality and composition of physical and human capital. In addition, it relies on the assumption of complete markets and constant returns to scale.

The downward trend in TFP was mainly due to reduced productivity in The Bahamas, Barbados, Saint Lucia and Haiti with TFP growth turning negative in the period 2000-15. Similarly, in other tourism-based economies such as Jamaica, Antigua and Barbuda, and St Kitts and Nevis, the contribution of TFP was negligible both on average and in explaining the variations in growth [see Annex 1.2].

Barro (1998) pointed out that negative TFP might simply reflect a drop in the efficiency with which the other factors of production are used either because other complementary circumstances have changed or due to bad policies and weak institutions. Carneiro et al (2016) suggested that the underutilisation of resources, such as capital and labour, could be related to the negative TFP growth in the latter half of 2000s, particularly during the 2008-09 global financial crisis. Thacker (2012) noted that the increase in unemployment in some Caribbean countries in the 1990s, following the decline in trade preferences, as well as the increase in capital accumulation related to tourism investment, may provide some explanation for the decline in TFP, due to how the labour input is measured in the methodology. The proxy for labour input (labour force, working age population 15+) does not allow for the control of unemployment in the labour input, resulting in the unemployment effect being captured in the TFP (residual approach).

On the other hand, the commodity-exporting countries of Belize, Suriname, and Trinidad and Tobago were able to reverse the declining trend in productivity, with improvements in TFP contribution since 2000. High commodity prices, increased production, and the discovery of natural resources accelerated the commodity-exporters' growth path allowing them to manage the effects of a declining agricultural sector. Moreover, the contribution of physical capital also increased, although to a lesser extent, reflecting in part investments (including FDI) in the primary sector associated with the commodity price boom.

Factor accumulation (physical capital) was the main driver of output growth with an average contribution of 57% over the historical period. However, the real GDP growth performance in the recent decade was weaker than in previous decades with increased contribution from TFP. The countries that experienced a strong pickup in output growth (Trinidad and Tobago, Belize, and Suriname) exhibited a higher contribution from TFP. In contrast, the low real GDP growth rates in The Bahamas, Barbados and Saint Lucia during the period 2005-2015, partly reflected negative TFP growth during the period.

The HRV growth diagnostic analysis is a recent addition to the growth literature with only a few studies being undertaken on Caribbean countries. The HRV framework provides a "strategy for figuring out the policy priorities" for enhancing economic growth. The aim of the strategy is to identify "the most binding constraints on economic activity, and hence the set of policies that once targeted on these constraints at any point in time, is likely to provide the biggest bang for the reform buck"⁴. The process involves two basis steps:

1. the identification of the "proximate determinants of economic growth"
2. the identification of the "specific distortions that lie behind the most severe of these constraints"

The methodology is conceptualised in the form of a decision tree which identifies the main constraint(s) and the factors affecting the constraint(s). In the original HRV formulation, the main factor determining low economic growth is "low levels of private investment and entrepreneurship" and a menu of binding constraints/distortions are identified (low return to economic activity, high cost of finance, etc).

The identification of these binding constraints allows the formulation or design of policies, regulations, and institutions needed to enhance economic growth. Research findings using the HRV growth diagnostic framework is provided in Annex 1.3. The general conclusion emerging from these qualitative assessments is that the access to, and the cost of, finance; weak institutions and governmental inefficiencies; and export challenges are the binding constraints on growth in the region. This conclusion corroborates the results of recent assessments of the World Bank's Doing Business and Compete Caribbean's private sector country assessments.

Research on the factors influencing productivity (single factor and multi factor) has not been as extensive as that on the determinants of economic growth. Part of the reason for this situation has been the lack of data on the various factors of production. For example, few countries collect labour market data on a continuous basis in the region, and hence much of the macro-level research has had to use proxies for the labour and capital inputs.

Kida (2005) found that total factor productivity (TFP) was a main factor of economic growth, with TFP being influenced by the macroeconomic environment, the quality of institutions and the degree of efficiency in the economy. Downes (2016) provides a summary of the macro and micro elements affecting productivity in Jamaica and Barbados. In the case of Jamaica, total factor productivity was influenced by such factors as the macroeconomic environment (inflation, taxes, depreciation of the exchange rate); degree of capital investment; shift to the services sector and the growth of the informal sector with low productivity; training of employees; focused management systems; and automation/re-tooling/technological improvements. In the case of Barbados, the following factors have been identified as affecting labour productivity: market demand for goods and services (Verdoon's law); organisational improvements (better management practices, re-organisation of plant layout, use of shift work); new investment in capital equipment; and technical improvements in existing equipment and low work effort.

⁴ Ricardo Hausmann, Dani Rodrik and Andres Velasco, *Growth Diagnostics* (Cambridge, Massachusetts: John F. Kennedy School of Government, Harvard University, 2005), 2.

Recent research on the productivity of Caribbean firms using survey data Cathles and Pangeri (2016) found that higher productivity firms tend to be: larger and older; export oriented; foreign owned; run by more experienced and qualified managers and professionals; technologically sophisticated users of ICT; certified in high quality standards; and able to access finance. They also noted that inadequately educated/trained workers, government bureaucracy, and taxes can be obstacles to increasing productivity in Caribbean firms, while access to finance can be a barrier in low productivity firms.

This review of the factors affecting productivity and economic growth in the Caribbean suggests that both micro and macro-economic factors are significant along with both quantitative and qualitative elements. In effect, the complexity of relationships can make analysis and policy formulation quite challenging. This study has therefore focused on the interplay of a selection of factors which have not received much attention in the Region namely: ICT, R&D, FDI, innovation and technological transfer and industrial clustering.

1.5 A FRAMEWORK FOR ANALYZING PRODUCTIVITY AND GROWTH

The research on productivity and growth in the Caribbean has taken place largely at a macroeconomic level with little analysis of the microeconomic factors affecting both variables. The general literature recognizes that enhancing overall productivity is critical to enhancing economic growth thus there is a need to consider both micro- and macro-economic factors. Until very recently, research in the Caribbean focused on such factors as trade (exports), HRD, investment, and the macroeconomic environment in the growth process. Little research has taken place on productivity growth and its relationship to economic growth. Furthermore, little attention has been paid to the role of research and development, innovation, and ICT in enhancing productivity and economic growth. These factors are now recognised as being fundamental drivers behind the technological change which propels economic growth.

There is need for a “new” approach to the analysis of productivity and economic growth within the region. Recent developments in the Schumpeterian growth framework provide a basis for examining the interrelationship between productivity and economic growth. The framework allows for the consideration of both micro and macroeconomic variables and more importantly the role of innovation and technological change in the growth process. The Schumpeterian framework is based on the concept of “creative destruction” which is the process by which new activities or innovations replace existing activities or previous innovations.

Economic Growth = G (Innovation, Productivity, Exports, Others)

Innovation = H (R&D, ICT, HRD, FDI, Clustering, Incentives, Institutions, Others)

Productivity = F (Innovation, Technological Transfer, FDI, Management, Others)

Endogenous innovations (product, process, organisational, and marketing) are the main elements in enhancing economic growth within the Schumpeterian framework, with new technologies replacing old ones via the creative destruction process. Boosting productivity also enhances economic growth, as the efficiency in the production allows more goods and services to be produced. In the context of a small open developing economy, exports provide scale effects which allow firms to expand and reap economies of scale as expressed in Verdoon’s Law. In some cases, FDI drives not only innovations but also improved productivity and exports.

Innovations take place in dynamic firms where investment in research and development allows them to bring new or improved products and services to the market. Innovations within this framework include introducing a new good or method of production, opening up a new market, identifying a new source of raw materials, or establishing a new production arrangement. Given the R&D effort required, human resources development (HRD) in the form of skilled individuals and the use of ICT are important in the creation of new innovations. It is therefore necessary to establish an “effective innovation system” which consist of “firms, research centres, universities, consultants and other organisations that keep up with new knowledge and technology, tap into the growing stock of global knowledge, and assimilate and adapt it to local needs”⁵. Such a system lies at the heart of a knowledge accumulation process which creates and develops ideas that ultimately enhances productivity and economic growth. As Romer (1996) argues, the major forces governing the allocation of resources to such knowledge creation and accumulation include support for basic scientific research, especially in centres of higher learning; private incentives for R&D and innovation such as tax credits, subsidies and expenditure on HRD; productive opportunities for talented individuals to contribute to the process; and opportunities for “learning by doing” which involve little capital outlay.

In small open developing economies, innovative activities can be facilitated through foreign direct investment mainly from more advanced economies, since some aspect of the innovation process can be costly. The adoption of “industrial clustering” can also promote innovation activity in small developing countries, especially where resources can be pooled among a set of countries. Available evidence suggests that the innovation system within the Caribbean Region is weak and there is a dire need to provide

⁵ World Bank, *Building Knowledge Economies: Advanced Strategies for Development*, (Washington, D C.: World Bank,2007), 240.

resources to enhance the system (King and Cameron, 2013, O’Garro, 2017, and Dohnert et al, 2017).

Factor productivity growth can be enhanced by the innovative activities taking place in the country or region. In addition, the introduction of new management techniques (managerial innovation) can foster productivity in organisations and the wider economy. Productivity enhancement is affected by two set of forces: internal to the enterprise (plant layout, skills of the workforce, managerial expertise) and external to the enterprise, which relates to the ease of doing business. For small developing economies, there is an imperative to be competitive in the international markets. Such competitiveness is driven by productivity growth and is a main element in an export driven growth strategy.

An important aspect of the relationship between productivity and economic growth and their drivers (FDI, innovation, R&D, ICT, and technological transfer) is the fostering of entrepreneurship. The development of entrepreneurs becomes the important cementing element in enhancing productivity and growth in the region. Such persons not only promote innovation but also take on the risks of undertaking growth enhancing projects.

While some of these elements have been raised from time to time in the Caribbean, there has been little systematic analysis of the capacity of ICT, R&D, innovation and industrial clustering to enhance productivity and economic growth. Furthermore, until recently little attention was paid to the microeconomic elements of the growth process in the region. There has been some discussion on the need to foster entrepreneurship but it has not been fully addressed in a new approach to productivity and economic growth in the region.

1.6 OVERVIEW OF THE CHAPTERS

The chapters in this study extend the analysis of productivity and growth in the Caribbean by focusing on foreign direct investment, ICT, R&D, innovation, technological transfer and industrial clustering. Chapter Two, examines the experience of the Caribbean with foreign direct investment since 1990. It reviews the weaknesses and strengths of the policy, regulatory and institutional frameworks associated with FDI in the Region and compares the costs and benefits of such activities. It also discusses the effects of FDI on growth by highlighting such elements as capital accumulation, total factor productivity growth, knowledge accumulation via R&D and innovation, technological spill-overs and “learning by doing”. The chapter concludes with a discussion of the elements of an “optimal” regulatory and institutional framework which, among other things, seeks to reduce the “cost of doing business” and underscores the importance of promoting regional cooperation in attracting FDI to the region.

Chapter Three, identifies the challenges associated with ICT access and affordability by micro, small and medium sized enterprises (MSMEs) and explores ways of overcoming these challenges. It notes that as the Region enters the innovation stage of development associated with the Fourth Industrial Revolution, ICT (broadband availability) will be a catalyst for productivity and economic growth. There is potential for new products and services, employment, innovation and production externalities especially among MSMEs. The main challenge is to ensure that internet use is accessible and affordable to a wide range of production units. The region needs to develop a modern information infrastructure and regulatory framework associated with the “knowledge economy” in order to avoid the disruptive and potentially divisive nature of ICT. The Chapter outlines ten (10) key recommendations for enhancing the role of ICT in the Region and importantly promoting access and affordability.

Much of the discussion of economic growth and productivity in the Region has taken place at the macroeconomic level. Chapter Four, however, undertakes an analysis of the microeconomic dimension of growth and productivity by examining R&D, technological transfer and innovation at the enterprise level. The Chapter highlights the important role of entrepreneurship and of the entrepreneur in the process. It links these elements to the performance of the enterprise as measured by its profitability. Given that the Region has to compete with other regions within the global economy, the emphasis is on enhancing the international competitiveness of enterprises. An examination of five (5) global exemplars—Estonia, Iceland, Ireland, Malta and Moldova—provides lessons from which the Region can learn in developing its strategy for boosting productivity and growth at the enterprise level.

Chapter Five develops a useful framework – clustering – within which enterprises can operate to promote R&D and innovation. It outlines the nature of clustering and discusses its role in enhancing productivity and growth. The basic elements of clusters and clustering are outlined and discussed within the context of the Caribbean and other developing countries. Four (4) case studies of clustering in the Region are presented: gold in Guyana, music in Jamaica, yachting in Saint Lucia and peppers in Trinidad & Tobago. These cases provide important insights into the challenges in developing the clustering concept at both the national and regional levels.

The final chapter summarises the main conclusions of the study and outlines the key recommendations for enhancing productivity and growth in the Region with a special focus on FDI, ICT, R&D, innovation, technological transfer and cluster development. The policy, regulatory and institutional elements required for the implementation of the various recommendation are also outlined.

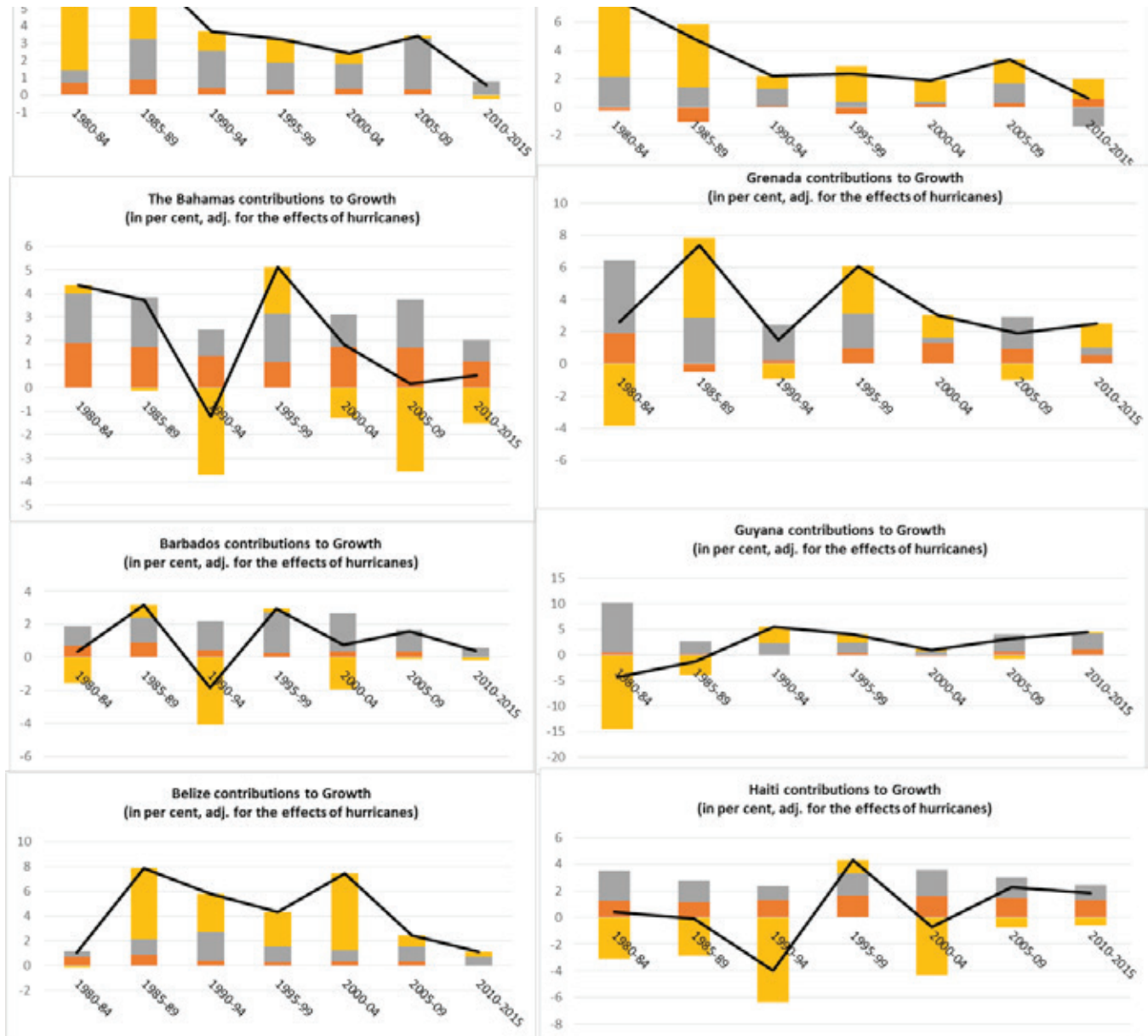
Annex 1.1: Summary of region-wide regression studies on economic growth in the Caribbean

AUTHOR(S)	COUNTRY(IES)	DATA & METHOD	RESULTS*
World Bank (1994)	Caribbean (14 countries)	1979 to 1990; Panel data regression for real GDP growth rate	Investment (+); Exports of Goods and Services (+); Gov't Consumption (-); FDI(-)
Peters (2001)	Caribbean (12 countries)	1977 to 1996; Panel data GLS regression for per capita GDP	Investment (+); Education (+); Life Expectancy (+); Trade/Openness (+); Financial Development (+); Inflation (-); Gov't consumption (-)
ECLAC (2009)	Caribbean (14 countries)	1981 to 2005; Panel data GMM for GDP per capita	Human Capital/Schooling (+); Trade (+); Real interest rate (-); Gov't Consumption (-); Inflation (-)
Thacker, Acevedo and Perrelli. (2012)	Caribbean (13 countries)	1979 to 2007; Panel data for real GDP growth rate	Investment(+); Arrivals (+); Terms of Trade (+); Inflation(-); Debt (-)
Fuentes (2013)	Caribbean (6 countries)	1960 to 2010; Time series analysis and panel data analysis	Human Capital (+); Outward Policy Focus(+); Institutions(+); Natural Disasters (-)
Mamingi and Borda (2014)	OECS	1980 to 2011; ARDL method and Time series analysis for real GDP per capita	Trade(+); Inflation (-); Population Increase (-); Prvt Consumption (-); Fiscal deficit/Govt Consumption (-)
Greenidge, McIntyre and Yun (2016)	Caribbean	1979 to 2014; Panel Dynamic OLS for	Investment(+); Openness to Trade/Tourism(+); Govt Effectiveness (+); Regulatory Quality(+); Govt Consumption (-)
Kouame and Reyes (2016)	Caribbean	1981 to 2013	USA Growth (+); Exports(+); Remittances (+)

Source: Authors

Note: Variables statistically significant at the five per cent level

Annex 1.2: Growth Accounting Decompositions for Caribbean Countries



■ Labor
 ■ Capital
 ■ TFP
 — Output

Output Growth Decomposition for Selected BMCs: 1980-2015



Sources: World Development Indicators, Penn World Table 9.0, Emergency Disaster Database (EM-DAT) and CDB staff calculations.

Annex 1.3: Growth Diagnostics for Selected Caribbean Countries

COUNTRY	AUTHORS	BINDING CONSTRAINTS
Barbados	Gibbs (2012)	Business facilitation, high labour and production costs, delays in implementation of policies and programmes, low level of productivity
Belize	Hausmann and Klinger (2007) and Martin (2015)	Access and high cost of finance Anti-export bias of public policies
Grenada	Grenade (2012)	Poor quality of human capital; Weak enabling environment for business activity; High business costs; Low level of innovation and creativity in production
Guyana	Armendariz (2007)	Poor appropriability of returns in private investment; Coordination and information failures in the discovery of new export activities
Jamaica	Liu and Morales (2010) World Bank (2011)	High debt; low levels of factor productivity, weak institutions and government inefficiency Crime; deficient human capital and entrepreneurship and fiscal and tax distortions
Trinidad and Tobago	Artana et al. (2007) Khadan (2016)	Limited human capital; high macroeconomic volatility; inadequate infrastructure; rising criminality and corruption; lack of innovation; burdensome bureaucracy; inadequate access to foreign markets Low social returns to investment (low appropriability); access to finance
Eastern Caribbean Currency Union (ECCU)	Riley(2013)	Access to finance especially for small and medium size enterprises; low returns to economic activity due to the high cost of doing business

2. Foreign Direct Investment and Economic Development in the Caribbean

2.1 INTRODUCTION

This chapter reviews FDI flows in the Caribbean. The second section of the chapter discusses the impact of FDI on the economy and the trends of FDI flows into the Caribbean from 1990 to the present. The third section reviews the current policy, regulatory and institutional framework for FDI flows into the Caribbean, while the fourth section identifies the various strengths and weaknesses of the framework. The fifth section presents the components of an improved institutional, regulatory and policy framework for incentivising FDI inflows. The sixth section concludes.

Foreign direct investment (FDI) refers to investment in the form of a controlling ownership by an entity from a foreign country into the host country. FDI can be organic in that it involves expanding the operations of a foreign entity in the home country or it can be inorganic, involving buying the assets of an existing host country company. Table 2.1 below shows that in 1990, world FDI flows stood at US\$207Bn but by 2015 had expanded to US\$1,762Bn. By 2015, the stock of FDI inflows stood at US\$24.98Tn as compared to US\$2.1Tn in 1990. The rapid increase in inward FDI led to an increase in income on inward FDI from US\$75Bn in 1990 to US\$1,404Bn in 2015. In terms of the distribution of FDI inflows, amongst the developing countries the majority of FDI inflows went to East and South-East Asia (Table 2.2). In 2015, only 9.5% of all FDI inflows went to Latin America and the Caribbean Region.

Table 2.1: Selected indicators of FDI (various years)

	Value at Current Prices (Billions of US dollars)				
	1990	2005-2007	2013	2014	2015
FDI Flows	207	1418	1427	1277	1762
FDI Outflows	242	1445	1311	1318	1474
FDI inward stock	2077	14500	24533	25113	24983
Income on inward FDI	75	1025	1526	1595	1404

Source: World Investment Report (2016)

Table 2.2: FDI flows, by region, 2010, 2013-2015

Geographic area	FDI inflows (billions of US dollars)			
	2010	2013	2014	2015
World	1244	1427	1277	1762
Developed Economies	602	680	522	962
Europe	313	323	306	504
North America	252	283	165	429
Developing economies	573	662	698	765
Africa	55	52	58	54
Asia	358	431	468	541
East and South-East Asia	300	350	383	448
South Asia	32	36	41	50
West Asia	58	46	43	42
Latin America and the Caribbean	159	176	170	168
Oceania	2	3	2	2

Source: Compiled from WDI, online

2.2 FDI ECONOMIC IMPACTS AND FLOWS INTO THE CARIBBEAN

2.2.1 FDI AND ECONOMIC DEVELOPMENT

There is a large body of research emphasising how FDI affects economic development. De Mello (1997) discusses the effect of FDI on economic growth from two main sources: factor accumulation and total factor productivity. For developing countries with limited capital stock, FDI contributes to economic growth in the host economy through factor accumulation. FDI can also result in knowledge accumulation via research and development (R&D) and innovation, contributing thereby to enhancements in total factor productivity.

Findlay (1978) elaborates on the FDI transmission of technology channel from more developed firms to host economies. Borensztein et al. (1998) emphasise that multinationals are responsible for basically all of the world's R&D spending. When foreign firms enter the local environment, they stimulate local employment and the multiplier effects lead to higher levels of employment. These jobs also tend to be skill intensive, so that workers move up the skills ladder (Osturk, 2007). Lim (2001) argues that when skilled workers from the petroleum sector leave their jobs with the petroleum-based MNCs and establish feeder firms, this deepens the knowledge base of the domestic economy.

Positive balance of payments (BOP) and other desirable effects are also associated with the inflow of foreign capital. Commodity exports and export revenues may increase. Depending on the type of goods produced, imports may also decline. In many developing economies, the tax base is thin. In this regard, the tax revenues from MNCs can significantly improve governments' revenue intake. For example, in Guyana's gold industry, large MNCs generate more tax revenues as compared to small scale informal producers, even assuming similar levels of production.

However, it is also important to note that FDI may crowd out investment by domestic firms through unfair levels of competition⁶. Additionally, the outflows of resources via FDI income remitted abroad can be quite large. This may be compounded by transfer pricing. Transfer pricing refers to income transfers through prices charged during intra company transactions especially through the over-invoicing of imports and under-invoicing of exports. Ford et al. (2008) have also argued that FDI expenditure on the labour force may prompt lower expenditure by the government of the host economy with respect to labour force training. Furthermore, the introduction of new technology by foreign firms may reduce R&D outlays by domestic firms, thus lowering the capacity of indigenous firms to benefit from accelerated growth, via R&D (Berthelemy and Demurger, 2000).

⁶ L. Best and K. Levitt, "The Mechanism of Plantation-type Economies: Outline of a Model of Pure Plantation Economy," *Social and Economic Studies*, 17 (1968): 64. "Dependence on imported enterprise builds into the economy an assured backwardness vis-a-vis countries whose entrepreneurial dynamic is indigenous."

2.2.2 FDI FLOWS TO THE CARIBBEAN

Table 2.3 displays FDI inflows to the Caribbean Region for the period 1991 to 2015. The data highlight that T&T, Jamaica, and The Bahamas have been the three major recipients of FDI in the region. FDI inflows peaked in 2008 and by 2015 all Caribbean economies, with the exception of Haiti and Suriname, experienced a reduction in FDI inflows.

The CARICOM region faces a number of problems in attracting FDI. These include the fact that domestic markets are small. This means that just a few industries dominate these economies, as evidenced by oil and gas in Trinidad; bauxite, rice and gold in Suriname; gold, bauxite and rice in Guyana; and tourism in the OECS countries, Jamaica, and Barbados. Additionally, the high per unit costs of energy and infrastructural deficiencies together with an inadequate policy, regulatory and institutional environment constrain FDI inflows.

Table 2.3: FDI inflows to the Caribbean USD million, 1991-2015

Year	Average 1991 to 2008	2008	2009	2010	2011	2012	2013	2014	2015	% change 2008 to 2015
Antigua	102.0	160.8	84.6	101.3	68.3	137.5	100.9	154.8	154.1	-4.2
The Bahamas	548.2	1512.3	873.1	1147.6	1533.3	1073.4	1110.8	1595.9	384.9	-74.5
Barbados	127.8	615.1	255.3	446.3	362.0	312.8	-35.1	485.6	254.4	-58.6
Dominica	24.6	56.8	57.9	43.4	34.6	58.6	25.4	35.4	36.0	-36.6
Grenada	52.6	140.7	104.0	63.6	45.2	34.3	113.6	38.2	60.7	-56.9
Guyana	70.5	178.0	164.0	198.0	246.8	293.7	214.0	255.2	121.7	-31.6
Haiti	22.1	29.8	55.5	178.0	119.0	156.0	160.4	99.0	104.2	249.7
Jamaica	433.7	1436.6	540.9	227.7	218.2	413.3	594.7	591.5	794.5	-44.7
St. Kitts and Nevis	58.8	183.9	136.0	118.8	111.6	110.0	138.6	120.1	78.2	-57.5
Saint Lucia	82.4	166.2	151.9	126.6	100.4	77.9	95.2	93.1	95.0	-42.8
St. Vincent and the Grenadines	52.9	159.3	111.0	97.4	85.8	115.4	159.9	109.8	120.7	-24.2
Suriname	-51.1	-231.4	-93.4	-247.7	69.8	173.7	187.6	163.4	276.4	219.4
Trinidad and Tobago	647.0	2800.8	709.1	549.4	1831.0	2452.9	1994.3	2488.8	1618.6	-42.2
Anguilla	47.1	100.9	43.6	11.4	38.9	43.5	42.2	79.3	85.5	-15.3
Belize	45.7	169.7	108.8	97.2	95.4	189.2	95.2	152.7	64.6	-61.9
Montserrat	3.9	12.7	2.6	3.6	2.5	2.6	3.8	6.2	4.2	-66.9
Total	2268.2	7492.2	3304.9	3162.6	4962.8	5644.8	5001.5	6469.0	4253.7	-43.2

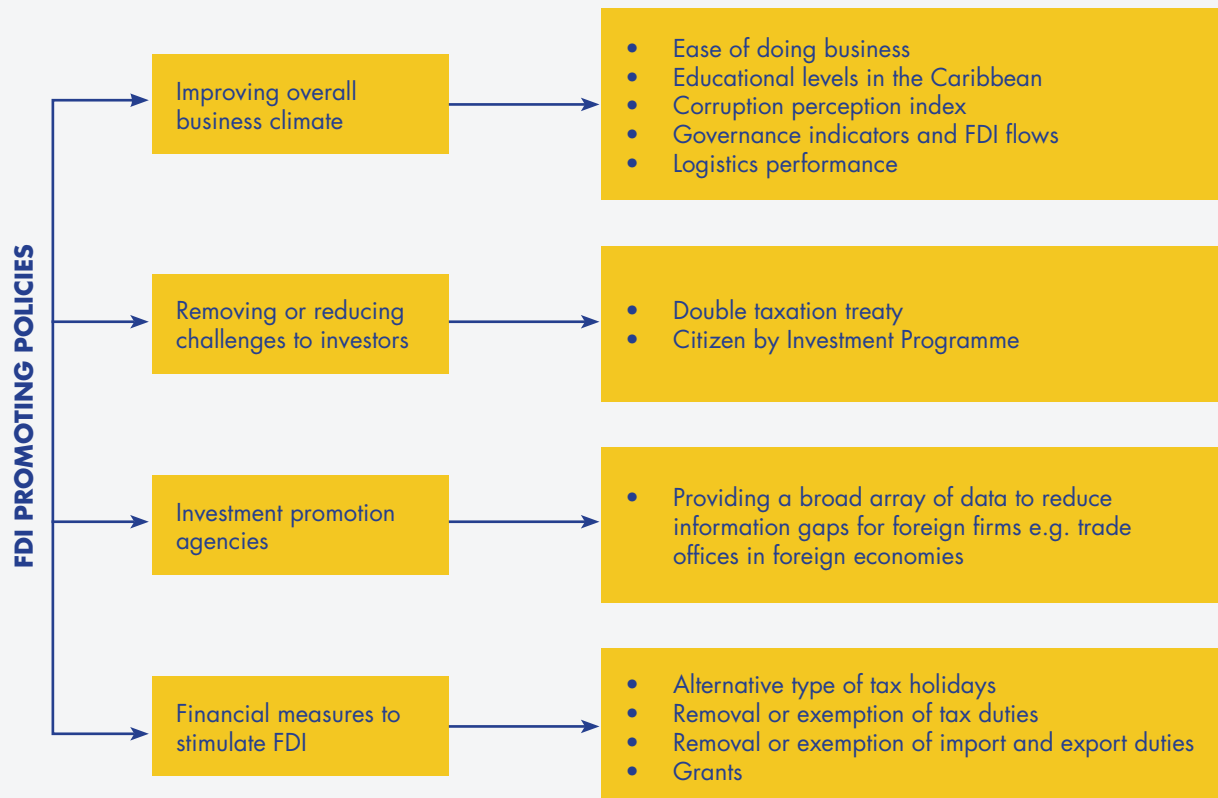
Source: UNCTAD, *World Investment Report* (various years)

2.3 THE CURRENT POLICY, REGULATORY AND INSTITUTIONAL FRAMEWORK FOR ATTRACTING FDI TO THE CARIBBEAN

Efforts to increase the amount of FDI flows into the Region recently have been receiving increased attention. This section focuses on the FDI promotion framework. Four broad areas related to the promotion of FDI in the Region are presented and discussed. The rest of the section undertakes a discussion of the strengths and weaknesses of the existing framework for attracting FDI into the Caribbean.

Figure 2.1 identifies the four broad thematic areas. These are: improving the overall business climate; removing or reducing challenges to investors; investment promotion agencies; and financial measures to stimulate FDI. Within the discussion regarding improving the overall business climate, the performance of the Caribbean with respect to several key business-related and other relevant indicators is presented. These are the ease of doing business (EOBD) index; corruption perception; governance indicators; and the logistics performance indicator. The thematic grouping related to the reduction and/or removal of challenges to investors focuses on the use of double taxation treaties as well the citizenship by investment programme (CIP) in some of OECS countries. The section on regional investment promotion agencies provides some insights into the operations of these institutions. The discussion on incentives focuses on the use of the various types of financial incentives.

Figure 2.1: Schema of FDI Promoting Policies



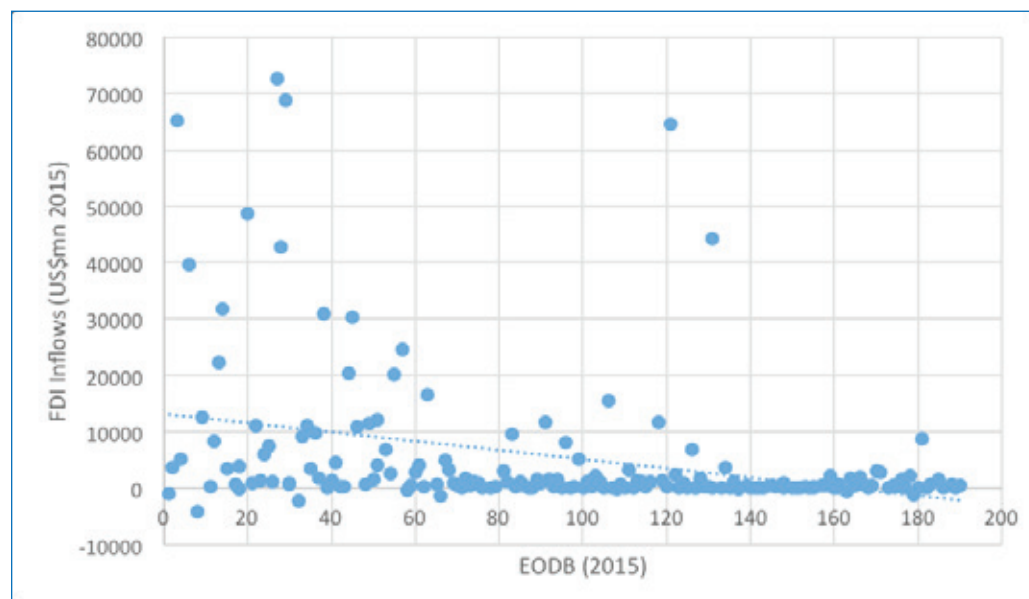
2.3.1 IMPROVING THE OVERALL BUSINESS CLIMATE AND FDI

2.3.1.1 EASE OF DOING BUSINESS (EOBD)

The EOBD Index was created by the World Bank Group. It has above all provided a guide as to the amount of business regulation in an economy. It is designed to provide insights into the impact of the regulatory environment which directly affects businesses within an economy. The scatter plot in Figure 2.2 shows the relationship between an economy’s rank on the EOBD index (2015) and FDI inflows in 2015⁷. Indications are that a worsening EOBD rank is associated with a lower level of FDI inflows.

⁷ The sample consists of a total of 176 countries with all 15 CARICOM countries represented in the dataset.

Figure 2.2: Scatter plot between the EODB index and FDI inflows, 2015



Source: Authors' derivation using data from WDI and EODB, 2015.

Corcoran et al. (2015) examined the effect of a country's business regulatory environment on its FDI inflows. The study made three significant findings. Using a data set spanning the period 2004-2009, the study found that the EODB rank has a significant effect on FDI inflows. Secondly, whilst the overall EODB index is important, the study found that the Trading across Borders sub-component is particularly so. Thirdly, the EODB rank did not have a significant influence on the OECD economies nor for the world's poorest region, Sub-Saharan Africa.

Table 2.4 displays the average number of procedures; the average time taken in terms of numbers of days; and lastly the average cost as measured by the percentage of income per capita for various regional groupings as it relates to starting a business. Focusing specifically on the Caribbean Region, the table highlights that an average of 6.9 procedures are required for starting a business, with only North America, Europe Central Asia, and the European Union having fewer procedures. As it relates to the number of days required to start a business, the table highlights that North America is ahead of all the other listed regions, requiring only 3.6 days on average. However, in the Caribbean Region, it takes an average of 21.4 days to start a business. This is surpassed only by East Asia, Sub-Saharan Africa, and Latin America. In terms of the cost of starting a business, the Caribbean Region lags behind other regions also, with only Latin America and Sub-Saharan Africa having a higher cost than the Caribbean Region. The latter is clearly a policy area to which the Caribbean Region needs to pay closer attention.

Table 2.4: Regional Averages: Ease of Doing Business, 2016

Doing Business Index: Starting a Business			
Region	Procedures (number)	Time (number of days)	Cost (% of income per capita)
North America	4	3.6	0.8
Europe & Central Asia	4.9	10.2	4.7
European Union	5.3	10.6	3.8
East Asia	7.6	26.8	13.1
Sub-Saharan Africa	7.9	27.4	54.1
South Asia	8.2	15.5	13.4
Middle East & North Africa	8.3	20.6	26.3
Latin America	9.1	37.9	39.4
Caribbean	6.9	21.4	29

Source: EODB report, 2016.

Table 2.5 shows that amongst CARICOM economies, Jamaica had the best EODB rank in 2015 followed by Saint Lucia, Trinidad and Tobago, and Dominica. At the other end of the spectrum, Haiti is lodged at 180. The average rank amongst CARICOM countries in the EODB index was 116.1 in 2015. The correlation between the EODB rank 2015 and FDI inflows for 2015 is -0.34. Based on the discussion above, this suggests in part that if the CARICOM economies were to improve their EODB rank, they can probably expect a higher inflow of FDI.

Most Caribbean countries experienced deteriorations in their rankings on the EODB index across the years 2007, 2010 and 2015. Jamaica's worsened between 2007 and 2010 but by 2015 improved to the best overall rank within the Caribbean. Guyana's rank improved from 2007 to 2010 but deteriorated in 2015. St Vincent and the Grenadines' rank improved and then worsened. Saint Lucia's rank deteriorated sharply from 36 in 2010 to 86 by 2015.

Table 2.5: EODB Rank for CARICOM (2007, 2010, 2015) and FDI Inflows 2015

	EODB 2007	EODB 2010	EODB 2015	FDI 2015 US\$mn
Antigua and Barbuda	33	50	107	85.5
Bahamas, The	n.a.	68	120	384.9
Barbados	n.a.	-	115	254.4
Belize	56	80	110	64.6
Dominica	72	83	95	36
Grenada	73	91	131	60.7
Guyana	136	101	140	121.7
Haiti	139	151	180	104.2
Jamaica	50	75	65	794.5
St. Kitts and Nevis	44	76	127	78.2
Saint Lucia	27	36	78	95
St. Vincent and the Grenadines	85	70	123	120.7
Suriname	122	155	155	276.4
Trinidad and Tobago	59	81	92	1618.6
Correlation (EODB 2015 and FDI 2015)				-0.34

Source: EODB reports various years, WDI online

Table 2.6 shows the correlation coefficient matrix amongst the regional average EODB index 2016 for the Caribbean and the 2010 and 2007 rankings respectively. These are high correlation scores and show persistence overtime, with a low EODB index rank in one year being associated with a low EODB index rank in the other years. In a highly competitive global environment, moving slowly is equivalent to falling behind.

Table 2.6: Correlation amongst the EODB indices

	EODB 2007	EODB 2010	EODB 2016
EODB 2007	1.00	0.82	0.62
EODB 2010	0.82	1.00	0.75
EODB 2016	0.62	0.75	1.00

Table 2.7 below shows some of the changes Jamaica made recently on the road to having the highest rank on the EODB index in the Caribbean.

Table 2.7: Changes made by Jamaica to improve its EODB rank

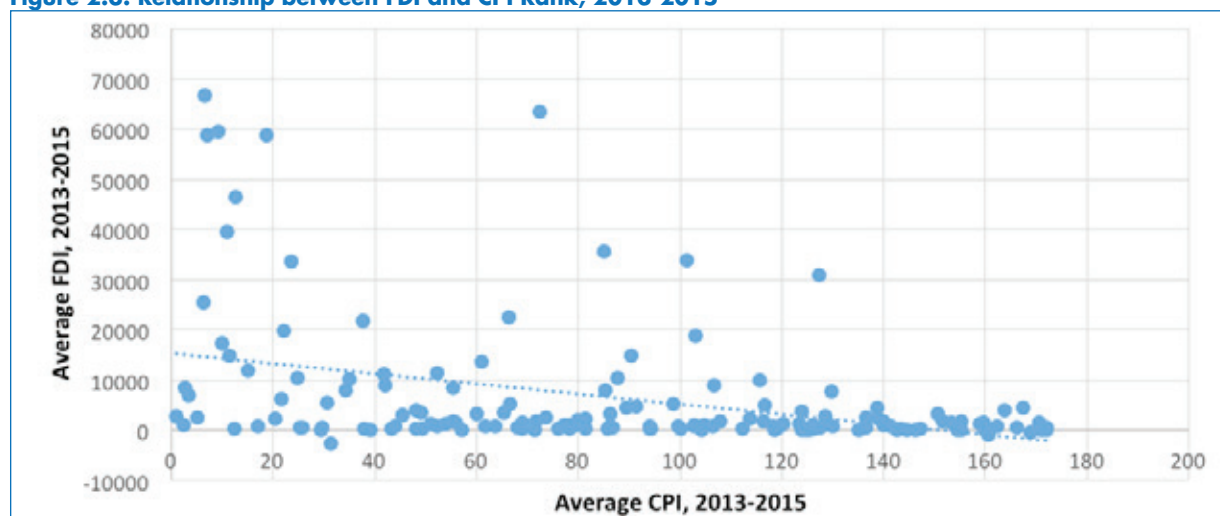
Category	Reasons for being first in CARICOM using information from the EODB 2014, 2015 and 2016
Starting a business	<ul style="list-style-type: none"> Simplified preregistration and registration formalities (publication, notarisation, inspection and other requirements). This was done in 2012/13. (Source EODB 2014). Jamaica made starting a business easier by launching an electronic interface between the Companies Office and the Tax Administration. (EODB 2016). Reduced the effective financial burden of profit taxes on companies by introducing changes to tax depreciation rules or deductions. (EODB 2016). Jamaica made starting a business easier by streamlining internal procedures.
Getting credit	<ul style="list-style-type: none"> Enhanced access to credit information by adopting laws or regulations improving frameworks for sharing credit information or protecting borrowers' right to inspect their data. Source (EODB 2014). Improved regulatory framework for sharing credit information. Source (EODB 2014). A project is under way to establish credit bureaus. Source (EODB 2014). Jamaica also established a new legal framework to modernize its secured transactions system. The aim is to improve the availability of credit to the private sector while minimizing the risk of nonpayment of loans. The Security Interests in Personal Property Act, which came into force on January 2, 2014, repealed provisions governing traditional securities under the Agricultural Loans Act, the Bills of Sale Act and the Debenture Registration Act. The new legal framework applies to all types of security documents, including pledges, leases and floating charges. Source (EODB 2015). Coverage continues to grow as economies establish or enhance credit reporting systems. Several did so in the past year. In Jamaica 2 new credit bureaus, Creditinfo Jamaica and CRIF-NM Credit Assure Limited, having received licenses in 2012, began serving banks and financial institutions in 2013. Thanks to the launch of their operations, Jamaica was the economy that made the biggest improvement in credit reporting in 2013/14. Source (EODB 2015).

Source: Compiled from various EODB reports.

2.3.1.2 CORRUPTION PERCEPTION AND FDI

The corruption perception index (CPI) has been published by Transparency International since 1995. The index ranks economies according to their perceived levels of corruption. (The summary definition of CPI used in this study is the misuse of public power for private benefit). Corruption raises the cost of firms investing if they have to pay bribes or engage in rent seeking activities (Murphy et al, 1991; Schleifer and Vishy, 1993; Wei, 2000; 2009; Woo and Heo, 2009; and Godinez and Liu, 2015). Corruption also decreases the productivity of public infrastructure and can thus decrease economic output (Rose-Ackerman, 1991; Bardhan, 1997). The data in Figure 2.3 illustrate that FDI (average 2013-2015) and the corruption perception index (average 2013-2015) rank are inversely related. That is, as a country's rank on the CPI worsens, it tends to realise lower FDI inflows.

Figure 2.3: Relationship between FDI and CPI Rank, 2013-2015



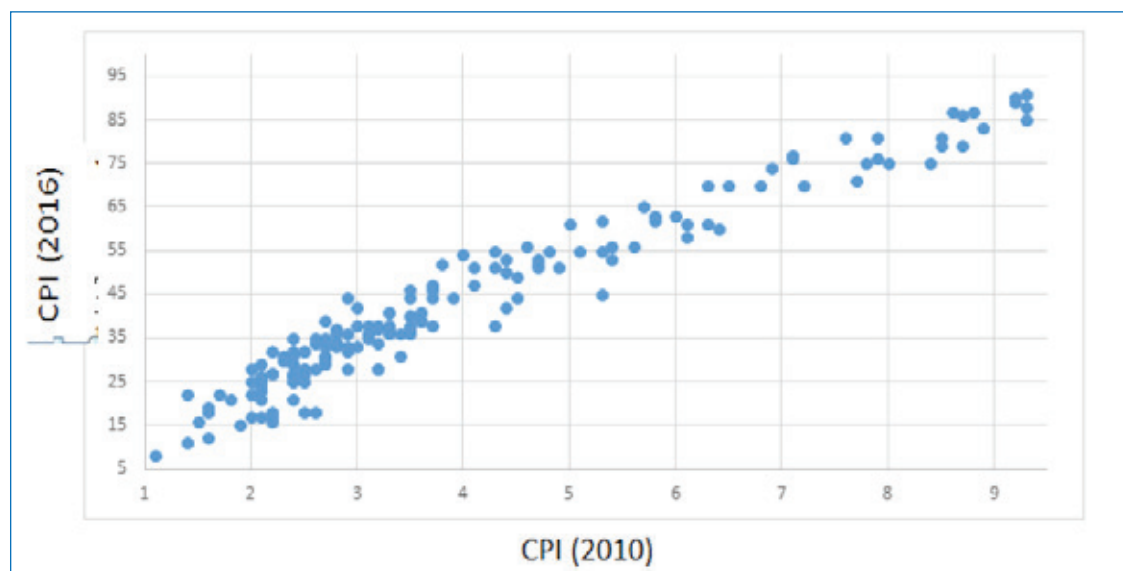
Amarandei et al. (2014) investigated the impact of corruption on FDI inflows for ten Central and Eastern European states over the period 2000-2012. They used multiple regression analysis, using the data from UNCTAD for foreign direct investment and data on corruption from the Corruption Perception Index. Using GDP as a control variable, the study found a negative and

statistically significant relationship between corruption and FDI for the Central and Eastern European States investigated in the study.

Using panel data, Alemu (2012) also investigated the effects of corruption on FDI inflows, focusing on 16 Asian economies spanning the time period 1995 to 2009. The main conclusion of the study is that there exists a negative and significant relationship between the level of corruption in the 16 Asian economies and FDI inflows. The model indicates that a 1% increase in the level of corruption results in a 9.1% decrease in FDI inflows. Alternatively stated, if a country can lower its level of corruption by 1%, its inward FDI flows into the economy may increase by 9.1%.

Similarly, Hossain (2016) using panel data for the period 1998 to 2014 on 48 countries from three regions, namely South and South-East Asia, Latin America and the Caribbean and Africa, estimated the impact of corruption on FDI inflows. Corruption was measured using the CPI. The major finding of the study was that that there existed a negative and significant relationship between the level of corruption and FDI inflows. The results suggested that a 1% decrease its level of corruption may increase FDI inflows by 8.1%.

Figure 2.4: Scatterplot of the CPI Rank 2010 and CPI Rank 2016



As regards the Caribbean, Table 2.8 shows that The Bahamas has the best CPI rank, whilst Haiti is the worst ranked economy. The average rank amongst Caribbean countries was 66 for 2016. The correlation between the CPI score 2016 and FDI 2015 is -0.39 , highlighting a relatively strong negative relationship between these variables⁸

Table 2.8: Corruption Perception Index (CPI) score in the Caribbean

Country	CPI score 2016	CPI Rank 2016	FDI US\$m 2015
The Bahamas	66	24	76.1
Barbados	61	31	254
Dominica	59	38	36
Grenada	56	46	60.7
Guyana	34	108	117
Haiti	20	159	109
Jamaica	39	83	936
Saint Lucia	60	35	95

⁸ The CPI score 2016 is used instead of the CPI score for 2015 as the latter has recorded values for only five Caribbean countries as compared to eleven Caribbean countries in the CPI 2016.

St. Vincent and The Grenadines	60	35	121
Suriname	45	64	197
Trinidad and Tobago	35	101	1619

Source: World Development Indicators and Transparency International (2016)

2.3.1.3 GOVERNANCE INDICATORS AND FDI FLOWS TO THE CARIBBEAN

The World Wide Governance Indicators (WGI) provide governance indicators for over 200 countries for the period 1996-2015⁹. The WGI cover six dimensions of governance: voice and accountability; political stability and absence of violence; government effectiveness and regulatory quality; rule of law; regulatory quality; and control of corruption.

Table 2.14 presents regional performance on the six dimensions of governance for the Caribbean¹⁰ for the years 1996 and 2015. The estimate for the indicator for each dimension ranges between -2.5 (weak) to 2.5 (strong) perception of governance performance. The control of corruption (CC) index indicates that in the Caribbean Region, perception regarding the control of corruption is generally weak. Countries that are perceived to have weakest control of corruption in the Caribbean are Haiti, Guyana, Belize, and Trinidad and Tobago as indicated by their large negative indices. In terms of the government's effectiveness and regulatory control dimension, the data suggest a pattern similar to that of the control of corruption. The exceptions are Barbados and The Bahamas, with ratings of 1.24 and 0.96 respectively.

The political stability and absence of violence/terrorism dimension captures perceptions on the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means. The results are somewhat mixed with stability in Haiti, Guyana, and Belize being perceived to be weak whilst the perceptions of stability in Barbados, The Bahamas, Antigua and Barbuda, St Vincent and the Grenadines, and Dominica are relatively strong.

With respect to the review of the regulatory quality (RQ) dimension, which captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, the results are also mixed. Again under this dimension, Haiti, Guyana and Belize are perceived as weak, whilst the perceptions of political stability in Barbados, The Bahamas, Antigua and Barbuda, Dominica, Saint Lucia, and St Vincent and the Grenadines are relatively stronger than the other listed Caribbean territories.

Under the rule of law (RL) dimension, perceptions of the extent to which agents have confidence in and abide by the rules of society are captured. The voice and accountability (VA) dimension on the other hand captures individuals' perceptions regarding the extent to which they are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Under both these dimensions, the results are strong for the Caribbean Region on a whole, with the only exception or outlier being Haiti.

Overall, whilst for the rule of law and voice and accountability indices there was an improvement between 1996 and 2016, for each of the other four governance indices, the average Caribbean score worsened.

Table 2.9: Pillars of Governance Estimates for Caribbean Economies, 1996 and 2015

	Control of Corruption		Government effectiveness		Political Stability and Absence of Violence		Regulatory Quality		Rule of Law		Voice and Accountability	
	1996	2015	1996	2015	1996	2015	1996	2015	1996	2015	1996	2015
Antigua and Barbuda	0.9	0.67	0.65	0.21	0.64	0.53	0.76	0.67	1.01	0.69	0.29	1.07
Bahamas, The	1.2	1.29	1.34	0.56	0.98	0.71	0.92	0.96	1.09	1.08	1.06	1.29
Barbados	1.36	1.79	1.44	1	0.96	1.05	1.28	1.24	0.96	1.32	1.47	1.79

⁹ Governance is described by Kaufmann et al. (2010, p.4) "the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them."

¹⁰ Details on the interpretation of these six indicators, can be found in the WGI methodology paper:

Daniel Kaufmann, Aart Kraay and Massimo Mastruzzi, "The Worldwide Governance Indicators: A Summary of Methodology, Data and Analytical Issues," *World Bank Policy Research Working Paper*, No. 5430, 2010.

<http://papers.ssrn.com/sol3/papers>.

	Control of Corruption		Government effectiveness		Political Stability and Absence of Violence		Regulatory Quality		Rule of Law		Voice and Accountability	
	1996	2015	1996	2015	1996	2015	1996	2015	1996	2015	1996	2015
Belize	-0.01	-0.21	0.38	-0.7	0.46	-0.47	0.16	-0.21	0.01	0.04	0.78	0.56
Dominica	0.9	0.62	0.65	0.26	0.64	0.62	1	0.64	0.78	1.11	1.01	1.19
Grenada	0.9	0.31	0.65	-0.2	0.81	0.01	0.52	0.31	0.33	0.81	0.57	0.94
Guyana	-0.44	-0.77	-0.39	-0.55	-0.38	-0.5	-0.19	-0.34	-0.36	-0.18	0.26	0.22
Haiti	-1.11	-1.26	-1.21	-1.26	-0.89	-1.17	-1.05	-1.16	-1.67	-0.84	-0.84	-0.73
Jamaica	-0.22	-0.33	0.16	-0.23	0.01	0.09	0.69	0.11	-0.44	0.25	0.56	0.55
St. Kitts and Nevis	1.04	0.27	n.a.	0.17	n.a.	0.27	n.a.	0.35	0.77	0.67	1.02	0.99
Saint Lucia	1.22	0.45	n.a.	0.28	0.94	0.45	n.a.	0.62	0.77	0.86	1.06	1.2
St. Vincent and the Grenadines	1.04	0.62	n.a.	0.26	0.94	0.59	n.a.	0.62	0.77	0.86	1.03	1.21
Suriname	-0.11	-0.57	-0.8	-0.57	0.33	-0.36	-0.62	-0.25	-0.37	0.21	-0.33	0.45
Trinidad and Tobago	1.01	-0.54	-0.03	-0.14	0.19	0.15	0.59	0.24	0.44	0.27	0.64	0.49

Source: WDI

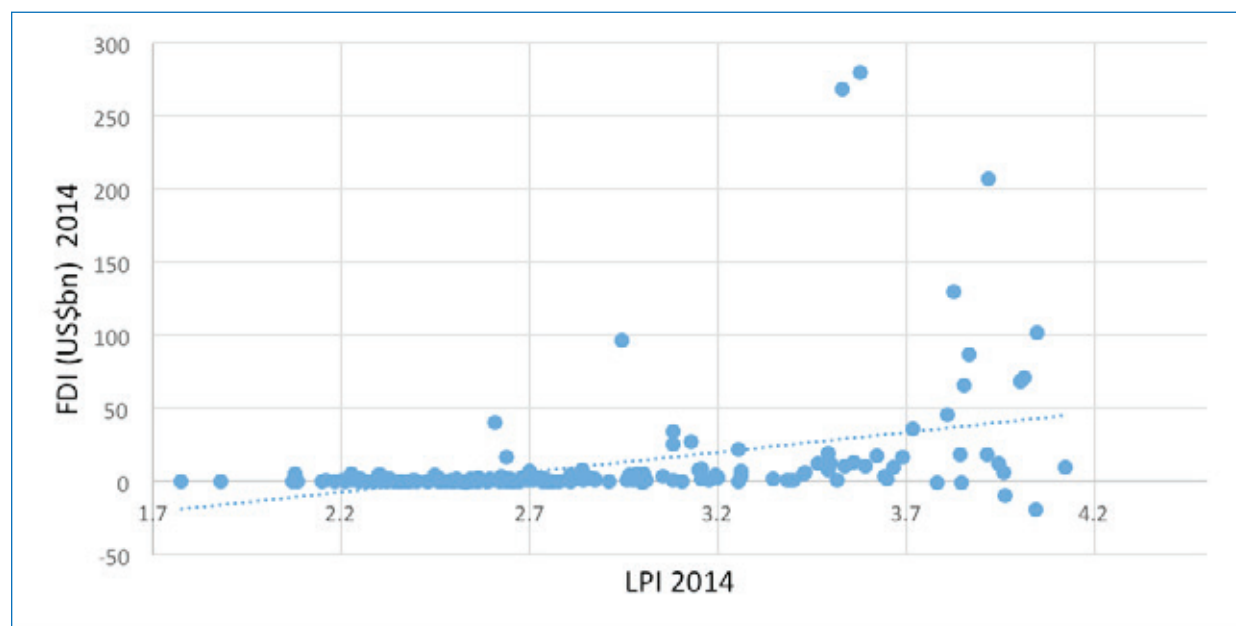
Using panel data Mengistu and Adhikary (2011) examined the effects of governance on FDI inflows in 15 Asian economies for the period 1996–2007. The empirical results revealed that, of the six components of good governance, political stability and absence of violence; government effectiveness; rule of law; and the control of corruption are the key determinants of FDI inflows. Each of the aforementioned variables was found to be positive and statistically significant. However, the study found no statistically significant evidence with relation to the voice and accountability and regulatory quality indices in explaining FDI inflows. The authors concluded that enhanced political stability, rule of law, and quality of public and civil services would likely attract more FDI inflows, despite offsetting deficiencies in other dimensions of good governance such as voice and accountability and regulatory quality.

Zeshan and Talat (2014) investigated the relationship between the six governance indicators and FDI flows in Pakistan for the period 1996 to 2010. To investigate the relationship, the authors applied both the auto regressive moving average (ARMA) and ordinary least squares (OLS) regression techniques. The results indicated that each of the six governance indicators had a positive and statistically significant relationship with FDI inflows. As a result, the authors concluded that it is essential that the governance indicators be improved in order to strengthen the confidence level of overseas investors and to increase FDI inflows into Pakistan.

2.3.1.4 THE LOGISTICS PERFORMANCE INDEX (LPI)

The LPI index reflects the perceptions of a country's logistics based on the efficiency of its customs clearance processes; quality of trade and transport-related infrastructure; ease of arranging competitively priced shipments; quality of logistics services; ability to track and trace consignments; and frequency with which shipments reach the consignee within the scheduled time. The index ranges from 1.0 to 5.0, with a higher score representing a better performance.

Figure 2.5: Scatter plot displaying FDI (US\$bn) 2014 and LPI, 2014.



Source: Authors' derivation using WDI data.

The scatter plot above indicates that as the LPI for an economy improves, it tends to attract a higher level of FDI.¹¹ In a related type of study, Kinra (2013), by focusing on South Asia, analysed the cost of distance for trade and FDI. This study found that the elements of the national transportation system favorably affected, that is, had a positive effect on both trade and FDI.

Table 2.10 shows that the Caribbean had the lowest LPI score amongst all of the listed regions, with East Asia having the highest overall regional LPI score. Moreover, of the six sub-indices from which the LPI is calculated, in each one the Caribbean lagged behind the rest of the world.

Table 2.10: Regional Performance on the LPI, 2016

Country	LPI Score	Customs	Infrastructure	International shipments	Logistics competence	Tracking & Tracing	Timeliness
East Asia	3.59	3.39	3.56	3.48	3.52	3.60	3.97
Europe	3.40	3.19	3.33	3.29	3.36	3.45	3.79
North America	2.76	2.63	2.61	2.76	2.71	2.76	3.08
Middle East & North Africa	2.89	2.60	2.78	2.96	2.81	2.86	3.29
Sub-Saharan Africa	2.47	2.36	2.29	2.49	2.42	2.39	2.84
South Asia	2.62	2.42	2.45	2.68	2.56	2.56	3.03
Europe & Central Asia	3.23	3.03	3.16	3.14	3.17	3.24	3.62
Caribbean	2.38	2.31	2.23	2.39	2.32	2.30	2.66
BRIC	3.19	2.82	3.16	3.10	3.22	3.28	3.55

Source: <http://lpi.worldbank.org/international/global>

¹¹ The sample consists of a total of 158 countries including five Caribbean countries - the Bahamas, Dominican Republic, Guyana, Haiti, Jamaica.

As concerns specific Caribbean states for which data on the LPI are available, The Bahamas experienced no change in its LPI between 2010 and 2016. The LPI for Jamaica and Haiti actually worsened, while Guyana's improved (See Table 2.11). The LPI for Trinidad and Tobago was only available for 2016 and was posted at 2.4, lower than that of Guyana and The Bahamas.

Table 2.11: LPI for Caribbean and selected countries

CARICOM Member States	2010	2016
The Bahamas	2.75	2.75
Guyana	2.27	2.67
Haiti	2.59	1.72
Jamaica	2.53	2.40
Trinidad and Tobago	-	2.4
Mauritius	2.72	-
Costa Rica	2.91	2.65
Singapore	4.09	4.14

Source: Based on data accessed from the World Development Indicators (WDI).

2.3.2 REMOVING OR REDUCING CHALLENGES TO FOREIGN INVESTORS

2.3.2.1 DOUBLE TAXATION TREATIES

Double taxation treaties (DTT) help to prevent earnings from being taxed twice. Egger (2006, p. 902) noted "One of the most visible obstacles to cross border investment is the double taxation of foreign earned income." Several CARICOM countries have signed DTTs with their main trading partners, (See Table 2.12 for listing).

Barthel et al. (2010) investigated whether a double taxation treaty (DTT) between two countries increases the amount of bilateral FDI flows between the two countries. The study used FDI stock data covering 30 FDI source economies and 105 host economies (of which 84 are developing economies). The study found, after controlling for several other influencing factors on bilateral FDI stocks, that DTTs have a positive and significant effect on FDI stocks. Neumayer (2007) provides evidence that developing countries which sign a DTT with the United States benefit from both a higher stock as well as a higher share of FDI stock, originating from the USA.

Table 2.12: Double Taxation Treaties between selected Caribbean Countries and their Respective Partner Countries

Partner Countries	Trinidad and Tobago	Barbados	Jamaica	Suriname	Guyana	Saint Lucia
The United Kingdom	Yes (1983)	Yes (1970)	Yes (1973)	No	Yes (1992)	No
Canada	Yes (1996)	Yes (1980)	Yes (1978)	No	Yes (1987)	No
USA	Yes (1971)	Yes (1984)	Yes (1986)	No	No	No
Finland	No	Yes (1989)	No	No	No	No
Norway	Yes (1970)	Yes (1990)	Yes (1992)	No	No	No
Sweden	Yes (1984)	Yes (1991)	Yes (1986)	No	No	No

Partner Countries	Trinidad and Tobago	Barbados	Jamaica	Suriname	Guyana	Saint Lucia
Switzerland	Yes (1973)	Yes (1954)	Yes (1995)	No	No	No
CARICOM	Yes (1994)	Yes (1994)	Yes (1994)	No	Yes (1994)	Yes (1994)
Venezuela	Yes (1999)	Yes (1998)	No	No	No	No
Cuba	No	Yes (1999)	No	No	No	No
China	Yes (2004)	Yes (2000)	Yes (1998)	No	No	No
Malta	No	Yes (2001)	No	No	No	No
Mauritius	No	Yes (2004)	No	No	No	No
Botswana	No	Yes (2005)	No	No	No	No
Austria	No	Yes (2006)	No	No	No	No
Kingdom of the Netherlands	No	Yes (2006)	No	Yes (1975)	No	No
Republic of Seychelles	No	Yes (2007)	No	No	No	No
Republic of Mexico	No	Yes (2008)	No	No	No	No
Luxembourg	Yes (2003)	Yes (2009)	No	No	No	No
The Republic of Panama	No	Yes (2010)	No	No	No	No
The Kingdom of Spain	Yes	Yes (2010)	Yes (2008)	No	No	No
Czech Republic	No	Yes (2011)	No	No	No	No
Iceland	No	Yes (2011)	No	No	No	No
Kingdom of Bahrain	No	Yes (2012)	No	No	No	No
State of Qatar	No	Yes (2012)	No	No	No	No
San Marino	No	Yes (2012)	No	No	No	No
Singapore	No	Yes (2013)	No	No	No	No
United Arab Emirates	No	Yes (2014)	No	No	No	No
Brazil	Yes (2008)	No	No	No	No	No

Partner Countries	Trinidad and Tobago	Barbados	Jamaica	Suriname	Guyana	Saint Lucia
Denmark	Yes (1971)	No	Yes (1992)	No	No	No
France	Yes (1989)	No	Yes (1999)	No	No	No
Germany	Yes (1977)	No	Yes (1976)	No	No	No
India	Yes (1999)	No	No	No	No	No
Italy	Yes (1974)	No	No	No	No	No
Israel	No	No	Yes (1985)	No	No	No
Indonesia	No	No	No	Yes (2014)	No	No

Sources: Compiled from data in the following online sources across various years: TT Ministry of Finance, Invest Barbados Tax administrator, Jamaica PricewaterhouseCoopers (PWC).

Trinidad and Tobago, Jamaica, and Barbados have signed DTTs with the USA, the largest source of FDI to the region. However, Suriname, Guyana, and Saint Lucia have not. In the case of Trinidad and Tobago, Table 2.13 shows that a large proportion of that country's FDI continues to come from the USA, Canada, and the UK.

Table 2.13: Direct Foreign Investment by Country of Origin, 2005-2011 (US\$mn)

Country	2005	2006	2007	2008	2009	2010	2011
USA	693.8	626.7	574.4	403.4	468.6	363.2	523.2
UK	164.5	150.1	159.1	145.8	152.4	118.2	22.8
Canada	1.4	2.6	2.9	2194.0	3.5	2.7	990.3
Germany	41.4	37.6	43.1	30.4	31.9	24.7	77.2
Japan	0.2	0.2	0.2	0.2	0.1	0.5	18.1
India	16.4	26.5	21.2	15.9	17.3	13.2	1.8
Other	22.0	39.0	29.1	11.1	35.3	26.9	197.5
Total	939.7	882.7	830.0	2800.8	709.1	549.4	1831.0

Source: Balance of Payments Yearbook of TT (2011).

2.3.2.2 CITIZENSHIP BY INVESTMENT PROGRAMME (CIP)

An important programme in the Caribbean that helps to generate FDI is the CIP which started in St Kitts and Nevis in 1984, but has since spread to Dominica, Antigua and Barbuda, Grenada, and Saint Lucia. The CIP is based on the notion that persons can be granted citizenship in a country (if desired) on condition that they make a significant economic contribution to the host economy.

The CIPs allow investors and their families to apply for citizenship and in so doing benefit from visa free travel. The objective is to enhance FDI inflows, stimulate revenue and economic growth.

In general, to qualify for the CIPs, countries require that the applicant must:

- Be of outstanding character;
- Have no criminal record;
- Be of sound health; and
- Have a high net worth.

One of the strategies used by various OECS economies is the offer of investment opportunities in the real estate sector, tourism, or other approved sector. In Grenada, for example, applicants must invest a minimum of US\$350,000. The US\$350,000 is geared towards capital investment in approved sectors and qualifies the applicant, a spouse and two dependants for citizenship.

A second route to citizenship is the donation of a minimum amount of money to a government fund. In Grenada, for example, a donation of US\$200,000 to the Grenada National Transformation Fund, geared towards funding projects/programs of national development, is one option for participation in the CIP. The donated amount generally makes eligible for citizenship the main applicant, the applicant's spouse, and two qualifying dependants.

One of the challenges of the CIP is to prevent a race to the bottom in the qualification for citizenship within the various member states. However, already Saint Lucia has reduced the cost of its CIPs to US\$100,000. This is lower than the previously lowest offer by Dominica. Table 2.14 provides summary information on the CIPs in the Caribbean.

It should be noted that the IMF Article IV report 2016 for the St Kitts and Nevis economy highlighted that strong growth in the economy, underpinned by the construction and tourism sectors, was supported by substantial inflows from its citizenship by investment (CBI) programme. The report also noted that large CBI inflows continued in 2015, albeit at a slower pace, on account of increased competition from similar programmes in the Region as well as the temporary impact of reforming the programme. The report further highlighted that CBI inflows increased substantially during 2012 to 2015. An indicator of the success of the program is the number of passports issued. For example, in St Kitts and Nevis the number of passports issued increased from six in 2005 to 2296 in 2015.

Ashram et al. (2015) in a recent review of these types of programmes noted that for small economies, they create potential benefits. However, they also include risks. The benefits are a significant boost to private sector investment, the level of economic activity, and the overall fiscal performance as well. Ashram et al. noted, however, that imprudent management of these flows can result in boom and bust like cycles and lead to a decline in external competitiveness¹².

Table 2.14: The citizenship by investment programme (CIP) in the OECS countries

Country	When started	Qualifications	Investment/donation route	Investment – real estate route
Antigua and Barbuda	2014	A person who is deemed a potential national security risk, a reputational risk or is subject to criminal investigation will be denied citizenship. Must be over 18 years of age	Contribution to the National Development Fund (NDF) of a minimum non-refundable amount of US\$200,000.	An investment of at least US\$400,000 into one of the approved real estate projects to be held for a minimum period of 5 years.
Dominica	1993	Applicants for citizenship must be at least 18 years of age, of good character, without criminal records and who are able and willing to make the required contribution. Applicants must engage an authorised agent who will assist them to prepare the required forms and supporting documents.	Contribution to the Government Fund of a minimum amount of US\$100,000	Purchase of a property to the value of US\$200,000.

¹² Xin Xu, Ahmed El-Ashram and Judith Gold, "Too Much of a Good Thing? Prudent Management of Inflows under Economic Citizenship Programs," *IMF Working Paper 15/93*, (2015). <https://www.imf.org/external/pubs/cat/longres.aspx?sk=42884.0>. The IMF notes that for these programs to be sustainable, a "rigorous due diligence process for citizenship applications is essential to mitigating potentially serious integrity and security risks. All applications should be subject to strong oversight and comprehensive background checks, including establishing a risk profile to identify and assess the criminal background of the applicant. The program should make it clear, by law, that certain criminal convictions are grounds for refusal of the application" (Xin Xu et al. 2015, p.23).

Country	When started	Qualifications	Investment/donation route	Investment – real estate route
Grenada	2013	Applicant is at least eighteen years old, and has enough funds to make the required investment. The source of these funds must be legal. A certificate by a medical practitioner, indicating that the main applicant and his or her applying family members are not suffering from any communicable disease and that they are otherwise in good health and A police certificate.	Contribution to the National Transformation Fund	An investment in an approved project (real estate) in Grenada.
Saint Lucia	2015	Applicant must be at least 18 years of age; provide details and evidence of the proposed qualifying investment; pass a diligence background check along with their qualifying dependents over the age of 16; provide full and frank disclosure on all matters pertaining to the application; and pay the requisite non-refundable processing, due diligence and administrative fees upon application.	Investment in the Saint Lucia National Economic Fund (Applicant applying alone: US\$100,000 Applicant applying with spouse: US\$165,000 Applicant applying with spouse and up to two (2) other qualifying dependents: US\$190,000 Each additional qualifying dependent, of any age: US\$25,000)	Investment in a real estate project (Main Applicant: US\$300,000) Enterprise projects - (Option 1 – A sole applicant (minimum investment of US\$3,500,000) Option 2 – More than one applicant (minimum investment of US\$ 6,000,000 with each applicant contributing no less than US\$1,000,000)) Purchase of non-interest-bearing Government bonds - (Applicant applying alone: US\$500,000, Applicant applying with spouse: US\$535,000, Applicant applying with spouse and up to two (2) other qualifying dependents: US\$550,000, Each additional qualifying dependent: US\$25,000)
St Kitts and Nevis	1984	The country does not accept clients from Iran, Afghanistan irrespective of where they live. The CIP is only available to wealthy or high net worth investors who are capable of making a substantial contribution to the economy of the country and who are able to support themselves financially.	A nonrefundable charity donation of minimum US\$ 250,000 to the Sugar Industry Diversification Foundation (SIDF) for a single person plus payment of processing fees. The total investment amount (including all charges) is approx. USD 290,000 for single applicant and additional fees apply for accompanying family members	Designated recoverable Real Estate Investment with a value of at least US\$ 400,000 plus payment of various registration and other fees. The total investment amount is approximately US\$ 492,000 for a single applicant, and additional fees apply for any accompanying family members

Sources:
<http://www.cip.gov.ag>
<http://cbiu.gov.dm>
<http://www.cbi.gov.gd>
<https://www.cipsaintlucia.com>
<http://stkitts-citizenship.com>

2.3.3 INVESTMENT PROMOTION AGENCIES (IPAS)

2.3.3.1 NATIONAL IPAS

The 1950s and 1960s were the heyday of investment promoting activities in the CARICOM with multiple incentives such as tax holidays, subsidised loans and commercial shells alongside tariff protection measures. In the 1970s, a wave of nationalisation strategies was pursued and many foreign companies were nationalised in some Caribbean countries. In the 1980s, the tide of

economic thinking changed again towards FDI as a consequence of the liberalisation and privatisation policies that were being promoted by the multilateral financial institutions. In this regard, one source noted that “member states have over time made considerable policy changes to create a conducive and enabling environment for foreign investment” (CARICOM 2000¹³, page 219).

From an empirical standpoint, Ni et al. (2015)¹⁴ used firm level and city level data from the Chinese National Bureau of Statistics to assess how IPAs affect intensive (reinvestment) and extensive (new) FDI inflows into China. IPAs were found to promote reinvestment by large firms but not necessarily increase FDI inflows. The authors argue that this may be on account of IPAs’ firm-oriented nature, which implies “that even though IPAs can alleviate information asymmetries between the host country and foreign firms and promote the latter’s investment, the influence does not spread to foreign firms’ source country”¹⁵ (p. 12).

Antwi et al. (2013) in another study investigated the promotional activities of the Ghana Investment Promotion Centre (GIPC) following which they analysed the effects of promotional activities on FDI inflows into the Ghanaian economy. The GIPC was established to promote and facilitate investments in different sectors of Ghana’s economy. The results of the study indicated that the Centre embarked on numerous promotion missions to attract FDI. These missions translated into large inflows of FDI, especially in 2011 when total investment was US\$6.8 billion.

Table 2.15 shows the IPAs in the various Caribbean economies in terms of their main aims and also the key projects being supported. While these IPAs certainly have clear aims and distinct areas of interest which they promote, the returns in terms of FDI inflows recently have not been promising, as since 2008 Caribbean countries have received less FDI (see Table 2.3). Perhaps this points towards the need for:

- a. Greater targeting of foreign investors; and
- b. A better marketing thrust for the Region as a whole under a relevant umbrella institution, a detailed discussion of which is undertaken below;

Table 2.15: Basic aims and key projects targeted by Caribbean Investment Promotion Agencies (IPAs)

Country	Main aims of IPA	Key projects and areas being promoted
Antigua and Barbuda	Antigua and Barbuda Investment Authority – To provide both investment promotion and facilitation services to investors. To launch and expand existing businesses within the economy. Increasing the international competitiveness of the country is another main aim and this is done via advising of the government on issues that matter to investors.	Under the Construct Antigua and Barbuda Initiative the main aims are: 1) to reduce construction costs in an effort to make housing more affordable, to create construction sector employment and to build confidence in the economy via government policy; 2) Mind Your Business course: This course is aimed specifically at the youth and future entrepreneurs in an attempt to teach the important concepts of successfully setting up, managing and operating a business; and 3) The ABIA & Diaspora Investment Partnership Programme (DIP): This project/program is designed encourage foreign direct investment into the economy from Antiguan and Barbadian nationals living throughout the world.
Barbados	Invest Barbados – To secure and facilitate sustainable foreign direct investment and international business that result in increased jobs, technology and skills transfer, foreign exchange earnings and tax revenues for Barbados.	The key areas being promoted are ICT, manufacturing, International banking and insurance, mutual funds, foundations, trusts and ships’ registry.

¹³ Caribbean Trade and Investment Report, Dynamic Interface of Regionalism and Globalisation, 2000.

¹⁴ Bin Ni, Yasuyuki Todo and Tomohiko Inni, “How effective are IPAs? Evidence from China,” Working Paper, 2015.

¹⁵ Ibid., 12.

Country	Main aims of IPA	Key projects and areas being promoted
Belize	Beltraide Investment – Promotion and trade development, the development of Micro and Small Enterprises as well as the facilitation of local businesses. Also on the agenda is the provision of research and technical support to private sector agencies.	BELTRAIDE is comprised of the following units which focus each on specific aims and key projects: 1) Belize Training & Employment Centre: This center provides demand driven, value-based programmes which will sustain and develop the quality industry-specific workforce needed; 2) Belize INVEST is another unit under BELTRAIDE which aims specifically at investors looking to invest and draw them towards Belize. They provide these services to both local and foreign potential investors; 3) EXPORT Belize provides services towards persons looking to export or expand their exporting capabilities. Educating exporters on the different national policies and best practices which contribute to export development are some of the services provided; 4) In an attempt to help the small and medium businesses in the economy, the Small Business Development Centre, Belize (SBDC Belize) was created. It provides customized, needs-based services that would help with the competitiveness and export readiness of businesses.
Dominica	Invest Dominica Authority – Formulating and executing strategies in which Dominica can be promoted as an investment destination;. Informing both local and foreign investors of the legal, financial, and other requirements needed when establishing businesses in Dominica;. Where certificates and approvals are needed, this agency assists investors and potential investors in attaining them; and also provides advice on ways in which the industrial and investment climate can be improved.	Some of the key projects and services of the Invest Dominica Authority include but are not limited to Tourism Investment, Water Investment, Manufacturing Investment, as well as the Citizenship by Investment Program.
Grenada	Grenada Industrial Development Corporation (GIDC) – To promote local and foreign investment, facilitate and strengthen entrepreneurial development within the growth sectors of Grenada’s economy. GIDC strives to contribute to Grenada’s socio-economic development by providing superior investor facilitation and entrepreneurial development services.	Investment opportunities in Grenada are directly related to the country’s resource endowment of sand, sun and sea. Grenada’s natural resource base includes white sand beaches, natural bays, exotic reefs, historic dive sites, waterfalls, volcanic lakes and ponds, rainforest, tropical flora and fauna, mangrove forests and rich fertile soil. In addition to its tourism sector promotion, areas such as ICT/Business outsourcing processing are promoted as well as the sale of land for tourism development by building of hotels for example.
Guyana	Guyana Office for Investment (GO-Invest) – To promote and assist local and foreign investors with private sector investments and exports that fall within the boundaries of the laws of the country’s investment and export strategies.	Investor projects in Guyana include large-scale agricultural cultivation of the following products: avocados, passion fruit, citrus, cashew nuts and quinoa. Opportunities exist in aquaculture, specifically freshwater farming of tilapia, hassar and tiger prawns and also mega dairy farms capable of producing fresh milk, but also butter, cheese and yogurt. Sectors such as agriculture & agro-processing, light manufacturing services, energy, tourism, forestry/wood products, information & communication technology and mining are also marked for investment opportunities.
Haiti	The Center for Facilitation of Investments (CFI) – To promote Haiti to potential investors and to persuade these investors to take advantage of the opportunities; and to help in attracting investments that would help diversify and develop the economy.	The major investment sectors in Haiti include Apparel and Textiles, Tourism, Agri Business and BPO and IT.

Country	Main aims of IPA	Key projects and areas being promoted
Jamaica	JAMPRO – promotes business opportunities with regards to investment and export from both private sector firms in Jamaica and foreign firms in Jamaica. JAMPRO also aims to help improve the Jamaican environment for business, and develop new industries.	Some key areas and projects that currently exist in Jamaica include; Logistics and Infrastructure (Global Logistics Hub Initiative, Caymanas Track Limited, Caymanas Economic Zone); Tourism (Fort Clarence Beach, Long Bay Beach 2, Reach Falls); Agriculture (Commercial Assets of Cocoa Industry Board), Housing Development (Montpelier Residential Lands, Johnson Hill, Mount Edgecombe); and Financial Services (International Financial Services Centre).
Saint Lucia	Invest Saint Lucia – Seeking out new investors and promoting Saint Lucia as the premier location for investing. Another aim is to create a National Investment Agency with which Invest Saint Lucia has partnered with the Government to develop.	Key sectors geared for investment include Tourism, Infrastructure and Manufacturing.
St. Kitts	The St. Kitts Investment Promotion Agency (SKIPA) – has been the investment agency in St Kitts in control of attracting and promoting FDI into the country. It also aims at being the agency which deals with assisting potential investors with information and opportunities for investing in St. Kitts.	Key investment opportunities exist in the areas of Tourism, Information Technology, Financial Services, International Education, Light Manufacturing, Renewable Energy and Agriculture.
St. Vincent	Invest SVG – To promote investment, export development and business facilitation and research services to potential investors in order to promote sustainable economic growth.	Investment opportunities exist in the areas of International Financial Services, Information and Communication Technology, Tourism, Agribusiness, Light Manufacturing and Creative Industries.
Suriname	Investment and Development Corporation Suriname (IDCS) – The IDCS is committed to external financing and aims to promote sustainable development in the Surinamese economy. It does so by attracting investment with the intention to expand economic diversification, the national income, employment, rural and regional development, and to strengthen the balance of payments.	Given the skewed production structure of Suriname, the IDCS focuses on the development of sustainable productive sectors such as agriculture, forestry, sustainable mining, renewable energy, construction industry, services (especially tourism) and import-based industry.
Trinidad and Tobago	InvesTT – is the first point of contact for investors hoping to invest in the TT economy, assisting investors to set up, grow, diversify and take their businesses further by providing resources and services such as delivery of key sector information, real estate surveys, market research, investment opportunity identification and even value chain advisory.	InvesTT promotes the non-energy sectors for investment. Some of these sectors include Aviation Services, Creative Industries, Fishing and Fish Processing and Maritime Services.

2.3.3.2 CARIBBEAN ASSOCIATION OF INVESTMENT PROMOTION AGENCIES (CAIPA)

CAIPA was formed in 2007 with the objective of increasing the visibility of the Region for FDI and to facilitate joint efforts in marketing the Region as well as to promote customised training for its members and to promote and develop cooperation amongst the region's IPAs.

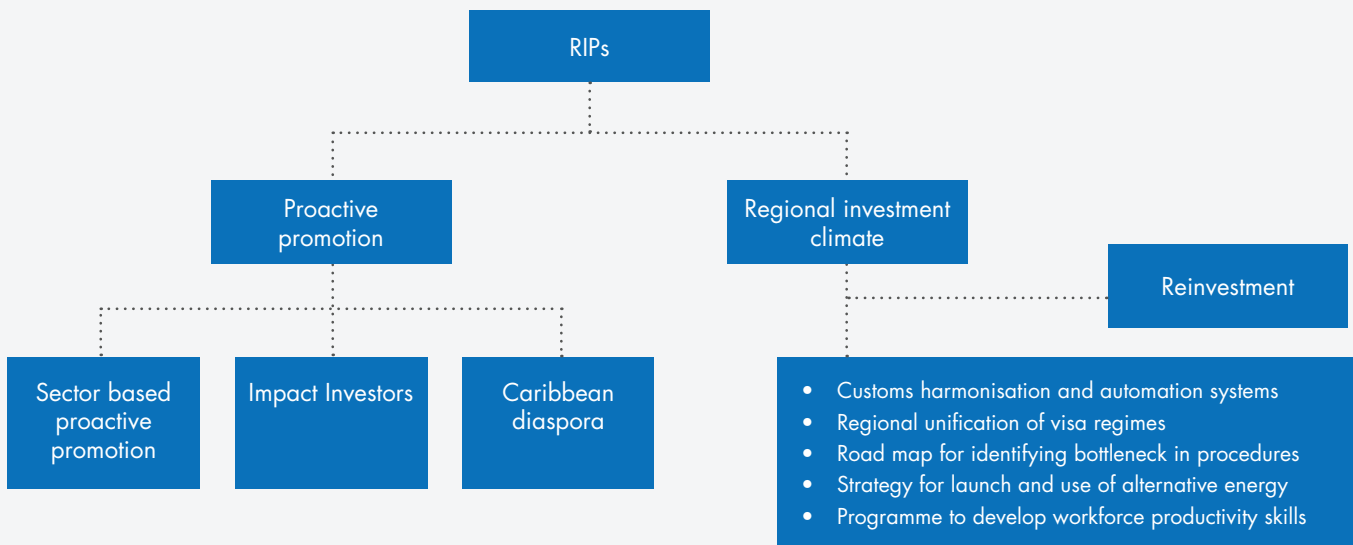
Against this back drop, Caribbean Export, as part of its mandate to improve investment promotion in the region, retained the consulting firm Consultaria Integral Financera (CIF) to design a regional investment promoting strategy (RIPS). The RIPS is an

opportunity through which the Caribbean can attract more FDI.” The RIPS comprises two main components.

- (i) Proactive Promotion; and
- (ii) Regional Investment Climate.

The RIPS strategy addresses not only CAIPA’s strategic plan for the period 2014-2018 but also some of the other constraints and challenges that IPAs in the Caribbean face, such as a limited flow of relevant research information as regards investors interested in the region. The structure of activities of the RIPS is presented in Figure 2.6 below.

Figure 2.6: Schematic outline of RIPS



2.3.4 FDI AND FINANCIAL INCENTIVES

In order to attract FDI, some economies offer a range of incentives, including tax holidays, low income/corporate tax, import and export duty exemptions and subsidies for the initiation or continuation of an investment project (de Groot and Ludena, 2014). By the nature of these incentives, they give preference to foreign investors and as a result are discriminatory to domestic investors. Indeed it is not impossible for the cost of the incentive support to attract FDI to outweigh the various benefits realised from FDI inflows. Specifically, tax incentives are costly to administer, and when incentives are offered to some and not others, they affect the efficient allocation of capital in the economy. The economy also loses revenues from tax concessions or exemptions. It has also been argued that incentives tend to trigger social costs linked to corruption, particularly when the tax incentives are administered with significant leeway for discretion (Bain, 1995).

Sosa (2006) and Nassar (2008) examined the effect of taxes on investment in Caribbean countries by calculating the marginal effective tax rate (METRs) and average effective tax rate (AETRs)¹⁶. Sosa (2006) found that the METRs for the countries of the ECCU are either zero or in some cases negative, in which case they are subsidies. Nassar (2008) calculated average effective tax rates to investigate the impact of corporate income taxes on the tax base of 15 Caribbean countries. He found that the tax bases of these economies were gradually eroded between 1985 and 2005, as economies engaged in an increasingly fierce tax competition in the context of more mobile capital. This gives some cogency to the argument for regional collaboration.

Chai and Goyal (2008), estimated the cost of revenue foregone associated with tax incentives. In their study, they found that ECCU countries could gain up to 9.1% of their GDP, should tax concessions be removed. The concessions granted are usually on import-related tax exemptions and corporate income tax. Perhaps the most important tax exemption is from taxes on imports of capital goods¹⁷.

Note, however, that because incentives have been widely used, potential investors, should they be removed from preferential

¹⁶ The METR is defined as the ratio between the difference in the expected pre-tax real rate of return on a new marginal investment project which is net of true economic depreciation and the after-tax real return to the saver who supplied the funds for the investment, expressed over the pre-tax rate of return.

¹⁷ Jingjing Chai and Rishi Goyal, “Tax Concessions and Foreign Direct Investment in the Eastern Caribbean Currency Union,” International Monetary Fund Working Paper (2008) <http://www.imf.org/external/pubs/cat/longres.aspx?sk=22456>. The granting of tax concessions involves a considerable amount of discretion by the Minister responsible for such industries and as one source notes, “the laws do not provide detailed procedural rules as specific criteria for granting concessions and in practice they have discretion in all aspects of a decision including for example whether the legal requirements are fulfilled in an application and what are the specific terms of the concession” (Chai and Goyal, 2008 page 6.)

incentives, would suffer a cost disadvantage. Hence incentives tend to be self-perpetuating¹⁸. Derivative of this is a type of “race to the bottom”, in providing incentives in a competitive environment.

Small states argue that they need to offer these tax incentives in order to attract FDI in a very competitive global environment. Caribbean countries compete not only with the rest of the world for FDI but also with each other. In an attempt to minimise a race to the bottom, Caribbean countries signed in 1973 the Harmonisation of fiscal incentives to the industry/manufacturing sector.

2.4 STRENGTHS AND WEAKNESS OF EXISTING FRAMEWORK

2.4.1 STRENGTHS

The Caribbean Region has a well-established and well positioned tourism product which has benefited substantially from FDI inflows. Some commodity-based economies such as Trinidad and Tobago and Suriname have also been able to attract a significant amount of foreign direct investment and Guyana, which recently announced several massive oil discoveries, is set to attract a considerable amount of FDI inflows. Also, the citizenship by investment programme in the OECS, risks notwithstanding, has been quite successful in attracting FDI. The rule of law indices and the voice and accountability index associated with the WWGI have improved and this change has to be built on and extended to the other governance indicators for which the mean value across the Caribbean declined. Additionally, the implementation of CAIPA points to further strengthening of the regional institutional infrastructure for attracting FDI. Beyond the foregoing, however, the study points to the need for substantial improvement in many regulatory and policy areas that go beyond the establishment of CAIPA and the strengthening of IPAs.

2.4.2 WEAKNESSES

As indicated by the foregoing discussion on regional performance with respect to the EOBD indicators, Caribbean countries need to improve the regulatory framework with respect to business in order to narrow the competitiveness gap between themselves and other economies. The performance by CARICOM economies on the logistics performance index is lower on average for the Caribbean than other regions of the world. Indications are that the region’s weak performance with respect to logistics (LPI) is compromising the level of FDI flows to the region. Indications are also that weak governance as shown by both the CPI and WGI indicators across the Region have also negatively affected the environment for attracting FDI inflows. Additionally, tax competition among Caribbean countries as, for example, in the case of the citizenship by investment programme (CIP), is leading to a downward spiraling of standards and a race to the bottom. Deficiencies in the current institutional infrastructure within countries for attracting FDI as recognised by the recent establishment of CAIPA, the neglect of opportunities for expanding investments by foreign companies already operating in the Region and inadequate attention to substantial potential in the diaspora market, signify the need for review and refocusing of institutional and policy efforts.

There is also a substantial deficit in the implementation of regional integration initiatives which can lead to making the Region much more attractive by increasing market size, an important determinant of FDI inflows as noted in the introduction. However, governments in the Region do not appear to be committed to reaching consensus on many important regional initiatives. Additionally, many policy proposals agreed upon are not implemented.

2.5 COMPONENTS OF AN IMPROVED INSTITUTIONAL, POLICY AND REGULATORY FRAMEWORK FOR ATTRACTING FDI

2.5.1 INSTITUTIONAL FRAMEWORK

Investment and CAIPA: Regional harmonisation of investment concessions in the Caribbean Region is needed so that a race to the bottom, which results in each country losing considerable amount of revenues, is avoided. In this regard, there will be a need for closer cooperation amongst Caribbean countries perhaps through CAIPA. CAIPA is not fully used, nor are the IPAs according to several studies, including Loewendahl and Gutierrez (2013).

Better marketing by the IPAs and CAIPA can help to enhance the amount of new investments and the level of re-investment by existing MNCs. Loewendahl (2015) in a study entitled “The Development of a Reinvestment Programme for CAIPA” emphasises that existing investors are an important source of investment funds as well an avenue through which valuable feedback on the investment process is realised. In this regard, strong national IPAs are required to facilitate and to channel feedback from existing foreign investment and the policy making entities to improve the national business climate and by extension, the regional

¹⁸ Ibid., 7. “There is the possibility in this type of setting to create incentive dependence and as one source notes, the investment regimes become anchored around the granting of incentives not only for existing ones. Such incentives become quasi-permanent subsidies for the operation of firms” (Chai and Goyal, 2008 page 7).

business climate. Loewendhal (2015) also notes that “based on estimates provided by 6 IPAs, reinvestment accounts for 40% of FDI projects”. Further, Lowendhal and Gutierrez (2013) and Lowendhal (2015) both indicate a very strong re-investment capacity amongst existing MNCs. Given the foregoing, CAIPA and its associated IPAs should develop sophisticated after-care programs for existing foreign investors to motivate re-investment.

Of note is that 90.8% of the companies surveyed indicated that they had never heard of CAIPA. This needs to change as CAIPA has the potential to play a crucial role in the attraction of FDI and the promotion of reinvestment by existing multinational companies. In this regard, CAIPA’s website emphasises its intent to increase the visibility of the Region for FDI; to promote joint marketing opportunities; and to improve on customised training for its IPAs. Policy makers would therefore need to work hard on increasing the visibility and functional integration of CAIPA throughout the region.

2.5.2 REGULATORY FRAMEWORK

Improving region wide EODB: There needs to be a combined national and regional effort to improve the region’s ease of doing business (EODB) rankings to make more attractive the general investment climate and encourage movement away from policies that are largely subsidy driven.

Caribbean countries should seek the support of donor agencies in this regard. They should also consider a regional collaborative approach similar to that used by APEC (Asia-Pacific Economic Cooperation). In 2009, the APEC Ease of Doing Business (EoDB) Action Plan was launched. Five priority areas were identified for regulatory reform in APEC economies, namely: starting a business; getting credit; trading across borders; enforcing contracts; and dealing with permits. The overall aim of the action plan was to make it 25% cheaper, faster and easier to do business within APEC economies by 2015, with an interim target of a 5% improvement by 2011. Specifically, the action plan consisted of a number of awareness-building workshops/seminars as well as capacity building programmes, which were carried out with the main focus being on the necessary regulatory reforms in the five priority areas listed above. Training initiatives for the group as a whole were led by those member countries which had demonstrated competence in the specific areas. Indeed for Caribbean countries, adoption of the changes Jamaica has implemented in advancing its own EODB index ranking in the last few years is worth considering.

2.5.3 POLICY FRAMEWORK

Accelerating CSME implementation and other market expansion initiatives: Accelerating the process of regional integration under the CSME will help to augment market size. Implementation of the CSME’s intraregional factor mobility regime would reduce bottlenecks in the supply of skills, and augment intraregional movement of capital and inflows of FDI. Furthermore, one of the propositions from the RIPS is that of a single visa and work permit system for foreign nationals to the region. Such an intervention will permit further free movement of labour across member states. The foregoing initiatives can help to increase the likelihood of a foreign entity making multi-country investments. Additionally, one of the most important findings of the Loewenthal and Gutierrez (2013) study is that “policies to further integrate and expand Cariforum will increase FDI to the regime”. This provides a strong basis for Caribbean countries to not only reinvigorate the CSME process, but also continue implementation of Cariforum agreements.

Furthermore, international investors would be more willing to invest in the Region if strong bilateral agreements are in place, such as deeper ties with South or Central America which would allow investors that establish enterprises within the Caribbean to have access to these larger markets.

Strengthening of governance: Reviews of the CPI and the WGI indicate that, in general, corruption, the perceptions of corruption, and weaknesses in governance have an impact on the level of FDI inflows. While democracy in the Caribbean seems well established (voice and accountability), in other areas of good governance the Caribbean falls short of expectations. Citizen insecurity has become a major issue and is generally cited by businesses in the Region as a major disincentive and a significant portion of the cost of doing business. The importance of the CPI and WGI indicators and the statistical significance on their impact on FDI clearly point to the need for a significantly broader perspective on the policy requirements for enhancing FDI inflows beyond fiscal incentives and the establishment of strong investment promotion agencies.

Removing tax competition: Within the Region there needs to be a greater focus on removing tax competition. There are benefits for Caribbean economies from not implementing any type of race to the bottom with respect to taxes as this would adversely affect their already strained fiscal circumstances. The revised Treaty of Chaguaramas (Article 4.4) notes that the pursuit of fiscal policy harmonisation and coordination within the CSME arises because there is a need to level the playing field as regards taxes, so that the likelihood of tax arbitrage is lowered. It should be emphasised also that focus on institutional, regulatory and policy reforms especially within the context of regional cooperation would likely reduce the need for tax competition.

Regional incentives working group: In the study on the Benchmarking of Investment Incentives in CARIFORUM by Investment Consulting Associated (ICA 2013), it was pointed out that a regional incentive working group can be formed to offer advice to Caribbean economies on the type of incentives member states should consider. This incentive working group, it was argued, could be part of CAIPA and can serve as a critical link around which Caribbean states can gain access to information regarding incentives and appropriate consultation. In a supporting study on investor perception in CARIFORUM by Loewendhal and Gutierrez (2013), the stated intention was to “increase understanding of the factors that have and will influence the investment decision of foreign and local investors in the Region and to provide an analysis of the current and future trends and prospects, given the perception of the regional investment climate”¹⁹ (page 2). From a foreign direct investment perspective, three principal factors according to the survey, determined where firms invested in CARIFORUM countries. These are: access to the regional CARIFORUM market; access to national country markets; and political and economic stability.

The investor perception study also asked companies about the role of incentives in the site selection process. Significantly, 58% of the firms surveyed cited income tax exemption as one of the most important incentives influencing the investment decision of firms with the majority of companies citing repatriation of capital, profits and dividends. Another factor is that of preferential trade agreements, as 45% of the companies surveyed indicated that they invested in a country as part of a CARIFORUM regional strategy.

The Caribbean diaspora: The Caribbean Region has a sizeable population abroad. A significant portion of the diaspora is both knowledgeable and affluent. However, for enhanced flows of resources from the diaspora to the region, policy makers in CARICOM would need to consider making a number of interventions, including the establishment of an investment friendly legal framework.

Managing the resource curse in the commodity-based economies: Guyana, Trinidad and Tobago, Belize, and Suriname need to closely guard against the further entrenchment of the “resource curse” within their economies, and they also need to manage the voracity effect²⁰. A major drawback associated with economies that are heavily dependent on natural resources is the resource curse. When an economy is affected by the resource curse it tends to experience lower growth rates than other countries that are not as resource endowed. To break the resource curse, resource abundant economies in the Caribbean such as Guyana, Trinidad and Tobago, Belize, and Suriname need to strongly consider addressing their relatively weak institutional frameworks. More specifically, and as the discussion in the body of the chapter illustrated, weak institutions promote the spread of the Dutch Disease. And as the ease of doing business index, the corruption perception index and the governance indices all showed previously, these commodity exporting countries need to make significant improvements. Managing the resource curse in commodity producing Caribbean countries is critical, as it will open up opportunities for FDI in both the natural resource and other segments of the economy.

2.6 CONCLUSION

The foregoing analysis points to four very important conclusions with respect to the enhancing of FDI inflows into the region. First, while in the past substantial attention has focused on national investment promotion agencies and, more recently, CAIPA, indications are that much more will need to be done beyond the strengthening of the institutional framework. Second, a much more robust regulatory and policy environment across the Region is needed in order for the Region to be competitive internationally with respect to the attraction of FDI. Third, also critical will be the implementation of the regional integration agenda, given the limitations of small size. Finally, also important will be the pursuit of integration initiatives with other neighbouring countries in the region.

¹⁹ Henry Loewendhal and Fernando M. Gutierrez, *Investor Perception Survey of CARIFORUM*, Report for the Caribbean Export Development Agency, 2013.

²⁰ The ‘voracity effect’ refers to the situation where as national income increases, political pressure for government expenditure increases and fiscal prudence is relaxed leading to reduced growth rates as a result of a weak legal, political and institutional framework.

3. CHALLENGES TO ACCESS AND AFFORDABILITY OF INTERNET USE BY MICRO, SMALL & MEDIUM ENTERPRISES (MSMEs) IN CARIBBEAN COUNTRIES

3.1 INTRODUCTION

The chapter examines the challenges of internet broadband access and affordability by Micro, Small and Medium Enterprises (MSMEs) in the Caribbean Region, and discusses measures that could be taken to tackle and overcome these challenges using ICTs. In the course of this analysis, the chapter will also look at the roles being played by broadband policy-making, regulation and infrastructure development in the efforts of countries to attain the overall goal of improved economic growth and productivity in the Region. It discusses MSMEs in regional and global perspectives and explores, inter alia, the prospects of the knowledge economy in the Caribbean and recommendations for its enhancement.

The term broadband is commonly used to describe internet connections that are significantly faster than earlier dial-up technologies. The ITU Standardisation Sector (ITU-T) defines broadband as a transmission capacity that is faster than primary rate ISDN, at 1.5 or 2.0 megabits per second (Mbit/s). However, this definition is not strictly followed. The OECD considers broadband to correspond to transmission speeds equal to or greater than 256 kilobits per second (kbit/s). Broadband includes several high-speed transmission technologies such as: Digital Subscriber Line (DSL), Cable Modem, Fibre, Wireless, Satellite and Broadband over Power lines (BPL).

The internet forms the hub of a diverse set of services and applications broadly described as Information Communication Technologies (ICTs). According to the World Bank, ICTs consist of “the hardware, software, networks and media for the storage, processing, collection, transmission and presentation of information (voice, text, data, and images) as well as related services”.²¹ A critical part of the required infrastructure for effective ICT usage is the development nationally and within companies of relevant and modern information infrastructure. This refers to the telecommunications and information networks through which information is transmitted, stored and delivered, as well as the embedded technologies and associated know how.²² The World Bank (2017) notes that “developing countries can harness the transformative power of ICTs to provide more efficient services, catalyze economic growth, and strengthen social networks.”²³

It warns, however, that “access to the internet through mobile or fixed broadband remains prohibitively expensive in many countries where lack of ICT infrastructure and regulatory bottlenecks still hamper broadband development.”²⁴ According to the Bank, the cost of residential fixed-broadband services in some cases amounts to about 30% of the average monthly Gross National Income (GNI) per capita in certain developing countries, compared to just 1.75% of the average national income in many developed countries. As Figure 3.1 shows, this extreme disparity is not prevalent in the larger Latin American and Caribbean (LAC) countries, where the figure is closer to the global target of 5%, which is still regarded as unaffordable in many countries and regions, with notable exceptions. Within Caribbean Community (CARICOM) countries, there is significant discrepancy in price as a percentage of GNI.

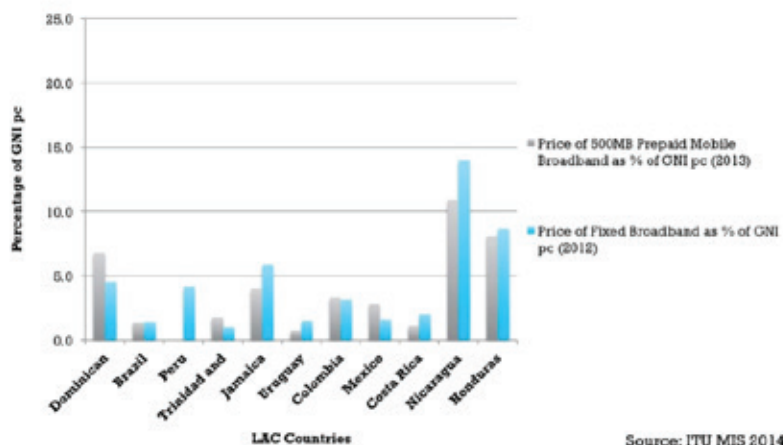
²¹ World Bank, *Information and Communication Technology: a World Bank Group Strategy*, 2002, 4. <http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/SSPwithAnnexes.pdf>

²² Ibid.

²³ World Bank Overview. Last Modified April 12, 2017, p.1. <http://www.worldbank.org/en/topic/ict/overview>.

²⁴ Ibid.

Figure 3.1 Price as percentage of Gross National Income (GNI) per capita for mobile and fixed broadband



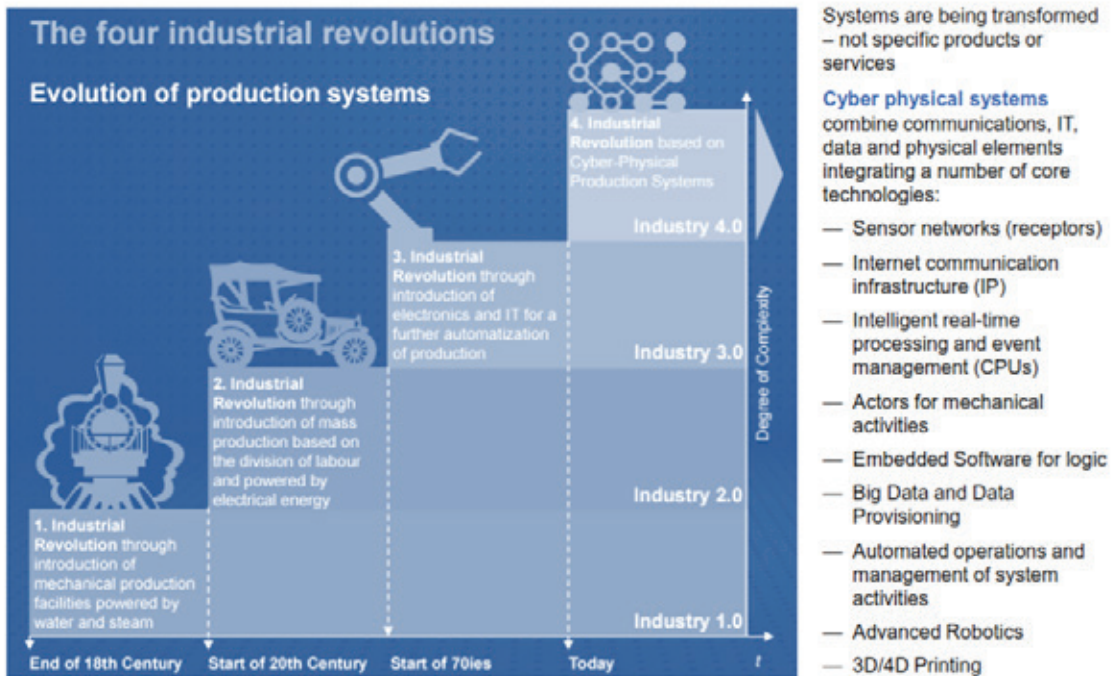
In this context, the International Telecommunication Union (ITU) at its 2014 plenipotentiary conference held in Busan, South Korea, emphasised that the internet had become a vital development tool. In its *“Connect 2020 Agenda,”* the ITU puts forward its four strategic goals: *economic development, social inclusion, environmental protection and innovation and partnership.* These initiatives are meant to both reinforce and facilitate universal and affordable access to the internet in least developed countries by 2020, as one of the targets of the UN’s Sustainable Development Goals (SDGs). SDG nine mandates the global community to “significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020”. These goals are being pursued at a time when ICTs are increasingly being regarded as a new factor of production in the ‘*Fourth Industrial Revolution*’.²⁵

The World Economic Forum describes the Fourth Industrial Revolution (4IR) as the advent of cyber-physical systems involving entirely new capabilities for people and machines. According to the Forum, these capabilities are reliant on existing or evolving technologies and infrastructure, but deployed in entirely new ways, with technology becoming more embedded within people and societies. The paradigm of the Internet of Things (IOT) builds on previous transformative technologies and eras. “The First Industrial Revolution”, the Forum notes, “is widely taken to be the shift from our reliance on animals, human effort and biomass as primary sources of energy to the use of fossil fuels and the mechanical power this enabled. The Second Industrial Revolution occurred between the end of the 19th century and the first two decades of the 20th century, and brought major breakthroughs in the form of electricity distribution, both wireless and wired communication, the synthesis of ammonia and new forms of power generation. The Third Industrial Revolution began in the 1950s with the development of digital systems, communication services and rapid advances in computing power, which have enabled new ways of generating, processing and sharing information.”²⁶

²⁵ Klaus Schwab. *The Fourth Industrial Revolution: What it means, how to respond.* (World Economic Forum, 2016), 2.

²⁶ Ibid.

Figure 3.2 – The four industrial revolutions



Source: Accenture

The 4IR builds on cyber physical systems to create social and economic applications promised by the preceding information age (see Figure 3.2). 4IR is “blurring the lines between the physical, digital, and biological spheres”, says Schwab of the World Economic Forum. It is heavily reliant on digital application in the delivery of services, including the replacement or enhancement of mechanical and physical tools by software programmes that control algorithms and robotics. These can together have a major disruptive effect on pre-existing norms reminiscent of Schumpeter’s ‘creative destruction’ paradigm. Schumpeter, drawing on prior works by Marx, described a process of industrial mutation that incessantly revolutionizes the economic structure from within, by destroying old systems and creating new ones.²⁷

Productivity systems and service providers in this 4IR are regarded as being more integrated into and adaptable to intensive and high value productivity needs, making redundant certain analogue technologies and systems. However, the technologies of 4IR can also contribute to inequality of access, increased start-up costs and have the potential to drive up unemployment if not carefully managed. Reaping the benefits of the 4IR requires universal and reliable high speed internet access for innovative individuals, small enterprises, large firms and governments. Without adequate broadband access, many households and some developing countries will not be able to fully participate in an increasingly mobile and digitally-based economy. The World Bank reminds us that, of a global population of 7.4 billion people, more than 4 billion still do not have access to the internet, with 90% of these persons living in developing countries. It should also be noted that only a third of the global population or about 1.1 billion people had access to high-speed internet in 2016.

Nonetheless, most countries around the world, including those in the Caribbean have been taking steps to enable their populations to participate more in this emerging techno-global eco-system. This engagement with innovation can directly affect regional economies through creation of new products and services, generation of new jobs and industries, contribution to Gross Domestic Product (GDP), social progress, workforce transformation and business innovation. Small enterprises and business start-ups represent the most broadly-based potential beneficiaries of high speed internet, mobile technologies and the *Internet of Things*.

In larger developing countries such as Nigeria, Egypt and Indonesia, micro-enterprises, operating with fewer than 10 persons, generate 38% of the GDP. According to the World Bank (2011), similar small businesses create a disproportionate share of new jobs, generate new ideas, new business models, and new ways of selling goods and services. In the Caribbean, the MSME sector has been a substantial contributor to economic and social development, representing more than 50% of regional enterprises, and over 50% of GDP.²⁸ Despite this, MSMEs in the Caribbean Region report making only limited use of broadband technology. The main reason is indicated as serious cost constraints that deny many regional MSMEs the putative advantages of faster economic growth and more efficient business development attributed to wider and entrenched broadband business usage.

²⁷ Joseph Schumpeter, *Capitalism, Socialism and Democracy* (New York: Harper and Brothers, 1942), 82-83.

²⁸ Caribbean Development Bank, *Micro-small-medium Enterprise Development in the Caribbean: Towards a New Frontier*. (Bridgetown, Barbados, 2016), 6.

3.2 INTERSECTING ICTs AND ECONOMIC GROWTH

Economic growth is regarded as a measure of the increase in the capacity of an economy to produce goods and services from one period of time to another. It can be measured in nominal or real terms, the latter being adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP).

The McKinsey Global Institute (MGI) indicated as early as October 2011 that the Internet accounted for a significant and growing portion of global GDP. MGI indicated that internet-related consumption and expenditure, if measured as a sector, was bigger than agriculture or energy. The International Telecommunications Union (ITU), for its part, noted that internet broadband had become a key priority of most countries in the 21st century because of its transformative power as an enabler of economic and social growth, making ICTs an essential tool for empowering people.

Several analysts have studied and offered correlations between economic growth and ICT prevalence in an economy. Brynjolfsson (1993) in the paper "The Productivity Paradox of Infrastructure Technology: Review and Assessment" is among the first group of scholars to investigate the influence of information technology on economic productivity. Several of the early studies were triggered by Robert Solow's quip in 1987 that "you can see the computer age everywhere but in the productivity statistics" (Solow 1987, 36). This became widely known as the Solow Productivity Paradox. It derives from the apparent contradiction in the 1970s and 80s between dramatic advances in computer power and increasing investment in IT on the one hand, and slow productivity growth in that same economy, on the other. While the computing capacity of the U.S. increased by over 100% in that period, labour productivity growth slowed from over 3% in the 1960s to roughly 1% in the 1990s. It was on this basis that Solow offered his remark, in line with other economists such as Stephen Roach and Paul Strassman.

Using a relatively narrow parameter a decade later, Waverman, Meschi and Fuss (2005) examined the diffusion of telecoms, particularly mobile phones in developing countries, and found that these technologies had a positive and significant impact on economic growth, which they estimated at almost twice as large an effect in developing countries compared to developed economies. It was argued that ICT diffusion affected economic development and growth by improving the quality of decision-making by economic agents, by raising output levels, creating economy-wide demand for goods and services and by lowering costs of production (Vu 2011; Sassi and Goaid 2013; Khayyat et.al. 2014; Shahiduzzaman, and Alam 2014).

Vu (2011) found in a cross-country study of 50 ICT-intensive countries that ICTs do contribute to economic growth, but the effects are dissimilar across countries. The variance is explained by differences in educational development, institutional environment, economic openness and language competence, particularly fluency in English. In the context of those large economies, Vu found that the weighted average contribution of ICT to output growth rose from 0.27 percentage points in the 1990-1995 period to 0.56 during the 1995-2000 period for the G7 countries. For non-G7 countries it grew 0.18 to 0.41; it increased from 0.15 to 0.34 for countries in the developing Asia region and from 0.12 to 0.27 for Latin America.

Vu (2011) also cites several other research studies that have identified the specific mechanisms through which ICTs impact on economic growth. Those studies suggest that economies with higher income levels and higher levels of productivity have a greater incentive to invest in ICT. This finding while establishing endogeneity, remains insufficient to establish causality: does economic growth precede ICT growth or is ICT growth the precursor to economic growth? He argues that high ICT investments can contribute to economic growth, since private investors view more positively those institutional contexts in which their investments are better protected by strong institutions and the rule of law. In this regard, Rodrik (2003) argued that the quality of institutions is even more important than openness and other factors as a determinant of growth.

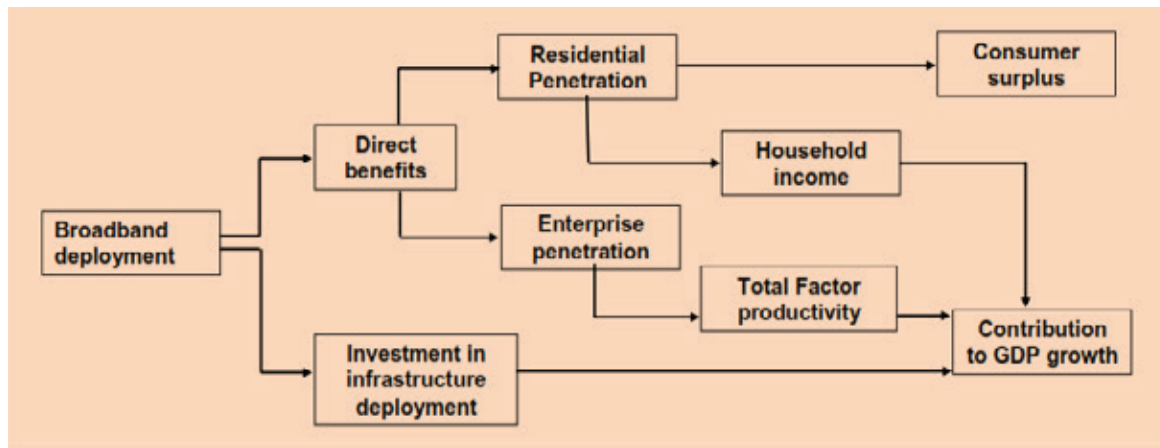
In the context of developing countries, Sridhar and Sridhar (2006) used a three stage least squares model to estimate the effects of telecommunication infrastructure on economic growth in developing countries. But the key finding of relevance in this study was the identification and estimation of reverse causality between economic growth and telecoms development. The authors noted that "estimates of the demand for telecom infrastructure, when one takes into account all telephone lines, show the dominance of traditional economic factors – income and price. The income elasticity of demand for telecom services is positive and greater than 1 (being 1.15 and 1.14 respectively and with fixed effects), indicating elastic demand. The magnitude of this becomes larger when one uses subscription prices rather than revenue per user. This implies that the reverse causation we suspect exists between telecom and economic growth indeed is true." (Sridhar and Sridhar 2006, 105)

Gordon (2012), a leading American macroeconomist, in a paper titled "Is US economic growth over? Faltering Innovation Confronts the Six Headwinds" questioned the putative productivity benefits of ICTs to the US economy. Using the organizing principle of industrial revolutions, his critique suggested that the innovations that brought about the first and second industrial revolutions substantially changed the labour saving and technological calculus for those economies, thereby leading to real productivity gains. He argues that the new innovations in the third industrial revolution are not labour saving, but instead are merely serving to provide convenience and mobility to consumers; conveniences that actually take place primarily during non-work hours, thereby side-stepping being a contributor to economic productivity. However, Draca, Sagun and Reenen (2006) presented a very detailed analysis on the ICT and productivity intersect, and found statistically significant evidence of the productivity inducing capabilities of ICTs both within a macro and micro economic setting.

3.3 BROADBAND AND PRODUCTIVITY

In contrast with Solow’s 1980s pessimism about investments in computing and the perceived low corresponding productivity outcomes, the ITU (2012) asserts that the economic productivity impact of broadband manifests itself through four types of effects. The first effect results from the construction of broadband networks. Somewhat similar to any infrastructure project, the deployment of broadband networks creates jobs and has economy wide multiplier effects. The second effect results from the “spill-over” externalities, which impact both enterprises and consumers. The adoption of broadband within firms leads to a multifactor productivity gain which in turn contributes to growth of GDP. Beyond these direct benefits, which contribute to GDP growth, residential users receive a benefit in terms of consumer surplus, defined as the difference between what they would be willing to pay for broadband service and its actual price (Figure 3.3). This last parameter, while not being captured in the GDP statistics, can be significant, as it represents benefits in terms of enhanced access to information, entertainment and public services.

Figure 3.3 – Broadband Economic Impact



Source: ITU 2012.

Consistent with the finding of the ITU and others, a study conducted in thirteen G8 countries in 2011 by the McKinsey Global Institute showed that the internet exerts a strong influence on economic growth. The use of the internet accounted for on average 3.4 per cent of GDP across the large economies that make up 70 per cent of the global GDP. In the two more advanced states of Sweden and South Korea, which were included in the study, the Internet accounted for 10% of GDP growth over the past 15 years. Over the five-year period 2007 – 2011, the internet’s contribution to GDP growth in these countries doubled to 21%. According to GSMA (2016), the use of mobile technologies and services across the Latin America and Caribbean Region generated \$255 billion in economic value in 2016, equivalent to 5% of the Region’s GDP.

In 2011, Ericsson published its own study ‘Socioeconomic Effects of Broadband Speed’. This study was a follow on to its 2010 report ‘Socioeconomic Impact of Broadband Network Investments’, which measured the economic effects of broadband penetration. Part 1 of the 2011 study featured a macroeconomic level investigation of the impact of broadband speed on national economic growth in 33 Organisation for Economic Co-operation and Development (OECD) member states. The main findings were that a doubling of broadband speeds for an economy can add 0.3% to GDP growth, in a simulation relative to the base year 2008. The benefits to faster broadband speeds for the member countries were categorised as:

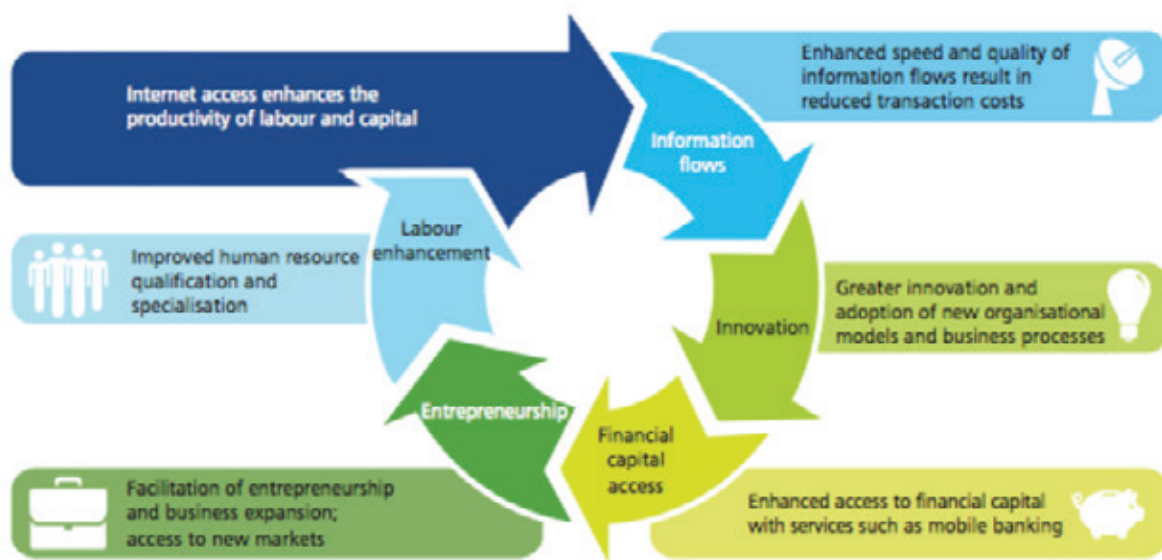
- Economic effects, including increased innovation and productivity in business;
- Social effects, including better access to services and improved healthcare; and
- Environmental effects, including more efficient energy consumption.

Part two of the 2011 Ericsson study featured a microeconomic (household) level investigation which assessed the impacts of broadband access and upgrades on household income. The microeconomic study analysed data from eight OECD countries, as well as Brazil, India and China (BIC), investigating the similarities and differences between them. The main findings of the study were reported as follows:

- In OECD countries, gaining four Mbps of broadband increases household income by USD 2,100 per year,
- In BIC countries, introducing a 0.5 Mbps broadband connection increases household income by USD 800 per year,
- In OECD countries, upgrading from 0.5 Mbps to four Mbps increases income by about USD 322 per month,
- In BIC countries, upgrading from 0.5 to four Mbps increases income by USD 46 per month.

The results from both the macroeconomic and microeconomic studies support the view that both broadband availability and enhanced speeds can effectively drive growth in an economy. Faster broadband speed boosts personal productivity and allows for more flexible work arrangements. Higher speed also opens up possibilities for more advanced home-based businesses as a replacement, or complement to an ordinary job. It was argued additionally that higher broadband speeds enabled people to be more informed, better educated and socially and culturally enriched, ultimately leading to more rapid enterprise development or getting on to a faster career path. In furtherance of this analysis, Figure 3.4 maps the reported value of internet connectivity in terms of perceived economic and social benefits.

Figure 3.4 – Value of Internet Connectivity to Productivity and Entrepreneurship



Source: Deloitte, 2014.

The business accounting and human resources firm Deloitte found that expanded internet access and broadband connectivity do facilitate better access by online enterprises to new markets as well as to financial capital, with services such as mobile banking, e-commerce and agricultural product marketing for rural users. As demonstrated in Figure 3.4, Deloitte argues that internet links can improve professional and technical qualifications that can enhance labour productivity. Online access can also lead to greater adoption of innovation by users and contribute to improved business processes and the better use of capital. The diagram also outlines a mutually reinforcing cyclical process whereby better information flows from internet access can lead to user innovation, easier financial capital access, higher incidence of entrepreneurial ventures and overall to productivity enhancement.

While this and other available studies strongly suggest that better connectivity and enhanced broadband speeds can and do positively affect economic productivity and growth, there are many local mitigating circumstances, which can slow down or even prohibit the accrual of these benefits especially to the small and micro enterprises that dominate the economic landscape in the Caribbean.

3.3.1 BROADBAND, ICTS AND THE CARIBBEAN

In this study, Caribbean refers to the following twelve CDB’s Borrowing Member Countries (BMCs) – *Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Guyana, Jamaica, Grenada, Saint Lucia, St Kitts and Nevis, St Vincent and the Grenadines and Trinidad and Tobago*. Except for Belize and Guyana, all the territories are island states. Table 3.1 provides geographical, demographic and internet access data for these countries, based in part on World Bank statistics for 2014.

The 2015 World Bank internet usage data in Table 3.1 reflect the spread of basic online access and not high speed connectivity, which is discussed elsewhere in this chapter.

Table 3.1 - Regional profile for selected Caribbean countries

Country	Population	Area (Sq. km)	GDP per Capita (USD)	Pop. % Using Internet
Antigua & Barbuda	91,818	442 km ²	\$13,714.70	64
The Bahamas	388,019	13,940 km ²	\$22,817.70	77
Barbados	284,215	430 km ²	\$15,429.30	77
Belize	359,287	22,966 km ²	\$ 4,878.70	38.7
Dominica	72,680	750 km ²	\$7,116.40	63
Guyana	767,085	214,969 km ²	\$4,127.40	37.4
Jamaica	2,725,941	10,991 km ²	\$5,232.00	40.5
Grenada	106,825	345 km ²	\$9,212.00	37.4
Saint Lucia*	184,999	539 km ²	\$7,735.90	51
St. Kitts & Nevis	55,572	261 km ²	\$15,771.9	64.4
St. Vincent & the Grenadines	109,462	389 km ²	\$6,739.20	56.6
Trinidad & Tobago	1,315,372	5130 km ²	\$17,321.90	65.1

* The area 539 km² excludes Saint Lucia's inhabitable forest reserves
Source: World Bank, 2015 ²⁹

Basic internet access across the Borrowing Member Countries (BMC) ranges between a high of 77% of the population in Barbados and The Bahamas to the lower levels of 37.4% in Grenada and Guyana. Trinidad and Tobago leads the group of second ranked countries with 65%, followed by St Kitts & Nevis, and Dominica with 64.4% and 63% respectively. These are followed by St Vincent with 56.6% and Saint Lucia at 51%. Jamaica follows with 40.5%, with Belize 38.7%, Guyana 37.4% and Grenada 37.4% occupying the lower ranks of connectivity. With increases in access to smart phones and other devices since 2014, it is expected that the percentages will go up, perhaps in the range of 10% increase.

According to data gathered by the Mona ICT Policy Centre, UWI, key factors affecting levels of connectivity in the Caribbean include equipment and subscription costs, government tax policy, the need for greater promotion of information literacy and availability of online public services. Other factors include trust in use of online business transactions and digital services such as online banking and e-commerce, and quality-related reservations about the use of online educational technologies and channels. In the Caribbean, there has been a progression in use of digital devices from the standard mobile phone, through to smart phones, tablets and other mobile connected devices. The adoption and use of fixed broadband connections such as for desktop PCs has been a slower and more expensive process for subscribers, although it is this application which better lends itself to stable commercial and educational operations requiring improved user interface and longer periods of access to broadband applications. While telecoms and broadband service providers in the Region claim increased access via their respective networks, users gain only brief mobile access durations at high tariffs.

3.4 REGIONAL CHALLENGES: ACCESS AND AFFORDABILITY

3.4.1 DEFINING ACCESS AND AFFORDABILITY

By access is meant the ability, right or permission to interact or engage with a valuable resource. According to the Glossary of ICT Terminology, by Davis and Riley, "the fundamental issue regarding *accessibility* is that everyone should have access to the services provided by ICT, e.g. computer programs, e-mail and the World Wide Web." (Davis and Riley, 2012). In many countries, such as Finland, France and Costa Rica, internet access is treated as a human right intended to be accessible to individuals regardless of income status, disability, geographical location or region of origin. Clause 4 of the Declaration of Principles of the World Summit of the Information Society (WSIS), as early as 2003, regarded communication as "a basic human need and the foundation of all social organisation. It is central to the Information Society. Everyone, everywhere should have the opportunity to participate and no one should be excluded from the benefits the Information Society offers."³⁰

²⁹ GDP per capita as at 2014; Population using the Internet 2014 estimates. World Bank, 2015. <http://data.un.org/>

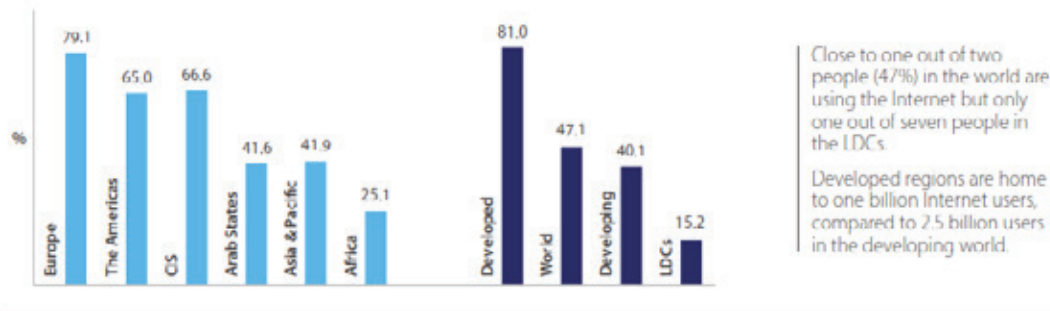
³⁰ United Nations, *World Summit of the Information Society, 2003 - Declaration of Principles, Clause 4.*

Statistics from the International Telecommunications Union (ITU) in Figure 3.5 paint a vivid picture of what has come to be called the *global digital divide*. It speaks to disparity in global access to the internet and other digital tools. There is a large gap in access to the internet between the developed countries (81%) and the least developed countries (15%) as well as between more developed and less developed regions within countries. Geographically this contrast is globally reflected with Europe showing highest internet usage (79.1%) while Africa is lowest at 25.1% in 2016. Most of the English-speaking Caribbean is located in the developing country category and geographically in The Americas. However, the relatively high indication of internet usage in the Americas region (65%) reflects the inclusion of the United States and Canada, somewhat overstating the continental performance of less developed countries and zones in the Americas region including parts of the Caribbean.

Figure 3.5 – Percentage of individuals using the internet by region

THE DIGITAL DIVIDE IN 2016

Percentage of individuals using the Internet



Source: ITU, 2016.

3.4.2 AFFORDABILITY

The term affordability refers to the belief that something is within one’s financial means. The UN Broadband Commission currently defines broadband as affordable if an entry-level (500MB) data plan is available at less than 5% of average monthly income (i.e., GNI per capita). However, for the Alliance for Affordable Internet (A4AI 2017), this definition of affordability does not account for poverty and income inequality – two major challenges facing the world today. A4AI observes that “The current 5% affordability target is insufficient in a world where income inequality is increasing. Even in countries that have achieved the 5% target, entry-level broadband (500MB) is still too expensive for at least the bottom 20% of income earners in the country – and much too often remains out of reach for all those except the top 20% of income earners. It explained that “using a national average income does not account for income inequality and the unequal distribution of income found across many countries. Unfortunately, the reality is that country data on income distribution is limited; as a result, using a national average (i.e., GNI per capita) remains the most effective measure for tracking progress. The national average measure, however, must move below the current 5% threshold” to allow lower income users to gain access.

In determining what a more accurate target should be, A4AI analysis shows that “when prices drop to 2% or less of GNI per capita, all levels of income earners, including the bottom 20%, can afford a basic broadband connection. At the 4% and 3% levels, mobile broadband remains unaffordable for the bottom 20% of income earners in several countries. A more ambitious 2% threshold will allow a broadband connection to become truly affordable for all income groups, enabling billions more to come online.”³¹

The Alliance notes that an additional issue is that affordability is currently measured against the cost of a 500MB data plan. “The reality is that a data allowance of 500MB a month allows a user to watch just two minutes of high-quality video – not enough to enable regular use of health, education, and other valuable online tools and information sources. Users are hungry for more data and meaningful use of the Web requires it. Video and picture-rich content consume large amounts of data and yet, it is exactly these resources that are likely to be most valuable for the poor, marginalised, and frequently illiterate populations that are offline today. A larger data allowance is needed for users to realise the development benefits of the Internet. Doubling the current 500MB yardstick to 1GB would be a good start.”³²

³¹ Alliance for Affordable Internet, *The Affordability Report 2017*: 2. <http://a4ai.org/affordability-report/report/2017/>.

³² Ibid.

An ITU 2013 global study found that subscribers in developing countries paid a much higher proportion of Gross National Income (GNI) per capita than did subscribers in developed countries. Those in some developing countries were found to be paying 30.1% of GNI per capita for fixed broadband while subscribers in counterpart developed countries paid 1.7% of GNI per capita³³. These numbers varied according to subscription plans, but the reported variance is reflective of global tendencies and is indicative of the relatively greater sacrifice that people in developing countries are making to obtain fixed broadband. As Table 3.2 indicates, while the percentage disparity is less for mobile broadband, there is still a significant adverse variation in subscription prices in developing countries as against developed ones for this more widely used mobile category of service, as a percentage of GNI per capita. At present, mobile-broadband services have become more affordable than fixed-broadband services. According to the ITU (2016), by the end 2015, the developed states were paying about 0.4% of GNI per capita for 1 GB of computer-based mobile-broadband services. In comparison, the developing countries were paying about 7.5% of GNI for the same service. So, despite overall price improvements in mobile broadband services, a significant development disparity in broadband costs persists.

Table 3.2 – Broadband costs as % of GNI per capita

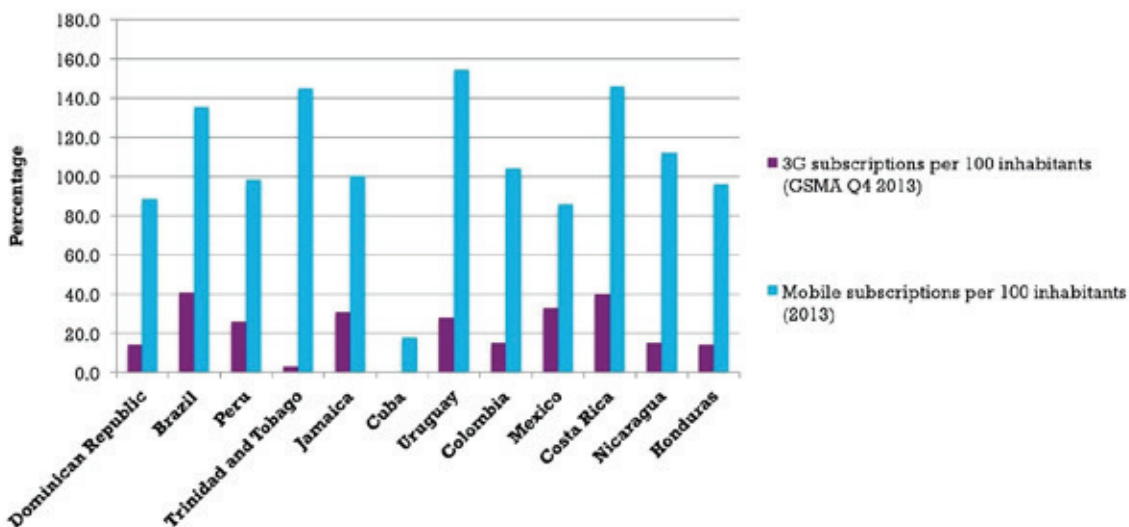
Broadband Costs as % of GNI per capita – ITU 2013		
	Developed	Developing
Fixed Broadband	1.7%	30.1%
Mobile Broadband	1.4%	11 – 25%*

Source: ITU Facts and Figures, 2015.

*Dependent on plan.

As ICT users all over the world embrace the marvels of the smart phone, internet speeds become a major value in obtaining optimum utility for such devices. Third and Fourth Generation (3G and 4G) mobile subscriptions as well as more advanced high speed applications are now in high demand among those who can afford this level of service. In its 2013 study contrasting 3G subscriptions to regular mobile subscriptions, the ITU found that while less than 40% of subscribers had by then gained access to 3G, a much larger proportion of subscribers were holding regular mobile subscriptions. Even with the expected increase in the number of higher end subscriptions since 2013, the pattern reflected in Figure 3.6 of a lower percentage of high speed internet users, remains the more prevalent trend.

Figure 3.6 – LAC 3G subscriptions as a percentage of total mobile subscriptions (GSMA 4Q 2013)



Source: Alliance for Affordable Internet, 2014.

In Figure 3.6, the uptake in 3G subscriptions in Jamaica was significantly higher than that in Trinidad and Tobago, where at the time 3G appears minimal. This may be related more to in-country availability of the service at the time than to relative affordability by subscribers in each country.³⁴

³³ International Telecommunications Union, *Study on International Internet Connectivity: Focus on Internet connectivity in Latin America and the Caribbean*, 2013, 4.

³⁴ Alliance for Affordable Internet, *The Affordability Report 2014*, 28. <http://a4ai.org/affordability-report/report/2014/>

3.4.3 CARIBBEAN BROADBAND INTERNET SPEEDS AND PRICES

The Caribbean web portal ICT Pulse has been tracking fixed Internet broadband speeds and pricing across the Caribbean since 2011. Data were collected from the websites of widely used Internet Service Providers (ISPs) in the countries covered, including from such providers as Flow and Digicel for many countries of the Region, as well as Belize Telemedia; GT&T and eNetwork in Guyana; BTC and Cable Bahamas; and Setar in Aruba. The exercise focussed on fixed/wired (non-dialup) internet services, and on the advertised service plans for domestic/residential customers. The review focused on the monthly rates payable for the specified Internet plans only, converted to US dollars (See Table 3.3) (Marius, 2016).

Table 3.3 – Lowest and highest advertised download speeds and the corresponding best rates in select Caribbean countries as at May 2016³⁵

Country	Lowest d/l speed		Highest d/l speed	
	Speed/bps	Price/USD	Speed/bps	Price/USD
Anguilla	2 M	\$ 39.98	48 M	\$ 128.82
Antigua & Barbuda	1 M	\$ 47.48	2 M	\$ 62.20
Aruba	256 k	\$ 27.37	24 M	\$ 55.31
Bahamas	8 M	\$ 29.99	70 M	\$ 124.75
Barbados	15 M	\$ 32.50	1 G	\$ 297.50
Belize	256 k	\$ 12.52	16 M	\$ 350.44
BVI	4 M	\$ 99.00	48 M	\$ 228.85
Cayman Is.	1 M	\$ 60.98	300 M	\$ 303.66
Curacao	6 M	\$ 32.89	100 M	\$ 177.65
Dominica	2 M	\$ 27.83	50 M	\$ 84.29
Grenada	12 M	\$ 29.26	100 M	\$ 128.46
Guyana	256 k	\$ 29.09	10 M	\$ 72.63
Jamaica	1 M	\$ 18.99	200 M	\$ 121.23
St. Kitts & Nevis	6 M	\$ 36.44	48 M	\$ 128.46
St. Lucia	2 M	\$ 33.49	100 M	\$ 126.98
St Vincent & Grenadines	2 M	\$ 33.44	100 M	\$ 126.98
Trinidad & Tobago	1 M	\$ 21.87	240 M	\$ 105.03
Turks & Caicos Is.	6 M	\$ 69.00	50 M	\$ 209.99

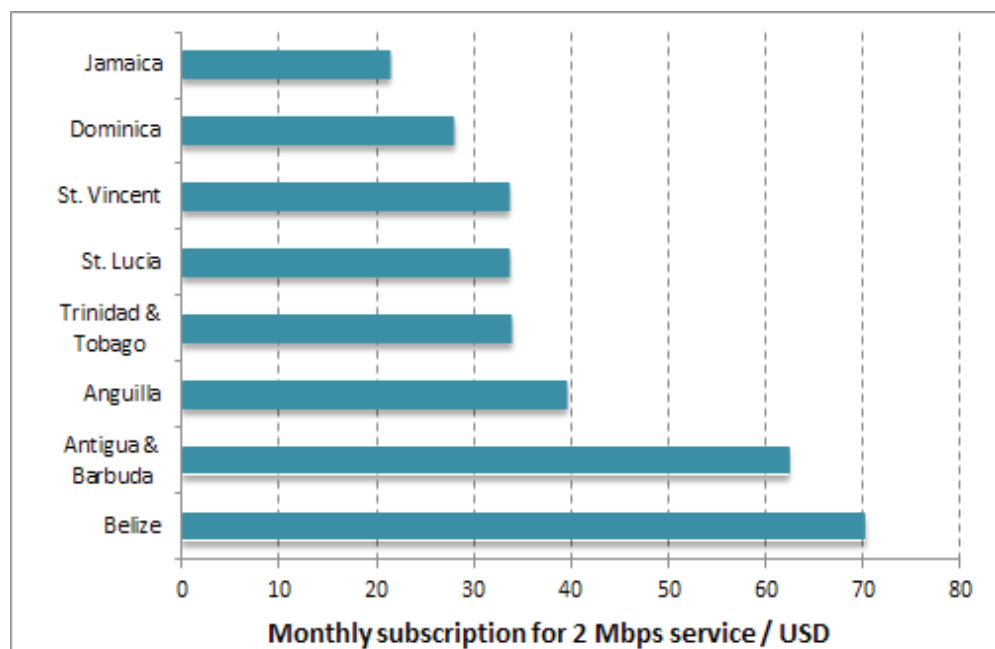
Source: ICT Pulse

Marius (2016) reported that “with the exception of Antigua and Barbuda, all other countries offered plans with a download speed of at least 10 Mbps. Nearly half of the ISPs are offering customers Internet plans with advertised download speeds of at least 100 Mbps. However, in Barbados a 1 Giga bit per second (Gbps) plan is being offered to residential customers.”

For the ranking of monthly prices for speeds of up to 2 Mbps, see Figure 3.7 from Pulse (Marius, 2016).

³⁵ Michele Marius, *ICT Pulse*. “Snapshot: 2016 update of Internet Speeds and Pricing Across the Caribbean,” 2016. <http://www.ict-pulse.com/2016/05/snapshot-2016-update-internet-speeds-pricing-caribbean>

Figure 3.7 – Monthly rates payable for an Internet plan with an advertised download speed of 2 Mbps for select Caribbean countries as of May 2016



Source: ICT Pulse and ISP websites

According to Marius (2016), the lowest advertised prices were in Jamaica (USD 21.22), Dominica (USD 27.53) and Saint Vincent and the Grenadines (USD 33.44). By contrast, some US service providers are offering fibre-based Internet directly to the home, condo or apartment at much faster speeds of up to 10 Gbps and at costs as low as USD 37.95. (US Internet Corporation, 2016), although commercial prices vary widely by State and region in the US and Europe.

As indicated earlier, there are major benefits to be gained by enterprises of all types, including MSMEs, from the use of broadband services and by entrepreneurs who operate with optimal access to the internet. However, the foregoing data also indicate that an important factor in the accrual of these benefits to individual entrepreneurs and small firms is affordability.

3.4.4 QUESTIONING CARIBBEAN ROAMING CHARGES

Another continuing challenge for regional business operators, including MSMEs, is the persistence of high mobile roaming charges. Small business operators in Saint Lucia, Jamaica and Belize expressed on-going concern about high roaming charges and the implications for their business communication when travelling the Region. The cost of doing inter-country business is considerably increased by mobile roaming costs, especially where business-persons are operating outside of their providers' network-specific service regions. Historically, roaming charges were levied across two or more telecoms administrations to account for expensive long distance charges imposed by the respective cross border providers. But with the cost of a telephone call now approaching zero and the distinction between a local and an international call erased by Voice over Internet (VOIP) services such as Skype and WhatsApp, the cost basis for continued high roaming charges has long been eroded.

Even where certain intra-Caribbean providers offer so-called 'Roam like You're Home' packages, users still have to make substantial down-payments at base before travel or activation. Cross net calls or travelling in remote jurisdictions also attract the full brunt of roaming charges. The imposition of high roaming charges in the Caribbean continues despite the now low-to-negligible cost of making these international telephone connections. In addition, given today's more advanced digital technologies, users at all levels in the Region are now more than ever able to access 'over-the-top' internet based services, signalling the need for policy and regulatory reforms to reduce network roaming charges generally.

Increasingly in Europe and elsewhere, roaming charges are being phased out by policy and regulatory measures or reduced to a minimum, given the absence of any significant cost basis in most parts of the world for retention of such charges. In the European Union, debate and regulatory actions on roaming have tended to treat roaming surcharges as an unwarranted restraint on freedom of movement whether regionally or internationally. The European Commission (EC) notes that "for a decade, the Commission has been working to reduce the surcharges that telecoms operators imposed on their customers each time they crossed a border while using their mobile device on holiday or during business trips. Since 2007, roaming prices have

decreased by more than 90%. In 2015, the European Parliament and the Council agreed to end roaming surcharges for people who travel periodically in the European Union (EU). “Roam like at Home” – where customers pay domestic prices, irrespective of where they are traveling in the EU – will become a reality for all European travellers on 15 June 2017,” (EC 2016).

This is a matter on which CARICOM and Caribbean service providers, government regulators, policy-makers and subscribers will need to engage, with a view to reducing roaming on a phased basis as a contributor to business cost reduction and productivity. Such a measure, if taken, would facilitate regional and international travel and reduce the cost of MSME and other business transactions. This is an important measure especially in a region where small and closely located countries actively trade and communicate across borders and where many Caribbean MSMEs are aspiring to grow beyond their small domestic markets.

3.5 DEFINING MSMEs IN THE CARIBBEAN

In the Caribbean, the definition of what constitutes a micro, small or medium-sized enterprise varies from territory to territory. Definitions may even vary within a territory due to industry peculiarities and private and public sector differences. In most cases, the definitions provided pertain to formally registered businesses, and exclude small-scale, informal family enterprises (CDB, 2016). At present, there is still no regional definition of an MSME across the Caribbean despite efforts to have a standardised definition through the forging of a regional MSME Policy. The Caribbean Development Bank found that based on how MSMEs have been identified across the Caribbean, the three most consistently used measurements are:

- **ASSETS:** An estimation of the value of an enterprise’s fixed assets (some may include land).
- **EMPLOYMENT:** The number of employees provides key data on the scale of its operations.
- **TURNOVER:** The volume of turnover of a business. The turnover rates and pattern reflect functional and behavioural attributes of the business.

These measures accord with those stated by the World Bank based in its 2014 survey. Additionally, consultation with regional stakeholders resulted in the recommendation that the following simplified MSME typology be adopted: *Micro: 1-5 employees; Small: 6-15 employees; and Medium: 16-50 employees (CDB, 2016).*

In the Caribbean, several regional bodies are agreed that MSMEs are important drivers of economic growth and development. The records show that these enterprises have created employment, facilitated wealth creation and have been the pillar for private sector growth and expansion. According to the Caribbean Export Development Agency, “the MSME Sector is a critical pillar of economic development within the Caribbean Community as they contribute more than 70% of GDP in some CARICOM Member States and they often employ more people than large businesses across the region.” (CEDA, 2013)

In the Caribbean, SMEs may be found primarily in the following sectors, listed from the highest to the lowest (ACS, 2011):

1. Services;
2. Distribution;
3. Food processing; and
4. Hospitality.

According to Caribbean Export Development, which is a development agency established by 15 CARIFORUM member counties, some of the economic contributions of SMEs include earnings from exports; tax generated on the new jobs created; workforce skills upgrade; innovation and technology changes.

Many Caribbean states have also witnessed SME contributions to progress towards solving social and development problems such as food security, through participation in the agricultural and agro-processing sectors (Guyana – honey; Belize – fish, shrimp; Jamaica – coffee). Social benefits have also been evident in the education and health care sectors where small businesses have been partnering with the state to provide these essential services. With regard to the environmental impact, SMEs have been in search of alternative energy sources (e.g. solar) and energy efficient devices in an effort to reduce the dependence on imported fossil fuels (Coke-Hamilton, 2014).

CDB, in its 2016 study on the MSMEs in the Caribbean, estimates that MSMEs constitute between 70% and 85% of the number of enterprises, contribute between 60% and 70% of GDP and account for approximately 50% of employment in the Caribbean (CDB, 2016). However, the general view that MSMEs are linked to domestic demand and have little participation in international trade is beginning to change with the emergence of the internet.

3.5.1 MSMEs: CHALLENGES IN THE CARIBBEAN

An important policy goal of many Caribbean countries, based on their strategic plans or recently enacted legislation, is to provide users with affordable access to modern telecommunications infrastructure and services. This is in order to support economic and social development, facilitate productivity led by the business sector and to serve the efficiency requirements of all users. These commitments are to be found in national strategic plans such as Jamaica's Vision 2030; Trinidad and Tobago's National Development Agenda 2012–15 called 'Prosperity for All'; the National Development Plan of Belize called 'Horizon 2030', among many others. In these plans, broadband internet in particular, is viewed as an important intervention to help alleviate poverty and enhance productivity. MSMEs are presented as the key vehicles through which greater employment will be created from these local engines of growth and productivity.

However, despite such planning provisions, there are serious implementation challenges facing Caribbean governments, including the affordability of broadband access. In discussing the topic with stakeholders and examining available national and regional data sources in the borrowing member countries (BMCs) of the Caribbean Development Bank, a picture emerged of the challenges and opportunities for MSMEs of an ICT-driven development strategy. In this research exercise, special emphasis was placed on Saint Lucia in the heart of the Organisation of Eastern Caribbean States (OECS) sub-region, given its pivotal role as the home of the Eastern Caribbean Telecommunications Authority (ECTEL). Saint Lucia also has a well-organised MSME sector, including the Saint Lucia Coalition of Service Industries (SLCSI); the Saint Lucia ICT Association; and the Saint Lucia Chamber of Commerce and Agriculture whose membership is dominated by small businesses. Belize was another country of research emphasis, as an integral part of the CDB group of borrowing member countries. Located in Central America, Belize provides special linguistic, cultural and geographical diversity while displaying many of the same challenges of MSMEs in broadband access and affordability. Jamaica and Trinidad and Tobago also figured in the specific data gathering, being among the more developed countries in the Region. Insights gained from multiple interviews in these and other countries provided a basis for better understanding of MSMEs and their challenges in utilizing broadband technologies.

Among those interviewed in Saint Lucia were leaders in the Eastern Caribbean Telecommunications Authority (ECTEL); the Saint Lucia Coalition of Service Industries; the Saint Lucia Industrial and Small Business Association; the National Telecommunications Regulatory Commission; the Saint Lucia ICT Association; and the Statistics Department of the Ministry of Finance. In Belize, interviews were conducted with representatives of the UWI Open Campus; the Belize Chamber of Commerce; Belize Telemedia Limited; Belize Broadcasting Authority; Central Information Technology Office; and the Belize Association of ICT Professionals and individual emerging entrepreneurs. Among the leading concerns raised in these and other interviews concerning Caribbean MSME productivity were:

- High broadband cost and unaffordability;
- Unreliable network services and infrastructure;
- Limited access to bank loans especially for ICT and Creative Industries start-ups;
- Outdated laws, policies and regulation;
- Poorly targeted training programmes; and the
- Need for improved media literacy programmes across a wide section of the public, to help drive more business and individual adoption of new or indigenous technology products and services.

3.5.1.1 SAINT LUCIA

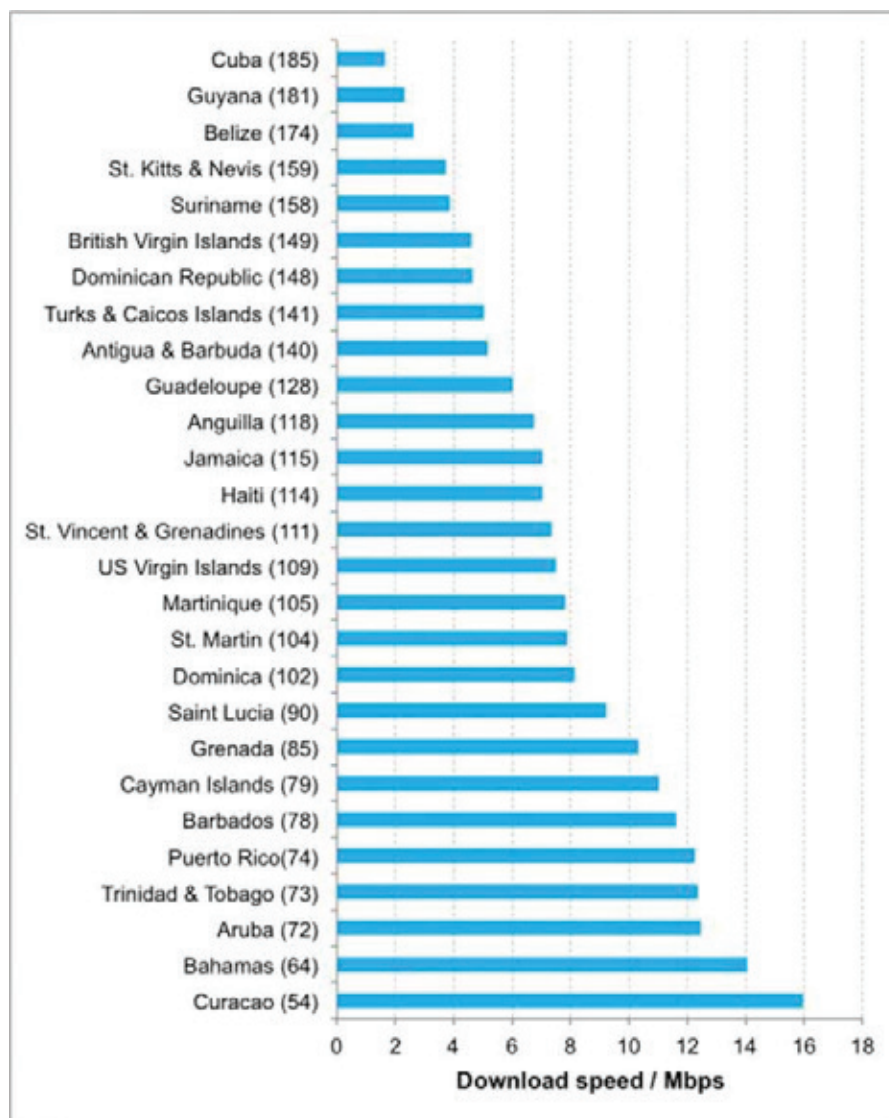
As a representative of the Saint Lucia ICT Association pointed out, "affordable access is not simply about connecting MSMEs to the broadband networks, but also involves the provision of training support and realistic cost options. This will help determine the extent to which the economic and social benefits of various internet enabled services are realised by small enterprises, based on affordability." (Lyndell St Ville, CEO Data Shore, Saint Lucia, Interview, Feb 15, 2017). Contributing to this analysis during another interview, Yvonne Agard, CEO of the Saint Lucia Coalition of Service Industries said MSMEs represent 77% of the Saint Lucia business environment. However, "these small enterprises are struggling for the most part, in need of financial and technical support. More technical skills training is required in areas such as business data analytics, product development, online marketing and business computing." (Interview – Agard 2017).

3.5.1.2 BELIZE

According to the view expressed by Belize Telemedia Limited's (BTL) Chief Operations Officer, Jelmer Gulmans, the ICT Infrastructure of Belize still remains in an unsatisfactory state despite the marked improvements over the last 12 months. Prior to this, according to Ambergris.com (citing the Ookla Report) Belize was ranked at 25 out of 27 Caribbean countries for its 2.64 Mb/s internet download speed which it offered its residents in September 2014. Only Cuba and Guyana were

ranked below Belize based on the Ookla Report, the results of which are shown in Figure 3.9³⁶. All stakeholders interviewed, including the Belize Chamber of Commerce; Association of ICT Professionals; and the Entrepreneurs, complained that the price for ICT Infrastructure and of the Internet in particular was high and the services unstable and unreliable. In agreeing with this perspective, Gulmans explains that the BTL had been the sole service provider up to about 2012. It is a government-owned company (70% shares) and prior to recent (2016) investment, offered limited coverage and mostly 2G technologies. However, in 2016, the company renewed both its fixed and mobile networks. Currently there are 100 cell-sites and deployment of 3G and 4G LTE Advanced technologies servicing about 80% of the population.

Figure 3.8 - Internet download speeds for 27 Caribbean countries



Source: AmbergisCaye.com, 2015.

The representative of the Belize Broadcast Authority (BBA) spoke to the need for eGovernment development right across the country. It was the consensus of most of the stakeholders that the life of Belizeans would be greatly improved should there be the ability to access critical services online. Among these services would be, for example, birth and death records. The General Manager commented on the challenges of waiting for months for the resolution of insurance claims due to the manual records procedures at police stations and the relevant insurance companies.

Further, interviewees expressed concern regarding the training and preparedness of the Belizean labour force to build an innovation culture. The Acting Director of the Central Information Technology Office (CITO) pointed out that his agency has had

³⁶ In September 2014, Ookla formulated two indices – a Household Upload Index and a Household Download Index – which compare and rank consumer upload and download speeds worldwide for 192 countries, and represents them as a rolling mean speed in Megabits per second (Mbps) over the past 30 days. 27 Caribbean countries were included in the 192 countries.

to provide basic training to its new employees just out of college. In addition to the labour force concerns, the Belize Chamber of Commerce and Industry, Chief Executive Officer commented that the MSMEs are being challenged by the high tax regime in Belize. It is estimated that the MSMEs generate over 70% of private sector employment and incomes, and contribute significantly to the GDP. However, there is concern that the sector has not been able to realise its full potential due to high taxes, limited access to finance, limited access to thriving markets and the unavailability of general business support services.

Drawing on these interviews and insights, Table 3.4 was developed to contrast the current approaches and the required new approaches by Caribbean governments in regard to MSMEs and Broadband usage, access and affordability.

Table 3.4 – Existing and required actions towards improved ICT usage by MSMEs

MISSION	EXISTING APPROACH	PROPOSED NEW APPROACH
Widen MSME access, improve technical support with new applications	Current Focus: Govt tech training in schools and provision of Community Broadband Access Points (CAPs)	Needed: Diverse tech support, access and ICT Training for pre-qualified MSMEs and Start-ups
Lower internet cost and improve ICT affordability	Current Focus: Promote competition among service providers to lower costs, universal service funds for low-cost access to CAPs. Tech price reductions	Needed: A proportion of USF funds targeted to MSMEs and pre-qualified start-ups to reduce ICT access costs at early or vulnerable stage of business operation
Improve infrastructure and regional network connectivity for MSME trade	Current Focus: Country regulation and regional commercial services	Needed: Stronger regional MSME alliance and a dedicated network. Cut roaming costs and build global peer-to-peer trade links
Update policies, laws and regulations	Current Status: Many outdated laws and inadequate regulations	Needed: International agencies and university support to update and harmonize ICT laws and broadband access policies
Provide tax relief, bank loans and more targeted business support for MSMEs	Current Status: Little or no special provisions for MSMEs and start-ups. Low rate of Bank loan approvals for ICT projects	Needed: Develop a regime of special reliefs and benefits for start-ups and prequalified MSMEs. Ramp up business and tech Support.
Training and online marketing opportunities	Current Focus: Local courses delivered face to face, with little or no new media marketing exposure	Needed: Expand MSME business training into high schools and offer more social media marketing, crowd-funding and 'sharing economy' modules

Source: Authors' analysis.

There is still much room for the owners of Caribbean MSMEs to learn about the transformative effects of technology, and the significant benefits that innovation could confer in getting connected to a high-speed internet broadband service (Dunmore, 2009). However, smaller enterprises tend to acquire the lower speed and more affordable internet packages, which limit their ability to exploit the available technologies and hence to improve their revenue stream. The MSMEs in Belize and Jamaica are clear examples of this. Today, the MSMEs, and especially the micro and small enterprises utilise the mobile platform along with easily available business applications. These businesses tend to use their smartphones both for personal calls and messaging as well as for business operations, but need to move beyond smartphone for a wider array of business data application and improved user interface.

At the same time, the smart phone continues to be improved upon as a business tool. In March 2017, for example, Jamaica's Grace Kennedy Money Services, launched the 'GK MPay' smartphone app which provides mobile money services to purchase phone credit, pay bills, buy goods and services, as well as receive and send remittances. The service is meant to target MSMEs; such virtual wallet accounts may be funded from different sources such as cash over the counter, peer-to-peer transfers and business to consumer payments (Lalah, 2017). Other financial institutions, such as large banks and credit unions have established mobile money services including M-banking. These financial technology (Fintech) business applications, also

available through some credit union and internet service providers in the Region, open up global scope for smaller enterprises to operate more cost effectively and to reach a larger customer base, provided that access costs to these new services are affordable.

The Jamaican Government (GOJ) has confirmed that MSMEs account for 90% of jobs in the Jamaican economy. In this regard, the GOJ moved to develop the “MSME and Entrepreneurship Policy”, which provides a comprehensive framework for the implementation of strategies to support the growth and development of the MSME sector. The framework involves a structured approach to business plan development and project design; the screening and evaluation of business plans; and rigorous risk-management assessments. Table 3.5 provides a picture of the percentage of MSMEs operating in various sectors of the Jamaican economy.

Supportive legislation such as the ‘*Security Interest in Personal Property (SIPP)*’ Act makes it possible for entrepreneurs to use moveable assets such as livestock, motor vehicles, agricultural products, stocks and securities to secure business loans. Owners of creative works, innovators and inventors can in principle also leverage their intellectual property, such as copyright, patents and trademarks to be used as collateral in the process of securing loans. In practice, this is rare as many financial institutions are not yet engaging in such credit policies. Establishment of a Collateral Registry, which forms part of the secured transactions framework, is therefore important in facilitating start-ups and other small scale entrepreneurial development, by expanding access to credit, while reducing the risks of loan default. The Registry, administered by the Companies Office of Jamaica, is a repository of information on non-real estate assets being tendered as collateral for securing loans. Table 3.5 outlines the percentage of MSMEs by sector in Jamaica.

Table 3.5 – Percentage of MSMEs by sector

Sectors	Percentage
Wholesale and Retail Trade	55.7
Community, Social and Personal Services	23.3
Manufacturing (Non-Metal)	9
Manufacturing (Metal)	2
Transport Sales and Communication	3.9
Financial, Insurance, Real Estate and Business Services	2.4
Construction	2.3
Electricity, Gas and Water Supply	1.2
Mining	0.1

Source: PSDP, *A Landscape Assessment of Jamaica Micro, Small and Medium-sized Enterprises (MSMEs)*, prepared for the Target Growth Competitive Committee (TGCC).

Box 3.1 – Rationale and highlights of Jamaica’s MSME Policy

MSME & ENTREPRENEURSHIP POLICY, 2013 (JAMAICA)

Micro, Small and Medium-Sized Enterprises (MSMEs) are important drivers of economic growth and development in Jamaica. These enterprises create employment, facilitate wealth creation and form the backbone for private sector growth and expansion. Despite their economic significance, MSMEs face many challenges that hinder their growth and development hence it is imperative for the Government of Jamaica (GOJ) to place entrepreneurship and MSME development at the forefront of the country’s economic policy agenda.

MSMES’ CHALLENGES

Entrepreneurs lack marketing capacity and broad operational capacity, business leadership, communication and technical skills, and are unfamiliar with available business support services. In addition, training and other forms of business development support for the sector are lacking while there appear to be low capacity for innovation and low utilisation of technology among Jamaican MSMEs, factors which also stymie productivity and competitiveness in the sector.

The prevalence of business informality among Jamaican MSMEs poses a challenge to the growth and development of the sector. Informal operations are obliged to remain invisible to the legal system and face restrictions in carrying out certain business activities. They also have a limited number of customers as well as limited access to certain government support (for example, participation in government procurement) that is crucial to their survival. MSMEs also face barriers to formalisation, further contributing to their high level of informality. These barriers include excessive regulatory and administrative procedures, fees and financial requirements.

POLICY STRATEGIES

Research and consultations have informed the policy elements, issues, and objectives. The strategies that will be implemented under the Policy fall within five (5) main domains: Improving the Business Environment, Increasing Finance to MSMEs, Enhancing Business Development Support, Broadening the Entrepreneurial and Innovative Base, and Tackling Cross-Cutting Socio-Economic and Environmental Issues.

Source: Ministry of Industry, Investment and Commerce, Government of Jamaica, 2013.

3.5.2 MSMEs AND CARIBBEAN WOMEN³⁷

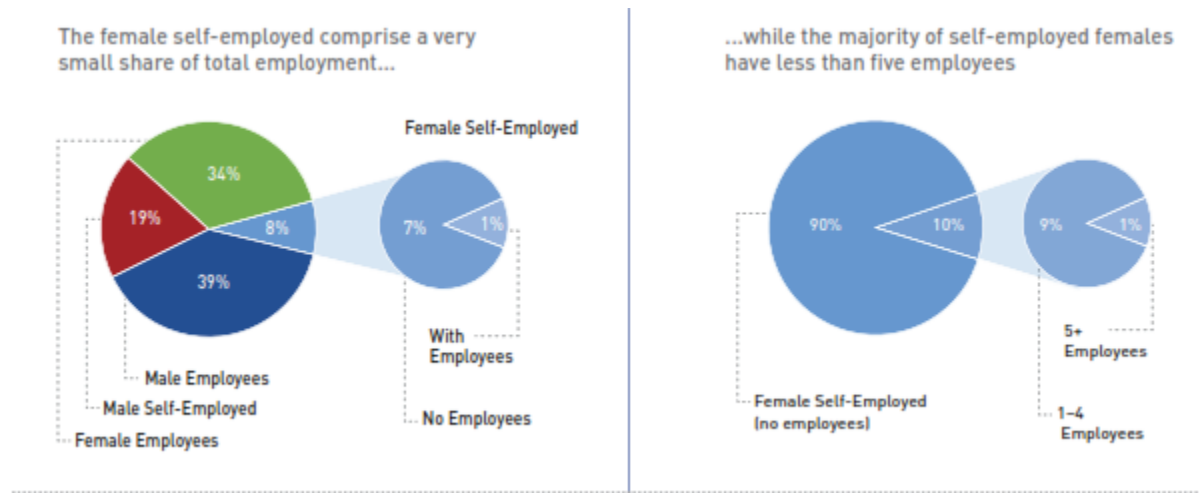
Economic development in the Caribbean must involve the full spectrum of talents and demographic groups that are available. Often, the role of women in the MSMEs and in the larger business sector is underestimated and inadequately supported. According to the World Bank Group (2015), it is estimated that there are about 1.2 million female entrepreneurs in the wider Caribbean. These women are engaged in just about every sector of the economy, but are chiefly found in consumer oriented businesses and usually are single person operations with family help and with none or only a few formal employees. According to World Bank data:

- In the wider Caribbean Region, it is estimated that there are approximately 228,000 self-employed females, of whom 204,000 had no employees, 21,000 had one to four employees, and 3,000 had five or more employees;
- 13% of employed females are self-employed, with 11% having no employees and 2% having one or more employees;
- In relation to total employment, self employed females comprise 8% of total employment, while self-employed females with employees account for 1% of total employment;
- Self-employed females with five or more employees account for only 1% of self employed females. (World Bank 2015)

³⁷ Jonathan Lashley and Katrine Smith, *Profiling Caribbean Women Entrepreneurs: Business Environment, Sectoral Constraints and Programming Lessons* (An InfoDev Publication, World Bank Group, 2015).

Figure 3.9 outlines the proportions in relation to total (male and female) employment in the Region. These approximations are in line with what is seen in the wider Latin America and Caribbean Region. Given that the number of women entrepreneurs is significantly lower than their male counterparts, it appears that an opportunity exists to enhance female participation in the economy by more training and through improved incentives such as more targeted loans and grants. Sectors such as retail, hotel and restaurants, and food and beverage manufacture accounted for 59% of businesses with some female ownership.

Figure 3.9 – Percentage of females in self employment in the Caribbean (estimated) ³⁸



Samuels and L. Dunn (2015) reported on a study conducted in Saint Lucia which was aimed at assessing the state of women’s participation in the ICT sector there. It stated that there was gender inequality in women’s participation in the ICT sector, especially in higher income positions. The study indicated that in 2015 some 40.4% of females compared to 26.1% of males in Saint Lucia said that ICT was not at all relevant to their daily operations. There is an ICT awareness gap among both men and women in Saint Lucia which contributes to limited global competitiveness and perhaps in other Caribbean states as well.

The 2015 study also noted that there were many existing and unexplored opportunities for trained and qualified ICT service providers, innovators and entrepreneurs to deliver ICT enabled services in Saint Lucia, in the Caribbean and internationally, but knowledge of these opportunities was limited. It argued that Caribbean people and women in particular need to move beyond their basic knowledge of hardware and software towards training in a wider and deeper range of concepts and opportunities such as the Internet of Things (IOT), e-learning, big data and business data analytics³⁹.

3.6 ICT INFRASTRUCTURE AND REGULATION IN THE CARIBBEAN

The ITU World Telecommunication Regulatory Database 2016 indicates that there is full competition in mobile telephone services in Belize, Dominica, Grenada, Jamaica, Saint Lucia, and St Vincent & the Grenadines. Antigua & Barbuda, Barbados, Guyana and Trinidad & Tobago are reported to have achieved partial competition because of the continuing network ownership role of the State or given the dominant role of one of the players in the market. The Bahamas has only recently (2015) added an additional provider of mobile telephone services in that country. These countries have all been engaged in the process of telecommunications sector reform since the 1990s and have advanced to varying levels of implementation of liberalisation and regulatory reform policies.

New initiatives such as number portability and per second billing have been implemented and new laws have been enacted in some jurisdictions to address such areas such as cybercrimes and access to information policies. Legislative bottleneck and financial constraints have stymied the implementation of other reforms including the creation of single converged regulators in countries like Jamaica. Additionally, very few Caribbean countries have a national broadband policy and consequently are incapable of adequately mapping the status of their ICT sectors.

Without access to affordable and reliable ICT infrastructure and services, the countries of the Caribbean are limited in their options to improve their productivity and diversify their economies through knowledge and information-based services. The model under which Caribbean broadband and ICT sectors operate is a combination of inputs and roles by government ministries, regulatory agencies and commercial providers, all intended to function in the best interest of consumers and the sector. Powerful developed countries often wield inordinate influence on the policy making of small emerging countries with regulatory structures that struggle to cope in the face of demands from large service providers and the general public.

³⁸ Ibid.

³⁹ Leith L. Dunn and Ayanna T. Samuels, “Gender Equity and Access in the Caribbean ICT Sector,” in Laura Robinson, Jeremy Schulz, Hopeton S. Dunn (eds.). *Communication and Information Technologies, Annual Studies in Media and Communications* 12, (2016): 65 – 92.

While they have not yet experienced regulatory capture, the risk exists unless there are deliberate measures aimed at strengthening these regulators. A key element of the needed reform is the separation of the sector regulator from the politically led ministries and from the telecommunication operators. A challenge in this regard is financial independence, which some regulators, such as the Broadcasting Commission of Jamaica and the Spectrum Management Authority there have achieved through reforms in licence fees. Independent regulators that are financially stable would help to better achieve professionally-based regulation of telecommunications, broadcasting and spectrum services. Table 3.6 summarizes the principal entities in the sector and their functions.

Table 3.6 – Principal telecoms sector entities and functions

RESPONSIBLE ORGANISATION	FUNCTION
Ministry or Executive Branch	Policy Development
Separate Regulatory Authority	Regulation
Commercial Operators	Network Facilities & Services

Source: BII/PAC Report CANTO and IDB, 2015.

A 2015 report to the Caribbean Association of National Telecommunications Organisations (CANTO), commissioned by the Inter-American Development Bank, identified a variety of approaches and issues in constructing credible regulatory oversight of the sector. These, as we have seen, include establishing independent regulatory agencies that respond to updated policy and laws; improved funding of the regulatory processes; enhancing the training and capacity-building of regulators and associated staff; and resisting arbitrary or political interference and appointments.

Barbados, Belize, Guyana and Jamaica have multi-sector regulators that regulate telecommunications as well as other industrial sectors such as postal services, transportation, water supply systems and electrical power generation. There is a marked absence of formal structures for inter-regulator consultations and for appeals tribunals that deliver judgments far faster than the formal judicial system. Legislative reforms through the parliaments of the Region tend to take a long time, with many outdated laws remaining on the books, despite the enactment of some other more recent pieces of legislation. Key provisions needed in reforming these laws include the requirements of interconnection agreements; an independent regulator; universal service funds; allocation of scarce spectrum resources; and competitive safeguards. Table 3.7 identifies the main pieces of legislation governing the sector in selected countries of the Region.

Table 3.7– Major enabling legislation for telecoms reform in selected Caribbean countries

Country	Telecom Law	Date of Enactment	Effective Date	Regulator
Barbados	Telecommunications Act and the Utility Regulations Act	2001	2005	Fair Trading Commission
Belize	Telecommunications Act 2002, Last amended 2009	2002		Multi-sector Public Utilities Commission
Guyana	Telecommunications Act 1990, Last amended in 2008	1990		Multi-sector Public Utilities Commission & Telecoms Agency (2015 Bills)
Jamaica	Telecommunications Act 2000. Last amended in 2012	1999	2000	Office of Utilities Regulation
Trinidad & Tobago	Telecommunications Act	2001	2004	Telecommunications Authority of Trinidad & Tobago (TATT)

Source: Authors' analysis.

3.7 ISSUES IN THE KNOWLEDGE ECONOMY

Knowledge has always been understood to contribute to productivity and economic growth. From as far back as the works of Adam Smith, David Ricardo, Karl Marx and Joseph Schumpeter, the concept of technological progress, through innovation and knowledge creation, as major sources for economic growth, has been used in economics. Schumpeter argued that innovation and knowledge accumulation are of crucial importance in order to realise long-term growth. Further, Schumpeter contended that evolving institutions, entrepreneurs, and technological change were at the heart of economic growth, not independent forces that are largely unaffected by policy.

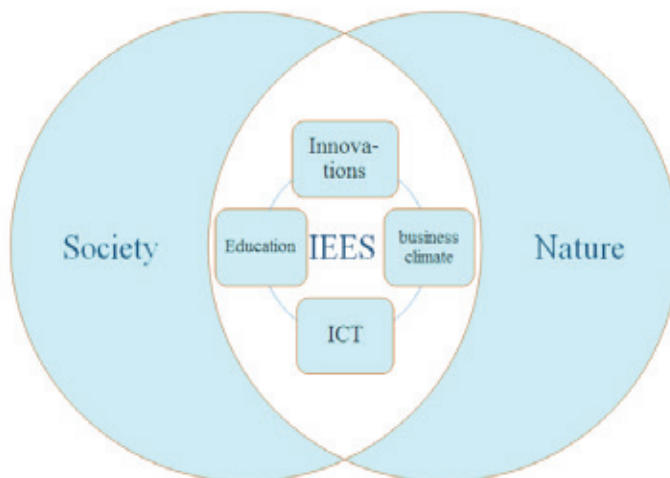
Several other scholars and entities have offered their own perspectives on the knowledge economy. Some, like Kanter (1995) also promoted the importance of knowledge. His view was that knowledge is more important as a product than it has ever been before and that we are seeing the rise of new forms of activities based on the trading of knowledge products (Kanter, 1995). This view was shared by the OECD, which stated that the role of knowledge (as compared with natural resources, physical capital and low-skill labour) has taken on greater importance. Others, like Drucker (1998), followed the same notion and documented that knowledge had become the central factor of production, side-lining both capital and labour (Drucker, 1998).

Some sources sought to focus on what was viewed as outstanding elements of the knowledge economy. For instance, UNESCO stated that knowledge societies are arguably a source of human development and empowerment in that access to knowledge will ipso facto contribute an element of power (UNESCO, 2005). Nicolae (2009) shared the view that the reason for the differences in economic growth of countries and their productivity is more linked with quality of their human resources and capabilities and less linked with endowment with natural resources. Consistent with the different emphases put forward by the various theoretical perspectives, the essential tenet is that knowledge has become the main factor of competitive advantage. The transition to the knowledge economy is about the increase in scale of knowledge as a production factor. (Alipourian & Gorji, 2010).

The efforts of many governments to establish knowledge economies (or knowledge societies) may be summed up in a statement by Breithaupt (2000) which indicated that “A successful modern economy is founded on a strong scientific base that has the ability to convert scientific research and knowledge into products and services, which bring social and economic benefits.” (Breithaupt, 2000, p.460). (See also Hadi and Rawahi, 2014). Over the last decade, discussions on the knowledge economy have been gaining increasing importance in regard to such topics as economic growth, globalisation and economic restructuring. In fact, governments in many developed and developing countries have been actively exploring policies that promote essential elements of a knowledge economy and its relationship to the environment. (See Figure 3.10).

The essential elements are manifested in the earlier discussed 4IR, involving robotics, artificial intelligence, algorithms, big data and wearable technologies. Skills training, fully digital networks for broadcasting and production, media literacy and research and innovation are integral to this new paradigm, if they are to be conducive to improvements in standards of living, good governance and strong business productivity.

Figure 3.10 – Knowledge economy – the thickening of networks in nature and society



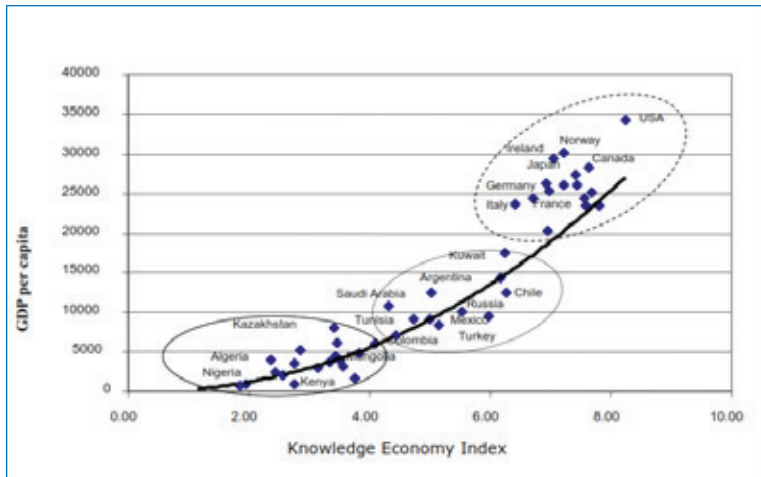
Source: Shodiev, 2017.

Gorji and Alipourian (2010) reference the World Bank Institute’s formal definition of a *knowledge economy*, regarding it as one that creates, disseminates, and uses knowledge to enhance its growth and development. A knowledge economy uses data as its raw material and transforms it using technology, analytical tools, and human intelligence into useful applications for businesses that can lead to economic and productivity growth. Another useful definition offered in a presentation by Shodiev

(2017) is that the knowledge economy is the use of knowledge to generate tangible and intangible values. It is observed that in the two definitions highlighted above, the emphasis is not solely placed on technological renewal as the ultimate objective of a knowledge economy, but on productivity and growth.

The challenge for the Caribbean policy makers is to quickly grasp the many dimensions and possible applications of the knowledge economy and to implement aligned policies that enhance productivity. Figure 3.11 shows how higher levels of the knowledge economy applications, reflected in an index, positively correlate to higher levels of GDP per capita especially in more advanced industrial economies.

Figure 3.11– Knowledge economy index for select countries



3.7.1 JAMAICA AND THE KNOWLEDGE ECONOMY – MAIN USES OF INTERNET 2016

A national ICT Usage Survey carried out in Jamaica in November 2016 by the University of the West Indies and the Statistical Institute of Jamaica (STATIN) provides some indication of how citizens are engaging with the knowledge economy through broadband. In response to a question on how respondents used the internet, it is clear that (as in Table 3.8) trade-related usage such as getting information about goods and services, ranked relatively low among respondents.

Table 3.8 – National ICT Usage Survey, Jamaica, 2016

	Internet Use	Responses	
		N	%
1	Telephoning over the internet/VOIP	1091	88.8%
2	Participating in social networks	972	79.2%
3	Streaming or downloading images, movies or music	902	73.5%
4	Sending or receiving an email	631	51.4%
5	Getting information about goods and services	540	44.0%
6	Seeking health information	465	37.9%
7	Uploading self/user created content to a website	453	36.9%
8	Using storage space	405	33.0%
9	Consulting wikis	397	32.3%
10	Downloading software or applications	394	32.1%

Source: UWI ICT Usage Survey, 2016.

Of a sample of 1996, 1273 (63.8%) indicated that they use the internet. This is a significant increase in reported internet usage as compared to 43% in a similar survey in 2011. Some 88.8% of the respondents reported that telephoning over the internet/VOIP was their top use of the internet. Other uses considered in the top ten included participating in social networks (79.2%);

streaming or downloading images, movies or music (73.5%); sending or receiving an email (51.4%); getting information about goods and services (44.0); seeking health information (37.9%); uploading self / user created content (36.9%); using storage space (33.0%); and consulting wikis (32.3%). Continued expansion in the use of the internet, and especially for business applications, can lend support to regional embrace of the knowledge economy.

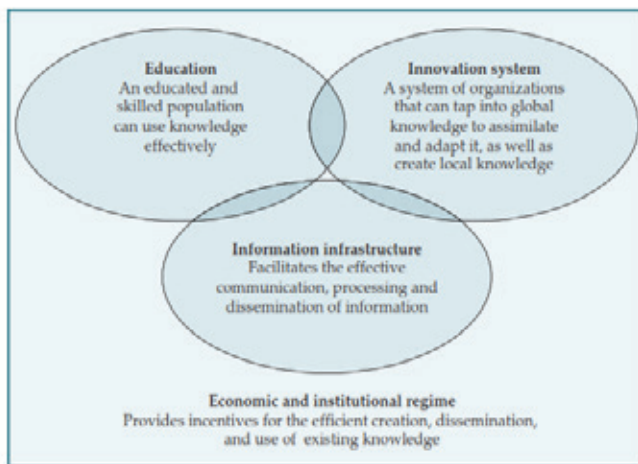
3.7.2 CRITICAL PILLARS OF THE KNOWLEDGE ECONOMY

The OECD and World Bank Institute frameworks for the knowledge economy are based on the following four key pillars:

- Effective government institutions and economic incentives that facilitate and encourage efficient creation, acquisition, dissemination and use of knowledge;
- An education and training system that produces a productive and innovative labour force;
- An information and communication technologies (ICT) infrastructure to disseminate effectively the creation, adoption and use of knowledge; and
- Research and development (R&D) that creates dynamic interactions between local science and technology and the local private sector, to better utilise and monetise the growing stock of global knowledge.

An effective way to quickly assess the status of the Caribbean’s knowledge economy is to evaluate the elements or drivers, namely: *research and innovation systems*; *education, skills and training services*; and *established ICT Infrastructure and governance frameworks* as listed in available international ICT Indices reports. The four pillars are reflected in Figure 3.12.

Figure 3.12 – The four interactive pillars of the knowledge economy⁴⁰



Source: World Bank, 2007.

3.7.3 ASSESSMENT OF CARIBBEAN KNOWLEDGE DRIVERS

According to the World Bank (2013), the varying levels of sophistication of ICT development across Caribbean countries can be seen from a comparison of key ICT development indicators (see Table 3.7). This implies the need for customised approaches to resolve intercountry and intra-regional disparities in ICT sector development (Gallegos, 2013). Policy actions to aid in the productivity and development of MSMEs should be focused on improving their competitive performance, which would give rise to a buzzing, innovative and dynamic business environment. This objective may be realised through, mainly: encouraging the creation of enterprises; providing the technical assistance and training; innovation and management improvements; and promoting more exports.

Many indices have been developed to rank and monitor changes in the business environment of countries globally. These indices include the ITU’s ICT Development Index (IDI); the Access Index; the Use Index; and the Skill Index. Table 3.9 provides an indication of the performance of several CDB BMCs, based on available data since 2014. St Kitts and Nevis appears to be the best performer by the IDI standard.

⁴⁰ World Bank, *Building Knowledge Economies, Advanced Strategies for Development*, 2007.

Table 3.9 – ICT development index 2016 ⁴¹

Country	IDI Rank	Access Index	Use Index	Skill Index
Antigua & Barbuda	75	6.34	4.02	6.17
The Bahamas				
Barbados	35	8.24	5.88	7.69
Belize	119	3.69	2.55	5.81
Dominica				
Grenada	74	6.3	3.78	6.99
Guyana	121	4.33	1.65	5.66
Jamaica	99	4.83	3.55	5.83
St. Kitts & Nevis	34	7.72	6.53	7.55
Saint Lucia	94	5.65	3.72	5.52
St. Vincent & the Grenadines	78	6.47	3.89	5.86
Trinidad & Tobago	67	7.03	4.53	5.67

Source: ITU, 2016.

The IDI 2016 report captures the level of ICT development in 175 economies worldwide and compares progress since 2014. The report assesses IDI findings at the regional level and highlights top performing countries and those that have most dynamically improved their rank in the IDI since 2014. It also uses the findings of the IDI to analyse trends and developments in the digital divide. The report highlights the role of ICTs in achieving the Sustainable Development Goals (SDGs) and presents the newly agreed SDG indicator framework, including the ICT indicators.

3.8 CONCLUSIONS AND RECOMMENDATIONS

It is clear that a diverse combination of interventions is needed in the Caribbean to address the inadequacy of broadband access; reduce high access costs; and boost the limited grasp of the imperatives of the new knowledge economy. In particular, special measures are required to strengthen and unleash the power of MSMEs to create employment and generate creative solutions to the needs of the Caribbean Region using the productivity enhancing innovations of ICTs. Ten recommended measures, enumerated below and discussed concisely with some subsidiary actions, are set out below. The clear requirement is for governments, ICT service providers, MSMEs and the wider private sector to collaborate in driving the knowledge economy forward including the changes that are warranted and recommended. In this, governments must take the lead.

Other entities that must perform a strategic role are universities and other educational institutions; the media in its broadest manifestations; the banking and financial institutions; and trade organisations. MSMEs must see the solution to their problems as residing both within themselves as well as embedded in traditional societal challenges in governance in the Caribbean.

Ten Recommended Measures:

1. Incentivise and train MSMEs into greater use of broadband and digital online technologies;
2. More actively support and promote MSMEs and women's roles therein;
3. Build the pillars of the regional knowledge economy to enhance global competitiveness;
4. Create twenty first century educational curricula and institutions;
5. Drive new private sector training initiatives for productivity in the knowledge economy;
6. Build better ICT infrastructure in the Region for improved access to rural and remote areas;
7. Finance and encourage MSME expansion in digital content production;

⁴¹ International Communications Union, *Measuring The Information Society Report*, 2016.

8. Undertake regulatory reform to converge existing fragmented regulatory structures;
9. Re-fashion fiscal regime to reduce taxation on MSME's and the ICT sector; and
10. Establish a regional oversight task force or office to co-ordinate the knowledge economy.

3.8.1 SYNOPSIS OF ACTIONS NEEDED TOWARDS IMPLEMENTATION OF THESE MEASURES

(1) Incentivise and train MSMEs into greater use of broadband and digital online technologies

Assessment of the Caribbean's ICT sector indicates that there is a relatively low level of broadband penetration and usage in the Caribbean countries examined. Prevailing internet usage levels of below 60% of the population in most countries of the Region is unacceptable. Contributing factors include high cost for equipment and service access as well as a lack of information literacy.

A major and immediate remedial emphasis should be directed towards securing access to the internet at lower costs and with faster speeds and better quality. A successful Caribbean knowledge economy requires low cost, high speed internet and wide availability of broadband, including in schools, colleges, business districts, agricultural regions and inner city areas. Government and service providers must lead in redressing this gap.

Inadequate physical infrastructure especially in rural and inner city areas also remains a problem. The promise of low internet rates and easy access derived from a competitive telecoms service provision in the Region have not been realised. The cost of internet access remains high and public policy interventions are required to reduce costs and drive broadband access, especially for MSMEs.

Caribbean MSMEs should be provided with financial incentives to acquire the necessary ICT training and basic online business skills to more effectively engage in online product research, marketing and customer service delivery. To do this, governments should direct some of their Universal Service Fund (USF) resources, where these exist, into training of owners and employees in MSMEs to better understand, use and manage broadband-connected ICT resources for greater productivity.

Governments, in partnership with MSME Coalitions and Chambers of Commerce and Industry in the Region should promote a deliberate programme of online and mobile business education for emerging entrepreneurs about digital transactions, such as e-Commerce, crowd-funding, mobile money and other fintech services.

Governments and associated regulators should engage telecommunications companies in a phased reduction and eventual elimination of high and unjustified intra-regional roaming charges. There is no longer a technical or cost basis for continuing to impose such high roaming charges. It is a disincentive to regional business transactions and normal business communication during intra-regional travel. In the European Union and elsewhere, roaming charges are being phased out as they are seen to be a tax on freedom of movement as well as a charge against normal business operation.

(2) More actively support and promote Medium, Small and Micro Enterprises (MSMEs) and women's roles in them

Members of the MSME sector in the Caribbean have indicated that they get only limited and patchy public policy support from Caribbean Governments. Acknowledging that a large part of the responsibility rests with themselves, MSME leaders also indicated that they do value support from governments to help effect faster transformation. Many individual entrepreneurs struggle to move from subsistence to the creation of viable and sustainable enterprises. While government-run agencies such as the Jamaica Business Development Centre (JBDC), the Barbados Small Business Centre (BSBC) and others exist, small enterprises and their Associations continue to complain of limited support, challenges to gain business loans, and low levels of ICT Literacy including awareness of the benefits of broadband access to business growth and development.

Government policy implementation strategies must include data-gathering and sharing with MSMEs through low cost training services in leadership, business development and technology applications, as well as provision of loans, grants and recognition through awards and scholarships.

Government and MSMEs need to work towards the establishment of Collateral Registers to help facilitate access to bank loans.

(3) Build the pillars of the regional knowledge economy to enhance global competitiveness

The Caribbean Region needs to more actively engage in building and strengthening the key pillars of the knowledge economy. This includes creating new systems of economic incentives that facilitate and encourage efficient production, acquisition,

dissemination and use of knowledge. This could include the removal of all taxes on computer equipment importation and tax reliefs for creators of nationally beneficial innovations.

The educational and training system must not just seek to produce an innovative labour force but must be geared to create entrepreneurs and enterprising start-ups.

Both governments and the private sector should tap into universities and colleges to help define and fund regional research and development (R&D) that creates dynamic interactions between the private sector and innovators in science, technology and creative industries, in order to utilise and monetise the growing stock of regional knowledge.

Industry and government must prepare for new 21st century work environments and for the disruptive technologies which will alter traditional nature of work. One implication of the emergence of the 4IR is that robots and co-bots will now increasingly compete with or work with human labour for many routine and advanced tasks.

Youth and employees in the Region should be more sensitised to the need to acquire new 21st century skills such as data analytics; social media marketing; digital media production; animation; and game design and development, among others.

MSMEs and government leaders should partner with media to create extensive information literacy campaigns, to engage and expose a wide cross section of the population, including MSMEs and family owned businesses on the advantages of 4IR and more extensive broadband use.

Legislators and regulators must pursue needed changes to the legal, policy and holistic regulatory landscape to respond to the changes in technology. In most Caribbean states, the laws and the regulatory frameworks were designed to focus primarily on voice services, and their delivery via fixed-line telephony and mobile/cellular networks.

This will require new Information Technology and Communication laws to replace outdated Telecommunications legislation and obsolete Broadcasting Acts. New laws in data protection, online banking, mobile money, cyber security, eCommerce, copyright, patents and privacy rights, among many others will need to be revised or enacted.

(4) Create 21st century educational curricula and institutions

There is need for a radical overhaul of the Region's educational content to better prepare Caribbean students for the demands of a dynamic new professional environment, with entrepreneurial skills and competences for the emerging globally competitive marketplace. Schools and colleges should create the foundation for modern digitally driven and globally competitive economic development. Many of the Caribbean countries have achieved near universal enrolment at the primary and secondary level (such as Aruba, Belize, Barbados, Grenada, and Guyana). However, access to higher education remains low with less than 15% of secondary school graduates going on to post-secondary education⁴².

The schools, colleges and universities themselves need to review and reform the educational curriculum to better reflect the digital environment, the future of work and entrepreneurial expertise.

(5) Drive new private sector training initiatives for enhanced productivity in the knowledge economy

Private sector employers must invest in the up-skilling and innovative training of their employees in the use of new technologies and applications without gender biases. Universities must teach students how to learn and to apply new knowledge. Firms must engage in more in-service training sessions, internships, more work-study programmes and more collaboration with educational institutions to create the required graduates especially in the new and emerging areas of the knowledge economy. Further, mentoring by larger firms can assist with the challenge of would be young entrepreneurs wanting to establish start-ups, but not knowing enough about how to operate a business and how to make productive use of the digital technologies.

(6) Build better ICT infrastructure in the Region for improved access in rural and remote areas

The Caribbean is lagging behind many of its Latin American neighbours in infrastructure development. With some exceptions by degree, the relatively poor infrastructure is seen in inadequate network coverage; poor quality broadband services; or low internet speeds. Although there have been significant ICT infrastructural upgrades over the last decade in some Caribbean countries, there still remain commercial challenges including for the operators to extend their network to some rural areas. The problem of low user take-up in mostly the rural and remote areas, reduces the commercial incentive for the network operators to make further investment.

⁴² World Bank, *Quality Education Counts for Skills and Growth*, (2013).

Establish or renew ICT investment funds to better target and manage public and private sector investment in broadband build out in rural and remote areas.

(7) Finance and encourage MSME expansion in digital content production

While infrastructure is important, there is also the pressing need to support training and development in the domain of digital content production and in the cultural and creative industries, as important areas of competitive global advantage from the Caribbean. The Region's creative talents in music, fashion, culinary arts, furniture design, film production, animation, digital game development and sports programming are often pursued within MSMEs and are vital activities requiring more sustained and practical support by governments, the banking and financial sector and educational institutions.

This need for an emphasis on content creation and digital design should be accompanied by more pro-active national policies to carry out a switchover from analogue to digital production, transmission and reception facilities throughout the Caribbean Region. This policy of Digital Switchover (DSO) is mandated by the International Telecommunications Union (ITU). But more importantly, it is a key competitive platform on which many of our global comparator countries and trading partners have already embarked.

(8) Undertake regulatory reform to converge existing fragmented regulatory structures

Many Caribbean countries have a pressing need for reform in regulatory structures and policies as regards the ICT and Broadband Sector. A splintered regulatory framework is expensive and less effective. Converged regulators are required to seamlessly handle the emerging integrated regulatory demands of the new era. A single communications regulator can oversee telecoms, broadcasting, spectrum management and internet-related services.

Governments need to update competition policies and legislation. Although most countries have a body of ICT policies and regulations in place, the handling of certain crucial regulatory topics which directly impact competition remain inadequate. One such area is in competition law and defining modern competition policies. In Jamaica, for example, there is a gap in competition legislation governing mergers and acquisitions. Other gaps include such areas as pricing and interconnection, number portability, infrastructure sharing and digital switchover.

(9) Re-fashion fiscal regime to reduce taxation on MSMEs and the ICT sector

Remove taxes on computer imports. The fiscal regime imposed by some Caribbean government often lean heavily on the ICT broadband and telecom sectors for new taxation. Several Caribbean governments, including those of the CDB's BMCs, have imposed some measure of taxes specific to the telecommunications sector. According to GSMA (2015), sector-specific taxation is creating barriers to access. Where these measures are implemented, Governments should be encouraged to give additional incentives and assistance with equipment imports to MSMEs and other industry start-ups as a means to diversify ownership in the sector and encourage employment.

(10) Establish a regional oversight task force or office to co-ordinate the knowledge economy

The seeming vacuum in leadership and championing of these causes within many Caribbean countries and in the Region as a whole will need to be redressed. Ministers of government should mandate CARICOM and the CDB to create a new unit or task force to promote the regional knowledge economy and related business and government applications.

It is through these measures and their effective co-ordination that the Caribbean will be enabled, within the ICT sector, to increase growth and productivity and to become more competitive in responding to the opportunities of the emerging 4IR.

4. R&D, TECHNOLOGICAL TRANSFER AND INNOVATION

4.1 INTRODUCTION

The entrepreneur: ‘...employs the results of work in research and development; very well, let us investigate what means make it easier, economically, to undertake R and D’⁴³

This use of Research and Development (R&D) as a facilitator of innovation, and subsequent Schumpeterian creative destruction, places the entrepreneur at the centre of the process of economic growth. Indeed, Thurik and Wennekers⁴⁴ consider this Schumpeterian entrepreneur to be the ‘prime cause of economic development’. However, the entrepreneur does not exist in a vacuum, and a multitude of factors influences the link between the operations of the firm and the realisation of economic growth and development. Dohnert, Crespi, and Maffioli note that ‘gender, finance, energy, competition, foreign direct investment, and particularly, business development programs [sic] impact firm level innovation, productivity, and therefore economic growth’;⁴⁵ in this sense, the authors are appreciative that economic growth is driven from the level of the firm, the institutional representation of the entrepreneur. The important role of productivity enhancements in driving economic growth rely on the behaviour of firms at the micro-level: ‘Productivity starts at the firm level and is related to how efficiently firms convert inputs into outputs’.⁴⁶ As with Dohnert et al. (2017), it is believed here that identifying the correlates of firm productivity, at the micro level, as well as the constraints faced in undertaking innovation, will assist in the development of effective policy to spur productivity growth and subsequently economic growth in the region.

This chapter takes a whole-system perspective in relation to the dynamic interplay between R&D, innovation, productivity, business support frameworks, and the characteristics of entrepreneurship, the entrepreneur, the enterprise and industry. The overarching goal here is to understand what ‘means make it easier’ for firms to innovate. To this end, the current chapter is guided by three basic questions:

- **What is the current situation in the Caribbean with regards to R&D, innovation and technology transfer?**
- **What are the constraints to undertaking R&D, introducing innovations and technological transfers?**
- **How can any constraints identified be addressed?**

Embedded within the concept of entrepreneurship are risk-taking and innovation. The entrepreneur, as the executing agent of entrepreneurship, does not necessarily demonstrate an affection for risk, but is tolerant of risk. In seeking to innovate to realise returns, the entrepreneur undertakes research and development, which is a risky investment as not all expenditure on R&D ‘pays off’. Therefore, any discussion on innovation and research and development involves a discussion of entrepreneurship. Cornell University, INSEAD, and WIPO (2016) support an entrepreneur-centred approach in their discussion of global innovation by noting that ‘There is no mechanical recipe to create sound innovation systems; entrepreneurial incentives and “space for innovation” matter’.⁴⁷

With respect to the region, the Global Innovation Index Report for 2016 indicates that Latin America and the Caribbean (LAC) is a ‘region with untapped innovation potential but important risks in the near-term... it will be important to overcome short-term political and economic constraints, and to cling to longer-term innovation commitments and results. Greater regional R&D and innovation cooperation in Latin America might indeed help in this process’.⁴⁸ This finding for LAC is, however, made with only two Caribbean countries being included in the sub-region of Latin American and the Caribbean; the countries included were the

⁴³ William J. Baumol, “Entrepreneurship in Economic theory,” *The American Economic Review* 58, no.2 (1968):70.

⁴⁴ Roy Thurik and Sander Wennekers, “Entrepreneurship, Small Business and Economic Growth,” *Journal of Small Business and Enterprise Development* 11, no.1 (2004):140.

⁴⁵ Sylvia Dohnert, Gustavo Crespi and Alessandro Maffioli. Exploring Firm-Level Innovation and Productivity in Developing Countries: The Perspective of Caribbean Small States. Washington, DC: Inter-American Development Bank, 2017, ix.

⁴⁶ *Ibid.*, 2.

⁴⁷ Cornell University, INSEAD, and WIPO, *The Global Innovation Index 2016: Winning with Global Innovation* (Ithaca, Fontainebleau and Geneva, 2016), xxv.

⁴⁸ Cornell University, INSEAD, and WIPO, *The Global Innovation Index 2016: Winning with Global Innovation* (Ithaca, Fontainebleau and Geneva, 2016), xxv.

Dominican Republic and Jamaica. Out of 128 countries, the Dominican Republic ranked 76th and Jamaica ranked 89th.

Given the current lack of appreciation of the Caribbean context, the absence of the majority of the Region in global indicators on R&D and innovation, and the noted importance of the entrepreneur and the enterprise in this process, this chapter seeks to address a number of issues. Primarily it seeks to profile the prevalence of R&D and innovation in the region, as well as to identify constraints, both external and internal to the firm. Drawing on global exemplars, the main goal of the Chapter is to make suggestions to strengthen the institutional, policy and regulatory infrastructure in the Region as it relates to R&D and innovation. With these goals, the Chapter is structured as follows. Initially the framework of the analysis is presented in relation to the process of conducting R&D, the realisation of an innovation, and the effect of innovation on enterprise performance. This is followed by a review of micro level data on Caribbean enterprises drawn from a survey conducted in 2014 to highlight current activity. Information on the correlates of innovation and performance are presented, as well as an analysis of the constraints to innovation identified at the enterprise level to highlight any areas where policy interventions would be required. This is followed by a review of the external institutional infrastructure in the Region within which these enterprises operate. While noting the constraints experienced at the enterprise level, section 4.6 examines the approach taken to promoting R&D activity and innovation in global exemplar countries. This subsection concludes with a contrast between the approach taken in the Caribbean vis-à-vis that of global exemplars, while section 4.7 summarises and provides policy recommendations to enhance R&D activity and innovation in the Caribbean.

4.2 FRAMEWORK OF ANALYSIS

Central to economic growth and development in the Caribbean is enhanced competitiveness. One channel through which this can occur is through increased productivity⁴⁹. Innovation⁵⁰ is central to any effort to enhance productivity and competitiveness in the region. Understanding innovation as the end product of an entrepreneurial endeavour requires an understanding of the entrepreneurial processes of opportunity discovery and exploitation, under the assumption that such opportunities exist.

The process of opportunity discovery and entrepreneurial exploitation commences with research and development (R&D). Within the conceptualisation of entrepreneurship used here, R&D is a necessary condition for entrepreneurship. Undertaking research and development (R&D) is the initial point in the discovery of an entrepreneurial opportunity, while the opportunity is considered entrepreneurial as there is the risk that the activities may not result in an innovation; that is, R&D is a costly and risky activity as it may or may not 'pay off' and there is limited knowledge of the probability of 'success'. Such 'risky' activity may be undertaken by several agents, including academic institutions, private enterprises or government agencies; however, it is only the entrepreneur that can exploit the output of any newly discovered opportunity. The transfer of this knowledge to the exploiting agent, i.e. the entrepreneur or the firm, is therefore integral in realising the returns from initial R&D investments. The process of economic development, the disturbing of the status quo through Schumpeterian creative destruction, is '...a process defined by the carrying out of new combinations on production. It is accomplished by the entrepreneur'.⁵¹

The importance of the various actors and interconnections in an innovation system has gained prominence in recent decades with the OECD (1997) noting:

'Technology-related analysis has traditionally focussed on inputs (such as research expenditures) and outputs (such as patents). But the interactions among the actors involved in technology development are as important as investments in research and development. And they are key to translating the inputs into outputs. The study of national innovation systems directs attention to the linkages or web of interaction with the overall innovation system.'⁵²

An understanding of an innovation system as a series of interactions has informed the conceptual framework adopted for the construction of the Global Innovation Indicators (GII) (Cornell University, INSEAD, and WIPO 2016). The GII 2016 report utilises a number of inputs and outputs to gauge the 'innovativeness' of an economy. As shown in Figure 4.1, there are several broad indicators utilised to judge innovation in an economy. The two sub-indices are an innovation input index and an innovation output index, which are used to calculate an innovation efficiency ratio (the ratio of the output index to the input index to indicate 'those economies that have achieved more with less').⁵³ The full Global Innovation (GI) index is a simple average of all items included.

⁴⁹ The definition of productivity is given in Chapter 1, while it is operationalised here at the enterprise level as sales per employee.

⁵⁰ The definition of innovation is given in Chapter 1, while it is operationalised here at the enterprise level as it is in the original survey instrument for the PROTEqIN Survey: 'the implementation of a new or improved product, namely good or service, or process, a new marketing method, or a new Organisational method in business practices, workplace Organisation or external relations' (p.11). See: <http://competecaribbean.org/proteqin/> [Accessed 6th April 2017]

⁵¹ Robert F. Hébert and Albert N. Link, "In search of the meaning of entrepreneurship," *Small Business Economics*, no. 1 (1989), 44.

⁵² OECD, *National Innovation Systems*. (Paris: Organisation for Economic Co-operation and Development (OECD), 1997), 3.

⁵³ Cornell University, INSEAD and WIPO, 410.

Figure 4.1: Adapted Framework of the Global Innovation Index 2016

Innovation Input Sub-Index	Innovation Output Sub-Index
<p>1. Institutions Political Environment Regulatory Environment Business Environment</p> <p>2. Human Capital and Research Education Tertiary Education Research and Development</p> <p>3. Infrastructure Information and Communication Technologies (ICTs) General Infrastructure Ecological Sustainability</p> <p>4. Market Sophistication Credit Investment Trade, Competition and Market Scale</p> <p>5. Business Sophistication Knowledge Workers Innovation Linkages Knowledge Absorption</p>	<p>6. Knowledge and Technology Outputs Knowledge Creation Knowledge Impact Knowledge Diffusion</p> <p>7. Creative Outputs Intangible Assets Creative Goods and Services Online Creativity</p>

Adapted from: Cornell University, INSEAD, and WIPO.⁵⁴

The key intervening factors which convert inputs to outputs rest at the level of the enterprise. The innovation ecosystem conceptualised and used for the GII includes several enterprise level indicators (details of the enterprise level indicators used are shown in the Appendix 4.4: Enterprise Level Indicators used in the Global Innovation Index Report, 2016).

While the ecosystem approach to innovation used as a framework for the GII is useful, the actual indicators mostly point to facilitators and output measures of innovation (quality of labour, training, R&D activity, patents, quality certifications, trademarks, use of technology, ICTs, internet, finance, collaboration, new business creation, high-tech exports, new sector growth (creative goods)). This mixture of product/technology/financial/market measurements (Denti 2013), while useful in allowing comparison of the quality of the innovation environment across countries, fails to take into account the actual prevalence of innovation at the enterprise level. This is noted with the proviso that not all R&D results in an innovation, and the manner in which innovation contributes to productivity increases and enhanced competitiveness. In this sense, competitiveness is the possession of some form of advantage, and as Porter notes: 'Invention and entrepreneurship are at the heart of national advantage'.⁵⁵

At a broad conceptual level, and with an appreciation of the enterprise and the entrepreneur in realising innovation and related benefits, the GII framework can be adapted to include not only innovation inputs and outputs, but also the intervening activities of the enterprise, as shown in Figure 4.2. The figure illustrates the interaction between external conditions, the nature and characteristics of the enterprise, and the effects these have on innovation outputs. This conceptual framework is utilised to investigate the prevalence of R&D and innovation in the Caribbean through firstly analysing activities at the enterprise level, and through this identify both internal and external constraints. This analysis at the enterprise level informs an investigation of measures to address constraints at the external level through an analysis of global exemplars, a review of related activities in the Caribbean, and the proposal of a series of recommendations to address constraints.

⁵⁴ Ibid., 50.

⁵⁵ Michael Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990), 125.

Figure 4.2: A Conceptual Framework of R&D and Innovation at a National Level



To facilitate the analysis at the enterprise level, a more detailed framework is given in Figure 4.3. Given the importance of the entrepreneur in realising increased competitiveness at the national level, the framework for the initial analysis here focusses on the institutional structure within which the entrepreneur operates, the enterprise. This approach draws on the extent to which several internal factors (inputs) play a role in facilitating innovation, and the manner in which innovation influences intermediate and ultimate firm performance (outputs). In a sense, this approach mirrors the GII approach in the use of inputs, as it relates to the Business Sophistication sub-indices, while enhancing the output measures by specifically analysing firm performance. Drawing on these results, it is then possible to establish the presence and effectiveness of inputs external to the firm, specifically those relevant to policy development for enhanced productivity and competitiveness. The general framework for the analysis of R&D, innovation, and technology transfer, and their effect on firm performance is shown in Figure 4.3.

Figure 4.3: An Analytical Framework for R&D, Innovation and Technology Transfer at the Enterprise Level

Research and Development Inputs and Outputs				Innovation and Firm Performance		
Antecedents	R&D Inputs	Type of R&D Undertaken	R&D outputs	Exploiting R&D: Inputs	Results of Exploiting R&D	Enterprise Performance
Organisational culture and market power Previous Innovation Performance (feedback) Previous Firm Performance (Profits, other feedbacks)	Finance Human Resources (HR) and HR management Technology/ICTs External Collaboration	Good/Service Development Production Process/Service Delivery Research and Development Market Research Partner search (suppliers, collaborators)	Good/Service Innovation (novelty and improvement) Process Innovation/ Technology Adoption/ Adaption (technology transfer) New Markets/ Marketing	Finance Human Resources and Training Logistics	Increased Revenue Lower Costs Increased Productivity Increased Market Share Increased Competitiveness	Increased Profits
			Patents, trademarks, industrial designs, copyright, geographical indications				Potential Future Revenue Streams

Figure 4.3 has seven main components ranging from Antecedents through R&D activity, resulting in innovations and changes in enterprise performance. While at an operational level the progression is not as linear as presented, given the opportunities for internal feedbacks and learning effects within each component, it is presented in this manner for ease of interpretation.

As an antecedent condition, organisational culture is important with respect to the tendency to innovate, that is, its entrepreneurial orientation. Organisational culture has a bearing on whether the R&D process is formalised within the firm, while noting that undertaking R&D does not necessarily require a formal structure within the firm. Organisational culture will be highly dependent on the nature of the principal or principals of the firm (the entrepreneurs), while it is appreciated that other external factors will also have a role to play such as the modus operandi of the sector in which the firm operates, as well as the other input elements of the GII conceptual framework. However, it is considered that the degree to which R&D is undertaken in the organisation is primarily driven by the ‘entrepreneur’, including previous experience in undertaking innovation.

Other R&D inputs and outputs are dependent on the type of R&D undertaken, with respect to the level of technological or

knowledge intensiveness required. For example, the level of finance, technical skills and collaboration with external research centres required for R&D in product development in biomedical technology will be significantly greater than market research on customer satisfaction by a commercial bank to attract new customers. However, it would be expected that most R&D endeavours will demand, in various proportions, the inputs required, while it is noted that not all R&D outputs will be utilised in the immediate term, with patents, trademarks, industrial designs, copyrights and geographic indications⁵⁶ having potential which may not be realised in the immediate term.

As a result of the R&D process, in order to exploit an innovation, a firm will need to provide finance, human resources and training, and logistical measures in varying proportions to realise the returns to R&D. These returns can be measured by increased revenue, lower costs, increased market share and increased competitiveness, inter alia. However, the main measure of enterprise performance here relates to increased profits. The rationale for the separation of profits from the other measures of firm performance is because this can be considered the main measure by which entrepreneurs will measure firm performance. While it is appreciated that there may be variation in measures of overall firm performance, the primary measure is the ability to satisfy 'shareholder' requirements. Results of primary research undertaken in Barbados suggested that entrepreneurs were not willing to undertake certain activities simply for the public good, such as exporting to earn foreign exchange, but rather they gauge 'success' as the ability to earn profits (Sir Arthur Lewis Institute of Social and Economic Studies, 2009). Another rationale to separate increased profits from other performance measures is that firms may not undertake R&D and therefore not innovate as antecedent conditions (such as monopoly power) may provide sufficient profits to 'satisfy' the shareholder or shareholders.

The general focus of investigations into R&D relates to its effect on productivity and competitiveness, while the competitiveness of the firm relates to: 'the ability to design, produce and or market products superior to those offered by competitors, considering the price and non-price qualities'.⁵⁷ While there are many processes through which competitiveness can be realised, the focus here is on the output, the actual good or service produced. In order to assess the 'competitiveness of the firm' through the good or service it produces, and given the small developing economies in the Region where domestic market power may be due to reasons not related to the firm's superior ability to 'design, produce or market' their product, it is considered that the best indicator of competitiveness of the firm would be whether the firm exports, while the level of competitiveness would be indicated by the share of sales accounted for by exports.

Given this analytical framework, the following section outlines the state of affairs as it relates to innovation amongst Caribbean firms within the last 5 years.

4.3 PREVALENCE OF R&D, INNOVATION AND TECHNOLOGY/KNOWLEDGE TRANSFER IN CARIBBEAN ENTERPRISES

4.3.1 BACKGROUND: DATA, DEFINITIONS AND CATEGORISATIONS

The analysis of the prevalence of R&D, innovation and technology/knowledge transfer in the Caribbean draws on a survey of enterprises conducted in 2014. Previous to this, in 2010, the World Bank conducted the Latin America and Caribbean Enterprise Survey (LACES) in 14 countries in the region⁵⁸, while the 2014 follow-up survey on Productivity, Technology and Innovation (PROTEqIN) was undertaken in 13 countries in the region⁵⁹ (Dohnert et al. 2017). The analysis here is based on approximately 1,850 enterprises. Several firms in the 2010 survey were again surveyed in 2014, allowing for the development of a short panel of enterprises where changes over the period can be examined. Both surveys collected a range of firm level data, and only the CDB BMCs that are the focus of this paper are included in the analysis. For the current analysis, and drawing on the data collected, the following operational definitions and categorisations are utilised as follows:

Research and Development (R&D): A broad definition of R&D is utilised rather than the narrower definition utilised for tax purposes in some countries. The Government of the United Kingdom (2010) provides a narrow definition of R&D for tax purposes as a project seeking to 'achieve an advance in science and technology' and activities directly and indirectly related to achieving such an advance. For the purposes of this paper, R&D is not solely related to advancing scientific and technological knowledge in the development of new products and processes, but also relates to research conducted to develop new networks of suppliers, partners and customers and generally enhance the growth and development of the enterprise. It is noted that R&D can either be formalised within the enterprise as a specific unit or informal, as it is characterised as part of regular activity across units. Operationalising R&D from the survey utilised information from the Business Strategy and Support Programmes module which provided data on the undertaking of specific activities, whether public resources were used, and whether the venture was successful. The activities included:

⁵⁶ The World Intellectual Property Organisation defines a geographical indication (GI) as: 'a sign used on products that have a specific geographical origin and possess qualities or a reputation that are due to that origin. In order to function as a GI, a sign must identify a product as originating in a given place. In addition, the qualities, characteristics or reputation of the product should be essentially due to the place of origin. Since the qualities depend on the geographical place of production, there is a clear link between the product and its original place of production.' See: http://www.wipo.int/geo_indications/en [Accessed 28th February 2017]

⁵⁷ Ajitabh, Ambastha and Kirankumar Momaya, "Competitiveness of Firms: Review of Theory, Frameworks and Models," *Singapore Management Review* 26, no. 1(2004), 46.

⁵⁸ The 14 countries included the Caribbean countries which are the focus of the current paper plus the Dominican Republic and Suriname.

⁵⁹ The countries included in the 2010 LACES were the same as the PROTEqIN survey with the removal of the Dominican Republic. Both surveys were sponsored by the Compete Caribbean Programme, a programme funded by the Inter-American Development Bank (IADB), the Government of Canada, and the UK's Department for International Development (DFID), in partnership with the Caribbean Development Bank (CDB).

- New or improved product/service/process R&D;
- Market Development R&D (export promotion and domestic and foreign market development);
- Quality Improvement R&D;
- Cost Reduction R&D; and
- Network Development R&D (horizontal and vertical relationships).

Innovation: Innovation is defined as the actual introduction of a new or significantly improved product, service or process within the enterprise. This is despite whether the new introduction is developed by the enterprise itself or drawn from other sources through a transfer of technology (purchase of off-the-shelf technology or obtained through licensing). From the data, innovative firms are those that had introduced a new or significantly improved good or service within and up to the 3 years preceding the survey.

Productivity: A simple version of productivity is utilised in the analysis and calculated as sales per employee.

Technological/Knowledge Intensiveness (TKI): Approximately 18 sectors (11 in manufacturing and 7 in services) are covered in the surveys⁶⁰. To simplify the presentation of results, sectors are classified in relation to their level of technological or knowledge intensiveness as utilised in Lashley and Smith (2015) (see Appendix 4.1: Technological and Knowledge Intensiveness (TKI) Categorisations).

Firm Size: The number of employees was used to categorise firm by size into three groups: small (less than 20 employees); medium (20 to 99 employees) and large (100 or more employees).

Foreign Ownership: Only 16.1% of the sample had any level of foreign ownership. In order to analyse the role of foreign ownership, firms were categorised as Majority/Equal Foreign Ownership (50% to 100% foreign owned), Majority Domestically Owned (1% to 49% foreign owned), and Domestically Owned (0% foreign ownership).

Gender Structure of Ownership: The data provided categorical information on the gender structure of ownership and management including for each group: All Men, Predominantly Men, Equal Men and Women, Predominantly Women and All Women. With the consideration that owners would be responsible for determining the strategic management of the enterprise, the gender structure of ownership is utilised to investigate any gender effects in relation to sector of operation, R&D, and innovative activities.

The above definitions and categorisations are utilised to profile the innovation activity of Caribbean enterprises. The following subsections are ordered in relation to the structure of the analytical framework outlined above. Initially an analysis of issues related to R&D is presented, followed by a review of the issues related to actual innovations. The main issues arising are utilised to provide a discussion of the main constraints and drivers of innovation in the Caribbean from the enterprise level.

4.3.2 R&D IN CARIBBEAN ENTERPRISES

Drawing on an analysis of the survey data described above, the level of formalised R&D in Caribbean enterprises is very low, with only 9% of establishments having a dedicated R&D department or group of persons dedicated in this area. This, however, varies by sector. 23% of enterprises in medium-high technology/knowledge intensive (TKI) sectors had a dedicated 'team', while the related figure for enterprises in lower TKI sectors was below 8%. This formalisation of R&D is also significantly more prevalent in larger enterprises where the median number of employees was 38 for enterprises with formal R&D and 19 for enterprises without.⁶¹ This result is in keeping with previous research on developing countries (Bhattacharya and Bloch 2004) that larger enterprises are more likely than smaller firms to have formal R&D teams.

With respect to the type of R&D undertaken⁶², the most prevalent was market development (local and foreign) which was undertaken by 47% of enterprises, while the least prevalent was network development (activities to build alliances with suppliers and/or clients) at 15%. Only 28% of enterprises undertook R&D that was directly related to the introduction of a new or improved product or service (see Table 5.1).

⁶⁰ The actual distribution of enterprises by county and sector is included as Appendix 4.2: Sector Distribution by Country.

⁶¹ Utilising nonparametric tests (independent-samples Mann-Whitney U-test): Sig.=0.000.

⁶² The specific type of R&D undertaken, the broad categories utilised and the distribution by country are shown in Appendix 4.3: Specific Types of R&D Activity Undertaken by Country.

Table 4.1: Type of Research and Development (R&D) Undertaken by Country (%)

Type of R&D	OECS	JAM	BAR	GUY	BEL	BAH	TNT	Total
New or Improved goods/services	14.6	55.4	39.0	72.5	41.0	18.1	18.8	28.1
Market Development	47.7	33.1	39.0	65.8	35.2	52.0	54.1	47.0
Quality Improvement	32.4	19.8	22.8	77.5	18.0	30.7	39.7	33.3
Cost Reduction	25.9	62.0	34.1	81.7	44.3	27.6	30.3	36.9
Network Development	7.4	16.5	20.3	60.0	7.4	10.2	15.6	14.6
R&D Score (Mean Number of R&D activities (max. of 5) undertaken per enterprise)	1.28	1.87	1.55	3.58	1.46	1.39	1.58	1.60
Number of Enterprises	772	242	123	120	122	127	340	1846

Source: PROTEqIN Survey, 2014.

In seeking to score R&D activity, in the broad sense of R&D used here, a simple R&D score for each enterprise was calculated based on the number of R&D activities undertaken. On average, enterprises in the Region undertook 1.6 R&D activities out of a potential five. As shown in Table 4.1, there is wide variation in the R&D score across the region, ranging from 1.3 in the OECS to 3.6 in Guyana. An analysis of statistically significant differences in scores revealed some element of clustering of results where Guyana demonstrated a significantly different R&D profile to all of the other countries in the region, while the OECS, Belize and The Bahamas presented profiles different to Jamaica, and Trinidad and Tobago presented differences in relation to the OECS. Barbados appears somewhere in between the OECS and Jamaica and Trinidad and Tobago, but differences seen here were not significant.

The question arises as to the underlying reasons for the different R&D profile seen in Guyana. A review of the structure of the enterprises in the Guyana sample indicated that Guyanese firms were younger (32% were less than 10 years old as opposed to 12% for the rest of the region), smaller (60% had less than 20 employees as opposed to 47% for the rest of the region), and more sectorally concentrated in wholesale and retail (42% versus 28%). Guyanese firms are also less productive than other firms in the Region with median sales of USD19,370 per employee as opposed to USD41,650 per employee for other countries in the region. Given that these firms are young, it could be the case that they are more active in the learning phase of development in seeking to reduce costs and develop markets, seeking to address low levels of productivity. However, these results are in contrast to the results for the whole sample, where the R&D score demonstrated significant differences⁶³ in relation to the level of TKI, firm size (employees), firm age, and the gender structure of ownership:

- Medium to High TKI enterprises undertook significantly more R&D Activities (mean=1.95) than Low (mean=1.6) and Medium-Low (mean=1.6) TKI Enterprises.
- All firm sizes were significantly different to each other with Small having a mean R&D score of 1.4, Medium with a mean R&D score of 1.7, and Large with a mean R&D score of 2.1. This result is supported conceptually and empirically by Bhattacharya and Bloch (2004).
- Old firms (25 years or older) (mean=1.73) undertook significantly more R&D activities than Mature (mean=1.54) and Young (mean=1.39) firms.
- Equal ownership enterprises undertook more R&D activities (mean=1.79) than firms owned by majority men (mean=1.57) or majority women (mean=1.55)

Of note was that no significant differences were seen in relation to the level of foreign ownership, which Grazzi, Pietrobelli, and Szirmai (2016) suggest as due to multinational corporations in LAC undertaking these types of activities in their home countries, which ‘poses urgent questions about the approach that countries [in LAC] should follow toward foreign investors’.⁶⁴ Caribbean Development Bank (2016) also suggests that this is the case in the Caribbean specifically.

The findings for Guyana are mirrored with respect to the success of R&D efforts. As demonstrated in Table 4.2, for those undertaking R&D in the various areas, the most successful efforts were seen in R&D for cost reduction, with a 57% success rate.

⁶³ One-Way Analysis of Variance (ANOVA) was utilised to test for differences. The results are shown in Appendix 4.6: ANOVA Results of Significant Differences in R&D Scores.

⁶⁴ Matteo Grazzi, Carlo Pietrobelli, and A. Szirmai, *Firm Innovation and Productivity in Latin America and the Caribbean* (Springer, 2016): 321.

The least successful was with R&D for market development at 32%. However, again a wide variation is seen across countries in the Region where Guyana shows a high degree of success across all categories of R&D, while the lowest success rates are seen in Jamaica with respect to innovation, Belize with respect to market development, cost reduction and network development, and Barbados with respect to quality improvement. The variation in success rates is not surprising given the variation in perceived obstacles to innovation discussed later in Section 5.4.

Table 4.2: Success of R&D Efforts by Type and Country (%)

Type of R&D	OECS	JAM	BAR	GUY	BEL	BAH	TNT	Total
Innovation (goods/services/processes)	46.0	20.1	37.5	86.2	24.0	34.8	46.9	42.8
Market Development	28.1	36.2	12.5	84.8	2.3	33.3	27.2	32.4
Quality Improvement	38.8	12.5	7.1	89.2	9.1	38.5	32.6	40.5
Cost Reduction	77.5	26.7	33.3	71.4	16.7	74.3	69.9	56.6
Network Development	42.1	25.0	16.0	86.1	0.0	38.5	41.5	47.2

Source: PROTEqIN Survey, 2014.

In seeking to explain Guyana's greater success rate, the utilisation of public sector resources does not appear as a contributing factor as the country demonstrates some of the lowest levels of utilisation of public resources, as shown in Table 4.3. Across the region, the level of utilisation of public resources is low with respect to R&D, due in part to a lack of explicit public support for R&D, as discussed later⁶⁵. The highest level of utilisation of public resources was seen among enterprises undertaking R&D being in the area of good/service/process R&D (8%), followed by market development R&D (5%). The lowest level of utilisation of public resources was seen with network development (1%).

Table 4.3: Use of Public Resources for R&D by R&D Type and Country (%)

Type of R&D	OECS	JAM	BAR	GUY	BEL	BAH	TNT	Total
Innovation (goods/services/processes)	13.3	5.2	8.3	0.0	6.0	1.3	15.6	7.7
Market Development	5.4	3.8	12.5	2.5	2.3	1.5	5.4	5.0
Quality Improvement	4.4	4.2	7.1	2.2	4.5	2.6	3.0	3.7
Cost Reduction	3.5	0.0	0.0	2.0	0.0	5.7	7.8	2.8
Network Development	0.0	0.0	0.0	2.8	11.1	0.0	0.0	1.1

Source: PROTEqIN Survey, 2014.

With respect to R&D outcomes, for those enterprises undertaking some form of R&D activity, approximately 27% (or 4% of the entire sample) had filed a patent, trademark, industrial design or copyright in the previous three years, while 20% (or 3% of the entire sample) currently possess at least one of these.

4.3.3 INNOVATION AND TECHNOLOGY TRANSFER IN CARIBBEAN ENTERPRISES

Denti (2013) reviews several indicators of innovation ranging from product/technology to financial/market measures as well as subjective measures. The range of product/technology measures includes the introduction of new/improved products or processes, patents and invention disclosures. While these measures allow innovative firms to be distinguished from non-innovative firms, financial measures indicate the effectiveness of innovation in relation to the ratio of innovative sales and R&D expenditures. Subjective measures speak to issues such as innovative behaviour, and team and organisational 'innovativeness'. While these various measures are useful, the concern here is to discern innovative firms from others, and therefore the product/technology approach is utilised in relation to the introduction of a new or improved product or service in the previous three years.

⁶⁵ A list of publicly supported enterprise development ministries, agencies and incentives is shown in Appendix 4.5: Listing of Ministries, Business Agencies and Business Incentives in the Caribbean.

Approximately 79% of enterprises surveyed conducted at least one form of R&D, with varying levels of achievement of goals, as highlighted in the previous section. However, only 20% of enterprises introduced a new or significantly improved good or service in the three years preceding the 2014 survey. Examining the relationship between the level of R&D activity, with respect to the number of R&D activities undertaken, and the introduction of an actual innovation or improvement, suggests a strong relationship⁶⁶, where the mean R&D Score for enterprises introducing an innovation or improvement was 2.9 versus an R&D score of 1.3 for non-innovators⁶⁷. However, the level of innovation varies widely across the Region with Guyana having the highest proportion of 'innovative' enterprises (40%), in keeping with its R&D profile, and Belize having the lowest (7%) (see Table 4.4).

Table 4.4: Innovative Firms by Country (%) (2014)

Country	Innovative Firms (%)	Total Number
OECS	18.7	772
JAM	11.6	242
BAR	22.0	123
GUY	40.0	120
BEL	6.6	122
BAH	22.0	127
TNT	23.5	340
TOTAL	19.7	1846

Source: PROTEqIN Survey, 2014.

At the sector level, and as seen with the prevalence of formal R&D 'teams', the introduction of an innovation also varied by level of technology/knowledge intensiveness⁶⁸ (TKI), with 40% of enterprises in medium-high TKI sectors introducing an innovation as opposed to 22% in medium-low TKI sectors and 17% in low TKI sectors. With respect to the contribution of innovations to sales, this averaged 23%, suggesting a significant impact on the performance of the firm.

In addressing innovation in firms with 'innovation teams', 86% of firms with an innovation team introduced a new product or service in the last 3 years compared with only 13% of firms without an innovation team.

Investigating the correlates of innovation, a number of firm characteristics were analysed. As shown in Table 4.5, enterprises with publicly-traded shares were introducing innovations to a greater extent (38%), although the sample size in this respect is quite low. What is clear is that sole proprietorships are the least likely to introduce an innovation (16%) and this difference is significant⁶⁹.

Table 4.5: Legal Status by Innovative Activity (%)

Legal status	Innovator (%)	Number
Shareholding company with traded shares	37.5	16
Shareholding company with non-traded shares	22.9	637
Sole proprietorship	16.3	686
Partnership/Limited liability	19.0	242
Limited /partnership	19.8	263
TOTAL	19.6	1845

Source: PROTEqIN Survey, 2014.

⁶⁶ The R&D score indicates the number of R&D activities, and as noted previously, not all R&D results in an innovation. However, there appears to be some correlation between the number of R&D activities undertaken and the probability of introducing an innovation.

⁶⁷ This difference was statistically significant. Utilising non-parametric tests (independent-samples Mann-Whitney U-test): Sig.=0.000.

⁶⁸ For a breakdown of sectors by TKI status see Appendix 4.1: Technological and Knowledge Intensiveness (TKI) Categorisations.

⁶⁹ Pearson Chi-Squared (1, n=1844)=7.561, p=0.006.

Having any level of foreign ownership demonstrates a relationship with whether a firm introduces an innovation or not, unlike with the prevalence of R&D. In addition, innovation also increases with the share of foreign ownership, although this correlation is only significant at the 10% level⁷⁰. In addition, as shown in Table 4.6, firms with some foreign ownership but majority controlled by domestic interests actually had the highest level of innovation activity, which may be due to the benefits of local knowledge.

Table 4.6: Foreign Ownership by Innovative Activity (%)

Structure of foreign ownership	Innovator (%)	Number
Majority/Equal Foreign Owned	21.8	220
Majority Domestic Owned	27.3	77
Fully Domestically Owned	19.0	1549
TOTAL	19.7	1846

Source: PROTEqIN Survey, 2014.

Table 4.7 shows that a greater proportion of older firms were introducing innovations (24%), with the youngest firms having the lowest rate at 15%.

Table 4.7: Age of Firm by Innovative Activity (%)

Age category	Innovator (%)	Number
25 years and over	24.4	726
15 to 24 years	17.6	518
10 to 14 years	16.2	358
Less than 10 years	15.2	244
TOTAL	19.7	1846

Source: PROTEqIN Survey, 2014.

In relation to firm size, as measured by the number of employees, Table 4.8 indicates that larger firms are innovating to a greater degree than smaller firms⁷¹, where the mean number of employees in the last financial year was 75 for innovators and 51 for non-innovators⁷².

Table 4.8: Size of Firm by Innovative Activity (%)

Size category	Innovator (%)	Number
Small (less than 20 employees)	15.7	890
Medium (20 to 99 employees)	20.4	697
Large (100 or more employees)	31.3	259
TOTAL	19.7	1846

Source: PROTEqIN Survey, 2014.

⁷⁰ Using cross-tabulations to test for the effect of any foreign ownership: Pearson Chi-Squared (1, n=1846)=2.853, p=0.091. Utilising nonparametric tests (independent-samples Mann-Whitney U-test) to test whether the level of foreign ownership was significantly different between innovators and non-innovations: Sig.=0.100.

⁷¹ Pearson Chi-Squared (2, n=1846)=31.039, p=0.000

⁷² Utilising nonparametric tests (independent-samples Mann-Whitney U-test): Sig.=0.000.

Table 4.9 appears to indicate some form of relationship between the gender structure of ownership and innovation, with all women and all men owned firms having the lowest representation among innovators. However, closer examination of the data reveals that these types of firms are also correlated with the other factors related to low levels of innovation, namely age (see Table 4.10), size (52% of all male owned and 64% of all female owned firms were categorised as small), and legal status (52% of all male ownership and 80% of all female ownership enterprises are sole proprietorships).

Table 4.9: Gender Structure of Ownership by Innovative Activity (%)

Gender Structure of Ownership	Innovator (%)	Number
All Men	18.3	996
Predominantly Men	26.7	273
Equally Men and Women	19.8	263
Predominantly Women	21.2	99
All Women	15.5	200
TOTAL	19.6	1831

Source: PROTEqIN Survey, 2014.

Table 4.10: Gender Structure of Ownership by Key Indicators (mean)

Gender Structure of Ownership	Age	Number of Employees
All Men	19.0	18.0
Predominantly Men	23.0	31.0
Equally Men and Women	22.0	24.0
Predominantly Women	20.5	23.0
All Women	18.0	13.0
Total	19.0	21.0
Number	1788	1831

Source: PROTEqIN Survey, 2014.

For firms with the largest ownership being female, 18.7% were innovators as opposed to 23.1% for firms where the largest ownership was male. Where the top manager was female (22.1% of the sample), 15.7% were innovators as opposed to 20.8% for firms with the top manager being male. Other correlates of innovation related to 27% of firms with internationally recognised quality certification innovating as opposed to only 18% of firms without an internationally recognised quality certification. For firms with an international orientation, 25% innovated, as opposed to 16% of firms with a local orientation and 23% with a national orientation. It is, however, not clear whether innovation led to a wider market orientation or whether a wider market orientation led to adopting innovative behaviour. While the direction of causality between a wider market orientation and various measures of firm performance is debatable (Montalbano, Nenci, and Pietrobelli 2016), there may be important learning outcomes from international activity which improve firms' ability to innovate. There may also be a 'selection effect' with innovation, as it is with exporting, with the most productive firms having the capacity to participate internationally, as noted by Montalbano, Nenci, and Pietrobelli (2016). The same may be true in relation to innovation, where innovations improve firm performance, and given the costs of international operations, profitable and productive firms self-select to participate in international markets.

With respect to the actual innovation process for innovating enterprises, approximately one-third undertook the innovation alone, while for those in innovation partnerships⁷³, partners were mostly other companies in the sector (30%), laboratory/research centres (24%), or universities (24%); 13% were private-public partnerships (PPPs), that is, approximately 4% of the sample undertook innovations through PPPs.

⁷³ The data do not allow for a determination of whether these partners were local, regional or international.

The actual types of innovation or improvement undertaken varied: 26% related to packaging or presentation; 61% were due to the use of licensed technology; and 70% of enterprises purchased new machinery/equipment/software (technology transfer) as a result of the introduction of the innovation. The impact of innovations was related to both processes and organisational structure, where 58% of enterprises needed to change business processes as a result of the innovation, and 42% needed to change organisational structure to accommodate the innovation implemented.

Box 4.1: A Brief Selection of Product and Service Innovation in the Caribbean

PRODUCT INNOVATIONS

- Alcoholic Beverages: Handcrafted rum-infused beer, 10 Saints (Barbados); spiced flavoured rums (Regional).
- Beverages: Grace Aloe (Grace Kennedy) exports to the UK as an alternative to traditional juices and flavoured waters (Jamaica).
- Energy: Institutional framework for the producing and selling solar power from domestic residences to the national power generator (Barbados Light and Power).
- Pharmaceuticals: Institutional framework for the licensing of the use, growing, processing, selling, transportation and distribution of marijuana for medical and therapeutic purposes (Jamaica).
- Personal Care and Environment: Natural/organic beauty care products (Regional).
- Condiments and Waste Reduction: Pumpkin Ketchup, to exploit glut of produce and reduce waste (Jamaica).
- Food: Frozen sweet potato fries (Barbados).
- Agriculture, Tourism and Energy Conservation: Development of prototype solar-powered greenhouses for specialty products currently imported (Barbados with UNDP grant funding).

SERVICE INNOVATIONS

Media and ICTs: Cable and Wireless Communications (Flow)- Introduction of Flow TV and Flow Sports Apps for live online viewing of TV channels and sports events (Regional).

Finance and ICTs: Introduction of mobile banking Apps by major commercial banks (Regional).

Finance and ICTs: First Global Bank (Grace Kennedy) introduction of Video Teller Machines (VTM) in December 2015. The VTM is like an ATM but with direct video contact with a teller- enabling remote assistance while retaining personal interaction (Jamaica).

Finance and ICTs: bitt, Financial Technology (FinTech) company established in 2014 (Barbados).

Education and Tourism: Educational tours for 'learning tourists' on native 'bush medicines' (The Bahamas).

Tourism and ICTs: development of specialist Apps for international sporting event (Antigua and Barbuda).

Tourism and Environment: Eco- and cultural tourism, Garifuna (Dominica).

Education and Exports: Teaching English as a Foreign Language (TEFL) (Spanish) (University of the West Indies).

ICTs and Waste Management: Disassembly, recovery and disposal of recyclable electronic equipment (Barbados).

Authors' analysis:

The organisational changes required as a result of the introduction of an innovation or improvement included changing staff roles (57%) and improving skill levels of staff (56%). For those enterprises needing to increase the skill levels of staff, 57% undertook recruitment of new staff while 72% undertook retraining of current employees.

In relation to the types of improvements introduced in the previous three years, only 12% were in marketing; with the use of ICT for online/new media promotion (66%) and online sales development (57%) dominating. Other marketing improvements included: sales network development (51%), distribution (47%), new pricing methods (38%), franchising (27%), and product placement (26%).

In relation to differences between manufacturing and services, the introduction of a new product or service was more prevalent

amongst manufacturing enterprises at 39% versus 10% for services⁷⁴, while other differences and similarities are shown in Table 4.11. The significant differences seen relate to the greater utilisation of licensed technology, marketing improvements and franchising amongst manufacturers, while for those enterprises that implemented marketing improvements, these improvements were more likely to be in the areas of product placement and new sales networks.

Table 4.11: Types of innovation for manufacturing/services (% of innovating firms)

Type of Innovation	Manufacturing (%)	Services (%)
Packaging/Presentation	23.7	28.4
New Machinery/Software	70.3	69.0
Licensed Technology*	65.5	49.1
Changes in Processes	58.6	56.9
Changes in Organisational Structure	44.8	35.3
Changes in Staff Roles/Responsibilities	51.0	68.3
Marketing Improvements*	20.0	7.7
Marketing Improvements: Distribution	52.9	40.7
Marketing Improvements: Product Placement*	20.2	33.7
Marketing Improvements: Sales Networks*	42.9	62.8
Marketing Improvements: Franchising*	37.0	14.0
Marketing Improvements: Online Promotion	69.7	61.6
Marketing Improvements: Online Sales	60.5	53.5
Marketing Improvements: Pricing Methods	34.5	43.0

* Indicates significant difference between sectors at the 5% level
Source: PROTEqIN Survey, 2014.

As with the financing of R&D, the financing of innovations/improvements was only sourced from public funds⁷⁵ by 11% of enterprises. Where public funds are utilised, they only accounted for 20% of total funds required. The main source of funding were the enterprises' own funds, utilised by all innovating firms with a median value of 75% of total funds. Private partners' funding was used by 52% of innovating firms with a median contribution to funds of 50%. Of those firms spending on innovation in the last two years, the median spending was USD24,500, with the highest spending seen in medium-high TKI firms (USD33,333) followed by low TKI firms (USD24,467) and medium-low TKI firms (USD20,000). With respect to sales, innovative sales accounted for 22% of total sales (median).

The prevalence of use of internal fund for financing of R&D lends support to "pecking order theory" (POT), where there is a preference for the use of internal funds over debt or equity. This is similar to Estwick (2013), which notes that this occurrence in Barbadian firms was due to a desire for control: 'reflected in their reluctance to utilise bank credit, government agency funding, and additional external equity funding to facilitate growth and development'.⁷⁶ However, one of the main external constraints to innovation, discussed in detail later, was the unavailability of external funds, which lends support to Nicholson and Lashley's (2016) suggestion that POT may not necessarily be a theory of choice or preference, but 'given the absence of options, the underlying theory of choice within POT is violated, suggesting that financing choices are enforced rather than selected'.⁷⁷

Overall, the main effect of innovation activity was in improving the quality of products/services, increasing sales, and improving the ability to develop new products or services in the future. These results for quality and sales improvement are not unexpected given that R&D undertaken in enterprises in the Region was focused on market development (47%), cost reduction (37%) and quality improvement (33%) (see Table 4.1). In this respect, approximately 60% of innovating firms noted that these factors were very important or critical outcomes of the innovation process. Less important were access to new customers (48%), increasing the number of products/services (31%), and, which is of concern for those focused on increasing productivity, only 24% noted

⁷⁴ Pearson Chi-Squared (1, n=1717)=198.407, p=0.000.

⁷⁵ It is not clear from the data whether these public funds were direct contributions or indirect in the form of tax credits or vouchers.

⁷⁶ Stacey Estwick, "The Small Business Finance Dilemma: An Exploratory Study of Barbadian Firms," *Journal of Eastern Caribbean Studies* 38, no. 3 (2013): 22.

⁷⁷ Lawrence Nicholson and Jonathan Lashley, *Understanding the Caribbean Enterprise: Insights from MSMEs and Family-owned Businesses* (London: Palgrave MacMillan, 2016), 89.

reduced cost per unit of output as a very important/critical outcome of innovation. While innovative activity has a perceived effect on quality, sales and capabilities, it appears the effect on productivity is marginal in comparison, with less than one-quarter of respondents considering their innovations as very important or critical to improving productivity.

These findings suggest that, at the level of the firm, the motivation for innovating is multifaceted, and not solely or directly focussed on improving productivity and growth. This is an important lesson for policy-makers, understanding that the objectives of public policy may not always directly mirror the objectives of the firm. This lends support to the rationale for the approach taken here, with a focus on the entrepreneur, where motivations are based on satisfying shareholder needs in the shorter-term, rather than contributing to 'the public good' in the longer-term. If the effects of the introduction of innovations mirror the motivations for innovating, then it appears that firms are relatively more concerned about increasing sales through the improvement of the quality of goods or services provided, than cost-savings through increased productivity.

Reviewing key performance variables, contrasted by level of technology and knowledge intensiveness of the sector, Table 4.12 presents productivity, size, exporting and profit indicators which show some deviation in levels. However, apart from significant differences as it relates to export propensity, there are limited significant differences for innovators and non-innovators in medium-low and medium-high TKI sectors. Significant differences are only seen in low TKI sectors as it relates to size (employees and sales) (innovators are larger) and profits per employee being higher in non-innovators in low TKI sectors. This finding with respect to profits per employee may appear on the surface to be counterintuitive. However, with respect to the motivations for innovation, it may be suggestive of a lack of motivation where sufficient profits are being earned, and on the other hand an increased motivation to innovate where lower profits are experienced. With respect to export propensity, this is higher for innovators in all categories of TKI⁷⁸, while tests indicate that firms in medium-high TKI sectors are more likely to export overall⁷⁹ (32% of medium-high TKI firms export as opposed to 20% for both low and medium-low TKI firms).

Table 4.12: Financial, Employment and Productivity Measures by Innovation Status and TKI (Medians)

Variable	Low TKI		Medium-Low TKI		Medium-High TKI		Total
	Innovative	Non-Innovative	Innovative	Non-Innovative	Innovative	Non-Innovative	
Productivity (sales per employee)	38,095	40,597	45,910	38,010	42,131	41,330	40,129
Employees	28.0	18.0	25.5	25.0	27.0	19.0	21
Sales (USD)	981,398	797,500	1,376,446	1,154,352	1,208,130	1,068,495	915,000
Exporting propensity (% of firms exporting)	33.5	17.3	30.4	17.6	45.8	23.3	21.1
Profits (USD)	116,074	139,131	172,901	122,942	299,472	150,000	139,704
Profits per employee	5,008	7,185	7,693	7,406	8,842	6,436	6,866

Source: PROTEqIN Survey, 2014.

These results suggest there are limited differences with respect to productivity when compared at the TKI sector level. However, the results do appear to indicate that innovative firms are more competitive in that they have a greater export propensity.

4.4 CONSTRAINTS TO INNOVATION IN CARIBBEAN ENTERPRISES

Of import in informing policy to address the low levels of R&D and innovation, and consequential productivity and competitiveness improvements in the Caribbean, is understanding the obstacles organisations face in undertaking R&D and introducing innovations. The major/very severe obstacles to innovation are highlighted in Table 4.13 and Table 4.14 in relation to enterprises' innovation status and categorised as to whether the obstacle is external or internal to the enterprise.

As Table 4.14 illustrates, the most severe external obstacles, from the enterprise perspective, relate to the building of networks with other firms in the sector and laboratories/research centres, as well as a lack of external incentives, either in the form of direct public funding for innovation or funding for the establishment of linkages with academia. These constraints account for four of the top five constraints with a lack of protection against 'copycats' being the other factor in the top five external constraints.

⁷⁸ Export propensity: Low TKI innovative firms have higher propensity to export (Chi-squared (1, n=1448)=33.32, p=0.000); Medium-Low TKI innovative firms have higher propensity to export (Chi-square (1, n=149)=4.33, p=0.04); Medium-High TKI innovative firms have a higher propensity to export (Chi-squared (1, n=149)=8.21, p=0.004).

⁷⁹ Pearson Chi-square (2, n=1846)=11.978, p=0.003.

Table 4.13: External Obstacles to Innovation (Major/Very Severe Obstacle) by Innovation Status (%)

Element	Variable	Innovator (%)	Non-Innovator (%)	Total
External (Demand)	Client flexibility/openness to new products or services	10.4	15.1	14.2
	Public funding/incentives for innovation: Direct Public Funding	46.3	50.5	49.7
External (Incentives)	Public funding/incentives for innovation: Linkages with universities/tertiary institutions	34.7	39.3	38.3
	Public funding/incentives for innovation: Investment/Policy framework for innovation	19.1	24.9	23.9
	Public funding/incentives for innovation: Technical capacity in key institution responsible for innovation	19.7	22.4	21.9
	Protection against copycats	44.3	48.3	47.6
External (Legal/Regulatory)	Compliance requirements to international standards	29.8	35.0	34.0
	Flexibility/openness of other companies in the sector for collaborative approaches	44.6	52.0	50.5
External (Networks)	Flexibility/openness of laboratories/research centres for collaborative approaches	42.6	43.5	43.2
	Level of information on new trends in the market	34.5	38.4	37.6
External Process (Knowledge)	Level of information on available technologies	20.4	23.8	23.2
	Number	363	1482	1845

Source PROTEqIN Survey, 2014.

Table 4.14 shows internal constraints. While a lack of financial resources is also noted, internal capacity appears to be the largest constraint in relation to the qualifications of employees and the ability to bring R&D outputs to market in a timely manner. What is interesting is that these major/very severe obstacles are not statistically different between innovators and non-innovators.

Table 4.14: Internal Obstacles to Innovation (Major/Very Severe Obstacle) by Innovation Status (%)

Element	Variable	Innovator (%)	Non-Innovator (%)	Total
Internal (Finance)	Level of available financial resources	44.0	43.8	43.8
	Current organisational/management culture	32.5	32.5	32.5
Internal (Organisational)	Degree of self-confidence for innovation	22.9	23.2	23.2
	Internal remuneration policy and incentive structure	10.2	16.2	15.1
Internal Process (Capacity)	Time to market	41.9	47.8	46.7
	Technical uncertainties	27.8	34.6	33.2
	Qualification of employees	33.6	37.3	36.5
	Number	363	1482	1845

Source: PROTEqIN Survey, 2014.

Recognising the development differentials across the region, it would be expected that the constraints also demonstrate some differences at the country level. However, as highlighted in Table 4.15, the lack of external incentives, the ability to build networks, and protection from copycats remain the main constraints to innovation across the region. Of note, however, is that information on new market trends is highly prevalent in the OECS, Belize and Guyana, with the caveat that Guyanese enterprises do not appear to perceive any significant barriers to innovation.

Table 4.15: External Obstacles to Innovation (Major/Very Severe Obstacle) by Country (%)

Element	Variable	OECS	JAM	BAR	GUY	BEL	BAH	TNT
External (Demand)	Client flexibility/openness to new products or services	10.8	27.6	22.8	14.2	27.9	7.1	7.1
	Public funding/incentives for innovation: Direct Public Funding	44.7	67.0	68.3	22.2	73.0	39.3	46.8
External (Incentives)	Public funding/incentives for innovation: Linkages with universities/tertiary institutions	30.0	69.4	69.1	10.2	59.9	29.9	29.1
	Public funding/incentives for innovation: Investment/Policy framework for innovation	17.5	45.4	44.7	14.6	34.4	22.1	15.3
	Public funding/incentives for innovation: Technical capacity in key institution responsible for innovation	18.7	31.4	32.5	13.7	33.6	15.8	19.4
External (Legal/Regulatory)	Protection against copycats	43.9	59.9	58.6	26.7	58.2	44.9	47.6
	Compliance requirements to international standards	33.1	40.9	40.6	7.6	41.8	36.2	34.4
External (Networks)	Flexibility/openness of other companies in the sector for collaborative approaches	47.3	70.3	63.4	14.3	70.5	39.3	48.8
	Flexibility/openness of laboratories/research centres for collaborative approaches	35.9	68.2	69.2	14.4	72.2	26.7	38.8
External Process (Knowledge)	Level of information on new trends in the market	35.1	50.4	51.2	15.8	59.1	27.6	32.9
	Level of information on available technologies	20.2	35.9	34.2	14.1	31.9	20.5	17.7
	Number	772	242	123	119	122	127	340

Source: PROTEqIN Survey, 2014.

In relation to internal obstacles (see Table 4.16), again, with the exception of Barbados, internal financial resources are one of the top three barriers in all countries, with the main overall constraints being related to internal capacity issues. Only in Barbados and Belize is organisational/management culture seen as an obstacle noted by more than half of the enterprises surveyed in these countries.

Table 4.16: Internal Obstacles to Innovation (Major/Very Severe Obstacle) by Country (%)

Element	Variable	OECS	JAM	BAR	GUY	BEL	BAH	TNT
Internal (Finance)	Level of available financial resources	42.1	52.9	43.9	27.5	55.0	40.1	44.4
	Current organisational/management culture	30.9	43.0	51.2	9.2	50.0	28.3	25.3
Internal (Organisational)	Degree of self-confidence for innovation	18.8	36.8	34.9	9.2	30.4	18.9	23.2
	Internal remuneration policy and incentive structure	12.3	26.4	22.7	6.7	26.3	7.1	12.4
Internal Process (capacity)	Time to market	45.2	61.5	63.4	11.7	55.8	41.7	44.4
	Technical uncertainties	29.4	43.4	44.7	17.5	45.9	31.5	32.0
	Qualification of employees	31.8	52.9	52.9	22.5	39.4	29.9	36.1
	Number	772	242	123	119	122	127	340

Source: PROTEqIN Survey, 2014.

The results presented above indicate that across the region, despite some minor variations in relation to innovation status or country, that the main obstacles to innovation in the Region relate to a lack of public incentives for innovation, whether through direct funding or the facilitation of linkages with research institutions; a lack of a culture of collaboration within the private sector and between the private sector and research institutions; and a lack of legal protection against infringement of intellectual property. At an internal level, the main constraints relate to a lack of finance and a lack of capacity to innovate, especially in a timely manner. Highlighting these constraints is not to suggest that innovation is not being undertaken in the region. Indeed, some companies have grown internationally through undertaking several RD&I approaches. An example of one such company, Automotive Art, is shown in Box 4. 2.

Box 4.2: Research, Development, Innovation and Internationalisation in a Manufacturing/Service Company: The Case of Automotive Art

Despite external constraints to innovation in Barbados, through entrepreneurial drive, Automotive Art has been able to innovate and grow into a multinational company using a variety of approaches.

As a result of the recognition of an entrepreneurial opportunity in automotive paint technology which their employer at the time did not want to exploit, Hugh Blades and Dereck Foster quit their steady jobs to found Automotive Art in 1990 to undertake what their previous employer considered 'an expensive and risky undertaking' (Sunday Sun 2015, 2).

Utilising experience from their previous employment, the pair sought to advance the technology utilised by a German automotive paints company, but needed finance, which they obtained through partnership with a local paint manufacturer, Harris Paints. The principals of Harris Paints recognised it was better to work with, rather than compete against, this new innovative enterprise, and the two formed a joint venture. In these early stages, Harris Paints focused on the manufacturing side of the business while Automotive Art dealt with the retail side of the business.

Through relentless application, Automotive Art was profitable by its second year, and subsequently was granted the regional distribution rights from the German company on which production was based. The company was also able over time to develop its own Automotive Art branded products. Expansion did not only occur in relation to paints, but complementary retailing of automobile painting accessories and car accessories in general, and the eventual takeover of other companies in the automotive sector, such as the Barbados Tyre Centre.

In keeping with a general ethos of network development, as seen with their German and Barbadian collaborators, Automotive Art also reached out to its clients (and potential clients) in relation to providing training to painters and bodyworkers, and also developed linkages with some of the larger car dealers in the country.

'...the company has resisted falling into the trap of resting on its own laurels, instead it has embraced innovation, and enjoyed accepting new challenges' (p.4)

The development of a regional distribution network and provision of free training led to a major development for the company with clients from the Region travelling to Barbados for training. This led to numerous queries about Automotive Art's other products for which it had distribution rights. In seeking to protect the tacit knowledge gained from building their business, while still wanting to support their clients, Automotive Art began a process of franchising the business model across the region. This process began in 1999, with the company only 9 years old; the company currently has 17 franchisees in 9 Caribbean countries.

Despite a number of setbacks, including the loss of its manufacturing partner in the US to a takeover, and significant growth in demand, the company eventually established a distribution centre in the US, in Miami specifically, to allow them to distribute to the Caribbean Region more efficiently. With the loss of its manufacturing partner, the company undertook an extensive search for another manufacturing partner. However, instead of establishing a contractual arrangement, and perhaps to avoid the takeover threat as occurred with their previous US partner, Automotive Art bought into a small Polish paint manufacturer.

Over the last 27 years, driven by an entrepreneurial spirit, and despite the constraints to business development and innovation in the region, Automotive Art has been able to grow from a mobile operation run by two men with a single delivery van, to the multinational company with manufacturing facilities in Europe, distribution facilities in the USA, and franchisees across the Caribbean Region. Automotive Art demonstrates that in the absence of external support, that innovative activity can still flourish with strong private sector linkages, the use of international linkages, and a sophisticated clientele with a demand for their products.

Source: Sunday Sun, 2015.

With these constraints in mind, the following section reviews the institutional support systems available in the region. This is followed by an examination of best practice from global exemplars to identify potential policy options for the region.

4.5 AN OVERVIEW OF R&D AND INNOVATION SUPPORT SYSTEMS IN THE CARIBBEAN

Generically, public sector support for enterprise development in the Caribbean is through what were originally industrial development corporations⁸⁰ (IDCs) providing technical assistance, training and investor services, as well as public sector finance institutions, which include development banks and microcredit institutions (MCIs) (Lashley 2012). Generally, training is overseen at the domestic level by national training agencies (NTAs) and at the regional level by the Caribbean Association of National Training Agencies (CANTA). There are also several universities in the region, with the University of the West Indies having the widest coverage with representation in all countries through dedicated campuses in Barbados, Jamaica, and Trinidad and Tobago, and representation in other territories through the Open Campus. While there is a support framework in relation to the acquisition of relevant skills due to the education system in general, NTAs also provide bespoke skills for enterprises. However, despite the existence of these institutions, their utilisation by enterprises is limited, especially as it relates to R&D, as noted above.

Although businesses in the Region can access technical assistance and training, and receive representation through chambers of commerce and sector-specific business associations, the main constraints to promoting R&D and innovation are at the governance and finance levels. Across the region, while there are ministries and agencies dedicated to the development of the private sector, and in some countries agencies dedicated to science and technology, there is limited visibility of policies and programmes supporting R&D and innovation explicitly. In Barbados, there is the National Council on Science and Technology; in Jamaica, the National Commission for Science and Technology (NCST) and the Scientific Research Council; and in Trinidad and Tobago, the Caribbean Industrial Research Institute (CARIRI)⁸¹. Of these national science and technology organisations, CARIRI, although owned by the Government of Trinidad and Tobago, is the only one with a regional scope, serving businesses across the Region in: ‘Laboratory and field testing, Consulting, Research and Development and Training’⁸². At the regional level, there is the CARICOM Regional Organisation for Standards and Quality (CROSQ), and CDB’s Caribbean Technological Consultancy Services (CTCS). International donors have also provided support, specifically: the Compete Caribbean Programme (funded by the IADB, DfID, Government of Canada and CDB); the Regional Entrepreneurial Asset Commercialisation Hub (REACH) (USAID); the Caribbean Innovation and Entrepreneurship Project (OAS); the Microsoft Innovation Centre (Microsoft); and the Improving Innovation Capacities in the Caribbean Project (EU) (Nurse 2014). Despite these agencies, projects and programmes, the level of visibility of activities to support innovation is low, as demonstrated by the lack of utilisation of public resources for R&D and innovation highlighted in analysis of enterprises in the region.

At a regional policy level, CARICOM’s Strategic Plan (2015 to 2019) makes explicit reference to innovation. Of the eight components of the strategic plan, a coordinated foreign policy and RD&I are considered as critical enablers, intended to cut across all strategic components. The eight components include:



⁸⁰ Originally established as Industrial Development Corporations from the 1960s, these publicly funded agencies now go by different names such as Investment Authorities, Business Development Corporations, Enterprise Development Divisions, and Investment Promotion Agencies.

⁸¹ See Appendix 4.5: Listing of Ministries, Business Agencies and Business Incentives in the Caribbean.

⁸² See: http://www.cariri.com/index.php?option=com_content&view=article&id=71&Itemid=541 [Accessed 24th February 2017]

As RD&I is seen as a cross-cutting component, the other strategic aims provide an indication of the main areas where RD&I can be focussed to assist development. In addition to the general focus on building economic resilience through traditional efforts at improved productivity and competitiveness, CARICOM's strategic focus and high priority areas suggests sectors for RD&I activity as education, health and wellness, social enterprises, climate change adaptation and mitigation, and general ICT and other technological developments. The high priority areas identified in CARICOM's plan are:

- Accelerate implementation and use of the CARICOM Single Market and Economy (CSME);
- Introduce Measures for Macro-economic Stabilisation;
- Build Competitiveness and Unleash Key Economic Drivers to Transition to Growth and Generate Employment;
- Human Capital Development;
- Advance Health and Wellness;
- Enhance Citizen Security and Justice;
- Climate Adaptation and Mitigation and Disaster Mitigation and Management;
- Develop the Single ICT Space;
- Deepen Foreign Policy Coordination (to support strategic repositioning of CARICOM and desired outcomes);
- Public Education, Public Information and Advocacy;
- Reform of the CARICOM Secretariat, the Organs, Bodies, Institutions and Governance Arrangements⁸³

The overall mission for CARICOM in relation to innovation is to: create the environment for innovation, the development and application of technology, productivity and global competitiveness, in which the collective strength of the Region is unleashed'.⁸⁴

In seeking to mainstream RD&I in the region, the plan proposes the consistent use of evidence-based approaches to achieve the goals of the plan which includes: 'Advocacy for resources (state and private sector) to finance R&D in business development; Facilitate an enabling legislative environment for R&D and innovation; Identify and promote opportunities for functional cooperation in R&D and innovation; Advocate for national school-based programmes that drive, enable and reward R&D and innovation'.⁸⁵ With respect to the enabling environment, the plan speaks to the protection of IP; incentives for the private sector; and incentives which capitalise on indigenous knowledge and resources. This last point relates to the principle of undertaking activities in the Region in areas where it has some form of unique advantage.

With respect to financial support for R&D in the region, there are limited explicit sources, with the exception of Barbados, Jamaica, and Trinidad and Tobago. While most countries in the Region provide duty free and tax incentives to facilitate investment in specific sectors, these are not explicitly directed towards supporting R&D and innovation. Of the countries with an explicit reference to R&D and innovation in public policy, it is probably most expansive in Trinidad and Tobago where grant funding for R&D (maximum of USD150,000) and assistance in patent registration (maximum of USD45,000) in non-energy manufacturing and services is provided. In Jamaica, there is an R&D Tax Incentive Scheme, which provides exemption from general consumption tax and customs duties for purchase of R&D related goods, equipment and chemicals. In Barbados, the main explicit financial support is through an Innovation Fund⁸⁶ established to assist in commercialising innovative ideas. Funding is available for between USD12,500 and USD125,000 through a co-funding arrangement. However, as seen in the case of tax incentives in exemplar countries (see discussion below), uptake is low; of the USD2.5 million available in the Innovation Fund in Barbados, at the end of financial year 2014, only USD1.1 million had been disbursed, to only 13 companies⁸⁷. An overview of the main ministries, agencies and incentives in BMCS is shown in Appendix 5.5: Listing of Ministries, Business Agencies and Business Incentives in the Caribbean.

Caribbean Development Bank (2016) summarises the basic innovation framework in the Caribbean as incomplete and unorganised, and lacking promotion of linkages between MSMEs and academia. What does exist is noted as focussing more on manufacturing, rather than services, the largest sector in the region.

The overview of the RD&I support systems in the Region indicate firstly that the GII innovation inputs exist in the region, but that their effect on actual innovation is limited given the low levels of innovation seen amongst enterprises. The main issues, as they relate to the constraints faced by businesses, is an absence of collaborative behaviour between enterprises and between enterprises and research centres and universities, and that where support exists, especially in the form of finance, it lacks visibility and direct relevance to RD&I. Of note, while many enterprises noted lack of IP protection as a constraint to innovation, there are

⁸³ CARICOM Secretariat, Strategic Plan for the Caribbean Community 2015-2019: Repositioning CARICOM- Vol. 1 Executive Plan (Turkeyen, Guyana: CARICOM, 2014), iv.

⁸⁴ Ibid., p.8.

⁸⁵ Ibid., p.13.

⁸⁶ See: <http://www.egf.bb/docs/areports/corporate/annual/2014/index.html#130>

⁸⁷ There are an estimated 9,651 formal enterprises in the country (Lashley and Moore, 2016).

agencies dedicated to this in all BMCs, and therefore the issue is again a lack of visibility, leading to enterprises perceiving this as a constraint. In seeking to address the constraints experienced in the region, the following section seeks to garner lessons from global exemplars in RD&I.

4.6 LESSONS FROM GLOBAL EXEMPLARS

Noting the constraints to innovation, financing RD&I, collaborative behaviour and lack of internal firm competencies, the following section explores the various approaches to addressing issues in relation to: Finance, Technical Assistance, Training, Network Development, and Demand Enhancement in selected countries. The analysis draws on the activities of global exemplars at the policy level as identified in the Global Innovation Index (GII) Report for 2016 (Cornell University, INSEAD, and WIPO 2016). Rather than examining the countries in the report with the highest GI, and in consideration of relevance to the situation in the Caribbean, countries were selected in relation to their position in the Innovation Efficiency Ratio ranking and size. The Innovation Efficiency Ratio is calculated as the ratio of innovation inputs to innovation outputs, and highlights countries that have 'achieved more with less',⁸⁸ which is especially relevant to the Caribbean situation.

Table 4.17: Global Innovation Index – Overall and Innovation Efficiency Ratios for Selected Countries (2016 unless stated otherwise)

Country	GII 2016 Rank	Efficiency Ratio Rank	Population (millions)	GDP per capita (PPP\$)
Luxembourg	12	1	0.6	98,987
Malta	26	2	0.4	35,826
Iceland	13	3	0.3	46,097
Moldova	46	4	4.1	5,006
Switzerland	1	5	8.3	58,552
Estonia	24	6	1.3	28,592
China	25	7	1,376	14,107
Ireland	7	8	4.7	55,533
Germany	10	9	80.7	46,893
Sweden	2	10	9.8	47,922
Dominican Republic	76	82	10.5	14,984
Jamaica	89	104	2.8	8,758
Barbados (2015)	37	25	0.3	25,193
Trinidad and Tobago (2015)	80	92	1.3	21,096
Guyana (2015)	86	95	0.8	8,735

Sources: Cornell University, INSEAD, and WIPO, 2015, 2016.

The selection of countries for further investigation was based on whether they had the potential to inform policy development in the Caribbean in relation to population size or state of market development. To this end, the countries selected were: Malta, Iceland, Moldova, Estonia and Ireland. The results of the analysis are presented below in relation to the core intervention areas the governments of these countries have undertaken, namely, finance, technical assistance, education and training, network development, and demand enhancement.

⁸⁸ Cornell University, INSEAD, and WIPO 2016, 410.

4.6.1 MALTA

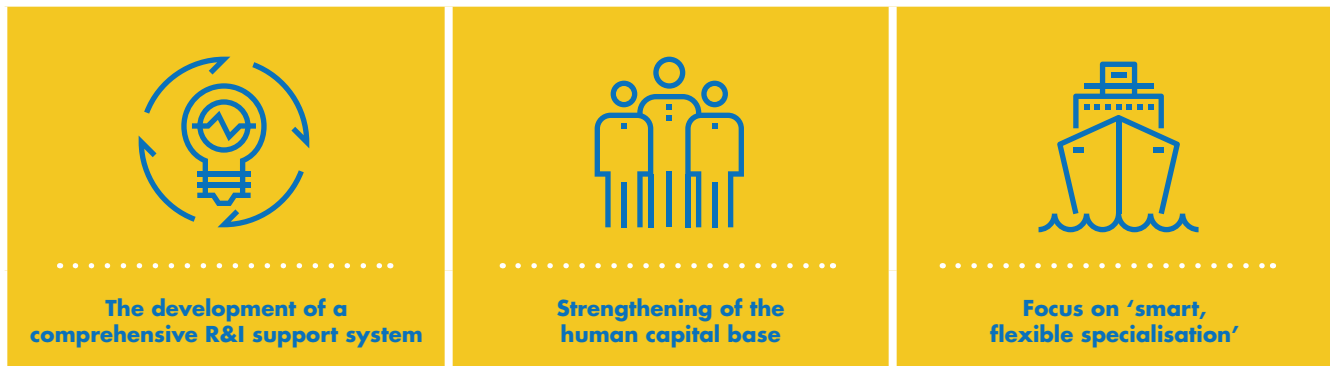
Innovation in Malta is considered in a wide context with two main drivers:

‘...first, the importance of creating a culture in our education system to support this way of thinking, and second, the role that all academic disciplines, be they the traditional sciences, the social sciences or the humanities, play in making innovation happen.’⁸⁹

Malta proves a useful comparator for the Caribbean not only because of its small size but also because it is currently navigating similar economic transformations as the Region with a shift to services. In addition, the country is dominated by micro-enterprises in low technology and low knowledge intensive sectors, and R&D is hampered due to lack of economies of scale, access to risk-taking finance, and reluctance to collaborate within the private sector (Malta Council for Science and Technology 2014). However, despite these constraints, the country is still able to demonstrate a high level of innovation efficiency. The approach to promoting innovation in Malta, given that its support systems are developed at the national rather than any subregional level would be particularly informative to individual countries in the Region with experiences comparable to Malta, although there are lessons that can be drawn for the development of Caribbean-wide innovation systems.

Malta’s research and innovation (R&I) strategy notes that while the country has a stable macroeconomic system, the R&I system is still small, young, and fragmented, and dominated by foreign entities. In addition, there are limited public research institutes and a lack of financial support for R&D. These issues, coupled with a private sector that exhibits a general ‘lack of an R&I culture and ‘quick-win’ mentality mean that R&I is perceived as something extraneous or ancillary, the value of which is often overlooked’.⁹⁰ Further observations with respect to a SWOT analysis of the Malta’s R&I system relate to opportunities in exploiting its geographic location and membership of the EU, as well as its small size in relation to ‘promoting Malta as a test-bed for new technologies prior to roll-out on a larger scale’,⁹¹ and utilising the Diaspora of researchers, innovators and entrepreneurs. These opportunities should be noted by the Caribbean, especially in relation to R&I in renewable energy technology in the solar and geothermal sectors, sectors identified as emerging in the Caribbean Region (The Economist Intelligence Unit 2015).

There are three explicit goals in Malta’s R&I strategy:



These goals in the first instance seek to reduce the risk of specialisation, where the comprehensive R&I support system seeks to improve current offerings (grant schemes, tax credits, cluster support and funds for collaborations). This is especially in the areas of venture capital funds and support for patenting, to facilitate the exploitation of all opportunities ‘wherever they arise’.⁹² The strengthening of research capacity through collaboration within and between disciplines and support for doctoral and post-doctoral studies are also key goals. While such activities seek to provide a framework where entrepreneurial opportunities can be discovered and exploited as they arise, and mitigate the risk of over-specialisation, there is also an understanding that there are benefits to strategic specialisation, as articulated in Goal 3.

Goal 3 of Malta’s R&I strategy seeks to draw on the country’s core comparative advantages and identifies seven thematic areas for smart specialisation which are presented below in addition to the rationalisation for their inclusion.

Tourism product development: Key sector of the economy with a high level of collaboration and a need to innovate to remain competitive, especially through linkages with ICT, health and the creative industries.

Maritime services: Mature sector in which Malta has a global profile. While diversification of service offerings has taken place over time, these are fragmented, indicating a need to integrate through clustering and promote innovation in maritime engineering, ICT, design and services.

Aviation and aerospace: New and growing sector with a research base in avionics, highly skilled human resources, and an

⁸⁹ Malta Council for Science and Technology, *National Research and Innovation Strategy 2020* (Floriana, Malta: Malta Ministry for Education and Employment, 2014), 5.

⁹⁰ Malta Council for Science and Technology. *National Research and Innovation Strategy 2020* (Floriana, Malta: Malta Ministry for Education and Employment, 2014), 13.

⁹¹ *Ibid.*, 13.

⁹² *Ibid.*, 14.

established international R&D network. The current capabilities and networks present the opportunity to move up the value chain in specific aerospace niches.

Health (healthy living, active ageing and e-health): There is currently significant investment in R&D in this area in Malta, but as with maritime services, activity is fragmented. A focus on healthy ageing and e-health contributes to the overall multidisciplinary approach of the R&I strategy by including ICT, social sciences and engineering, areas in which there is a strong knowledge base.

Resource-efficient buildings: Due to water scarcity and dependence on fossil fuels, in addition to a decrease in construction in recent years, the focus on resource-efficient buildings seeks to increase sector value added and green jobs and address societal challenges. Collaborations are expected in various fields including architecture, engineering, materials science and energy technology, especially given the difficulty in transferring technology from countries with different climatic conditions.

High value-added manufacturing (focus on processes and design): Mature and strong sector which needs to innovate, specifically in relation to process innovation (greater efficiency and automation) and product design.

Aquaculture: High level of collaborative R&D over the previous 20 years in public and private sectors, and opportunities for differentiation.

As exhibited in the above, ICT is also considered important in Malta's smart specialisation as an enabler, particularly in health, digital gaming, financial services and tourism product development.

The governance structure of R&I in Malta includes the Ministry of Education and Employment (MEE), with a Parliamentary Secretary for Research, Innovation, Youth and Sport, with the main implementation body being the Malta Council for Science and Technology (MCST). MCST oversees the main public funding programme for R&I, the Fusion Programme. In addition to this specific support for R&I, the Ministry of Economy, Investment and Small Business (MEISB) oversees the Government's main enterprise development agency, Malta Enterprise (see Appendix 5.7: Example RD&I Governance Structure for an outline of the governance structure of RD&I in Malta).

At the private sector level, the Malta Chamber of Commerce, Enterprise and Industry is the main representative body which participates in R&I policy development. There is also a Malta Chamber of Scientists, but this is not active in R&I policy development (Warrington and Hristov 2016).

Private enterprises in Malta obtain direct project funding from the Fusion Programme and Malta Enterprise, while higher education institutions obtain both institutional funding and project funding from MEE, EU Structural Funds, and the Fusion Programme.

Malta Enterprise operates an R&D Tax Credit scheme with allowable claims including remuneration to research staff, depreciation of equipment, material costs, subcontractor costs and costs of technical skills and patents. Collaborative projects (industry partners and research institutions) also receive tax incentives. However, uptake has been limited, with experts indicating that the scheme 'has not been effective and there have been few beneficiaries to date'.⁹³ Direct project funding is available, on a competitive basis following a call for proposals from the Fusion Programme, while the Commercialisation Voucher Programme specifically provides funds, following an evaluation of impact, for market research, product development costing, risk profiling, IP checks, and initial patent registration, inter alia. Malta Enterprise also provides grant funds for R&D.

The funding mechanisms in place allow for enterprises to undertake R&I as the funding permits the acquisition of technical assistance. The enhancement of education and skills is provided through public funding of educational institutions. However, while being part of the EU gives Malta the ability to access a wide market for its goods and services, and the Government of Malta has provided support to R&D on the supply-side, Warrington and Hristov (2016) note that little progress has been made in adopting demand-side initiatives such as 'innovative public procurement'.

4.6.2 ICELAND

Iceland's Science and Technology Policy is driven by a desire to enhance welfare and growth, and in Iceland:

'...the concept of innovation refers not only to companies that are sometimes called high-technology firms. For the sake of promoting diversity in the economy, a well-functioning health system, the rational use of natural resources, and first-class education institutions, innovation must be present in all parts of the economy, both in the public sector and in private companies.'⁹⁴

⁹³ Brian Warrington and Hristov, RIO Country Report 2015: Malta, JRC Science for Policy Report (Seville, Spain: European Commission, 2016), 32.

⁹⁴ Iceland Science and Technology Policy Council, *Science and Technology Policy and Action Plan 2014-2016* (Reykjavik: Icelandic Prime Minister's Office, 2014), 2.

The main components of the country's science and technology policy and action plan are as follows:

Growth and economic value creation:

- a. Increasing the impact of science and innovation funding;
- b. Increased investment in innovative enterprises; and
- c. Effective participation in international programmes.

Human resources:

- a. A goal-oriented and diverse education system from the primary to tertiary level; and
- b. Robust recruitment in scientific research and innovation.

Collaboration and efficiency:

- a. Active collaboration between business and research and education institutions

Results and follow-up:

- a. Improved evaluation of the quality of research and innovation and of the economic value created.

Of particular interest at the enterprise level are tax incentives and related actions. Tax incentives in this area are aimed at encouraging businesses and individuals to contribute to research and innovation activities, and include the provision of financial support to post graduate students undertaking collaborative research with industry. The tax incentive system is, however, rarely utilised and efforts are being implemented to expand this through an awareness campaign.

Strategic policy direction on R&D policy emanates from the Science and Technology Policy Council (STPC) (a tripartite body including Government experts and representatives from the Icelandic Confederation of Labour and the Confederation of Icelandic Employers), while the Ministry of Education, Science and Culture is responsible for implementation. The Icelandic Centre for Research (Rannis) is the main administrator of innovation funds and programmes. While the country does not seek to overly focus on specific sectors, and instead seeks to provide an enabling environment in general, there is some attention to agriculture, renewable energy, health and marine-related issues (Skogland, 2016).

The Innovation Centre Iceland supports R&D and is composed of two units: The Technology Research and Consulting Unit and the Innovation and Consulting Services Unit. These units seek to encourage cooperation between domestic enterprises and their European counterparts, as well as to assist domestic enterprises in furthering their businesses. Other support in the country for business development includes the Icelandic Federation of Trade and the Iceland Chamber of Commerce (see Appendix 5.7: Example RD&I Governance Structure for an outline of the governance structure of RD&I in Iceland).

The Icelandic Government provides support to enterprises through investments in the education and training system, and direct technical assistance, as well as including both representatives of labour and employers in charting the strategic direction of innovation policy in the country. However, the main vehicle through which Iceland supports R&D and innovation in the private sector is through a series of funding programmes, which include:

- **The Icelandic Research Fund** targeted at academia, research institutes and companies to fund research students and defined research projects;
- **The Technology Fund** targeted at individuals, academia, companies and public institutions to conduct innovation related R&D;
- **The Infrastructure Fund** targeted at research institutions and companies to co-finance the purchase of equipment, data, software and other related research infrastructure;
- **The Agricultural Productivity Fund** to support technical innovation in agriculture;
- **The Strategic Research Programme** targeted at researchers and students in academia, research institutes and companies for defined research projects;
- **The Student Innovation Fund** targeted at SMEs and university students to facilitate temporary employment of students in SMEs to conduct research and facilitate technology transfer;
- **Icelandic Language Technology Fund** provides funding for projects to develop language products in digital form;
- **Energy Research Fund** provides grants for Masters and Doctoral research in environmental and energy issues;
- **Added Value in Seafood (AVS) R&D Fund** of the Ministry of Fisheries for R&D in fisheries;
- **Tax Credit Scheme** for enterprises implementing R&D projects to improve competitiveness;
- **Energy Fund of the National Energy Authority** provides loans to facilitate increased utilisation of geothermal resources.

4.6.3 MOLDOVA

The Republic of Moldova is not highly ranked in the overall GII for 2016 (46th), but ranks 4th in the Efficiency Index. For the most part, this high efficiency rank is due to the country currently commencing efforts to enhance innovation and, in this sense, is a step ahead of the Caribbean and provides some useful lessons for the Region during these intermediate steps.

The Moldovan Academy of Sciences (MAS) is the main policy-making and implementation body of the Government, as well as the main research body in the country with 19 research institutes. Overall, the innovation system is highly centralised (Cuciureanu 2014). Research is also undertaken by the 32 domestic higher education institutions, but not all are performing R&D. In the private sector, only accredited enterprises can receive public R&D funding, and in 2013 there were only four of these (Cuciureanu 2014). Public funding is mainly through grants and determined through a 'semi-competitive' framework following a call for and submission of proposals. Venture capital and subsidised funding are absent in the funding mix in Moldova (see in Appendix 5.7: Example RD&I Governance Structure for an outline of the governance structure of RD&I in Moldova). Indirect funding is theoretically available through tax incentives for those in science parks; implemented in 2007, 'but which in reality were never applied'.⁹⁵

The structural challenges faced by Moldova in 2013 are reflective of the situation in the Caribbean, as discussed above. Cuciureanu (2014:3) notes these challenges as:

- 'Lack of human resources for R&D...
- Low R&D investments, especially by the private sector, with no clear prioritisation...
- Weak links between R&D institutions, universities and BES [the business sector]...
- Inefficient innovation governance model...
- Undeveloped evaluation and monitoring system of R&I...'⁹⁶

To address these challenges the Government has adopted two main strategy documents: Innovations for Competitiveness (2013 to 2020); and Strategy for Research-Development until 2020. The Innovations for Competitiveness strategy seeks to provide an open governance model for innovation; entrepreneurship skills training for innovation; increasing the private sector's innovation orientation; application of knowledge to societal and global problems; and enhancing demand for innovative products and services. The related R&D strategy has five main objectives: capacities, research priorities, linkages, internationalisation, and research governance (Cuciureanu 2014).

These policy documents in part seek to address the challenges noted above in several concrete and generalised ways. Reforms in higher education, orienting training to the needs of innovation in industry, and research capacity building are all intended to address the current HR problem in R&D. However, Cuciureanu (2014), in an extensive review of the innovation system, notes while these activities fit with best practice, that the level of funding will not allow for the 'radical' changes needed, and brain drain and a lack of orientation towards science and engineering will constrain capacity-building in HR for R&D.

Actions to address the lack of R&D in the private sector in Moldova include: dedicating 1% of GDP to gross expenditure on R&D (GERD); the provision of an enabling environment for innovative enterprises, including venture capital funds and stimulating R&D investments by the private sector; stimulating international collaboration; and determining strategic R&D priorities at the governmental level. These identified action areas, however, appear to be what Cuciureanu (2014) terms 'declarative', lacking any substantive detail, finding that these issues have not been addressed in any systematic manner. A similar finding is observed with actions to address the weak links between R&D institutions, universities and the private sector, where the development of science parks, incubators, as well as the measures to stimulate R&D in general, all appear as generalised approaches with limited or no funding.

In seeking to enhance the efficiency of the governance mechanism, the recommendations for a more open governance system have not been achieved and especially marked is the absence of the private sector's involvement in policy formulation (Cuciureanu 2014). Given the general inaction in this area, the development of an appropriate monitoring and evaluation system is constrained.

Given the assessment of the R&I in Moldova, it appears that the high rank in the GII Efficiency Index for 2016 is more reflective of lower input for a slightly higher output, rather than efficiently utilising limited resources for effectively higher innovation outputs. However, there are conceptual lessons to be learnt from the Moldovan experience in relation to international best practice⁹⁷; the assessment presents Moldova's intended actions as suitable to address the structural challenges faced, and that 'declarative' actions, *id est*. lip service, require concrete actions to realise innovation outcomes.

⁹⁵ Gheorge Cuciureanu, ERAWATCH Country Reports 2013: Moldova, JRC Science and Policy Reports (Seville, Spain: European Commission, 2014), 10.

⁹⁶ *Ibid.*, 3.

⁹⁷ Cuciureanu (2014) notes that the Government's intended actions in relation to public funding of R&D, provision of an enabling environment for private enterprises to undertake R&D, stimulating international collaboration, and determining clear priorities for R&D all mirror international best practice in theory, but lack application.

4.6.4 ESTONIA

The Organisation of Research and Development Act is the legal framework under which the structure and financing of the R&D system in Estonia operates. The ministries responsible for funding R&I are the Ministry of Education and Research (MER), which focuses on pure research in educational institutions, and the Ministry of Economic Affairs and Communication (MEAC), which focuses on private sector R&D, applied research, technological development and innovation (see Appendix 5.7: Example RD&I Governance Structure for an outline of the governance structure of RD&I in Estonia).

There are no tax incentives for R&D and innovation investments, although corporate profits are not taxed if profits are reinvested in the business for 'development', not explicitly for R&D or innovation. Government support for R&D is through direct funding, utilising a competitive grant process. The financing of the development of new products, services and technologies is available through Enterprise Estonia, under the auspices of MEAC. Enterprise Estonia also provides general business support. The main funding programmes in Estonia available to the private sector include (Ruttas-Kuttim and Stamenov 2016):

Cluster Development Programme: Goal is to promote cooperation between firms (horizontally and vertically) and between firms and research institutions to increase value added, sales and exports.

Innovation Vouchers Programme: A grant programme for SMEs to encourage knowledge and technology transfer, and cooperation with R&D institutions. Support is provided for service procurement for product/service/technology development, design, feasibility studies, standards and certification, patent registration, inter alia.

Start-up Programme for young 'innovative' enterprises.

Support for Applied Research in the areas of 'Smart Specialisation':⁹⁸ Co-funding initiative for enterprises tendering for applied research/product development from public R&D institutions.

Enterprise Development Programme: Targeted at 'Smart Specialisation' enterprises to support development plans, action planning, innovation implementation and product development.

Technological Development Centres: Goal is product, service and technological development for increased international competitiveness and 'Smart Specialisation'. While the long-term intention is to transfer centres to Estonia entrepreneurs, the general objective is to provide them with opportunities for collaboration in innovation, as well as increase the HR capacity in R&D-oriented businesses and the movement of skilled personnel between businesses and research institutes.

There appears to be a comprehensive policy framework in place to support enterprise-level R&D and innovation, unlike what obtains in the Caribbean. However, a number of challenges are present, including the need to: (1) intensify prioritisation and specialisation in the R&I system; (2) increased collaboration between science and industry and research commercialisation; and (3) the internationalisation of science, technology and innovation and addressing the lack of highly-skilled human resources (Ruttas-Kuttim and Stamenov 2016).

With respect to 'Smart Specialisation' issues, there are plans to establish a cooperative model to strategically link Technological Development Centres with cluster development initiatives to more effectively achieve 'Smart Specialisation' objectives. In consideration of addressing the other challenges experienced, it is expected that the other measures introduced, as described above, will prove effective over time as they were mostly introduced in 2015. Of noted importance are the measures to enhance applied research in the areas of 'Smart Specialisation' which are having a positive effect on the linkages between industry and public sector R&D, as well as funding of doctoral students undertaking research related to the needs of universities and companies based in Estonia (Ruttas-Kuttim and Stamenov, 2016).

4.6.5 IRELAND

Two main departments of the Government of Ireland address R&I policy development and implementation: Department of Jobs, Enterprise and Innovation, and the Department of Education and Skills (see Appendix 4.7: Example RD&I Governance Structure for an outline of the governance structure of RD&I in Ireland). Of interest for the Caribbean is that support for innovation in Ireland, through the use of European Regional Development Funds (ERDF), is divided into two, with support for the more innovative region, the South and Eastern region with 80% of GDP, separated from the lower innovative region, the Border, Midlands and West region. Each region has a managing authority, and this approach could be useful in the Caribbean in relation to taking more appropriate, context-specific, approaches to promoting R&I at the sub-regional level. This would be a useful approach for the Region given the difference in antecedent conditions experienced at the country level in relation to development stage, natural resource endowments and sectoral focus, all of which will require different approaches to RD&I.

The general governance structure for R&I in Ireland includes a Cabinet Committee on Economic Recovery and Jobs, supported

⁹⁸ 'Smart specialisation' areas include: ICT supporting other sectors (automation and robotics, cyber security, software development); health technologies and services (biotechnology and e-health); resource efficiency (material science, knowledge-based construction, health-promoting food industry, chemical industry) (Ruttas-Kuttim and Stamenov, 2016).

by an Inter-Departmental Committee on Science, Technology and Innovation and the Research Prioritisation Action Group which oversees the National Research Prioritisation Strategy. A significant shortcoming of this governance structure is that there is no representation by the private sector. Despite this, a variety of stakeholders were included in the development of the country's Innovation 2020 strategy (Martin and La Placa 2016).

The main goal of the Innovation 2020 strategy (2016 to 2020) is for Ireland to be a global innovation leader in order to achieve economic sustainability and 'a better society'.⁹⁹ Private sector innovation is at the core of the innovation strategy in order to advance competitiveness, but especially to increase employment, exports and government revenue through increased taxes.

'A key tenet of the strategy is to enhance coordination and coherence among policy instruments (grants, R&D tax credits, enterprise-HEI [higher education institutions] linkage supports) so that public resources are deployed to their maximum effect and that these supports are readily accessible by the enterprise sector and are fully aligned with the needs of the private sector'.¹⁰⁰

The main approach in this regard is to ensure policy efficiency, accessibility and address the needs of the private sector, issues that distinctly reflect the shortcomings of innovation initiatives in the Caribbean.

In addition to ensuring system-wide efficiency, Ireland's innovation strategy is also focussed on specific sectors, including: ICT, Health and Medical, Food, Energy, Manufacturing and Materials, and Services and Business Processes.

The main areas that policy seeks to address relate to supporting private sector innovation; provision of relevant education; innovation for social and economic development; innovation in the public sector; and international collaboration. In seeking to ensure policy coherence, the innovation strategy was developed in tandem with the enterprise development policy, Enterprise 2025, which seeks to realise 'a step-change in enterprise performance...a strong emphasis on embedding innovation in enterprises and on development and attracting talent for the 21st Century'.¹⁰¹

The indirect funding at the enterprise level in Ireland includes tax credits for qualifying R&D expenditure, while direct funding is provided through Enterprise Ireland and IDA Ireland, mostly in the area of close-to-market innovations. These agencies also provide support to research centres that undertake research directly relevant to industry, as well as private sector skill development related to research and innovation skills.

Through consistent monitoring and evaluation processes, and despite a comprehensive support framework for research and innovation in Ireland, a number of challenges have been noted, primarily:

- Need to increase R&D activities in indigenous enterprises;
- Lack of ability to sustain and increase public sector funding of R&D;
- Low degree of industry-academia collaboration and knowledge transfer; and
- Lack of demand-side policies and innovation procurement initiatives.

Promoting indigenous R&D has proved problematic, and despite policy measures that provide both direct and indirect funding, uptake by indigenous enterprises continues to be low. Following consultations, Martin and La Placa (2016) note that recommendations have included increasing the funds available through the Innovation Voucher Scheme¹⁰² to fill a gap between the scheme and other support measures in relation to the quantum of funding available, as well as rationalising the number of support schemes into two main streams- science and basic research, and applied research and innovation- so that enterprises are clearer as to what exists and which agencies to contact.

Increased focus (sector targeting), rationalisation and efficiency in the provision of public funds has been undertaken to address public sector funding of R&D as the Government's fiscal constraints do not allow for funding increases. In effect, instead of increasing funding, the Government is seeking to enhance the efficiency of funding.

In seeking to build linkages between industry and academia, in addition to the Innovation Voucher Scheme, funding is specifically set aside for public-private collaborative projects as well as funds for individual academic researchers (both domestic and international) to work in industry, in Ireland or elsewhere.

With respect to developing the demand-side through public sector procurement, limited progress has been made in Ireland. However, in the development of policy, programmes and projects in the Caribbean, innovative public procurement strategies could be a central pillar for the development of R&I capabilities in the region. In the absence of demand for innovative products and services, governments can design procurement policies in their purchasing of goods and services that assist in spurring RD&I in specific 'smart specialisation' areas.

⁹⁹ Interdepartmental Committee on Science, Technology and Innovation, *Innovation 2020: Ireland's Strategy for Research and Development*, Science and Technology, 2015.

¹⁰⁰ Tom Martin and Giovanni La Placa. *RIO Country Report 2015: Ireland*, JRC Science for Policy Report (Seville, Spain: European Commission, 2016), 23.

¹⁰¹ *Ibid.*, 24.

¹⁰² The Innovation Voucher Scheme provides funds to small enterprises to pay for technical assistance from a 'registered knowledge provider' to address a business issue.

4.6.6 SUMMARY: LESSONS IN DEVELOPING R&D AND INNOVATION SUPPORT IN THE CARIBBEAN

The main lessons that the Caribbean Region can garner from the activities undertaken in the global exemplars relate to both the governance framework for research, development and innovation (RD&I), as well as the incentive framework. Overall, the main lessons from global exemplars in developing an explicit guiding institutional structure include:

- Guiding Legislation;
- Explicit R&D Strategic Plans;
- Dedicated Ministries, Research and Science Councils;
- Explicit fiscal and technical support for R&D;
- Explicit support for Research Centres/Academia/Industry Linkages;
- Generic and ‘Smart Specialisation’ Strategies and Support; and
- Constant Monitoring, Evaluation and Adaptation of Support.

The activities of the global exemplars address many of the constraints noted by enterprises in the Caribbean. Initiatives to provide access to finance, catalyse collaboration between research centres and industry, as well as explicit attention to building internal firm capabilities, all feature prominently in the cases presented above.

In contrast to the explicit research and innovation (R&I) frameworks seen in global comparators, individual Caribbean countries, for the most part, lack a central agency responsible for R&I, specific laws and tax concessions, and dedicated links between research institutions and the private sector. While there appears to be a degree of sectoral targeting in the Caribbean, this is at a broad sector level, unlike the ‘smart specialisation’ seen in some global comparators which target specific subsectors in areas where a comparative advantage can be obtained.

The constraints to innovation in the Caribbean have been presented as financial (both external and internal); a lack of opportunities and incentives for collaboration; intellectual property (IP) protection; and internal constraints related to the process of conducting R&D. Specific internal constraints include finance; networking; skills; and innovative tendencies. These factors are not unique to the region, as they have presented themselves in other smaller states which have managed to demonstrate innovation efficiency by reducing the negative consequences of these constraints, although it is noted that these states still have challenges to address.

The development and implementation of an overall strategy for RD&I in the Caribbean is paramount, one that is explicit in its focus with clear areas of responsibility. Such an overall strategy, developed at the regional level, would be essential in guiding practices at the country level to avoid the implementation of conflicting approaches to fostering innovation. Decisions will need to be made in relation to the main channels through which RD&I will be catalysed; the role of governments versus the market; the extent of the focus on infant innovators versus experienced innovators; the roles of academia and the private sector; and the desired form of innovation networks, whether national, regional or international, vertical or horizontal, physical or virtual. The intervention areas to catalyse innovation that will need institutional attention broadly relate to finance, technical assistance, education and training, network development and demand enhancement.

There are many points to consider here. Morck and Yeung (2001) present a number of stylised facts about innovation, including: large firms typically undertake capital intensive research to adapt previous innovations, while ‘Radical innovations are associated with smaller firms’;¹⁰³ state subsidisation to small enterprise does not promote innovation, while public sector investment in infrastructure and education does; and competitive, developed and sophisticated financial systems are critical to innovation. However, such stylised findings are based on developed countries’ innovation systems, and given the relative underdevelopment of the private sector in the Caribbean, as well as a financial system not noted for an inclination to provide risk-taking capital, there will be a greater role for the public sector in addressing market failures.

Emerging from these findings is that all intervention areas will need to be addressed through public policy, given deficiencies in availability and access to finance, technical assistance in conducting R&D, human resource deficiencies, and lack of collaboration within the private sector and between the private sector and research centres. Regional institutions and national governments will also have a role to play in spurring innovation (demand enhancement) and building capacities in the Region through their procurement strategies, strategies that should actively promote collaboration both within the Region to build cooperative behaviour, as well as between regional enterprises and international partners to boost technology transfer. While

¹⁰³ Randall Morck and Bernard Yeung. *The Economic Determinants of Innovation* (Ottawa, Ontario: Industry Canada, 2001), 1.

there are a number of new innovative approaches to finance innovations globally, such as crowd-funding, as well as traditional venture capital approaches, governments will still have a role to play in increasing the capacity of enterprises in the Region to access such funding sources, especially for infant innovators. While the utilisation of tax incentives, grant funding and duty waivers are low, both in the Region and in some of the global exemplars, they are still useful incentives, and as indicated by Caribbean Development Bank (2016), there is a need to communicate their existence to enterprises, as they appear currently unaware of various sources of support.

CARICOM has highlighted RD&I as a cross-cutting area in its strategic plan, and this needs to be mirrored at the country level, with a clear, explicit reference to the role envisaged for RD&I. Currently, at the country level, the role and approach to RD&I is concealed within a range of other strategic plans, rather than as a central strategy supporting the effectiveness of other national strategies. Incentives that could in principle assist innovation, are also concealed under general incentives. National agencies to address innovation challenges will need to be founded or further developed, with explicit relevance to the development of the private sector. In addition, a clear focus on the subsectors that provide the greatest opportunity for contribution to enhanced competitiveness of the Region will need to be identified. The Economist Intelligence Unit (2015) identified the main large and emerging sectors in the Region (although some countries possess potential in other areas as shown in Table 4.18) as: business-process outsourcing (BPO) and business services; tourism; higher education; agriculture and food processing; and energy and mining. Identifying the specific subsectors, within these broad sectors, in which the Region has some form of competitive advantage will be of paramount importance. As an example of specific subsectors, Lashley and Moore (2016) identify several sectors in Barbados which exhibited sales, employment, export and physical growth in the period 2014 to 2016 as accounting, tax and consulting services; design services (clothing, website and graphic design); entertainment and media services; education; ICT; specialty foods; pharmaceuticals; and crafts. Box 4. 3 highlights a case of FDI in an area where the Region has a distinct advantage, rum, and therefore embedded the foreign investment in the region, and Box 4. 4 highlights an institutional response to 'smart' specialisation in medical marijuana in Jamaica.

Table 4.18: Key Sectors for Growth and Development in the Caribbean

Sectors	OECs	BAH	BAR	BEL	GUY	JAM	TNT
Tourism (eco- and sustainable)	X	X		X		X	
Construction	X						
Energy (including Green Energy)	X		X				X
Energy-related Services							X
ICTs	X			X		X	
Creative/Cultural/Sports Industries	X					X	
Light Manufacturing (electronics, food, alcohol)	X	X	X			X	
Agro-processing	X			X	X		
Alternative/Offshore Finance/International Business	X	X	X	X			
Offshore Health and Education Services	X						
Business Process Outsourcing (BPO)					X		
Agriculture	X	X		X	X		
Mining		X			X		

Source: Compete Caribbean (2014) Private Sector Assessment Reports. Available from: <http://competecaribbean.org/category/psars/page/2>
 [Accessed 7th April 2017]

Box 4.3: Institutional Support, Collaboration and Smart Specialisation: Rum Flavoured Beer in Barbados- The 10 Saints Brewery Company

Attending the 2009 'Jazz on the Beach' festival, 10 Saints founder, Glyn Partridge, '*had the great idea of combining the rum heritage of Barbados with refreshing lager beer to produce a truly unique taste*'.

Barbadian 10 Saints beer is named after the ten parishes in the island that are named after saints, giving the product a unique association with the country, and strongly identified with being 'Bajan'. The unique selling point for the beer is that it is aged in old Mount Gay Special Reserve rum casks, to infuse the taste of rum in the beer. Mount Gay is noted as one of the oldest rum distilleries in the world, further adding to the unique selling point of the beer, which fully embeds the company in the Caribbean.

Founded in 2011, the demand for the product, as with handcrafted microbrewery products globally, has grown significantly. Due to the brew and age production process, the company only produces in small batches, and with growing demand has experienced supply shortages at times. While the company brews at their microbrewery, bottling is undertaken through an agreement with the largest brewery in the country, the internationally owned Banks Brewery. This type of collaboration between competitors is quite unusual in the region. However, it is facilitated as 10 Saints is not considered a direct competitor to the products of the larger brewery.

In 2016, the company won the Caribbean Export Choice Award, and the beer is currently sold across the Region as well as in Europe. The handcrafted beer is currently sold in 23 markets.

The 10 Saints story is interesting as it demonstrates the benefits of institutional support (Caribbean Export), collaboration (with a larger producer), concentration on selling points unique to the region, and an entrepreneurial founder and CEO.

Source: Personal correspondence.

At a broad level, the main lessons include:

- Research and innovation should be highlighted as a main pillar for achieving economic growth and socio-economic development;
- Explicit and proactive actions to promote linkages between government, academia and the private sector need to be implemented, as well as across countries;
- 'Smart specialisation', which draws on the unique characteristics of the region, will need to be employed to overcome the noted constraints of small states; and
- Consistent monitoring and evaluation to identify challenges and development of measures to address them will need to be undertaken.

Underlying the development of broad strategies at the regional and individual country level should be measures to address the specific constraints noted by enterprises including a lack of financial and collaboration incentives; a lack of desire to cooperate; a perceived lack of legal protection for IP; and internal capabilities to innovate, particularly skills, suggesting a need for interventions within and outside of the educational system.

Intarakumnerd, Chairatana, and Tangchitpi boon (2002), in reviewing the 'concept' of National Innovation Systems (NIS) in developing countries, note that the institutional structure for innovation does not exist, or is fragmented, and that innovation activities are mostly informal. These are two of the main characteristics of the situation in the Caribbean. In such a situation, the authors note that strategic efforts should be focussed on 'catching-up', and that 'capital accumulation, rather than intangible assets (such as knowledge) and learning, is the main contribution to technical progress in developing countries'.¹⁰⁴ This, however, does not need to be the reality for the Caribbean, and instead of 'catching-up', the Region could in effect 'start a new race'. Instead of the functional interventions seen in Thailand and attributive as a reason for its underdeveloped NIS (Intarakumnerd, Chairatana, and Tangchitpi boon 2002), or the declarative approaches seen in Moldova (Cuciureanu 2014), and reflective of political speeches in the Caribbean, the Region should seek to emulate the 'smart specialisation' approaches seen in the global comparators reviewed. In this sense, the focus should be on reorienting the sectors in which the Region has experience,

¹⁰⁴ Intarakumnerd, Patarapong, Pun-arj Chairatana, and Tipawan Tangchitpi boon, "National innovation system in less successful developing countries: the case of Thailand," Research Policy 31, no.2 (2002): 1447.

e.g. tourism, as well as the development of new emerging sectors in which the Region has an advantage in some form such as renewable energy technologies, biotechnology, marine sciences, inter alia. Caribbean Development Bank (2016) suggests that for MSMEs, which comprise the largest proportion of businesses in the region, that support should be focussed on culture and the creative industries, offshore education and business process outsourcing.

Caribbean Development Bank (2016) echoes the suggestions above in relation to the need for the establishment of explicit national innovation systems (NIS) and integrating them within national strategic plans, policies and programmes. Legislation to encourage cooperation between academia and enterprises is also recommended, as is smart specialisation. However, smart specialisation will need to be informed by an explicit 'articulation of service sector innovation policies',¹⁰⁵ as the current orientation is overly focused on industry, while the economy of the Region is heavily driven by the service sector (Caribbean Development Bank 2016). These broad suggestions are accompanied by a number of more specific recommendations for advancing innovation in MSMEs in the Region including: fiscal incentives for 'creative' education and training; access to finance; international standards certification for educational institutions, firms and employees; capacity enhancements in infrastructure (business parks, broadband); and information dissemination to MSMEs on the support available for innovation, a shortcoming of the current system, as noted previously.

Box 4.4: Institutional Environment for Smart Specialisation: Medical Marijuana in Jamaica

To facilitate the exploitation of the opportunities available for use of marijuana for medical and therapeutic purposes, the Government of Jamaica has made amendments to the Dangerous Drugs Act to allow for its use, growing, processing, selling, transportation and distribution. Through the amendments to the Act, the Cannabis Licensing Authority (CLA) was established in 2015 to regulate the industry. The Authority is an agency under the Ministry of Industry, Commerce, Agriculture and Fisheries.

Through two divisions, a Licensing and Applications Division and an Enforcement and Monitoring Division, the agency implements its mandate which is:

- *To create regulations to guide the development of an orderly legal ganja and hemp industry in Jamaica, for the use of the plant and its by-products for medical, therapeutic and scientific purposes;*
- *To ensure that regulations created and activities within the industry are in keeping with Jamaica's international obligations; and*
- *To issue licenses, permits and authorisation for the handling of hemp and ganja.'*

As of February 2017, the CLA had provided conditional approval to three applicants with another 20 being considered. Given international trends, this formal infant industry provides significant opportunities for exploitation, and is receiving suitable institutional, regulatory and legislative support.

Source: <http://cla.org.jm/> [Accessed 9th April 2017]

4.7 CONCLUSIONS

The current chapter sought to address three basic questions, namely:

1. What is the current situation in the Caribbean with regards to R&D, innovation and technology transfer?
2. What are the constraints to undertaking R&D, introducing innovations and technological transfers?
3. How can any constraints identified be addressed?

The preceding discussion sought to address these questions firstly from a micro-level enterprise perspective, followed by a review of the current support environment for RD&I in the Caribbean. Drawing on approaches in global exemplars, general measures to address the constraints to innovation and competitiveness in the Region were proposed.

The current level of formalised R&D in the Region is low, with less than 10% of enterprises having a dedicated R&D team.

¹⁰⁵ Caribbean Development Bank, *Micro-small-medium Enterprise Development in the Caribbean: Towards a New Frontier* (Bridgetown, Barbados, 2016), 119.

However, while 79% of firms undertook some form of R&D, this was primarily in relation to market development rather than directly related to promoting innovation in goods or services; only 28% of enterprises undertook R&D specifically in relation to good/service/process innovation. Given the low level of R&D in this area, it is perhaps not surprising that only 20% of enterprises had introduced a new product or service within the three years preceding the 2014 survey. Of these innovating enterprises, the majority of innovation related to technology transfer (61% related to licensed technology and 70% related to the purchase of machinery/equipment/software).

Of concern to policy-makers seeking to improve productivity, it appears that innovation in the private sector has a greater effect on quality, sales and internal abilities, rather than a direct effect on improving unit costs; less than one-quarter of enterprises indicated this as an effect of innovations introduced.

With respect to the constraints to R&D and innovation; a lack of available finance, both internal and external; a lack of collaborative behaviour within the private sector and between the private sector and research institutions; a lack of internal skills to undertake RD&I; and a perceived lack of legal protection for IP were noted as the main constraints, although all countries across the Region have IP protection. In seeking to address similar challenges, global exemplars have implemented a number of policies, programmes and incentives, as described above. The Caribbean has attempted similar interventions, although not explicitly to address RD&I, but for enterprise development in general, and perhaps this is one of the main shortcomings in the region, where an explicit reference and orientation towards promoting RD&I is not visible.

Drawing on the lessons from global exemplars, and noting CARICOM's explicit strategic attention to RD&I, there is a need for further elaboration of this approach to RD&I for the Region and application of concrete approaches at the regional and country levels. This is as opposed to the noted declarative approaches, and simple functional approaches, to enterprise development in the region. In addressing the practical approach for the region, there are four broad areas that will require attention, areas which seek to promote innovation across all sectors, but are appreciative that certain sectors hold greater promise for value-added, competitiveness and the economic growth and socioeconomic development of the region. These four areas include:

1. Giving primacy to RD&I as a means to achieving economic growth and socioeconomic development in strategic plans, institutional establishment, legislation, policy and programmes;
2. Promotion of collaboration in the execution of RD&I between governments, academia and the private sector, as well as demand enhancement for innovative products through 'smart' government procurement;
3. The implementation of 'Smart Specialisation' drawing on the unique characteristics of the Region as an element of an overall RD&I support framework; and
4. Monitoring and evaluation of RD&I inputs and outputs to identify emerging challenges and address them in a timely manner.

Of critical importance to the success of any RD&I interventions will be activities that occur at the level of the enterprise. As noted previously, and also demonstrated in some of the global exemplars, without the facilitative action of the entrepreneur, collaboration, the uptake of fiscal incentives, or the realisation of increased productivity, competitiveness and economic growth, will not occur. In this vein, a lack of action may relate to a lack of knowledge or a lack of entrepreneurial inclination. To address these particular constraints, there is a need to adopt proactive implementation strategies, rather than the field of dreams approach currently undertaken, where there is a hope that once plans are implemented, that enterprises would eagerly participate (Lashley 2012). Whilst an approach that seeks to proactively engage enterprises would not be feasible in larger economies, the small economies of the Caribbean allow some degree of direct interaction between public policy implementation agencies and the enterprises themselves, a process similar to that of the intermediary role played by extension officers in agriculture. The Caribbean already has a public sector funded business support framework in the guise of industrial development corporations (IDCs) across the region. However, while IDCs have been effective support providers for clients that approach them, the general IDC approach is reactive rather than proactive, that is, they await clients to approach them. Utilising the resources and expertise in the region's IDCs has the dual potential of enhancing the propensity to innovate, as well as providing a longer-term potential direct revenue stream for governments in the Region as the value of services provided are realised, and the potential to charge for services emerges.

While addressing lack of information at the level of the enterprise can be addressed in the short-term through more proactive engagement, the issue of a lack of entrepreneurial tendencies is a more difficult issue to address, given its cultural roots. A two-pronged approach to enhancing entrepreneurial behaviour, a prerequisite for innovation, will be required, a developmental approach through the introduction of business management and entrepreneurial education in the curricula of the region's educational institutions, and a re-education of existing enterprise owners, in a sense, a remedial approach. Educational reform can be driven at the regional level by the Caribbean Examinations Council (CXC) and the Caribbean Association of National Training Agencies (CANTA), while those agencies interacting directly with existing businesses in the Region could be charged with the responsibility of engendering entrepreneurial behaviour, R&D and innovation. Countries' business development agencies, and private sector representatives such as chambers of commerce, small business associations and sector specific associations will be important in this regard.

The Caribbean has a substantial historical record in attempting to address the constraints of businesses through the provision of fiscal incentives, concessionary finance, technical assistance, and training and education. While originally seeking to promote inward investments, the system has evolved in a manner seeking to address the needs of indigenous micro, small and medium enterprises (MSMEs), with some countries in the Region implementing specific MSME policies. However, in the promotion of RD&I, these institutions need to innovate themselves if the Region is to realise increased productivity, competitiveness and socioeconomic development. The summation of the general deficiencies in the Region and actions required is shown in Table 4.19: Action Areas for the Development of RD&I in the Caribbean – Lessons from Global Exemplars.

Table 4.19: Action Areas for the Development of RD&I in the Caribbean – Lessons from Global Exemplars

Current RD&I Constraints	Current Situation	Actions Needed
Lack of a Regional or National Innovation System (NIS).	Some references to RD&I in national policies. CARICOM Strategic Plan treats RD&I as a cross-cutting element in attaining strategic targets, but current targets are highly abstract.	Design and Implement national RD&I strategic plans drawing on identified best practice within the general structure of the CARICOM Strategic Plan. These plans should focus in part on 'smart specialisation' as well as consistent monitoring and evaluation (M&E). Implementation of relevant legislation and regulations to guide and promote the main elements of the national strategic plan. Founding of dedicated ministries, research support centres and science councils to provide for a one-stop-shop for innovators.
Lack of Finance (internal and external)	Generic fiscal incentives for business development; lack of specific focus on RD&I. Limited specific funding for RD&I, and limited utilisation.	Within regional and national RD&I strategic plans, legislation and regulations, ensure adequate financial support available in the form of grants, fiscal incentives, co-financing, and international donor support.
Lack of Collaboration within Private Sector and between Private Sector and Research Centres	No promotion of collaboration in public sector procurement policies. Some support for private sector associations.	Active promotion of collaboration through innovative procurement strategies at the regional and national levels that require joint ventures or strategic alliances to access contracts. Active promotion of collaboration by enterprise extension officers.
Lack of Internal Capacity	Existence of a variety of training opportunities but not explicitly targeted at RD&I.	Development of explicit technical and training support services for RD&I. Implementation of incentives for industry-academia linkages to enhance enterprise and academia capacities. This allows for greater matching of the supply and demand for skills. Curriculum development in secondary, post-secondary and tertiary education to inculcate innovation and entrepreneurial behaviour.

Appendices

APPENDIX 4.1: TECHNOLOGICAL AND KNOWLEDGE INTENSIVENESS (TKI) CATEGORISATIONS

Table 5.A1: Technology and Knowledge Intensiveness (TKI) Classifications (Lashley and Smith 2015, 17)

Classification	Sector
High TKI	Publishing, printing and reproduction of recorded media; Computer and related activities; Post and telecommunications; Manufacture of medical, precision and optical instruments, watches and clocks; Manufacture of radio, television and communication equipment and apparatus
Medium-High TKI	Manufacture of machinery and equipment n.e.c.; Air transport; Other business activities; Manufacture of chemicals and chemical products; Manufacture of Coke, Refined Petroleum Products and nuclear fuel; Water transport; Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment; Manufacture of electrical machinery and apparatus n.e.c.; Manufacture of other non-metallic mineral products
Medium-Low TKI	Manufacture of fabricated metal products, except machinery and equipment; Manufacture of basic metals; Manufacture of rubber and plastics products; Construction
Low TKI	Manufacture of furniture; manufacturing n.e.c; Land transport; transport via pipelines; Manufacture of wearing apparel dressing and dyeing of fur; Manufacture of paper and paper products; Tanning and dressing of leather manufacture of luggage, handbags saddlery, harness and footwear; Wholesale trade and commission trade, except of motor vehicles and motorcycles; Manufacture of food products and beverages; Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods; Manufacture of Tobacco Products; Manufacture of textiles; Manufacture of wood and of products of wood and cork, except furniture, manufacture of articles of straw etc.; Hotels and restaurants; Sale, maintenance and repair of motor vehicles and motorcycles, retail sale of automotive fuel; Supporting and auxiliary transport activities, activities of travel agencies

Categorisation of manufacturing sectors by level of technology available from:
<http://www.oecd.org/sti/ind/48350231.pdf>

Categorisation of services by knowledge intensiveness available from:
http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/Annexes/hrst_st_esms_an9.pdf

Construction not included in OECD or Eurostat Classification; included here under medium to low technology.

APPENDIX 4.2: SECTOR DISTRIBUTION BY COUNTRY

Table 5. A2: Sector Distribution by Country (%)

Sector	OECS	JAM	BAR	GUY	BEL	BAH	TNT	Total
Other Manufacturing	1.6	16.5	13.8	12.5	18.9	0.0	10.3	142
Food	7.8	10.7	11.4	14.2	18.0	12.6	6.5	177
Textiles	10.0	0.0	2.4	0.0	0.0	0.0	0.0	4
Garments	1.4	4.1	4.1	2.5	0.8	0.8	2.4	39
Chemicals	1.6	1.7	4.1	2.5	4.1	4.7	4.4	50
Plastics and Rubber	0.4	1.2	2.4	0.0	0.8	0.0	1.5	15
Non-metallic Mineral Products	2.8	2.9	4.1	0.0	2.5	2.4	1.8	46
Basic Metals	2.6	0.0	0.0	0.0	0.0	0.0	2.1	27
Fabricated Metal Products	1.3	0.8	1.6	3.3	0.8	1.6	3.2	32
Machinery and Equipment	4.3	0.8	0.0	0.8	0.8	3.1	0.9	44
Electronics	1.6	0.4	0.0	0.0	0.0	0.8	1.2	18
Construction	7.9	2.9	4.9	2.5	2.5	18.1	7.6	129
Service of Motor Vehicles	3.9	8.7	0.8	3.3	2.5	2.4	4.1	76
Wholesale	3.4	5.0	5.7	10.8	1.6	2.4	7.6	89
Retail	24.5	29.3	7.3	30.8	14.8	16.5	31.5	452
Hotels and Restaurants	23.8	7.4	26.0	8.3	25.4	23.6	7.6	331
Transport	9.7	5.4	6.5	2.5	6.6	7.9	6.2	138
Information Technology	1.4	2.1	4.9	5.8	0.0	3.1	1.2	37
TOTAL NUMBER	772	242	123	120	122	127	340	1846

Source: PROTEqIN Database

APPENDIX 4.3: SPECIFIC TYPES OF R&D ACTIVITY UNDERTAKEN BY COUNTRY

Table 5. A3: Types of Activities Undertaken in Last 2 years by Country (% undertaking activity)

Broad R&D Category	Variable	OECS	JAM	BAR	GUY	BEL	BAH	TNT	Total
Cost Reduction	To reduce costs:	8.4	14.5	10.6	79.2	20.5	10.2	11.5	15.4
	To reduce energy consumption:	18.8	57.0	27.6	60.8	27.9	20.5	22.1	28.4
Innovation	To support innovation:	11.1	17.4	17.1	50.0	9.0	13.4	14.1	15.4
	To increase number of goods/services:	8.0	47.5	30.1	63.3	33.6	9.4	10.3	20.5
Market Development	To promote exports:	20.1	3.7	8.9	17.5	1.6	18.1	21.8	16.0
	To develop new foreign markets:	9.3	0.0	3.3	21.7	0.8	10.2	8.8	8.0
	To increase national markets:	33.7	32.2	33.3	59.2	32.8	37.0	35.6	35.6
Network Development	To make business alliances with suppliers/clients:	7.4	16.5	20.3	60.0	7.4	10.2	15.6	14.6
Quality Improvement	To obtain quality certification:	26.7	9.1	8.1	19.2	4.1	23.6	30.0	21.6
	To improve quality of goods/services:	8.8	12.8	16.3	75.8	14.8	10.2	11.2	15.1

Source: PROTEqIN Database

APPENDIX 4.4: ENTERPRISE LEVEL INDICATORS USED IN THE GLOBAL INNOVATION INDEX REPORT 2016

Table 5. A4: Enterprise Level Input and Output Indicators used in Global Innovation Index Report 2016

Enterprise Level Indicators: Inputs	Global Mean
2.3.1 Researchers, FTE/mn pop	1,921.76
2.3.2 Gross Expenditure on R&D, %GDP	0.95
2.3.3 Global R&D firms, average exporting top 3, mnUSD	407.85
3.1.2 ICT use (index)	4.15
3.1.3 E-participation (index)	0.51
3.3.3 ISO 14001 environmental certificates/bn PPP\$ GDP	2.56
4.1.2 Domestic credit to private sector, % GDP	64.69
4.2.4 Venture capital deals/bn PPP\$	0.08
5.1.1 Knowledge-intensive employment %	27.21
5.1.2 Firms offering formal training, % firms	37.00
5.1.3 GERD performed by businesses, %GDP	0.63

Enterprise Level Indicators: Inputs	Global Mean
5.1.4 GERD financed by business, %	31.69
5.1.5 Females employed with advanced degrees, % total employment	14.46
5.2.1 University/industry research collaboration	3.82
5.2.2 State of cluster development	3.84
5.2.3 GERD financed from abroad, %	13.74
5.2.4 JV-strategic alliance deals/bn PPP\$ GDP	0.02
5.2.5 Patent families filed in 2+ offices/bn PPP\$ GDP	1.09
5.3.1 Intellectual property payments, % total trade	0.91
5.3.2 High-tech imports less re-imports, % total trade	8.74
5.3.3 ICT service imports, % total trade	1.21
5.3.4 FDI net inflows, % GDP	4.41
5.3.5 Research talent, % in business enterprise	33.19
Enterprise Level Indicators: OUTPUTS	Global Mean
6.1.1 Patents by origin/bn PPP\$ GDP	4.38
6.1.2 PCT patent applications/bn PPP\$ GDP	1.27
6.1.3 Utility models by origin/bn PPP\$ GDP	2.31
6.2.1 Growth rate of PPP\$ GDP/worker	1.49
6.2.2 New businesses/th pop. 15-64	3.58
6.2.4 ISO quality certificates/bn PPP\$ GDP	9.05
6.2.5 High- and medium- high-tech. manufacturers, %	25.84
6.3.1 Intellectual property receipts, % total trade	0.47
6.3.2 High-tech exports less re-exports, % total trade	4.26
6.3.3 ICT service exports, % total trade	2.17
6.3.4 FDI net outflows, % GDP	4.14
7.1.1 Trademarks by origin/bn PPP\$ GDP	49.08
7.1.2 Industrial designs by origin/bn PPP\$ GDP	4.06
7.1.3 ICTs and business model creation	4.56
7.1.4 ICTs and organisational model creation	4.25
7.2.1 Cultural and creative services exports, % total trade	0.46
7.2.2 National feature films/mn pop 15-69	5.15

Enterprise Level Indicators: Inputs	Global Mean
7.2.3 Global entertainment and media market/th pop. 15-69	0.90
7.2.4 Printing and publishing manufacturers, %	1.85
7.2.5 Creative goods exports, % total trade	1.36
7.2.1 Generic TLDs/th pop. 15-69	15.26
7.2.2 Country-code TLDs/th pop. 15-69	15.47

Source: Cornell University, INSEAD, and WIPO (2016)

APPENDIX 4.5 LISTING OF MINISTRIES, BUSINESS AGENCIES AND BUSINESS INCENTIVES IN THE CARIBBEAN

Table 5. A5: Institutional Support for Enterprise Development in the Caribbean (various sources: see website links)

Country	Main Ministry(ies)	Main Business Agency(ies)	Business Incentives
ANT	Tourism, Economic Development, Investment and Energy; Education, Science and Technology; Trade, Commerce and Industry	Investment Authority; International Institute of Technology; National Development Foundation	Reduction/removal of duties or taxes for investors. See: http://investantiguabarbuda.org/start-a-business/investor-incentives/ Reduction/removal of duties and taxes for approved small business seeking to grow or reinvest. See: http://investantiguabarbuda.org/start-a-business/small-business/incentive-programs-for-small-businesses/
BAH	Education, Science and Technology; Finance	Investment Authority; Agricultural and Industrial Corporation	Duty free and property tax incentives available in tourism and industry. See: www.bahamas.gov.bs
BAR	Industry, Commerce, and Small Business Development; Education, Science, Innovation and Technology	Industrial Development Corporation; Productivity Council	Exemptions on duties for raw materials, machinery, equipment and spares in manufacturing, agriculture and fisheries; tax holidays for manufacturing. Extension of tax holidays available for enterprises investing in new equipment, technology, innovative process or management accounting to a value of USD500,00 or more in the preceding three (3) years. There are also allowances for particular investment and market development activities. An Innovation Fund is also operated to assist in commercialising innovative ideas. Funding is available for between USD12,500 and USD125,000 through a co-funding arrangement. See http://www.bidc.org/entrepreneurs/preparing-business/financing-your-business
BEL	Economic Development, Petroleum, Investment, Trade and Commerce	Trade and Investment Development Service	Duty exemptions up to 15 years for approved enterprises and further extension of 10 years for enterprises in agriculture, agro-industries, mari-culture, food processing and manufacturing which are exporting and highly labour intensive. See: http://www.belizeinvest.org.bz/investment-incentives.html

Country	Main Ministry(ies)	Main Business Agency(ies)	Business Incentives
DOM	Trade, Energy and Employment	Invest Dominica Authority; Employment and Small Business Support Agency; Export-Import Agency	Tax holidays and waiver of import duties for raw materials and equipment in manufacturing, assembly, agro-processing, tourism, international business services and services: See: http://www.investdominica.com/investment-opportunities/investment-incentives/
GRN	Labour, Economic Development, Trade and Planning	Industrial Development Corporation	Duty and tax exemptions. See: http://grenadaidc.com/about-gidc/services/#.WLBG-zsrKHs
GUY	Business and Tourism	Office for Investment; Small Business Bureau	Duty free and tax incentives on raw materials, machinery and equipment, with special schemes for exporters, agribusinesses, manufacturers, tourism, fisheries, forestry, mining and ICT. See: http://goinvest.gov.gy/investment/incentives/
JAM	Economic Growth and Job Creation; Science, Energy and Technology; Industry, Commerce, Agriculture and Fisheries;	Business Development Corporation; Trade and Investment Jamaica (JAMPRO); National Commission for Science and Technology (NCST); Scientific Research Council	R&D Tax Incentive Scheme: exemption from General Consumption Tax and Customs Duties for purchase of R&D related goods, equipment and chemicals. Administered by the NCST. For specific details see: http://ncst.gov.jm/programmes/r-d-tax-incentive-scheme/ There is an Omnibus Fiscal Incentives Framework providing relief with respect to duties and corporate taxation. See: http://www.jamaicatradeandinvest.org/investment/incentives
SKN	Industry, Trade and Commerce	National Enterprise Development Division; Investment Promotion Agency	Tax holidays and duty exemption for raw materials, parts and production machinery. See: http://www.investskitts.kn/investor-guide/incentives/
SLU	Finance, Economic Growth, Job Creation, External Affairs and the Public Service; Education, Innovation, Gender Relations and Sustainable Development	National Development Corporation; National Investment Promotion Agency; Office of Private Sector Relations; Trade Export Promotion Agency	Tax and duty free concessions for enterprises in tourism, manufacturing, and heritage. See: http://www.investslucia.com/p/doing-business
SVG	Economic Planning, Sustainable Development, Industry, Information and Labour	National Investments Promotion Agency	Tax and duty free exemptions in light manufacturing, agro-processing, ICT, and tourism and other services. See: http://www.investsvg.com/EXPORTSERVICES/Incentives/tabid/175/Default.aspx
TNT	Labour and Small Business Development; Trade, Industry and Investment	Business Development Agency; Invest in Trinidad and Tobago; National Export Facilitation Organisation; Caribbean Industrial Research Institute (CARIRI)	Grant funding for R&D (maximum of USD150,000) and Patent Registration (maximum of USD45,000) in non-energy manufacturing and services. Tax rebates (agribusiness) and fiscal incentives (manufacturing, creative industries and tourism) See: http://investt.co.tt/doing-business/incentives and http://www.exportt.co.tt/node/64

APPENDIX 4.6: ANOVA RESULTS OF SIGNIFICANT DIFFERENCES IN R&D SCORES

Table 5.A6: Significant Differences in R&D Scores (ANOVA)

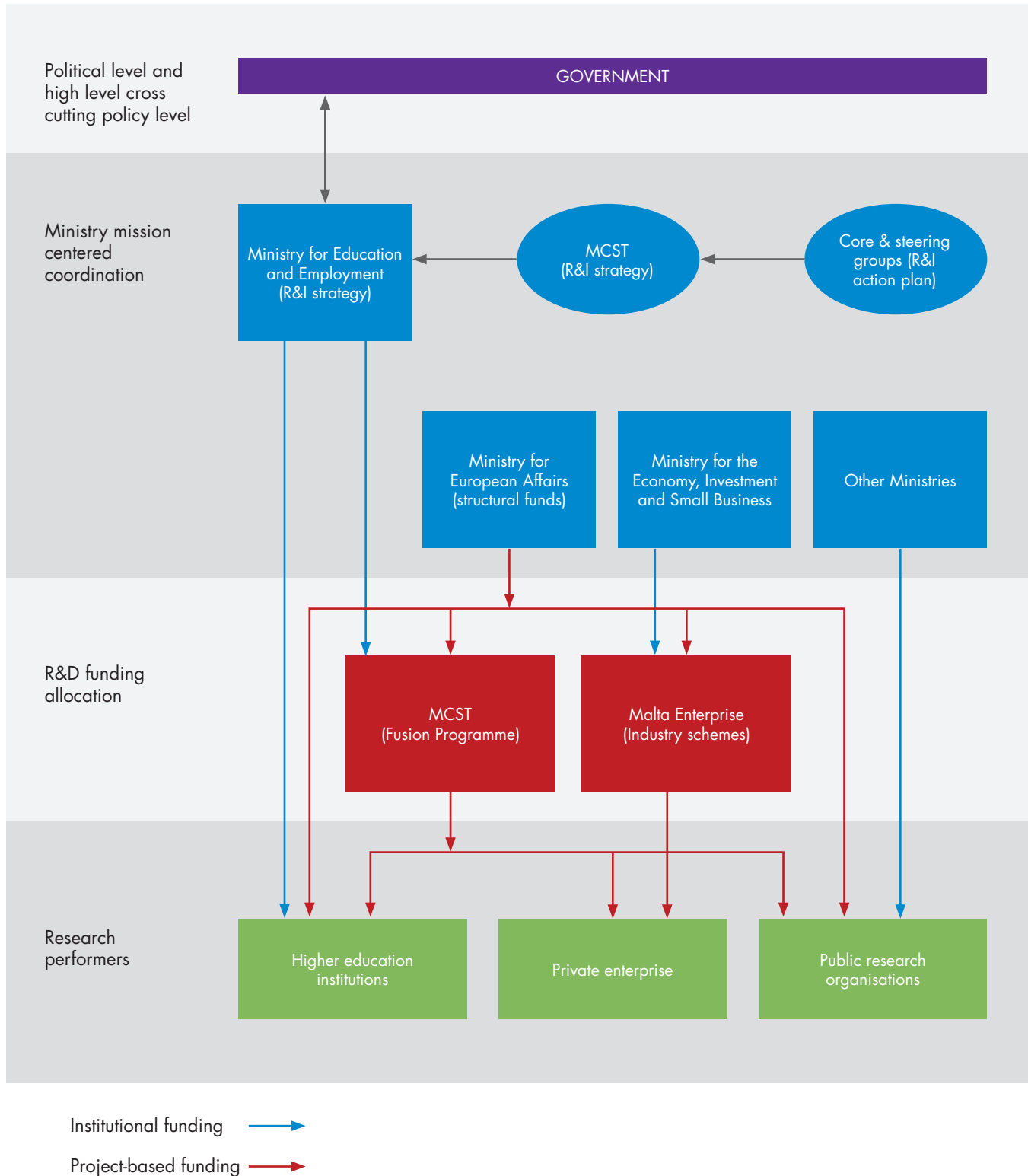
Variable	p-value*	df1	df2	F	Effect Size	Significant Result
Level of Technology/ Knowledge Intensiveness	0.003	2	1843	5.79	0.01 (small)	Medium to High TKI enterprises undertake significantly more R&D Activities (M=1.95) than Low (M=1.6) and Medium-Low (M=1.6) TKI Enterprises
Firm Size (employees)	0.000	2	1843	38.95	0.04 (small to medium)	All firm sizes significantly different to each other with Small having a mean R&D score of 1.4, Medium with a mean R&D score of 1.7, and Large with a mean R&D score of 2.1. This result is supported conceptually and empirically by Bhattacharya and Bloch (2004).
Firm Age	0.000	3	1842	6.10	0.01 (small)	Old firms (25 years or older) (M=1.73) undertake significantly more R&D activities than Mature (M=1.54) and Young (M=1.39) firms.
Gender Structure of Ownership	0.042	2	1828	3.35	0.00 (very small)	Equal ownership enterprises undertake more R&D activities (M=1.79) than firms owned by majority men (M=1.57) or majority women (M=1.55)

*Where the assumption of homogeneity of variances is violated, the Welch p-value results are presented.

Source: PROTEqIN Database

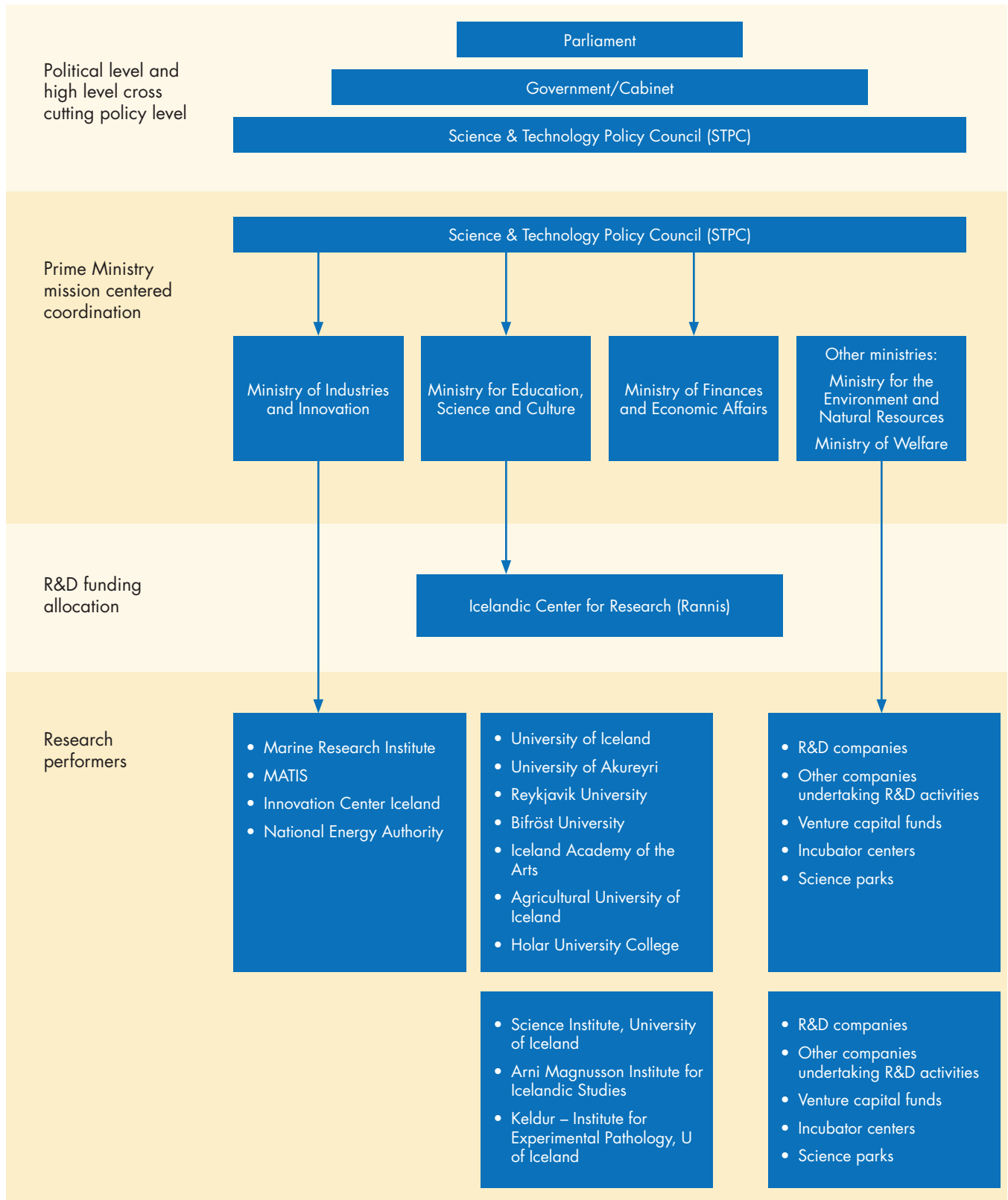
APPENDIX 4.7: EXAMPLE RD&I GOVERNANCE STRUCTURES

Figure 5. A1: Governance Structure of RD&I in Malta



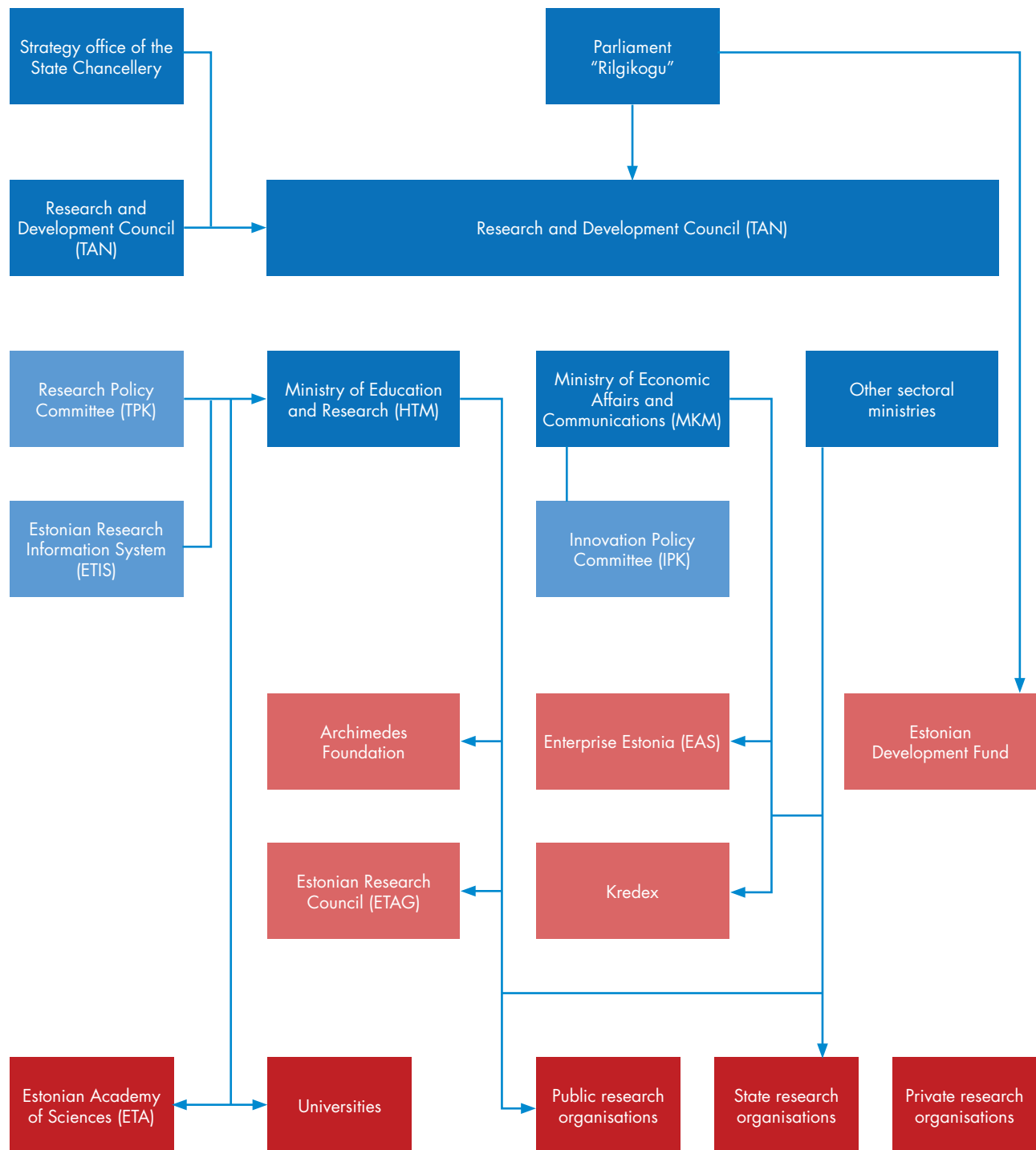
Source: Warrington and Hristov (2016), 20.

Figure 5. A2: Governance Structure of RD&I in Iceland



Source: Skogland (2016), 13.

Figure 5. A3: Governance Structure of RD&I in Estoni



Source: Ruttas-Kuttim and Stamenov (2016), 18.

5. CLUSTER DEVELOPMENT IN THE CARIBBEAN

5.1 INTRODUCTION

This chapter explores clusters as an economic development tool through which productivity, innovation and sustainable growth of industries can be facilitated in the Caribbean. A cluster is defined as “a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities”¹⁰⁶. It is an organising framework for understanding industry development which allows a new type of dialogue amongst firms, government agencies and other institutions. The cluster concept is not new¹⁰⁷. It has become the economic model of choice for many developed countries. In Europe alone, there are over 1,400 cluster initiatives, with clusters accounting for 38% of employment and 130 funding schemes specifically dedicated to clusters in 31 countries.¹⁰⁸ In the United States, nearly 380 clusters operating in all sectors have been analysed. According to the World Bank, clusters offer “a new way of dividing and understanding an economy and formulating policies and practices.”¹⁰⁹

It is important to note that the success of clusters as a development tool rests largely on the willingness of cluster participants to collaborate even as they aggressively compete against each other. This requires a culture of trust, openness and accountability. According to Kettels and Memedovic (2008), clustering is a deviation from failed traditional approaches such as stable macroeconomic policies, open market and interventionist industrial and innovation policies.¹¹⁰ They argue that competition, generated through globalisation has created the need for innovative approaches to improving productivity and attracting firms beyond low factor costs and subsidies. Noteworthy and of relevance to the Caribbean, the geographical scope of a cluster can range from a single city or state to a country or even a network of neighbouring countries. Clustering is now well accepted not only at the level of the country but also at the level of the multilateral institutions amongst which are: The United States Agency for International Development (USAID); the United Nations Industrial Development Organization (UNIDO) and the Inter-American development Bank (IDB).

This chapter provides a theoretical analysis of clusters; describes the evolution of cluster theory and cluster classifications and explores their roles in productivity, innovation and new business formation towards sustainable competitiveness. It also discusses: the role of government, the private sector, and other institutions in cluster development and upgrade; explores best practices with respect to the organization of cluster initiatives to catalyse the growth of industries; and develops a framework to examine potential clusters in the Caribbean. This framework is applied to four clusters in the Region to determine the extent to which clusters exist and conform to formal models of economic clusters. Finally, recommendations are provided for upgrading into stronger clusters, thereby strengthening the use of clustering as a tool for economic development in the Caribbean.

5.1.1 METHODOLOGY

A desk review of cluster theory and best practices was employed in developing an analytical framework for examining clusters. A combination of review of existing studies on the chosen regional clusters and site visits to conduct interviews with cluster stakeholders was used to gather information. The choice of regional clusters to be analysed was guided by a desire to represent the varying sizes and economic structures of the economies of the region; apply the methodology to different industries in the region; and cover clusters with varying geographic scope in the medium to long term. Thus, the countries chosen were Trinidad and Tobago; Saint Lucia; Jamaica; and Guyana. The industries chosen were respectively agro-processing (agriculture); music (creative industries); yachting (maritime industry); and gold jewellery (extractive industries). The first three have tremendous scope for further developing into regional clusters, and gold, while common only to Guyana and Suriname, has lessons for value adding in the extractive sectors of the region.

¹⁰⁶ Michael Porter, *On Competition* (Harvard Business Publishing Corporation, 2008), 215.

¹⁰⁷ This gained popularity only since the 1990s owing to Michael Porter’s work in his *Competitive Advantage of Nations*, 1990.

¹⁰⁸ Alberto Pezzl, “Clusters as a Tool for Competition Reinforcement: Its Support Framework at European Level and the Example of Catalonia,” *The Competitiveness Institute (TCI) Network* (2015): 15.

¹⁰⁹ World Bank, *Clusters for Competitiveness: A Practical Guide & Policy Implications for Developing Cluster Initiatives* (Washington D.C., 2009).

¹¹⁰ Christian H.M. Ketels and Olga Memedovic, “From clusters to cluster-based economic development,” *Int. J. Technological Learning, Innovation and Development* 1, no. 3 (2008): 377.

5.2 THE EVOLUTION OF CLUSTER THEORY

The term “clusters” as a developmental framework can be traced back to Alfred Marshall’s original idea of the dynamics of Industrial districts (1842–1924). He explained that geographic concentrations of particular industries allowed for them to benefit from **labour market pooling**, **supplier specialisation**, and **knowledge spill-overs** (the “Marshallian Trinity”). He noted that the concentration of firms provided the impetus for the input suppliers to locate in close proximity so as to benefit from a scale of demand which allowed for greater efficiency and specialization to the cost advantage of customers. And finally, he found that in industrial districts, ideas moved easily from firm to firm as if knowledge was in the air.¹¹¹

His work was validated in the 1980’s by studies on the industrial districts of Northern Italy. Here, clusters of many small firms coalesced in a particular neighbourhood often specializing in a different step in the production process (value chain), while coordinating activities with those of other firms¹¹². These studies challenged the basis of industrial policy at the time which was premised on the economies of scale and scope achieved through large vertically integrated and diversified corporations (Alfred Chandler). Economic sociologists Michael Piore and Charles Sabel coined the term “Second Industrial Divide” to describe the emergence of the Italian clusters of small and medium sized enterprises, arguing that the saturation of mass markets for relatively standardised goods was giving way to consumer preference for greater variety and quality. Coupled with technological change—flexible tools and computerization—this made it possible for smaller, craft oriented firms, employing higher- skilled labour to out-compete larger, less flexible businesses. What emerged was “flexible specialisation” based on product diversification and dense interaction between dynamic SMEs in industrial districts “clusters”.¹¹³

The Italian clusters could produce for international markets distinctive, high-quality products, from ceramics to industrial machinery to furniture and textiles and apparel because they could rapidly discern and respond to changes in market demand to fill market niches.¹¹⁴ Larger firms, on the other hand, were organized to make long runs of standardized products and could not respond as quickly to demand changes. They also found that these small firms were supported by a variety of institutions and a culture of cooperation that enabled them to mimic or offset many of the advantages of scale (group buying, technology-development, market research) previously only available to larger firms.

Michael Porter (2008) in the 1990s described industry clusters as the product of four factors he called the “diamond of competitive advantage”: factor conditions; demand conditions; related and supporting industries; and firm strategy, structure and rivalry. Porter’s work emphasised the importance of location and how it affects a company’s strategy and performance. Porter’s diamond is integral to understanding why industry clusters are more competitive than isolated firms as it models the complexity of the business environment in a location and its impact on productivity and innovation.¹¹⁵

In Porter’s diamond, factor conditions include tangible inputs such as physical infrastructure, information, the legal system and R&D institutions upon which firms draw. Porter singles out the importance of specialised factors from university research institutions as this is integral to innovation and upgrade and moreover, less tradable or available elsewhere and therefore critical for the sustained competitiveness of the cluster. Firm strategy and rivalry are the rules and norms governing local rivalry. The more intense is the local rivalry, the better are the chances for cluster development as rivalry acts as an impetus for continuous innovation and upgrade to achieve greater efficiencies. Porter explains that where low productivity characterises the location (as in the case of developing countries), competition comes from imports and local rivalry is focused on imitation. Here price is the sole competitive variable which is achieved through wage suppression. Where there is high local rivalry (as in advanced economies), the competitiveness variable moves from low wages to low cost to product differentiation. This requires upgrading efficiency through innovation. Demand factors heavily influence the cluster’s movement from imitation and low quality products to high quality differentiated products and services. Here local demand is important, not as much its size as the quality of the demand. In the Porter diamond, sophisticated local demand pressures firms to improve and offers insights into future trends to which the cluster must respond to maintain competitiveness. Related and support industries is the network of specialised input providers and competitive related industries. This represents an environment in which learning, innovation and operating productivity can flourish. The clusters of related firms and specialised suppliers support each other allowing for further labour market pooling and knowledge spill-over.¹¹⁶

In the final analysis, for firms to emerge, grow, innovate and be competitive within a cluster model, there must exist amongst actors a culture of relationship building, networking and a sense of common interests and purpose. Herein lie some of the greatest challenges to cluster development in developing countries and, by extension, the Caribbean. Further, clusters in developing countries are constrained by many structural impediments. Firms are largely SMEs and often insufficient to achieve the critical mass needed to create sizeable learning externalities for further development of the cluster. There are weak linkages between cluster actors (firms, government, academia, finance and institutions for collaboration). Economic activity is concentrated in low value primary niches with firms competing largely on the basis of cheap labour and natural resources; heavy reliance on foreign components, services and technology; poor supporting institutions; firms which are largely integrated rather than specialised and interdependent on other firms and institutions; low education and skills level; limited access to capital; anti-

¹¹¹ Joseph Cortright, “Making Sense of Clusters: Regional Competitiveness and Economic Development,” A Discussion Paper, Brookings Institution Metropolitan Policy Programme, (2006):8.

¹¹² Ibid.

¹¹³ This connection was made by Bianchi and Gualtieri in 1987 and cited from: The Bookings Institution Metropolitan Policy programme. 2006. Making Sense of Clusters.

¹¹⁴ Ibid.,12.

¹¹⁵ Ibid.,13.

¹¹⁶ Porter, On Competition, 227.

cluster government policy; curriculum disconnected from cluster needs; and high degrees of protectionism. These factors impede upgrading and productivity improvements and innovation. Noteworthy, a changing trend is occurring as exports of high-value products (horticulture, livestock, cut flowers and organic products) now make up almost half of all developing country exports, far more than the 21% for traditional tropical commodities such as coffee, cacao, tea or cotton (World Bank, 2009).

5.2.1 CLUSTER LIFE CYCLE

Clusters are both the result of evolutionary and constructive forces.¹¹⁷ Analysts have found that most clusters form independently of government action and sometimes despite it. Further, they do not emerge by chance but are responses to the existence of some location advantage/s which provide the impetus for firms to emerge and agglomerate. Such advantage may be natural resource endowment; strong infrastructure; specialised skills; or research capacity in a particular field. For example, the Dutch transport cluster emerged as a consequence of a network of water ways and the Massachusetts cluster as a result of research being done at Massachusetts Institute of Technology.¹¹⁸ Policy imperatives can also provide the incentive for clusters to emerge. In Israel, for example, the goal to become self-sufficient in food in a hot environment with water scarcity led to the development of the country's irrigation equipment cluster. Clusters can also emerge as a result of related clusters. The San Diego, California golf equipment cluster evolved because of the Southern California aerospace cluster which created new materials which it was discovered could produce golfing material superior to steel. Clusters can also develop around a single large lead firm which acts as the nucleus around which firms agglomerate to meet the needs of the lead firm.¹¹⁹

Porter's research has estimated that once a cluster emerges, it takes 10 years to develop the depth to enjoy real competitive advantage, and the rate at which it achieves this is linked to the efficiencies in the diamond factors. As the number of firms grows, suppliers of specialised inputs are attracted; institutional support expands (specialised training, research, infrastructure and financing); and new firms emerge. And as the cluster's contribution to the economy is recognised, it can increasingly leverage government policy in its favour. The cluster can then move to the stage of internationalisation, exporting into foreign markets and sourcing generic inputs from cheaper distant locations. As related clusters begin to intersect, diversity of learning emerges, further stimulating innovation. This was the case with the German home appliance and built-in kitchen clusters allowing Germany to gain a higher share of world markets.

If the interconnections of the diamond are strong and co-reinforcing, the cluster can continue in a competitive state for decades. On the other hand, the cluster can start to decline. Unless the firms in the cluster are nimble enough to quickly source and adapt to changes, competitive advantage shifts to another location. This was the case with the golf equipment cluster where new materials from the aerospace cluster rendered the use of steel shafts by the New England cluster obsolete, shifting the competitive advantage to the San Diego California golf cluster where the new technical skills and materials were readily available.

5.2.2 CLUSTER CLASSIFICATIONS

Clusters are characterised by inter-firm relationships. First, there is the "Marshallian" type which comprises many roughly equal firms that compete with one another and engage in arm's-length transactions but do not intentionally cooperate. Second, there is the "network model" which is named after the Northern Italian industrial districts and consists of firms that are roughly equal that both compete and cooperate. Third, there is the "hub and spoke" type, characterized by a single large firm providing the substantial market for local suppliers and which generally sets the conditions for their relations (e.g., Toyota or Boeing). Fourth, there is the "satellite platform" type which comprises collections of branch plants located closer to markets and low-cost labour. Fifth, there is the "state-sponsored" type which exists because of government spending, usually military spending or government research laboratories.¹²⁰

5.3 CLUSTERS, PRODUCTIVITY, INNOVATION, NEW BUSINESS FORMATION AND VALUE CHAINS

A cluster in a context of a fully developed diamond where the synergies amongst the constituent parts are strong represents a complete innovation system. An economy characterised by high productivity and innovativeness would comprise a series of such eco systems with degrees of interconnections between the various diamonds or clusters.

¹¹⁷ Ibid., 226.

¹¹⁸ Alberto Pezzl, "Clusters as a Tool for Competition Reinforcement: Its Support Framework at European Level and the Example of Catalonia," *The Competitiveness Institute (TCI) Network* (2015): 12.

¹¹⁹ Porter, *On Competition*. 254.

¹²⁰ These are discussed in greater detail in Porter, *On Competition*. 253-256.

5.3.1 CLUSTERS AND PRODUCTIVITY

Clusters can increase productivity and operational efficiency through linkages, spill-overs, and synergies across firms, suppliers and associated institutions and through efficient access to public goods, better coordination and the diffusion of best practices.¹²¹ This is supported by the World Bank (2009).¹²² One of the most effective productivity enhancing features of a cluster is the inter-firm rivalry within the cluster. Because all firms in the cluster have access to the same business climate conditions and inputs, there is constant competitive pressure to out-do each other. Further, managers can compare internal costs and employee performance against similar firms in order to engage in internal improvements. And even as production processes reach efficiency limit, changes in demand will trigger process and product innovation towards yet greater efficiencies.

Clusters encourage vertical and horizontal integration amongst firms rather than within single firms. This stimulates the development of specialist lower-cost firms supplying specialised inputs such as components, machinery, business services, and personnel services, which in the case of developing countries could be, and often are, supplied by subsidiaries of international companies headquartered elsewhere, or by franchises of international companies with local ownership. According to Porter (2008), this model lowers transaction costs of inventory due to costs and delays as compared to distant outsourcing. The physical presence of many suppliers discourages opportunistic behaviour from suppliers to overprice or renege on commitments as they risk the loss of reputation with other cluster participants. Such agglomeration encourages new firms to enter and forces existing firms to continuously upgrade and innovate to stay ahead of competitors and satisfy changing demand of consumers. Further, inter-cluster linkages allow suppliers to service related clusters nearby, allowing for increased scale advantage.

Clustering allows firms to engage in joint provision of ancillary and support services, thereby reducing costs. In the case of the Catalan leather cluster, firms came together and secured a government-supported loan to invest in a waste management plant. The agglomeration of many firms in one area means job opportunities, and can send the appropriate signal to government and training institutions with respect to education investment and curriculum focus. This can ensure the efficient allocation of state funding in education. Where employees must be sourced from a distance, collective demand by a cluster can reduce the cost of sourcing. Clusters also gain efficiencies through joint marketing and collective brand development. When a cluster develops a solid reputation, it increases the possibility that buyers will choose firms from said location. Such reputation represents what Porter (2008) calls a type of public good for all firms in the clusters. He uses the example of Italy's reputation for fashion and design which benefits firms in footwear, leather goods, apparel and accessories.¹²³ Clusters can increase buying efficiency as they can visit many suppliers in one trip. This allows buyers to multisource, to compare quality and price, to switch vendors, all at minimal costs. Production organised through a cluster allows easier recognition of bottlenecks and inefficiencies which can be targeted for improvement in order to more efficiently support the activities in the other parts of the cluster.

It should be noted, however, that close interaction and networking in a cluster can sometimes limit the capacity of the cluster to respond to radical change. Too dense a networking can create a tunnel view and collective conservatism resistant to external challenges and the need for change. On the other hand, firms producing the same or similar products may be averse to cooperating and sharing. Often because the benefits may be long-term and hypothetical whereas costs and risks are obvious and immediate, firms are hesitant to cooperate. For a firm, the most obvious risk is the loss of trade secrets, such as technology or knowledge regarding markets and customers. These risks can be important motives for firms not to enter cooperative ventures with direct competitors. Clusters can encourage anti-competitive behaviour, such as the emergence of cartels to pursue joint purchasing and sales cooperatives to create market power or eliminate market processes. Cooperation also includes first and foremost transaction and opportunity costs. Meetings must be held. There must be some follow-up and discussion papers and minutes must be prepared. All this puts a strain on the scarce time of decision makers in firms. If firms agree on concrete activities, this will generate further costs (for example, the investment and operational costs of joint development projects). Clusters can be vulnerable to contagion shocks as well as a lead firm suffering a decline which feeds through the entire cluster.

5.3.2 CLUSTERS AND INNOVATION

According to the World Bank (2009)¹²⁴, clusters can contribute to the foundation of knowledge and help stimulate technological innovation, as in the IT clusters in Silicon Valley and Bangalore. They also spur creative innovation, as in the fashion designing clusters in Paris and Mumbai. Innovation is driven largely by anticipated buyers' needs. In effect, the more sophisticated is demand, the greater the stimulus to innovation. Clusters create the environmental conditions for innovation. The critical mass of firms and complementary stakeholders in a particular sector or industry in a common geographic location competing and cooperating, allows for new ideas to form through both planned and unplanned interactions. Research organizations respond to the needs of firms by producing new advanced knowledge. Educational organizations produce technical skills to support this platform. Financial institutions, such as angel networks, venture capitalists, and commercial banking institutions provide the capital needed for the exploitation of inventions and new business models. Government and other public bodies make and implement policy decisions to support an innovation climate.

¹²¹ Summarised by Markusen (1996) but cited from: Joseph Cortright, *Making Sense of Clusters*, 6.

¹²² World Bank, *Clusters for Competitiveness: A Practical Guide and Policy Implications for Developing Cluster Initiatives* (Washington D.C., 2009).

¹²³ *Ibid.*, 2.

¹²⁴ *Ibid.*, 233.

Further, because of the presence of specialised input suppliers and specialised labour pool within the cluster, firms can rapidly source new components, machinery and skills needed to implement innovation. The ability to source innovation enhancing requirements within the cluster allows firms to experiment at lower cost and delay large commitments until the process is sufficiently tested. In 2015, the Catalan leather tanning cluster was working with the University Research Unit to develop a process that would prevent stains on the leather. Working in close proximity and collaboratively, the cluster firms were able to engage in low cost testing along the way to a successful outcome¹²⁵. It must be noted, however, that clusters can also retard innovation. Where cluster stakeholders are trapped in old behaviours and disinclined to embrace change which can render existing pools of talent, information and technology obsolete, barriers can be mounted to prevent the adoption of improvements. This invariably leads to the decline of the cluster.

5.3.3 CLUSTER AND NEW BUSINESS FORMATION

Clusters encourage new business formation. The readily available information flows point to gaps to be filled as does long experience working within a cluster. The latter shapes employees into entrepreneurs as hands on experience points the way to possibilities. More than 80% of the scientists in California research institutions who went on to start their own biotechnology firms did so in California, and a majority of United States scientists starting firms launched them in the state in which they had done their academic research. Barriers to entry are lower within clusters as there is a ready pool of skilled labour and input suppliers to draw upon. Where a cluster is functioning efficiently, financial institutions with established relations are more inclined to lend to new entrants as they are familiar with the risk profile of the investment and established consumer market. Established companies are incentivised to establish subsidiaries within the cluster to take advantage of productivity and innovation advantages. New business formation is the key to the cluster growing in depth and breadth. Clusters can facilitate commercialisation and new business formation through spinoffs and start-ups. One cluster often seeds or enhances other clusters as it disperses activities in the value chain to reduce risk, access cheaper inputs or better serve particular regional markets. A good example of such a domino effect is the optics cluster in Arizona, which gave rise to clusters in plastics, aerospace, environment technologies, information technologies and biosciences¹²⁶.

5.3.4 CLUSTERS AND VALUE CHAIN

While a cluster reflects mostly horizontal interrelatedness of the various stakeholders, a value chain defines vertical interrelatedness from the process from primary resource to final product in the hands of the consumer. This can evolve through a variety of trajectories. For example, the cocoa bean can move through a chocolate value chain or through a cosmetics value chain. In fact, a cluster can exist in only one segment of a value chain such as, for example, the grapes cluster in Maharashtra India, which grows and exports grapes. Alternatively, it could be further expanded along the chain to include wine production as is the case of the wine cluster in Chile. The value chain therefore represents the vertical interrelations of firms and institutions as it expands to facilitate greater value adding and therefore value capture for the benefit of cluster stakeholders. Understanding value chains is therefore important for cluster upgrade and greater value creation.

5.4 CLUSTERS AND STAKEHOLDERS ROLES

5.4.1 ROLE OF THE PRIVATE SECTOR

Cluster policy defines a proactive role for the private sector. The private sector must often take the lead in initiating and managing cluster initiatives. Through cluster organizations, the private sector can educate government departments on the impact the appropriate regulations and policies can have on cluster development. It can push governments to address key constraints to cluster growth more effectively than can individual firms and can through agglomeration, attract suppliers, services and complementary product producers to the cluster. It can also facilitate investment in specialised infrastructure such as ports or handling facilities; satellite communications links and testing laboratories. It can also signal human capital needs to educational institutions, thus shaping curricula to meet market needs and link with research and development to ensure greater applied focus to cluster needs, specifically as it relates to improving productivity and innovation

5.4.2 ROLE OF GOVERNMENT

Government policy has a dual role in cluster development - providing a stable macroeconomic environment and targeted cluster incentives and support. To compete effectively requires continuous productivity enhancement and innovation. For governments, the challenge is getting the policy intervention right and ensuring effective implementation. Centralised industrial policy which

¹²⁵ Ibid., 2.

¹²⁶ This information was ascertained during a field visit by the author to the Catalan Tannery Cluster in 2014. World Bank; Clusters for Competitiveness, 3.

focuses on the provision of subsidies and other protection for selected industries has had a high failure rate and requires sustained financial commitment by the public sector.

The emerging hypothesis amongst cluster practitioners is that cluster policy is significantly more likely to be beneficial if it is focused on leveraging rather than creating clusters. Since governments usually lack the knowledge to evaluate where new clusters could emerge, it should respond to the market signals of clusters that have already emerged, and work with them to address existing externalities. Policymakers, together with practitioners should promote and maintain the economic conditions that enable new clusters to emerge; support knowledge creation, entrepreneurship, new firm formation and the availability of capital. In essence, cluster policy should not be about “picking winners” or excluding industries,¹²⁷ but about supporting existing clusters with well-defined potential for growth.

Porter (2008) adds that clusters make government initiatives more viable, actionable and operational. He advocates dynamic policy response to clusters, shifting from supporting infrastructural and regulatory impediments early to removing hurdles to innovation later.¹²⁸ This is not to say that governments cannot or should not seed cluster formation. There may be instances of strategic importance to the country where, left to private enterprise, development may not take place. Therefore, governments should intervene, either by incentivising the private sector to invest or investing itself. The latter intervention should have an exit strategy. Over time, the direct role of the government should be reduced as the private sector is encouraged and incentivised to take over.

Governments can positively impact all aspects of the diamond. governments should be active in collecting cluster specific information; setting educational policy to encourage public universities and schools to respond to local cluster needs; moving from centralized to cluster-tailored regulations; improving the sophistication of local demand for cluster products and services; co-locating public and private investments (New Zealand cluster); attracting foreign direct investment (FDI) (Costa Rica Information and Communications Technology (ICT) cluster); developing cluster-focused free trade zones and industrial parks with tailored regulations and infrastructure. The latter can be particularly effective in developing countries. Here the cluster starts as an enclave with no links to the local economy. All/most inputs are imported and all output exported. Over time, policy incentives should be used to link it into the local economy, local suppliers, and local educational institutions for training. There should be ongoing cluster assessment for identifying and validating effectiveness of initiatives and where necessary, adjusting for greater efficiency. Constant assessment allows for identification of cross cluster issues which can allow for greater efficiency.

5.4.3 ROLES OF OTHER INSTITUTIONS

Universities impact all the dimensions of cluster competitiveness. Universities expand human capital through education and training and are therefore vital to responding to the human capital needs of clusters. Secondly, universities are creators of knowledge, sources of innovation and hence generators of economic development. Universities must therefore be engaged at the earliest stage of cluster development and clusters should drive both the teaching and research agenda of Universities and Research and Development institutions. As an example, in Costa Rica, the two public universities educate the workforce of the Costa Rican ICT cluster, which transformed a small coffee-exporting country into the number one Latin American ICT producer per capita. They also produced the engineers and technicians who attracted investments from several knowledge-intensive multinational corporations (MNCs), including Intel, and account for a far larger share of research and development (R&D) expenditure than the Latin American average.¹²⁹ Universities and other institutions of research and development should be highly engaged with industry clusters through diverse and complementary units that broadly address the research and technology needs of the clusters.¹³⁰

A strong financial institutional framework is important for cluster development. Traditional commercial banking based on collateralised lending can serve the needs of larger firms in a cluster. However, where a cluster is characterised largely by small firms and where start-up firms are important to create the critical mass needed to maximise the benefits of clustering, a parallel segment of non-profit financial institutions and public development funding institutions play a critical role in catalysing and supporting cluster growth.

5.5 CLUSTER IDENTIFICATION, ANALYSIS AND PLANNED INTERVENTION

5.5.1 FRAMEWORK FOR CLUSTER IDENTIFICATION AND ANALYSIS

The analytical framework presented in Table 5.1 is derived from the forgoing examination of clustering theory and its application. It presents a summary of the key characteristics of a cluster and is a checklist that must be completed when analysing

¹²⁷ World Bank, *Clusters for Competitiveness*, 3.

¹²⁸ Porter, 2008, 52.

¹²⁹ Luciano Ciravegna, “Academia-private sector collaborations in the Costa Rican information and communication technology (ICT) cluster,” *International Journal of Technology and Globalisation*, Special Issue on: “Emerging Markets”, 4 (9). 1

¹³⁰ Jerry Paytas, Robert Gradeck and Lena Andrews, *Universities and the Development of Industry Clusters*, Economic Development Administration U.S. Department of Commerce. 2004.

a potential cluster. Its application allows for a comprehensive understanding of any economic cluster. Subjecting any cluster to such detailed scrutiny allows for the identification of its strengths and weaknesses; the missing segments; relational linkages and opportunities for shifting along the value chain. This then forms the basis for intervention to facilitate increased productivity, innovation and growth. Application to the case studies (5.6) will illustrate the usefulness of this comprehensive approach.

TABLE 5.1 – Framework for Cluster Identification and Analysis

Locational advantages of the geographic space where the cluster exists
Firms are located in the common geographical space in close proximity to each other.
Age and classification of the Cluster.
Charismatic, knowledgeable and trustworthy leadership.
Localised firm rivalry which encourages efficiency and competitive prices.
Corporation and networking amongst firms which facilitates relational contracting, information exchange/ joint learning, and collective action. ¹³¹
Firm level specialisation and horizontal integration amongst firms.
Backward linkages to a network of suppliers close by to provide to firms products and services.
Forward linkages to institutions (R&D, Training, Standards) servicing the cluster of firms.
Demanding and sophisticated local consumers
Labour market pooling of specialised skills around the cluster.
Knowledge spill overs facilitating a widely-shared understanding of the industry and its workings
Targeted government policy and support to the cluster allowing for greater efficiency
Integration to other related clusters.
FDI attractiveness
The existence, quality and vibrancy of industry organisations
The existence of a Formal Cluster Initiative.
For long-term sustainability, potential for the acquisition of new competences to access international markets through participation in global value chain.

Source: Author

It should be noted that geographic proximity which results in the formation of a critical mass of firms and institutions is very important in clustering as it encourages productivity enhancement (inter firm rivalry, specialization, labour market pooling, joint investments) and continuous innovation (rivalry, knowledge spill-overs and deliberate collaboration).

5.5.2 PLANNED INTERVENTION: BEST PRACTICES FOR THE ORGANISATION OF CLUSTER INITIATIVES

Clusters can be left alone to develop organically or formal cluster initiatives can be designed to accelerate development. A cluster initiative is a collaborative action by groups of companies, research and educational institutions, government agencies and others to improve the competitiveness of a specific cluster. It can be initiated by companies, universities or government. Cluster initiatives raise the awareness of companies within a cluster and create a more effective platform for interaction

¹³¹ Ibid.

especially with the public sector. A cluster initiative offers a comprehensive assessment of a cluster's markets, products, linkages, externalities, and synergies to help identify regulatory and business constraints; tap new and wider market opportunities; and develop sound business strategies to tackle its main competitors. Strategic initiatives vary by country and cluster but focus on improving market information, workforce development, supply chain improvements, quality standards, branding, forward integration, and process improvements.¹³² A strong cluster can influence government policy and interventions to ensure appropriate support for and growth of the cluster.

Cluster initiatives bring companies together to jointly upgrade their sophistication. Especially where firms are small and lack the financial resources to make individual investment necessary for growth, they can promote joint investments. For example, coffee growers in Colombia have used such an approach to create a branded product for higher margins and improved production processes. Many tourism clusters, wine clusters, and flower clusters around the world have followed a similar approach. Cluster initiatives can help bridge what the Cluster Green Book (2013) calls the seven innovation gaps between firms and research organizations; firms and education organizations; firms and capital markets; firms and government; firm-to-firm in the cluster; firms in one cluster with firms in other clusters; and firms to global markets and value chains.¹³³ Cluster effectiveness should be assessed by the degree to which it closes these gaps and by its direct impact on value added growth; profitability growth; wage increase per employee; sales increase; new or better products and services; employment increase; workplace equality; work place diversity; and sustainability.

A Cluster Observatory survey of firms to identify perception of the most important role of a cluster initiative found that creating a cluster identity and building a brand and sense of community for the cluster ranked first; building a strategy and vision for the cluster (e.g. identifying a desirable market position or developing a technology road map) ranked second; R&D and innovation promotion ranked a close third; lobbying government for improved business environment (e.g. infrastructure or legislation) ranked fourth; and joint purchasing arrangements (6% of respondents.) ranked fifth.¹³⁴ The Green book (2013) also provides the following guidelines for funding a cluster initiative. It must be shared between the cluster participants and the state and "on average, about 34% of CI revenues comes from primarily private sources, such as membership fees and sales of services. About 54% come from public sources, mainly regional and local public funding."¹³⁵ As a rule, state funding should be provided for specific activities such as the provision of a cluster initiative tool box for diagnostic and impact assessment tools; for office space; a cluster initiative manager and staff; and for the training of cluster facilitators. These investments are moderate in size but are critical to reach a high level of effectiveness in cluster efforts.

Leadership is very important in starting and sustaining a cluster initiative and is most effective when this comes from the private sector. It is important to recruit highly committed leadership to champion and manage the process through a cluster initiative. It is also vital to ensure that the resources needed to see the process to fruition are identified and allocated. This requires a leader who can build trust and rally all interests. A tangible outcome is usually the best galvanizing tool for collaboration. A key government champion is also useful. Table 6.2 below summarises the most important activities in which a cluster initiative would be engaged.

TABLE 5.2 – Cluster Initiative Activities

Cluster Mapping: To understand the existing state of the cluster (size, patterns of specialisation, depth, profile, role in the economy, local value chain)
Global Industry analysis of value chains: To understand trends, growth niches, lead-firm practices and markets.
Geographic scope: Define the appropriate scope for the cluster.
Cluster Action Agenda: Develop concrete action plans focusing on reform and redesign of services, adding value, productivity and innovation. Establish market viability of each initiative and identify necessary support from stakeholders for taking action. Potential implementing institutions must be engaged from the earliest stages of the process.
Lobbying: educating and lobbying public institutions on cluster specific policies and incentives
Resources: Develop a strategy to ensure adequate resources throughout the process.
Management of the Action Agenda: Create accountability mechanisms, progress milestones and evaluation tool.

Source: Author

¹³² Jörg Meyer-Stamer and Ulrich Harnes-Liedtke, *How to Promote Clusters, Mesopartner Working Paper*, (2005):3.

¹³³ Göran Lindqvist, Ketels Christian and Orjan Sölvell, *The Cluster Initiative Greenbook 2.0*. (Stockholm: Ivory Tower Publishers, 2013): 37.

¹³⁴ *Ibid.*

¹³⁵ *Ibid.*, iv.

5.6 REGIONAL CLUSTER ANALYSIS IN THE CARIBBEAN: FOUR CASE STUDIES

The formal use of clustering in the Caribbean is very limited. The Jamaica Cluster Competitiveness Project was launched in September 2002. This was a two-year pilot project managed by the Jamaica Exporter's Association (JEA) and funded by DFID, USAID, the Government of Jamaica, the JEA and participating firms. It targeted three sectors (Agribusiness, Tourism and Entertainment) and used a highly-structured cluster process that focused on strengthening the linkages between firms, government agencies, and the international market.¹³⁶ The Compete Caribbean Programme (CCP) has an enterprise innovation challenge fund dedicated to supporting cluster initiatives in the region. The general objective is to enhance the capacity of clusters and firms to increase productivity and sustainably compete in national, regional and global markets.¹³⁷ One project was the North Rupununi catch and release cluster in Guyana. Funds were provided to a cluster of three eco-lodges to introduce and market catch and release sport fishing as a viable eco-tourism product executed over 18 months. The funds covered operating costs of the cluster organisation, the fees for a scientific determination of the rate of catch and release and upgrade to some of the lodges. The CCP financing has ended. It is now necessary to make legislative changes to operationalise the scientific process and the cluster organisation has lost its champion leader Andrea Salvador de Caires. In addition, additional funding which the community-based cluster does not have is needed to continue the process started by the CCP. It should be noted that the CCP cluster initiatives are limited as they do not seek to bring together all stakeholders to build sustainable structures for long term growth of the clusters.

In this section, the Cluster framework (Table 5.1) is applied to four clusters in the region: yachting in Saint Lucia; music in Jamaica; gold Jewellery in Guyana; and pepper sauce in Trinidad and Tobago.

5.6.1 YACHTING CLUSTER IN SAINT LUCIA

A hub and spoke yachting cluster exists in Saint Lucia. In this case, the two main Marinas, Island Global Yachting (IGY) Rodney Bay Marina, and the Marigot Marina are the main hubs, but Rodney Bay is the nucleus. The Soufriere Marina is largely underdeveloped. A range of supporting business activities and services (the spokes) has developed to support the hubs. The island has significant location advantages: its unique physical location between Martinique (Europe of the Caribbean) and St Vincent and the Grenadines (biggest sailing playground of the Americas); natural bays/sheltered harbours; hurricane holes; full range of infrastructural services; rugged alluring coastlines providing differentiated experiences in one island; great diving waters; and natural attractions such as the Pitons, a part of the Caribbean which is ranked as one of top ten cruising destinations in the world. The cluster has its roots in Ganters Bay (Vigie Cove) as far back as the 1950s but has burgeoned since the 1970s.

Infrastructure: Currently the cluster is concentrated in the north and western coasts of the island. It is characterised by a full-service marina (hub) with a haul-out at IGY Rodney Bay Marina; a smaller marina at Marigot (hub); mooring areas (Ganters Bay, within Port Castries and Soufriere Marine Management Area); and a boat yard at IGY Rodney Bay Marina. About 450 Saint Lucians are directly employed in the yachting sector with 130 businesses servicing the sector. The economic impact to the national economy is estimated at 160 million Eastern Caribbean dollars per annum. Saint Lucia has five seaports of entry: Rodney Bay; Castries Harbour; Marigot Bay; Soufriere Bay; and Vieux Fort Harbour; and six passenger ferries operating between Saint Lucia and Martinique out of Rodney Bay, Marigot Bay and Castries Harbour. The island also has two international airports with consistent service out of the United States and Europe and the ability to accommodate small private jets at Hewanorra International Airport.¹³⁸ The yachting season in Saint Lucia extends from December to April.

Growth as defined by yacht throughput (number of vessels arrivals) has been variable. According to the Saint Lucia Air and Sea Ports Authority (SLASPA), over the period 2011 to 2014, yacht arrivals at Rodney Bay in all categories increased steadily from 31,997 in 2011 to 37,931 in 2014. On the other hand, Marigot Bay experienced a decline (particularly in the 40 to 70ft category) from 10,259 in 2010 to 7,811 in 2014.¹³⁹ There is a need for improvement in data collection and, according to one yachting consultant, new measurement indicators as throughput alone does not adequately reflect the performance of the sector. In his view, the cluster is transient, not a true yachting destination, as only yachtsmen who own property keep their boats in Saint Lucia. In addition the average stay for a chartered boat is only two to three days as they dock primarily for provisioning.¹⁴⁰ Another source suggests that cruisers, which comprise 60% of the yachts coming to Saint Lucia, stay for an average of three weeks. Those who live aboard their yachts, about 20%, make Saint Lucia their base for an average of six to twelve months.¹⁴¹

The development of the cluster has been shaped by visionary leadership. The names which emerge as significant are Arch Marez, the founder of The Rodney Bay Marina; John Compton "Father of the Nation"; and Cuthbert Didier.¹⁴² The first two are deceased. Mr Didier now leads the policy agenda for the cluster as Director of Yachting. There is currently no private sector leader who stands out in a comparative sense.

¹³⁶ Kenneth Hynes and Beverley Morgan, "The Jamaica Cluster Competitiveness Project (JCCP)," International Workshop on Public-Private Dialogue (2006): 1.

¹³⁷ Compete Caribbean, "Catch and release sport fishing in the North Rupununi, Project number: gy-cc3002.," 2013-3.

¹³⁸ The Embassy of Eastern Caribbean States to Belgium and the European Union, *St Lucia Yachting Sector Action Plan 2015*: 15.

¹³⁹ *Ibid.*, 15.

¹⁴⁰ *Ibid.*, 16.

¹⁴¹ Bobb Hathaway (Yachting Consultant) in discussion with the author, St. Lucia, January 2017.

¹⁴² ECLAC, *Yachting in the Eastern Caribbean, an Overview*, 2004.

The Yachting cluster enjoys sophisticated foreign demand but weak local demand for its product. In fact, the growth path of the cluster, although spontaneous and largely private sector driven,¹⁴³ responds to the needs of an increasingly discerning clientele as it moves up the value chain of product offering. For example, the securing and continual expansion of the world renowned Atlantic Rally for Cruisers (ARC) transatlantic events has contributed to the evolution of Saint Lucia's yachting image and facilities and services. In addition, it has impacted positive developments in related clusters such as tourism and entertainment, as an annual calendar of activities is now available. This caters to the over 1,500 sailors who descend upon Saint Lucia between November and January as a consequence of these three events alone.

There is a role for Government to strengthen the local demand for yachting. This can take the form of fiscal incentives to encourage local purchase of yachts, inclusion of sailing in school curriculum or establishment of specialised sailing schools for locals. Currently the yacht club offers training in sailing but its capacity is limited.

There is a degree of integration amongst firms and between clusters. The Rodney Bay Marina houses franchisees of locally-owned businesses and the marina is strongly linked with the on-land service, tourism and entertainment clusters. The cluster is also strongly integrated into the high-end boutique hotels and the real estate cluster.

Currently localised backward linkages are weak. The supply of equipment and materials is facilitated by foreign specialised manufacturers through local distributors, and yachts are purchased directly from foreign suppliers. In effect, the boat building and equipment manufacturing segments of the cluster do not exist within or in close proximity to the cluster. The government is currently working on building these two segments.¹⁴⁴ There is no identifiable effort to attract components and equipment manufacturers to locate within the local cluster.

Forward Linkages in the yachting cluster are deeper than the backward linkages. Yachtsmen interviewed commended the quality of the marina services.¹⁴⁵ The marina at Rodney Bay has a cluster of small firms amongst which are: restaurants, supermarkets, chandlery, tour operators and water sports. In addition, the areas around the Rodney Bay Marina have developed a range of support services which are accessed by yachtsmen. According to yachtsmen interviewed, Marina costs, provisioning costs, costs of entertainment and the range of services on offer make Saint Lucia a competitive destination compared to rival clusters in St Martin, Turks and Caicos and Martinique. Saint Lucia's competency in "cruisers" maintenance is apparently well established.

There is an events calendar to support and grow yacht arrivals, length of stay and value added to the island. Sir John Compton in 1990 negotiated for the Rodney Bay Marina to be the finishing line for the globally recognised Atlantic Rally for Cruisers (ARC Plus). To this event have been added ARC Speed and World ARC. There are also the Russian Business Regatta; the Heineken Sailing Regatta targeting local participation; the Mercury Fun Beach, appealing to a young demographic of party goers and attracting scores of yachts and speedboats from Martinique and Saint Lucia; and the Mango Bowl Regatta. Related events are Michael Hackshaw memorial fishing tournament in March; Saint Lucia Jazz Festival held in May; the Saint Lucia Game Fishing Tournament in November and the annual Bill Fish Competition in November at the Rodney Bay Marina. Most of these activities take place during the 4 months of the official yachting season. This means that the cluster needs to create activities to extend the length of the yachting season to keep its local resources more fully employed.

The day boat cruise segment of the cluster is on the decline as stakeholders are being squeezed out of the market by the vertical integration of the island's many all-inclusive resorts. These resorts have used the fiscal incentive available to import duty free boats specifically for diving and are using them to organise day cruises. Since most of these resorts offer all-inclusive packages, paid for before arrival, the local sub cluster is being squeezed out of the market. At the time of conducting this study (early 2017), day boat operators were downsizing operations and calling on the government to intervene by confining the resorts to the strictest interpretation of the incentive. There is, however, need for product innovation in this segment, to explore, for example, creating bespoke products which can increase value capture such as customised "occasion" cruises. In Trinidad and Tobago, for example, a customised romantic "dinner for two" experience is on offer.

Within the cluster, there are underdeveloped segments. Currently there is only one boatyard managed by one marina. Expansion is needed to create internal rivalry for greater productivity. The proposed construction of another boatyard at Vieux Fort would help in this regard. Care must be taken to ensure that such an investment is linked to further value adding as this is important for continuous productivity enhancement and innovation. There are only two yacht management companies on the island, one at Rodney Bay and the other at Marigot Bay. There are only two bare boat charter companies on the island compared to 17 in neighbouring Martinique considered the "Charter Mecca" of the region¹⁴⁶. Boat charter is considered the most value creating segment of the yachting cluster¹⁴⁷ and currently most of this is lost to Martinique.¹⁴⁸ The government has introduced a targeted fiscal incentive to encourage growth in this segment.¹⁴⁹ Provisioning of imported produce for luxury yachts

¹⁴³ Saint Lucia Business Focus, Issue No. 81 May/June (2015): 33.

¹⁴⁴ *Ibid.*, 29.

¹⁴⁵ Government is in discussions with G Force Yachts, a Dutch manufacturer, to establish an assembly plant to build regatta yachts up to 35 feet in length. This is linked to a goal of expanding the Russian demand for Saint Lucia as a choice destination for week-long regattas. In addition, the government is exploring an alliance with Taiwan, linked to a movement towards an open ship registry to attract mega yacht building companies to Saint Lucia. Taiwan is ranked the sixth largest manufacturer of mega yachts. Ascertained from discussion with Cuthbert Didier (Director of Yachting), January 2017.

¹⁴⁶ Bernard Beesmag (UK live aboard yachtsman.) in discussion with author, January 2017.

¹⁴⁷ Sean Devaux (Manager IGY Rodney Bay Marina) in discussion with author, January 2017.

¹⁴⁸ The Embassy of Eastern Caribbean States to Belgium and the European Union, *Saint Lucia yachting Sector Action Plan*. 2015, 28

¹⁴⁹ The cost of the charter can vary, ranging from over USD 100,000 per week for a private crewed yacht to USD 5,000 per week for a 40ft bareboat catamaran to an 'all-inclusive' USD 1,000 per person per week, flight included, for a one-week.

is also inadequate. The main hubs for this are Saint Maarten, Martinique, or Florida.¹⁵⁰

Although increasing mega-yacht arrivals is a targeted objective, currently, Rodney Bay's mega-yacht capacity is only at 10% occupancy on average. This is probably due to the inadequacy in its maintenance competencies for such luxury yachts. St Maarten is the "Mecca" of super yacht harbours in the region. Sewage disposal is also an underdeveloped segment of the cluster.

Saint Lucia has built up a pool of local skilled labour in maintenance and restoration of the most complex luxury yachts.¹⁵¹ Unfortunately, much of these skills are uncertified. In addition, there are some critical areas which need to be expanded or filled. Currently, there is only one sail maker on the island and insufficient certified shipwrights, wood chandlers, expertise in rigging, fibre glass, luxury cleaners and specialist crews for mega yachts, and highly specialised maintenance skills for mega yachts for the sustained growth of the cluster.

There is targeted Government support for the cluster. Since 2009, there has been a dedicated director of yachting. The Saint Lucia Business Focus defines him as "synonymous with the growth of the Saint Lucia yachting cluster". In addition, there is a yachting committee comprising all stakeholders and provides a one stop desk for yachtsmen chaired by the yachting director. Yachting specific fiscal incentives were recently put in place to simplify approval for length of stay; encourage development of the local bare boat charter segment; facilitate strategic alliances with key source markets and encourage local ownership of yachts. A move from a closed to open ship registry to encourage a one-stop yacht purchase and yacht registration product is also in implementation phase. There is also targeted government action to expand the weak segments of the cluster for example the new fiscal incentive targeting the charter boat segment. Government institutions which support the yachting cluster are Saint Lucia Air and Sea Port Authority (SLASPA); the Ministry of Tourism; the Tourism Board; the Watercraft Advisory Committee; Marine Police; the Department of Fisheries; and Soufriere Marine Management Area which is responsible for managing the coastal zone of Soufriere.

Private institutional support to the cluster is provided by the Yachting Association of Saint Lucia; the Day Boat Charter Association and the yacht club. Related institutions are the Saint Lucia Game Fishing Association; Association of Private Power Boats; Saint Lucia Whale and Dolphin Association; and the Saint Lucia Hotel and Tourism Association. There is an absence of cooperation and coordination of efforts amongst these institutions. Government can incentivise strategic cooperation by providing the financial support for the administration of an umbrella institution based on clearly defined cluster growth objectives. There is inadequate training support for the cluster. The Sir Arthur Lewis College currently has no courses. There are plans to introduce short courses, but no curriculum or time frame for implementation exists.¹⁵² Monroe College has no plans to introduce any program for the cluster¹⁵³. Insurance services are currently sourced from international specialist firms. As the island moves to open registry, the need to strengthen the insurance segment of the cluster will become increasingly important.

There is innovation in this cluster largely through FDI. The Rodney Bay Marina uses Marine Tracker communication to track the location of boats to efficiently manage berthing allocations. It provides both American and European electrical outlets, which, prior to newer boats having converters, served as a competitive advantage. The Rodney Bay Marina is also linked via technology to all marinas owned by IGY.¹⁵⁴ Additionally, because yachts are increasingly computerised, this has caused the maintenance segment of the cluster to be constantly in upgrade mode to meet client needs. There are strong links to the following related and linked clusters: tourism; gaming; entertainment; cruise; real estate and agriculture.

Geographic Scope: From the perspective of yacht brokers, charterers, agents and managers, the Caribbean is viewed as a regional destination, somewhat like the Mediterranean, with multiple countries; wide choice of destinations; diverse anchorages and services; variety in culture; and places of high visitor interest. There is already a degree of specialisation. The British Virgin Islands are considered the major regional centre for bareboat chartering; Saint Vincent and the Grenadines, with Tobago Cays, is perhaps the major cruising attraction in the region; Antigua is known as a major centre for yacht racing, other events and entertainment; St. Maarten is the largest super-yacht destination with respect to berthing capacity and availability of supplies and technical services; St. Barths is perceived as a lifestyle upscale destination and Trinidad and Tobago is the best yacht shelter from hurricanes.

ECLAC (2004) conducted a regional overview of the yachting in the Caribbean and the OECS (2014) conducted a survey of yachtsmen at the United States Sailboat Show to gather information to develop a regional strategy for yachting in the OECS. The former found a lack of awareness of the value of yachting amongst regional institutions even those directly involved in tourism and recommended the establishment of a regional private sector body linked to the Caribbean Tourism Organization to promote maritime tourism; the establishment of national marine trade associations to focus on country issues; the standardisation of industry definitions across the region; the establishment of a code of conduct for sailors and the operations of marinas and charter boat companies; the setting of safety standards for search and rescue, occupational health and fire-fighting; and the planning of hurricane shelters and cooperation in meeting training requirements. The latter (OECS 2014) recommended

¹⁵⁰ Saint Lucia Business Focus Issue No. 81 May/June (2015): 28. 100% waiver of income tax from operations for the first 5 years for local charter companies with a minimum fleet of 3 powered or sailing yachts and a minimum employment of 4 crew members including the captain.

¹⁵¹ Cuthbert Didier (Director of Yachting) in discussion with Author, January 2017.

¹⁵² Deodata Preville, (lecturer, Sir Arthur Lewis College), January 2017.

¹⁵³ Gus Small, (Head, Monroe College), January 2017.

¹⁵⁴ Sean Devaux (Manager, IGY Rodney Bay Marina) in discussion with author, January, 2017.

comprehensive analysis of each destination and a marketing strategy to build consensus and incentives to induce increase yacht arrivals. It is evident that little has been done to implement recommendations of either of these reports.

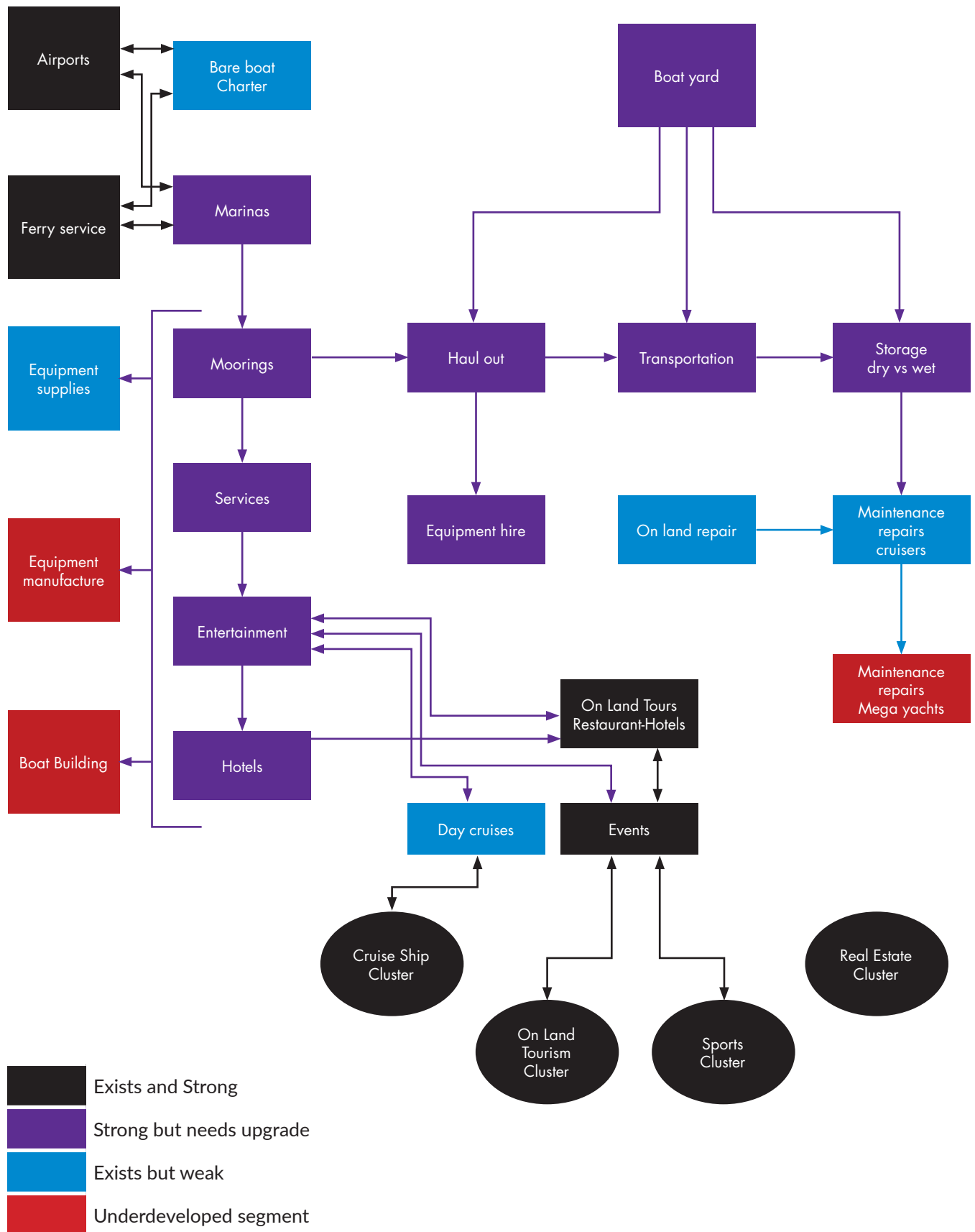
There is a strong basis for the Region to market itself as a complete experience as in “one region many experiences”. To fully develop this, each island cluster needs to be mapped and consolidated into a single regional cluster map. This can guide the design of a comprehensive regional strategy which must show how each island can compete against each other, on the one hand, while collaborating in strategic areas to continuously expand the size of each island cluster respectively, thereby simultaneously growing the regional product. This can best be developed within the framework of a regional cluster initiative. The Caribbean Development Bank (CDB) can play the critical role of encouraging governments to finance the cluster mapping and strategy development phase. It is critical that from inception, all stakeholders are brought on board to secure buy-in.

Box 5.1

CLUSTER MAP INTERPRETATION

The cluster maps are derived from the case analyses and maps both the direct segments of the cluster and the relational linkages to supporting institutions and other clusters. A colour code is used to distinguish the degree of development of each segment as follows: black: exists and is strong; purple: strong but needs upgrade; blue: exists but is weak; red: undeveloped; and green: embryonic. Where segments exist but are not physically located in the domestic cluster, the label of “international” is used. The arrows are used to depict the relational linkages between and amongst the segments not the depth of the relation. Double-headed arrows illustrate backward and forwards synergies, and therefore interdependence, while single-ended arrows represent a one directional relationship.

Figure 5.1 – Yachting cluster of Saint Lucia



5.6.2 THE JAMAICAN MUSIC CLUSTER

A “network model” music cluster exists in Jamaica. It consists of many small firms that are roughly equal, competing and cooperating with each other. The cluster is concentrated in Central Kingston dubbed the “Music Street” where a proliferation of recording studios operates. The locational advantages are: unlimited supply of natural creative talent; constant innovation to create new compositions and genres; and the Reggae and Bob Marley legacy.

This cluster dates back to the 1950s. However, it was not until Jamaica’s National Industrial Policy (1996)¹⁵⁵, that the government formally recognised its importance as an expression of the richness of the country’s national culture. Accordingly, it was incorporated as an integral element of the national effort to promote growth and development of the Jamaican economy and society.¹⁵⁶ Yet, the cluster remains very fragmented, lacking visionary leadership and consensual organisation. While there is still a high degree of collaboration and competition, it is not directed to the collective development of the cluster. There are many industry giants, but none it appears with the qualities to unite the cluster to a common purpose.

According to the National Services Sector Strategy, the music industry accounts for about 4% of Jamaica’s Gross Domestic Product valued at US\$80-100 million (about 1.7% of total goods and services exports). It is estimated that Jamaican earnings from live performances and sales of ancillary products generate a further US\$50 million. The sector employs approximately 12,000 persons directly (approximately 1% of the labour force) and an undefined indirect number associated with linked industries such as tourism. The country releases more records daily per capita than any other in the world. Jamaica’s music industry has become one of the world’s most active industries, after the recording industries of the United States and The United Kingdom. It is estimated that it has an estimated potential value of US\$2.25 billion.¹⁵⁷ There is no agency dedicated to capturing ongoing data on the music industry.

Demand, both local and foreign, is sophisticated. Thus, new product creations arrive very quickly on the market as on average 200 recordings are done a week in Jamaica.¹⁵⁸ The main export markets are in The United Kingdom and the United States. The Jamaican industry has also established a strong position in the markets of Canada, Japan, Germany, France, Brazil, Argentina, and various countries in South East Asia.¹⁵⁹ There is a high degree of agglomeration of firms and institutions in this cluster: a large number of musicians; song writers; producers; publishers; managers; booking agents; recording studios; promoters; disc jockeys; a government-owned radio station; the Jamaican Broadcasting Corporation, set up in 1959 to promote Jamaican arts; many small specialist record shops; training institutions and private and public institutional support. This is indicative of the skills-pooling in this cluster. However, most are uncertified. Missing elements are specialist lawyers; accountants who understand the international music business; sound engineers; videographers; event planners; and voice training expertise.

The cluster is characterised by both firm level specialisation and internal integration where the same firm offers production, distribution, management services (multi-product firms). The lead firms are: Tuff Gong, owned by Bob Marley’s widow Rita Marley, considered the best-known studio; Dynamics; Sonic Sounds; Mixing Lab; Scorcher Music; and Groove. From the 1970s, influenced by Bob Marley, producers began to shape the music for the international audience. This has caused production (recording and manufacturing) and distribution of the work of top artistes to begin shifting overseas. Consequently, Jamaican manufacturers find it hard to sell to the global market directly. With the exception of tourism and entertainment, links to other clusters such as fashion, movies and animation, sports, and video games are weak. Backward linkages are weak within the cluster. Most of the inputs required for the cluster are imported. These include computers, musical instruments, office equipment and furniture which are non-competing imports. There are local companies offering supplies. However, they are often unable to adequately keep abreast with providing state-of-the-art equipment because of limitations of financing from established institutions. Government should incentivise FDI into this segment of the cluster.

Forward Linkages exist but need strengthening. There is a network of local manufacturing companies serving primarily the local market. Foreign demand for recorded products is met by foreign manufacturers. Some of these products are re-imported to Jamaica for local consumption. Production for foreign demand is a missing segment of the cluster. The role of the local radio stations in the cluster is also weak as only 10% of broadcast is local content.¹⁶⁰ This is usually an important medium through which new artists build a following as a launch pad into the international market. The TV, music videos, gaming and movies segments are underdeveloped. There are limited quality live performance venues in the country. There should be small venues in every parish (1,000 persons) and a national multi-purpose venue with a capacity of at least 5,000 in a covered or semi-enclosed space.¹⁶¹ This is important to revitalise the declining rate of natural talent currently characterising the cluster. Live tours enable significant value capture. However, this is controlled by global live tour managers linked to international distributors. Jamaican performers are constrained in maximising use of this opportunity because of difficulties for performers of Rastafarian faith to obtain visas for many markets. Local branding and marketing are done by manufacturers themselves while internationally it is done through alliances in Miami, California, New Zealand, Holland and the Bahamas. Earnings from copyright are a grossly underexploited area. A major challenge is the collection of the considerable sums that are due from abroad as royalties to

¹⁵⁵ The National Industrial Policy (1996), 3.

¹⁵⁶ ITC, Jamaica’s Approach to the Development of Non-tourism Services Exports (2004), 3.

¹⁵⁷ Ibid., 3.

¹⁵⁸ Ibid., 6.

¹⁵⁹ Ibid., 6.

¹⁶⁰ Compared to 30% in Canada, 40% in France, 80% in Nigeria most of which must be played before midnight. Ibid., 13.

¹⁶¹ Marcus Goffe (Deputy Director, JIPO) in discussion with author, February, 2017.

Jamaican authors/composers and artistes. JIPO is currently addressing this¹⁶².

Government support and Institutions: No single public sector institution has complete responsibility for facilitating the development of the music industry. The function is spread over many institutions - currently the Ministry of Culture, Gender, Entertainment and Sports; Ministry of Tourism; Jamaica Cultural Development Centre; Jamaica Intellectual Property Office; JAMPRO and the Entertainment Board. Noteworthy, under the current Government, there is a policy shift away from music towards the film and animation cluster. There are no directed government incentives to the music industry. Only music stakeholders who register with the Entertainment Board can access duty free concession for equipment available to all creative industries stakeholders. The Copyright Act was amended in 2015 to increase copyright protection for original literary, musical, dramatic and artistic works.¹⁶³ JAMPRO produces a Music Industry Directory. There is a Motion Picture Encouragement Act (MPEA), which provides relief from customs duty, general consumption tax, stamp duty and income tax allowances for the film industry alone. It is currently under review to include music and other forms of entertainment. The noise abatement Act in its current form is a hindrance to the development of the live performance segment of the cluster.

Many private sector institutions have been established within the cluster. However, there is an absence of a collective purpose as each represents only the interest of its stakeholders. There is a general consensus that these institutions suffer from low capacity, lack of collaboration, poor funding, lack of trust and poor service delivery. These include the Association of Jamaica and Jamaica Reggae Industry Association; The Jamaica Federation of Musicians; Association of Vintage Artists; Association of Female Artists; Association of Composers; Authors and Publishers Association; Recording Industry Association of Jamaica; and the Sound System Association of Jamaica. The Jamaica Exporters' Association spearheaded a programme, the Jamaica Cluster Competitiveness Project (JCCP), to foster the collaboration of sector members to sell entertainment (music) as a collective product/service. Unfortunately, the initiative ended once the donor funding came to an end.¹⁶⁴

There is a supporting network of educational and training institutions: the Edna Manley College of the Visual and Performing Arts; UWI Reggae Studies Unit; HEART-NTA; The Jamaica University of Technology (UTECH); and the Creative Production Training Centre (CPTC). While there are programmes on offer, they often follow strict matriculation requirements that often cannot be satisfied by some industry personnel. No advanced training courses exist. For example, Europe has a high demand for certified dance hall trainers, but none of the institutions offers such certification. The link to the financial sector is poor. Cluster participants mostly rely on self-financing and venture capital as they are not able to obtain loans without collateral. Except for tourism, links to other clusters such as merchandising and fashion; information technology; and sports are very weak.

Innovation in this cluster takes place at two levels: creative talent, and equipment modification. Innovation in genres is rooted deeply in the indigenous culture and inner city hardships of the Jamaicans with strong influence from the American blues and R&B genres. Jamaican genres have moved through Mento (early 1950s); Jamaican R&B to Ska (late 1950s); Rudeboy (early 1965); Rock Steady (1966 to 1968); and early Reggae (1968 to 1974), which shifted the focus from music created for a Jamaican taste to music for an international audience. It also marked the shift away from local to foreign manufacture as in 1972 when the Wailers signed with a UK company, Island Records. With recording adjustments, effective packaging and marketing, their 1973 album "Catch a Fire" helped make reggae popular worldwide. Bob Marley continued to modify his music to broaden international appeal by slowing the songs' tempo, enriching his band's sound, and adding three female backup singers. Dub emerged (mid-1970s) and Dancehall (1979 to 1985).¹⁶⁵ Unfortunately, Jamaica's strongest comparative advantage, its creative talent which innovates on the musical genres, is on the decline thus inhibiting its ability to generate quality material for recording in recent times¹⁶⁶.

"The sound system" is an innovation associated with the cluster. It was initially used as a form of public entertainment but evolved into a vehicle for which recordings, called specials, dub plates or soft wax, are made. Sound systems distinguish themselves from competitors with unique recordings. Eventually, artists who became popular through dub plates would have these or further recordings released on commercial 45's. This is how the local popular music industry began and, to a large degree, it is the way it continues to function.¹⁶⁷ Today young entrepreneurs import computer parts, assemble and modify to build specially designed computers to deliver computerised music in a "sound system." Electronic commerce offers an innovative new way for Jamaica's small music labels to compete in the global marketplace with the giant multinationals. The latter is in its embryonic stage.

The music cluster has regional geographic scope. Trinidad and Tobago, the land of calypso, soca, and steel band has exported musical genres through the proliferation of the Trinidad-styled carnival throughout the Anglophone Caribbean and in metropolitan cities where there are large Diasporas. In Barbados, calypso has been combined with reggae and dancehall to produce ragga soca, and has also been mixed with other Caribbean music including zouk, samba, and salsa. Today, the "tuk"

¹⁶² Renee Robinson (Film Commissioner and Head of Creative Industries JAMPRO) in discussion with author, February 2017.

¹⁶³ The Copyright Act was amended in 2015 to increase copyright protection for original literary, musical, dramatic and artistic works. from life of author + 50 years to life of author + 95 years; for sound recordings, films, broadcasts and cable programmes, from 50 years from creation or from first publication to 95 years from creation or first publication; for typographical arrangements of published editions, from 25 years from creation, to 50 years from creation.

¹⁶⁴ Efforts at accessing the report emanating from this project were not successful. The author only learned that the project came to an end once the IDB donor funds were exhausted. None of the interviewees could provide further details and efforts to contact the president of the JARIA was unsuccessful.

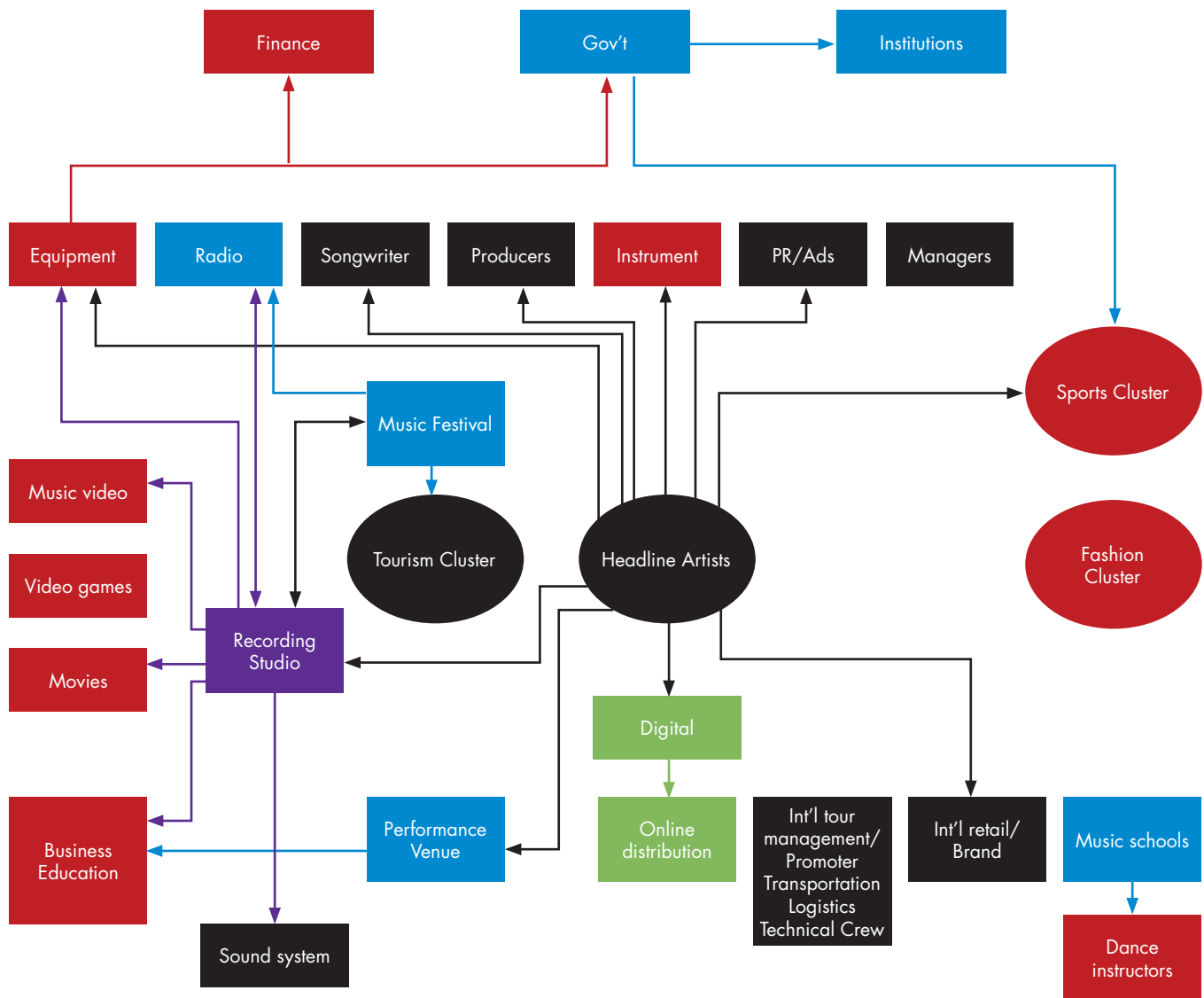
¹⁶⁵ Michael Witter, "Music and the Jamaican Economy," UNCTAD/WIPO, (2004):.1-11.

¹⁶⁶ Rob Bowman, "The Use of Intellectual Property in the History and Development of Jamaican Popular Music," World Intellectual Property Office, (2013):. 2.

¹⁶⁷ Keith Nurse, The Cultural Industries in CARICOM Trade and Development Challenges, Caribbean Regional Negotiating Machinery, (2006): 30.

sound can be found in many of the calypsos recorded by some of the island’s top music bands.¹⁶⁸ Opportunity exists to combine these into a regional music cluster, in the same way as described for the regional yachting cluster. Keith Nurse (2001) examined the structure and performance of the Caribbean music industry, with a view to identifying a strategy for industrial upgrading and export expansion. This is an extensive study with numerous recommendations for implementation. Some generalised regional recommendations are establishment of a regional organisation (Caribbean Music Office) to monitor and propel the strategic plan; establish and upgrade national industry associations; and develop data collection and market research capabilities.

Figure 6.2 – Music cluster of Jamaica



- Exists and Strong
- Strong but needs upgrade
- Exists but weak
- Underdeveloped segment
- Embryonic

¹⁶⁸ Ibid.

5.6.3 THE GOLD JEWELLERY CLUSTER IN GUYANA

The gold sector in Guyana is characterised by two distinct clusters. These are: primary extraction for export (mining) and jewellery production. There are therefore two agglomerations of firms, with the mining sub cluster operating largely independent of the local jewellery production segment as 96% of Guyana's raw gold is exported.¹⁶⁹ Moreover, by law, miners can only sell ore to shops (in a barter arrangement); to the nine authorised dealers; or to the Guyana Gold Board (GGB). Also by law, the jewellery cluster can only purchase gold from the GGB. Thus, while there is no direct link, the two clusters are indirectly connected.

Both the mining and gold jewellery clusters are of the "Marshallian" type comprising mostly many roughly equally sized firms that compete with each other; engage in arm's-length transactions, but do not intentionally cooperate. In both cases, there are lead firms. Locational Advantages are natural resource endowment of ore, semi and precious stones and a long tradition of gold-smithing for over 120 years. Local demand is small, traditional and unsophisticated. Therefore, it does very little to encourage innovation in the quality and design of jewellery. Currently, foreign demand comes from visitors to Guyana who are primarily persons from regional countries or returning residents to the country. There is no direct export of gold jewellery from Guyana. Attempts by King's Jewellery World to establish retail outlets in Trinidad and New York were abandoned.

Leadership is currently missing, as most of the industry organisations are either dormant (Guyana Gold and Diamond Manufacturers Association), or defocused from this cluster as is the case with GOINVEST¹⁷⁰ and the Private Sector Commission.

Structure of the Cluster: The mining sector contributes 10% to GDP of which gold accounts for 7%¹⁷¹. The gold mining segment comprises two large foreign direct investors (producing 33% of Guyana's gold), a few locally owned medium-sized firms and an undefined number of small and micro miners (porkknockers)¹⁷². While the larger mining operations use technology to extract at least 70% of the ore, the smaller operations, due to outdated and inefficient mining processes, capture only 30% of the ore.¹⁷³ There is an immediate opportunity for increased efficiency if process innovation takes place. Unfortunately, the cost of technology is prohibitive to individual small miners and the absence of a culture of trust and collaboration prevents collective action to solve this problem.¹⁷⁴ The jewellery segment comprises many jewellery shops which both produce and market their own products in small retail outlets highly concentrated in the city of Georgetown. There are also firms in many of the towns and many villages in the countryside, for example, Parika and Berbice. A few leading jewellery manufacturers service local and tourist (foreigners and returning nationals) demands for gold jewellery.

Thirty-one listed jewellery establishments exist in Georgetown. This is indicative of firm agglomeration. However, while they compete with each other, because demand is mostly unsophisticated, rivalry is not sufficiently aggressive to positively impact productivity and innovation and consequently the quality of the product offering. In fact, except for a few larger producers, the leader being King's Jewellery World, cluster development has stagnated. Collaboration is non-existent as indicated by the dormant business association. Inner firm integration rather than horizontal integration among firms characterises the cluster. There are few linkages to related clusters such as tourism and ICT. Tourism in Guyana is a weak cluster and moreover, the country's focus on ecotourism does not bring the type of tourist who purchases expensive gold jewellery. Internationally, gold jewellery manufacturers are now increasingly using ICT, particularly in design. There is also the potential to market Guyana's gold jewellery using an online model.

The backward linkages within the geographic location are weak as most inputs are imported. The supply of materials and equipment to the mining sector is facilitated largely through local dealership of international brands. The necessary raw materials for manufacturing jewellery, precious metals such as silver, platinum and palladium are not locally produced and therefore imported. Although diamonds and gemstones are mined in Guyana, they are exported in the rough. Consequently, diamonds are imported for use in jewellery production because cut and polished stones of calibrated sizes and consistent qualities are required for even small production. Guyana's diamond cutting industry does not have the capacity to cut all the rough diamonds produced in Guyana.¹⁷⁵ Import tax on imported diamonds and gemstones is 50%. This negatively affects Guyana's ability to become a competitive producer of this type of jewellery. Design of jewellery is also almost completely missing in the cluster. Chinese moulds are imported for use. Jewellery design is critical for product innovation and putting new products on the market. The use of computer aided design (CAD) software is required, since, with many programmes fully compatible with downstream processing applications, it provides a seamless integration into the manufacturing stages.

Jewellery production requires pure gold which is 99.9% certified. Under the Gold Board Act, jewellers can only purchase gold from the GGB. In effect, they receive an inconsistent quality of gold on every purchase because the GGB only takes the process from natural ore to smelting into gold Dore bars (rough gold bars typically about 80% pure gold). This process does not guarantee the required standard of purity. The refining required to produce 100% raw gold is contracted to an international

¹⁶⁹ Dianna DaSilva-Glasgow, "Global Value Chain Analysis of the Gold Jewellery Industry: Upgrading trajectories for Guyana," Institute of Development Studies, University of Guyana, (2013):.43

¹⁷⁰ Lisaveta Ramotar (General Manager, Guyana Gold Board) in discussion with the author January 2017.

¹⁷¹ K. Ramdas, "Guyana's Gold and Diamond Mining Sector, An Overview, 2005-2010," Guyana Geology and Mines Commission, 2011.

¹⁷² Lisaveta Ramotar (General Manager of the GGB) estimates that there are over 12,000 miners on their system.

¹⁷³ Dhanraj Singh (Director of Lands GGMC) in discussion with the author, January 2017. Ibid.

¹⁷⁴ Ibid.

¹⁷⁵ Dominic Gaskin, "Developing a Jewellery Industry in Guyana, Stabroek News, July 11, 2014.

refinery. There is no local refinery, and the high cost of electricity affects feasibility.¹⁷⁶ The inconsistency in quality prevents the use of a standardised formula for producing the various karat-weighting of the final product. There is constant need for adjustment which negatively affects efficiency. This is further worsened by a thriving illegal gold trade which some argue is a consequence of the existing Guyana Gold Board Act. This means that the quality of gold entering the manufacturing process can be even more variable than the supply from the GGB. In addition, only 4% of Guyana's official production of gold is kept for local consumption. This often means that jewellers are unable to get the required volume needed for manufacturing¹⁷⁷.

Further, the inability of the cluster to import refined gold duty free is a major impediment to the growth and productivity of the sector and a serious deterrent to attracting large scale FDI involved in the jewellery business. "Findings", defined as the range of precious metal fittings (clasps, settings etc.) that are mass-produced and imported by manufacturers as components, are currently classified under Customs Tariff heading 71.13 as "articles of jewellery and parts thereof". This attracts a 60% rate of duty which significantly compromises cost competitiveness and discourages the use of these standard industry components in favour of handmade substitutes which are not always as functional and not widely acceptable.¹⁷⁸ Targeted government intervention to reduce the above duty rates can significantly improve the competitiveness of the cluster.

Forward linkages are also very weak. Manufacturing is primarily by hand, is basic, and lacks the quality guarantee important to a competitive jewellery cluster. Industry development is also hampered by absence of the use of technology which is common place in the globally competitive jewellery clusters. Effort at an aggressive development of the jewellery cluster in the late 1980s with funding from the CDB failed and with it the proposed system of hallmarking which was designed to protect the public against fraud, and the goldsmith or merchant against unfair competition from "under-karating".¹⁷⁹ In lieu of hallmarking, Guyana has a Jewellery Certification Scheme. This is a voluntary scheme administered by the Guyana National Bureau of Standards, through which in-house gold testing and record keeping are done so that every item produced can be traced back to a particular batch of gold and its test records. This does not provide the same level of standard guarantee as hallmarking, which requires each manufacturer to stamp each individual product with the guaranteed karat and manufacturer's stamp.

The gemology segment of the cluster is undeveloped. This has the potential to move the cluster up the value chain with respect to the market-acceptable use of diamonds and gemstones in jewellery. It should be noted that King's Jewellery World, which represents the potential world class cluster waiting to happen, is in large part a product of the 1980's CDB funded initiative. In fact, its founder, Mr Loknath Persaud, was a key leader in that process.

Skills pooling has not taken place. The cluster is challenged to find trained craftsmen and much of the training is done on the job through apprentice schemes. Some important skills sets are completely missing from the cluster: diamond cutters and polishers; assayers; gemologists; designers; and technologists. Since these skills are completely absent, Government can provide an attractive framework of incentives to attract foreign training institutions or experts or encourage partnerships between local institutions of training such as the University of Guyana and foreign training institutions ensuring that ongoing training and technology transfer takes place. It is imperative, however, that this is done in the context of an overall growth strategy for the cluster. Such a strategy would make growth projections as a basis for identifying skills requirements and will signal the depth and size of training investment needed.

Government. Guyana's National Development Strategy focuses only on the mining of gold and is silent on value adding via jewellery production. Not surprising then, Government's support is restricted to the mining sub-cluster. Here, duty free concessions are granted for imported equipment and tax incentives for larger firms. At the micro level, the national policy of granting mining license to thousands of individuals is based on a social welfare objective of alleviating poverty and providing a legitimate source of livelihood. A few government institutions support the cluster - Guyana Geology and Mines Commission (GGMC); the Guyana Gold Board (GGB); The National Bureau of Standards (GNBS); GOINVEST; and a few government ministries. While the Guyana Gold Board Act states that miners declaring gold to the Gold Board should be paid 10% less than the price quoted on the London Gold market in Georgetown and 12% less in any other mining region,¹⁸⁰ over time Government has mandated the GGB to pay miners or dealers the Pure London Fix. This means that the GGB has no surplus to meet its day to day operations and so depends wholly on Government subvention. The current 7% royalty and duties (compared to 3-4% in neighbouring Suriname) to which mined gold is subject is a contributing factor to the active illegal trade which has emerged. In fact, it is estimated that the latter is greater than the volume being legally declared to the GGB. This means that the government loses out on significant tax revenues¹⁸¹. It has also meant that the porkknockers, most of whom sell their gold to dealers, are forced to accept low prices on the argument that the dealers must pay the royalties and taxes plus absorb any losses when the gold is weighted at the GGB. However, it is also the view of the GGB that a lot of this gold enters the illegal trade.

Institutional Support is very weak. There are currently no training institutions providing skills training for the gold cluster. The 1980's project did establish a jewellery institute. However, this is no longer functioning. The financial sector link is weak because

¹⁷⁶ William Woolford (former Director of GGMC) in discussion with the author, January 2017, noted that as part of the CDB-funded project in 1988 this was explored. Persons were sent to be trained in India, but it was found that a refinery needed a larger volume of ore and inexpensive fuel which Guyana does not have..Ralph Persaud, (General Manager, Kings Jewellery World) in discussion with the author, January 2017.

¹⁷⁷ Ralph Persaud, (General Manager, Kings Jewellery World) in discussion with the author, January 2017.

¹⁷⁸ Dominic Gaskin, Stabroek News, July 11, 2014.

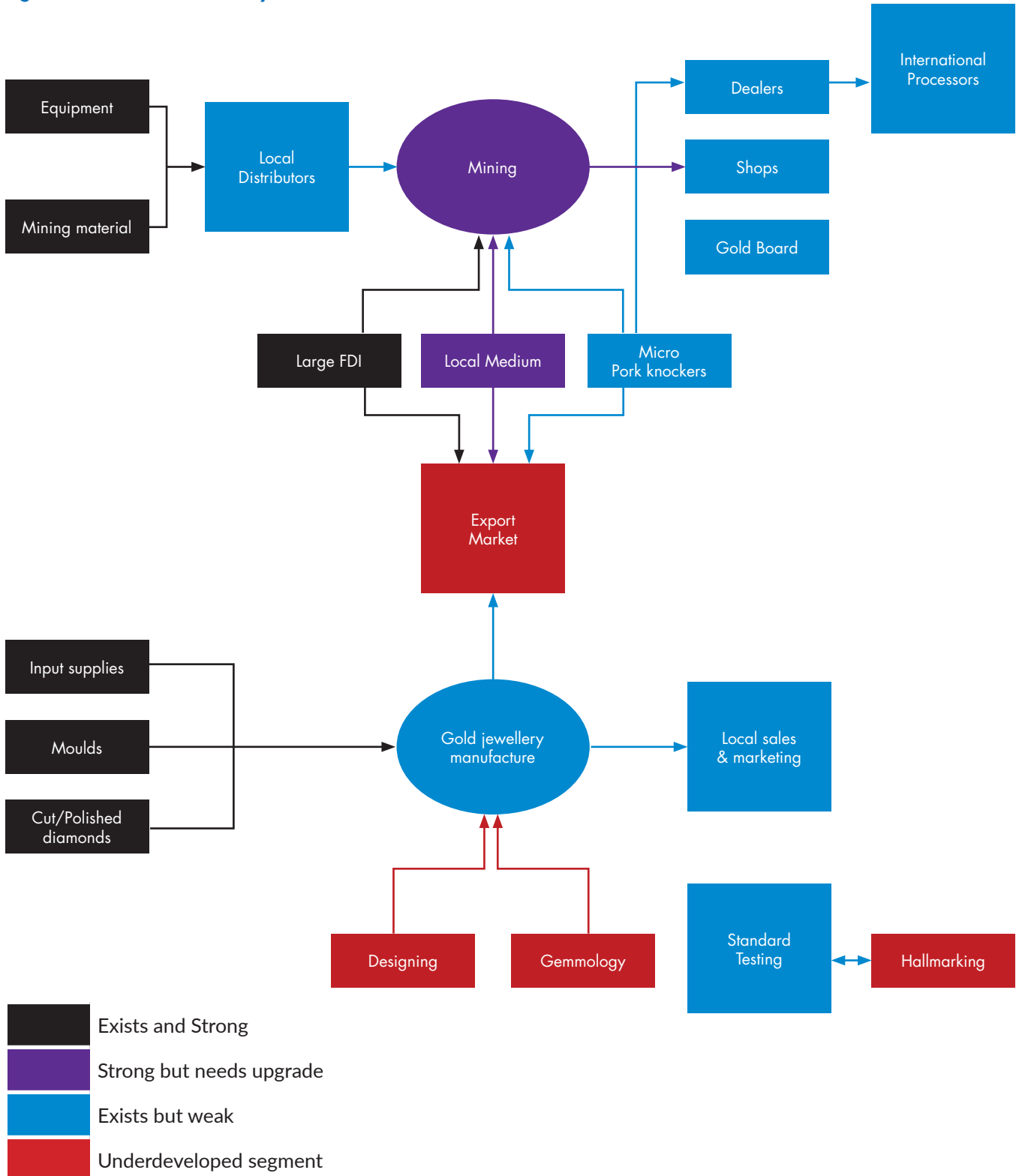
¹⁷⁹ Mr William Woolford (former director of GGMC) in discussion with author, January 2017.

¹⁸⁰ Guyana Gold Board Act, Chapter 66:01, Subsidiary Notice made under Section 5 #NT.25/6/1983.

¹⁸¹ Staff Writer, Kaitour Newspaper, September 16th 2015. The President is reported to be committed to the reduction of the royalty and tax on gold in order to be competitive against neighbouring countries Suriname and Brazil through which much of Guyana's gold is smuggled.

the variability of gold quality makes it difficult for banks to use it as collateral. The Guyana National Association of Goldsmiths and Jewellers is currently dormant due largely to a lack of visionary leadership to bring all the firms under a single functional umbrella organisation. There appears to be a strong sense of frustration with the government and a feeling that it is wasted effort to lobby for better support to the cluster. The general private sector institutions such as the Private Sector Commission, Chambers of Commerce and Manufacturers Association, which are open to accepting membership from the jewellery cluster, do not address the cluster's specific needs in a targeted manner. There is very little innovation in this cluster. Technology is used only in large scale mining.

Figure 5.3 – Gold cluster in Guyana



5.6.4 THE PEPPER SAUCE CLUSTER IN TRINIDAD AND TOBAGO

The pepper sauce cluster is classified as a variation of the Marshallian type as firms are of varying sizes but there is no collaboration. The cluster can be traced back to the 1960s. It comprises a number of large and medium-sized firms (producing pepper sauce as only one of many food items) and many micro firms (specialising in the production of pepper sauce and other seasonings). The locational advantages are that Trinidad and Tobago is home to three of the hottest pepper varieties in the world (Moruga scorpion currently ranked number two (number one in 2012); Trinidad scorpion “Butch T” ranked at number five; and Barrackpore “7 Pot” ranked at number eight¹⁸²). In addition, the country has ideal climatic and soil conditions and expertise exists in pepper cultivation and pepper sauce production. There is no dedicated target or effort in research and development to improve or maintain these rankings.

Both local and foreign demand for pepper sauce is sophisticated, and ranges from mild to hot¹⁸³. International demand is diasporic, and is situated in the markets of Miami and New York in the United States, Toronto in Canada, and London in the United Kingdom. Trinidad and Tobago pepper sauce can be found on the ethnic shelves of supermarkets as the product has not been able to break into the mainstream market. Notwithstanding, sophisticated diasporic and local demand inspire constant product innovation. The large firms produce for both the local and foreign markets; the medium firms for the local and regional markets; and the micro firms only for the local market. The economic contribution of the cluster was estimated at US\$15.6 million in 2010.¹⁸⁴ There is minimal skills pooling as the cluster suffers from a shortage of human capital. At the primary level, there is an aging farming population and little incentive to attract young people into pepper cultivation.

There are backward linkages to pepper farming, commercial processing and packaging. However, local pepper production is unable to meet local manufacturing demand and therefore, a significant volume of pepper mash is imported. All manufacturing equipment is also imported either directly or through distributors. There is one state-owned monopoly in the local mash processing segment which cannot satisfy local demand. This is supplemented by imports from Costa Rica and Columbia. It should be noted that imported mash is significantly cheaper than local mash. The packaging segment of the cluster is well developed with several local producers of glass bottles and jars, caps and seals, plastic bottles, labels, and cartons. Seeds are sourced from the local gene bank. The pepper cultivation segment of the cluster comprises many small farms spread across the country. There is no formal integration collaboration or contractual arrangements between the cultivation and manufacture segments of the cluster. The fresh pepper sub-cluster produces mostly for the local and export fresh pepper markets. In terms of forward linkages, most manufacturing firms are vertically integrated engaging in manufacture, packaging and sales directly to retail outlets in the local markets. In the case of exports, export agents or overseas distribution companies are used. Products are sold in supermarkets, minimarts and specialty fairs or via the internet and in international markets in the ethnic section of supermarkets. In effect, the Trinidad and Tobago pepper sauce has not broken into the mainstream international market.

There is no cluster-specific government support. Farmers and manufacturers have access to general agricultural incentives. The following state institutions support the cluster: The Trinidad and Tobago Agribusiness Association (TTABA); The National Agricultural Marketing and Development Company (NAMDEVCO); The Food and Beverage Industry Development Committee (FBIDC); and exporTT Limited. In addition, the Ministry of Food Production, Land and Marine Affairs (MFPLMA), The Ministry of Trade, The Ministry of Health, and The Trinidad and Tobago Bureau of Standards provide additional support. Some generalised manufacturing support includes subsidised electricity; exemptions from custom duties, value added tax and income tax for a specified period of time when establishing businesses; and physical infrastructure in government-built industrial parks. In terms of financial institutions, there are the commercial banking sector, The Agricultural Development Bank (ADB), and The National Entrepreneurship Development Company Limited (NEDCO) offering loan financing and grants for start-ups and expansion of micro and small enterprises.

No cluster organisations support this cluster. Institutional support comes from regional and government-funded institutions and peripherally from established private sector organisations. These include the Caribbean Agricultural Research & Development Institute (CARDI), the University of the West Indies (UWI), the University of Trinidad and Tobago (UTT), and the Caribbean Industrial Research Institute (CARIRI). CARDI, UWI, and UTT focus on identifying, producing, and enhancing indigenous hot pepper varieties; land preparation and planting; crop maintenance and harvesting; and post harvesting techniques. In addition, CARIRI provides technical support by way of food safety and product development services. The Trinidad and Tobago Manufacturing Association (TTMA), The Caribbean Network of Rural Women Producers (CANROP), and The Inter-American Institute for Cooperation on Agriculture (IICA) are other regional institutions supporting agriculture and by extension this cluster

¹⁸⁵.

Related Clusters are the processed food and meat industry and the spice industry, packaging, entertainment and tourism.

¹⁸²<https://pepperhead.com/top-10-worlds-hottest-peppers/>

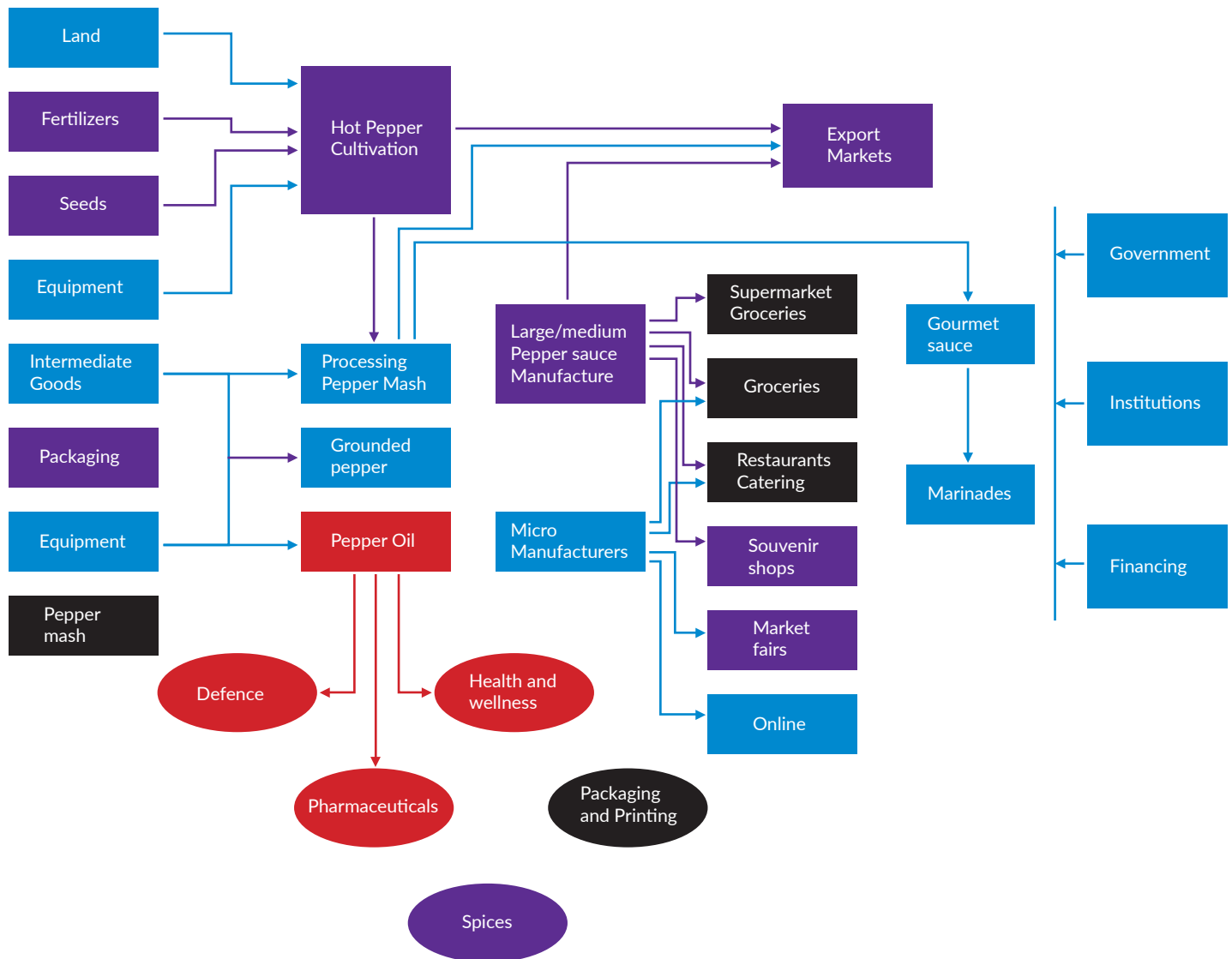
¹⁸³Peppers are generally classified as sweet peppers, bell peppers and hot peppers or chilies. Hot peppers or chilies are distinguished from bell peppers and sweet peppers based on their pungency, which is caused by the compound capsaicin. The pungency, measured in terms of Scoville Heat Units (SHU), range from low values of 5,000 SHU for jalapenos, to medium values for scotch bonnet of 250,000-300,000 SHU, to high values for Bhut Jolokia of over 1 million SHU (Liu and Nair 2010). In 2012, the Trinidad Moruga Scorpion Pepper was reported to be the world’s hottest pepper, with its pungency measuring over 2 million SHU (Bosland, Coon and Reeves 2012) cited in Wilson, Shellyanne. “A Structural Analysis of the Competitiveness of the Pepper Sauce Industry in Trinidad and Tobago: A Global Value Chain Approach,” in *Caribbean Competitiveness Through Global Value Chains*, ed. Indera Sagewan-Alli (Jamaica: The University of the West Indies Press (2016): 41.

¹⁸⁴Ibid., 45.

¹⁸⁵Ibid., 48.

The Geographic scope of this cluster is regional as Antigua and Barbuda, Barbados, Belize, Jamaica, St Kitts and Nevis, Saint Lucia, St Vincent and the Grenadines, Guyana and Dominica are all pepper producing countries, most with a pepper sauce manufacturing sub-cluster servicing largely the local markets. A regional cluster initiative can be launched to further develop the competitiveness of this regional cluster. It should be noted that there are value-added areas which are yet unexplored by the region. This is illustrated in red in the cluster map below. They include the processing of pepper oil for use in the pharmaceutical, health and wellness and defence clusters.

Figure 5.4 – Pepper sauce cluster in Trinidad & Tobago



- Exists and Strong
- Strong but needs upgrade
- Exists but weak
- Underdeveloped segment

5.7 CONCLUSIONS AND RECOMMENDATIONS

5.7.1 POLICY, INSTITUTIONAL AND REGULATORY ANALYSIS

The matrix below summarises the policy, institutional and regulatory frameworks which emerged as existing in the four clusters studied and provides recommendations for improving productivity and growth.

Table 5.3 – Policy Institutional and Regulatory Matrix

	What currently exists	What is needed to promote productivity and growth?
Policy Measures	<p>Saint Lucia</p> <ol style="list-style-type: none"> 1. Dedicated Director of Yachting leading the policy agenda for Yachting 2. A Yachting Committee comprising all stakeholders and providing a one stop desk to yachtsmen 3. Saint Lucia Revised Policy on yachting to simplify approval for length of stay and so improve the yachting experience; encourage the development of local bare boat charter; facilitate strategic alliances with key source markets; and encourage local ownership of yachts 4. A move from a closed to open ship registry to encourage a one stop Yacht purchase and Yacht registration product is under implementation. 	<ol style="list-style-type: none"> 1. National growth and competitiveness strategy for Yachting 2. Fiscal incentives to: <ol style="list-style-type: none"> a. Strengthen local demand by encouraging local purchase of yachts; b. Encourage the boat building and equipment segments of the clusters through a targeted PPP model; c. Encourage FDI in dedicated boat yards catering to the needs of mega yachts to leverage the country's cost advantage over neighbouring competitor countries; d. increase competition in the current boat yard segment of the cluster; e. Expand the yachting season by encouraging off season yachting activities; 3. Enforce the restricted use of yachts by all-inclusive resorts to diving to support the day cruise segment of the cluster
Institutional Features	<p>Public Institutions: Saint Lucia Air and Sea Port Authority (SLASPA); the Ministry of Tourism; the Tourism Board; the Watercraft Advisory Committee; Marine Police; the Department of Fisheries; and Soufriere Marine Management Area</p> <p>Private Institutions: The Yachting Association of Saint Lucia; the Day Boat Charter Association; the Yacht Club; the Saint Lucia Game Fishing Association; Association of Private Power Boats; Saint Lucia Whale and Dolphin Association and the Saint Lucia Hotel and Tourism Association</p> <p>Sir Arthur Lewis College and Monroe Collage</p>	<p>Greater collaboration of all institutions in the context of a formal cluster initiative to develop and manage implementation of growth strategy.</p> <p>Targeted response of training institutions to growth needs of the cluster e.g.: inclusion of sailing in school curriculum; establishment of specialised sailing schools for locals; human capital skills training. This would only become feasible if there is the appropriate level of demand locally or if the institutions take a regional approach to product offering.</p>
Regulatory Measures	<p>Shipping Act</p>	<p>A determination of necessary changes required to support the move to an open ship registry</p>

ITEM	What currently exists	What is needed to promote productivity and growth?
<p>Policy Measures</p>	<p>Jamaica The Jamaica National Industrial Policy (1996) formally recognised the importance of music to the country's development.</p> <p>National Services Sector Strategy</p> <p>Duty free concession for equipment available to all creative industries stakeholders if registered with the Entertainment Board.</p>	<p>Provide fiscal incentives to:</p> <ol style="list-style-type: none"> 1. Incentivise linkages to other clusters e.g fashion, movies and animation, sports, video games 2. Private developers to expand the infrastructure of live performance venues
<p>Institutional Features</p>	<p>Public: Ministry of Culture, Gender, Entertainment and Sports; Ministry of Tourism; Jamaica Cultural Development Centre; Jamaica Intellectual Property Office; JAMPRO and the Entertainment Board.</p> <p>Private Institutions: The Association of Jamaica and Jamaica Reggae Industry Association; The Jamaica Federation of Musicians; Association of Vintage Artists; Association of Female Artists; Association of Composers; Authors and Publishers Association; Recording Industry Association of Jamaica and the Sound System Association of Jamaica; The Jamaica Exporters' Association Edna Manley College of the Visual and Performing Arts; UWI Reggae Studies Unit; HEART-NTA; The Jamaica University of Technology (UTECH) and Creative Production Training Centre (CPTC).</p> <p>Network of Training Institutions: Edna Manley College of the Visual and Performing Arts; UWI Reggae Studies Unit; HEART-NTA; The Jamaica University of Technology (UTECH) and Creative Production Training Centre (CPTC).</p> <p>Weak linkage to Financial Institutions</p>	<p>Greater collaboration of all institutions in the context of a formal cluster initiative to develop and manage implementation of growth strategy</p> <p>Rationalisation and strengthening of private sector institutions through models which promote self-sustainability</p> <p>Development financing for the industry</p> <p>Establish a Music Academy of International Excellence linked into the Educational Tourism Product. Such an institution can leverage and build on the natural creative genius of Jamaica and on the innovation in music genres and equipment modification for greater productivity and efficiency.</p> <p>Introduce a certificate program for Dancehall Instructors</p> <p>Provide Advanced Training programs to meet the needs of the cluster</p>
<p>Regulatory Measures</p>	<p>The Noise Act inhibits growth of live segment of the cluster</p> <p>The Copyright Act was amended in 2015 to increase copyright protection for original literary, musical, dramatic and artistic works: from life of author + 50 years to life of author + 95 years; for sound recordings, films, broadcasts and cable programmes, from 50 years from creation or from first publication to 95 years from creation or first publication; for typographical arrangements of published editions, from 25 years from creation, to 50 years from creation.</p>	<p>Noise Act needs amending to support the growth of the cluster</p> <p>Impose a minimum requirement for local content on National Radio</p> <p>Amendment of the Motion Picture Encouragement Act (MPEA) to provide the music cluster with the same relief from customs duty, general consumption tax, stamp duty and income tax allowances currently enjoyed by the film industry alone.</p>

ITEM	What currently exists	What is needed to promote productivity and growth?
<p>Policy Measures</p>	<p>Guyana Gold Jewellery</p> <p>National Development Strategy focuses only on the mining of gold and is silent on value adding via jewellery production</p> <p>Duty free concessions for imported equipment and tax incentives for larger firms in the mining sub-cluster</p> <p>50% import taxes on cut and polished diamonds and gemstones</p> <p>Only 4% of Guyana's Gold is available for jewellery production</p> <p>60 % rate of duty on "findings". This discourages the use of these standard industry components in favour of handmade substitutes which are not always as functional and not widely acceptable</p> <p>7% royalty and duties on ore encourages an active illegal trade</p>	<p>Fiscal Incentives to:</p> <ol style="list-style-type: none"> 1. Encourage the use of technology in small scale mining of gold through collaboration; 2. Attract FDI to the refining segment of the cluster especially in the context of Guyana's imminent access to substantial oil resources; and 3. Mandate an increase in the percentage of local gold for jewellery manufacture or allow for the importation of refined gold. <p>Reduce import duties on inputs into jewellery manufacture in keeping with global industry best practices for competitiveness</p> <p>Revise the royalty and duties on ore</p>
<p>Institutional Features</p>	<p>Public: Guyana Geology and Mines Commission (GGMC); the Guyana Gold Board (GGB); The National Bureau of Standards (GNBS); GOINVEST; and a few government Ministries.</p> <p>Private: Dormant Guyana National Association of Goldsmiths and Jewellers is currently</p> <p>Jewellery Certification Scheme, which is a voluntary scheme administered by the Guyana National Bureau of Standards</p> <p>No Training Institutions offering skills training for this cluster</p> <p>No Research and Development</p>	<p>Establish a system of hallmarking designed to protect the public against fraud, and the goldsmith or merchant against unfair competition from under-karating.</p> <p>Cluster needs diamond cutters and polishers; assayers; gemmologists; designers and technologists. Since these skills are completely absent, Government can provide an attractive framework of incentives to attract training institutions or experts or encourage partnerships between local institutions of training and foreign training institutions into the country, ensuring that ongoing training and technology transfer takes place.</p>
<p>Regulatory Measures</p>	<p>The Gold Board Act: Under the Act, jewellers can only purchase gold from the GGB. This results in an insufficient and unreliable gold of varying quality</p>	<p>Amendment needed</p>

ITEM	What currently exists	What is needed to promote productivity and growth?
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Policy Measures

Trinidad and Tobago Pepper Sauce

Generalised fiscal incentives for agricultural production

Generalised incentives for manufacturing - subsidised electricity; exemptions from custom duties; value added tax and income tax for a specified period of time when establishing businesses and physical infrastructure in government-built industrial parks.

Cluster specific fiscal incentives

Institutional Features

Public: The Trinidad and Tobago Agribusiness Association (TTABA); The National Agricultural Marketing and Development Company (NAMDEVCO); The Food and Beverage Industry Development Committee (FBIDC) and exportTT Limited. In addition, the Ministry of Food Production, Land and Marine Affairs (MFPLMA); Ministry of Trade; The Ministry of Health; and The Trinidad and Tobago Bureau of Standards.

Other Institutions: Caribbean Agricultural Research & Development Institute (CARDI); the University of the West Indies (UWI); the University of Trinidad and Tobago (UTT) and the Caribbean Industrial Research Institute (CARIRI). CARDI, UWI and UTT focus on identifying, producing and enhancing indigenous hot pepper varieties, land preparation and planting, crop maintenance and harvesting and post harvesting techniques. In addition, CARIRI provides technical support by way of food safety and product development services. The Trinidad and Tobago Manufacturing Association (TTMA); The Caribbean Network of Rural Women Producers (CANROP); and The Inter-American Institute for Cooperation on Agriculture (IICA) are other regional institutions supporting agriculture and by extension this cluster

Financing: The Agricultural Development Bank (ADB) and The National Entrepreneurship Development Company Limited (NEDCO) offer loan financing and grants for start-ups and expansion of micro and small enterprises.

Strengthened Research and Development:

1. aimed at increasing and maintaining the hottest pepper rankings;
2. developing new varieties of hot pepper flavours; and
3. more efficient agricultural practices to reduce cultivation costs while increasing yields.

Skills training in cultivation and value adding

Regulatory Measures

5.7.2 CONCLUSIONS AND RECOMMENDATIONS

Cluster policy does not provide a quick fix solution to productivity and growth challenges but a medium to long term strategy for sustainable development, as it takes at least ten years for a cluster to truly develop. Clustering provides a valid framework for industry analysis towards growth and development in the Caribbean. While there is familiarity with the concept of clustering in the region, it is in some cases vague and in others superficial and misunderstood. In the two instances of formal approaches to clustering in the Region (the Jamaica Competitiveness Cluster Project (JCCP) and the Compete Caribbean Cluster initiative), the cluster initiatives are partial in scope. In the Jamaica case, the focus was on building collaboration for only a specific marketing outcome, thus ignoring the other elements such as localised competition and backward linkages critical to building competitive sustainability. In the case of the CCP initiative, this is a funding window with a finite time frame and resources to achieve a few objectives which, while productivity enhancing, are not comprehensive and sustainable.

The analytical framework developed in this analysis has proven very effective in capturing the level of development of the studied clusters and, most importantly, identifying the weak linkages/segments which should be targeted for intervention. All four clusters exhibit core characteristics of economic clusters as defined and outlined in this chapter: geographic proximity of firms; competitive advantages; backward and forward linkages; and labour market pooling. However, in all cases some critical elements are absent: visionary, trustworthy leadership; a culture of collaboration within the clusters; and targeted government support (except in Saint Lucia). In Saint Lucia, while there is strong public sector leadership, there is weak private sector leadership. In Jamaica and Trinidad, there are many industry leaders with significant industry experience, but none have emerged to build sustainable models of competition and collaboration around a common vision and strategy. Public sector leadership in both Trinidad and Jamaica is weak. In Guyana, both public and private leadership are weak. In all cases, there is a high degree of mistrust both amongst industry players and even more so between industry actors and the public sector.

In all cases, there is no clearly defined growth strategy for the clusters, neither at a policy nor cluster level. There is a dearth of available information and in most cases no single entity charged with the responsibility of capturing and keeping data up to date. There is also no single private institution or government agency with overall responsibility for managing the full development of any of the clusters. Cluster development is primarily supply rather than demand driven. There is an absence of market analysis of value chains, trends and niche market analyses influencing the direction and development of the clusters, with Saint Lucia being the qualified exception. The absence of market analysis is particularly evident in the gold and music clusters. There are weak and, in some cases, important missing segments in these clusters. These deficiencies must be addressed for greater efficiency and cluster innovation.

FDI plays an important role in the yachting cluster in Saint Lucia and in gold mining in Guyana. It is foreign investor Ach Marez who in the 1986 built Rodney Bay Marina, branding the island with the finest marina in the Southern Caribbean for yachts of all sizes. In 2009, Island Global Yachting added this Marina to its global network of marinas with a focus on expanding the mega-yacht segment of the market. This focus pushes the cluster along the innovation continuum as the level and quality of services needed to satisfy this very sophisticated consumer will force increased productivity and propel the cluster up the value chain. The Marigold Marina, which is built alongside the luxury Capella Marigot Bay Resort, is also foreign-owned. According to Saint Lucia's director of yachting, FDI brought equity capital, brand recognition, international marketing, and "wow and sexiness" to the Saint Lucia yachting experience. It has pushed the level of innovation at every level from the way coconuts are packaged for sale, the quality of restaurants to the sophistication of island landscaping. In Guyana, technology allows the large mining companies greater efficiency in capturing the ore than the micro miners using inefficient practices.

Only in Saint Lucia is there cluster specific fiscal support. The other clusters have access to incentives which are generic to a range of industries and in the case of gold, the fiscal regime is punitive. Further, and in all instances, there is a communications gap as many stakeholders are unaware of the incentives (whether targeted or general) available. In all cases, institutional support is weak and the institutional models which do exist are dependent on the state for financial support. They are all in need of strengthening but based on models of self-sustainability.

The following general recommendations emerge from this study to strengthen clusters for improved productivity, innovation and growth.

At country level, governments should:

- Be guided by the market and support existing private sector driven activities in clusters already in existence save and except where a national strategic objective dictates the seeding of new clusters.
- Develop cluster level incentives for greater efficiency; incentivise:
 - new business formation within targeted clusters to develop critical mass of firms;
 - collaborative rather than firm specific initiatives;
 - activities higher up the value chain;
 - public-private partnerships where inputs into the cluster is concentrated on foreign inputs;
 - institutions of research and development to focus on technology innovation to improve productivity of economic clusters; and
 - the development of a financing ecosystem to support the needs of clusters.
- Provide funding for the early stages of a cluster initiative, but ensure counterpart funding is provided in a model that over

time reverses the funding formula.

- Support cluster initiatives through which competitiveness strategies are developed, implemented, and managed. As a rule of thumb, such initiatives should be private sector led.
- Target incentives and support to strengthen weak cluster segments.
- Fund the training of technocrats and cluster stakeholders in clustering as a tool for industry growth.
- Rationalise state institutions and establish key performance indicators to ensure that they meet the needs of economic clusters.
- Where government is directly involved in tertiary education, direct curriculum and research and development to meeting the needs and growth trajectories of economic clusters.

At country level, the private sector should:

- Develop leadership competencies to build trust towards working together;
- Initiate cluster initiatives;
- Educate government on the targeted support needed for growth;
- Collectively invest in productivity enhancing projects which serve the common interests of the cluster; and
- Create stronger linkages between cluster firms and institutions to encourage institutions to respond to the needs of the cluster for improved productivity and innovation.

At the Regional level, institutions such as the CDB should:

- Encourage and support Bank member countries to conduct robust mapping of industry clusters as an important prerequisite to designing growth strategy;
- Support the training of regional policy makers, private sector institutions and firms in clustering and cluster management (The European Union currently funds an annual program in “Cluster Excellence” which can be modelled for the Caribbean);
- Establish and fund a regional cluster fund to support cluster development along the best practices defined in this analysis (Clusters should have to apply for such funding based on annual calls for proposals. There should be a requirement of counterpart-funding from the cluster whether in cash or kind. Again, the European Union has a model which can be adapted for Caribbean use);
- Establish a “Regional Cluster Observatory” to collect and manage cluster data and monitor and evaluate cluster performance on an ongoing basis (There are many best practices to inform the design of an effective model for the Caribbean);

Establish a special fund to promote “Regional Clusters” as distinct from country clusters with regional potential; (Such a fund would support the operations of regional cluster initiatives which are private sector-managed to develop and execute competitive strategies for respective clusters).

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The previous chapters in the study have provided a review of the economic performance of the Region over the last five decades and have highlighted the general decline in economic growth rates and also total factor productivity. Several factors have been identified for such a trend, namely, the declining growth of the region's major trading partners, which negatively affected exports of goods and services; macroeconomic instability; and declining investment. Although the Region has performed well from a socio-economic (education, health and standard of living) perspective as evident by its high ranking in the human development index, several regulatory and institutional factors have inhibited the smooth operation of the business environment. Indicators of the "ease of doing business" and the "degree of competitiveness" point to elements which have constrained the growth of enterprises in the region. Indeed, in a recent study of enterprises in the region, it was observed that five obstacles must be overcome to boost productivity and growth: access to finance; the cost and time to export (e.g. the documentation requirements); barriers to knowledge production and use (e.g. weak protection of intellectual property); the competitive nature of the business climate; and the state of the infrastructure (Dohnert, 2017). These factors negatively affect the degree to which firms can innovate and contribute to productivity and enterprise growth.

While it is important to attend to the traditional factors which affect productivity and growth in the small states of the Caribbean—exports, investment in physical and human capital, and macroeconomic stability—it is critical for the countries of the Region to pay attention to new areas of focus such as R&D, innovation, ICT and clustering which are important factors as the Region moves to the innovation stage of economic development associated with a new industrial age (the Fourth Industrial Revolution). The organising framework for such a strategic approach is the Schumpeterian model of economic growth which allows consideration of both macroeconomic and enterprise-level factors.

The study has analysed selected elements in the matrix of factors affecting productivity and economic growth within the region. This chapter seeks to summarise the main conclusions and recommendations emerging from the various chapters.

6.2 CONCLUSIONS OF THE STUDY

In the area of FDI, the Region has witnessed a decline since 2008 as foreign investors have shifted their investments to other emerging economies. It is noted that FDI has been concentrated in the "natural resource seeking investment areas" such as oil and gas and also in the tourism sector. In many cases, the income loss associated with the downturn in FDI has been significant in recent years and the technological spillovers have not been great.

Several factors have been identified as hindering the inflow of capital to the region: the high costs of doing business in the Region (time taken to do things and starting a business), the inadequate skill level of the workforce, and the number of steps to be taken to undertake business transactions. There is evidence of persistence in the "ease of doing business" indicators as necessary changes in the indicators have not been undertaken in a timely manner. Weak trade and business facilitation constitutes a barrier to inflows of FDI. Jamaica is one country in the Region which has adopted measures to enhance the "ease of doing business" thus attracting more FDI.

Other indicators which affect the degree of FDI to the Region have also proven to be a challenge, namely, transparency of transactions, governance arrangements, and the lack of competitiveness of regional logistics. These indicators appear to be deterrents to inflows of capital. Furthermore, indications are that investment promotion agencies have not been as effective as was hoped in attracting FDI. Opportunities exist for attracting FDI to the region. However, more effective market targeting is needed by national and regional institutions.

While the Citizenship by Investment programmes in the OECS have brought some benefits to the sub-region, there is a need to extend the double taxation agreements that are not as widespread as one would like in the region. However, it has been noted as well that the degree of tax competition in the Region is an associated problem that needs to be resolved. Although the

tools of ICT have now become ubiquitous, there is a controversy as to the benefits of the use of ICTs on economic growth and productivity. The available evidence gives mixed results with those who advocate no effects pointing to the existence of a Solow Productivity Paradox and those who advocate positive effects point to the econometric evidence.

Within the Region there is a divide between countries with relatively low penetration of ICT (Guyana, Belize) and those with high levels (The Bahamas, Barbados). Using survey evidence from Jamaica, the factors which affect connectivity and the use of the internet include equipment and subscription costs, tax policy, information/computer literacy and the lack of trust surrounding the use of online services.

Other major challenges in the sector are the high cost of roaming charges, although competition from VOIP has been reducing such charges, and also the affordability of services for given internet speeds in the region. There has been either full or partial liberalization of telecommunication services in the Region which, together with improved regulatory oversight and updated legislation, should lead to a reduction of access costs over time.

While it is recognized that MSMEs play a very important socio-economic role in the Caribbean, there is a relatively low use of ICT by these entities. Some of the constraints which have prevented MSMEs from the greater use of ICT in their operation to raise productivity include: the cost and affordability of internet services; inadequate infrastructure and problems with respect to the reliability of service; limited access to finance, and the lack of training in and knowledge of the use of the range of ICT business tools. The greatest use in the Region of ICT tools is in the areas of personal consumption—telephone calls, social media, movie and music downloads. However, there is a growing trend in business production and applications, especially among young entrepreneurs with IT backgrounds. The Caribbean Region still shows a relatively low degree of ICT development as demonstrated by world ICT indices.

At the enterprise level in the Caribbean, survey data indicate that there is limited formal R&D capability in terms of dedicated personnel with only 9% of establishments having an R&D team. While nearly 80% of enterprises undertook some form of R&D, within or outside of formal teams, only 20% of enterprises actually introduced a new or significantly improved product, service or process according to a 2014 survey. This low level of innovation is in part due to deficiencies in the external environment such as a lack of financial incentives and incentives for collaboration. Internally, finance was also an issue as was the capacity to undertake R&D and innovation (RD&I).

The constraints experienced at the enterprise level are mainly due to the absence of an overarching strategy for RD&I in the Region together with a lack of support incentives at the institutional level. Lack of knowledge of support available is also a problem. However, while support for R&D and innovation is made explicit in some states, namely Trinidad and Tobago, Barbados and Jamaica, the majority of incentives for business development, which can be utilised for innovation, are not applied.

While some of the constraints noted by enterprises in the Caribbean also exist in global comparators, actions to address these constraints are being taken at the state level by the establishment of institutions, policies and programmes to explicitly support innovation. The main components of the RD&I systems in global comparators from which the Caribbean can learn are:

- The existence of guiding legislation;
- Explicit R&D Strategic Plans;
- Dedicated Ministries, Research and Science Councils;
- Explicit support for R&D;
- Explicit support for Research Centres/Academia/Industry Linkages;
- Generic and 'Smart Specialisation' Support; and
- Constant Monitoring, Evaluation and Adaptation of Support.
- Investment in R&D is important for technological transfer and adoption. The low level of R&D in the Region stymies such a process.

At the public sector level, much of the R&D has taken place in the agricultural sector through agencies such as CARDI, IICA, UWI and CARIRI. However, these institutions have been financially handicapped. Accordingly, the extent to which they have been able to influence the degree of innovation in the Region has been minimal. There is evidence that the filing of patents has been few, partly due to the cost of maintaining them. Furthermore, the linkage between these research institutions and the private sector has been weak with little evidence, for example, of start-up companies emerging from such cooperation. While there is some R&D and innovation taking place in such areas as agro-processing, biotechnology, alternative energy, biomedicine, manufacturing, tourism and ICT, it has largely been on a small scale with little capacity for scaling up the processes with existing resources.

Focus on the development of production clusters has recently emerged in the region. Clusters provide a mechanism for harnessing the scarce resources of the country or region to boost productivity and growth. More formally, a cluster is defined as “a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities.” It is an organising framework for understanding industry development which allows a new type of dialogue amongst firms, government agencies and other institutions.

Within the region, the approach to cluster development has not been comprehensive. There is need for an analytical framework for the development and operation of clusters in the Region – such as has been outlined in this study. The four (4) cases undertaken in the study – yachting in Saint Lucia, music in Jamaica, gold in Guyana and peppers in Trinidad & Tobago- highlight some of the challenges with cluster development in the region. The case studies indicate a general lack of leadership, of strategic collaboration and targeted governmental support. In addition, the existing clusters, while meeting the core requirements of clustering, exhibit no clearly defined growth strategy; have no monitoring and evaluation system in place; are supply and not demand driven; and lack market analysis of value chains, trends and market niches. Importantly, two of the clusters—yachting and gold—were developed with FDI which has had a positive effect on growth via equity capital, branding, marketing and innovation.

6.3 RECOMMENDATIONS

Over the years, several recommendations have been made to enhance productivity and growth in the Caribbean (see, Dookeran, 2012, Downes, 2013). These have ranged from increasing exports; diversifying the production structure; enhancing human capital; upgrading the social infrastructure; promoting economic integration; and maintaining macroeconomic stability. It has also been claimed that the Region suffers from policy “sclerosis” which has contributed to the stagnation in growth performance (Ruprah, Melgarejo and Sierra, 2014). Furthermore, it has been argued that the private sector, which should be the engine of growth in the region, has not lived up to the task (Ruprah and Sierra, 2016).

This study has added to the list of recommendations relating to policy, institutional and regulatory changes that are needed with respect to FDI, ICT and Internet access and affordability, R&D, innovation and technological transfer and the development of industrial clusters in the region. It is hoped that the adoption and implementation of these measures would enhance productivity and growth in the region. Importantly, these recommendations relate to the development of “knowledge economies” in the Region as the countries seek to break through the “middle income trap” and emerge into the “innovation stage of development” within the context of the Fourth Industrial Revolution.

In the area of **FDI**, it is recommended that:

- A regional strategic plan be developed and implemented to improve the “ease of doing business”;
- Tax competition be removed so that there would be no game playing by foreign investors;
- A regional working group be established to examine the package of incentives needed to attract foreign investors in selected key sectors;
- Discussion be held with educational and training institutions to assist with both R&D and HRD to support the needs of FDI;
- The diaspora be targeted as an important source of skills and finance for the development of the region;
- Standards be set for the Citizenship for Investment programmes;
- Greater use be made of foreign-local partnerships; and
- Work be undertaken with CAIPA and Caribbean Export to develop a regional investment promotion strategy to boost innovation and technological transfer.

In relation to the **Access and Affordability of Internet Use and ICT**, the recommendations are as follows:

- Incentivise and train MSMEs in greater use of Broadband and Digital Online technologies;
- More actively support and promote Medium, Small and Micro Enterprises (MSMEs) and women’s roles in them;
- Build the pillars of the regional knowledge economy to enhance global competitiveness;
- Create Twenty First Century Educational Curricula and Institutions;

- Drive new private sector training initiatives for productivity in the knowledge economy;
- Build better ICT infrastructure in the Region for improved access in rural and remote areas;
- Finance and encourage MSME expansion in digital content production;
- Undertake regulatory reform to converge existing fragmented regulatory structures;
- Re-fashion fiscal regimes to reduce taxation on MSMEs and the ICT sector; and
- Establish a regional oversight task force or office to co-ordinate the knowledge economy.

At the enterprise level, the recommendations relating to ***R&D, Innovation and Technological Transfer*** are as follows:

- Design and implement national RD&I strategic plans drawing on identified best practice within the general structure of the CARICOM Strategic Plan. These plans should focus in part on ‘smart specialisation’ as well as consistent monitoring and evaluation (M&E);
- Implementation of relevant legislation and regulations to guide and promote the main elements of national strategic plans;
- Founding of dedicated ministries, research support centres and science councils to provide for a one-stop-shop for innovators;
- Within regional and national RD&I strategic plans, legislation and regulations, ensure adequate financial support is available in the form of grants, fiscal incentives, co-financing, and international donor support;
- Active promotion of collaboration through innovative procurement strategies at the regional and national levels that require joint ventures or strategic alliances to access contracts;
- Active promotion of collaboration by enterprise extension officers;
- Development of explicit technical and training support services for RD&I;
- Implementation of incentives for industry-academia linkages to enhance enterprise and academia capacities. This allows for greater matching of the supply and demand for skills; and
- Curriculum development in secondary, post-secondary and tertiary education to inculcate innovation and entrepreneurial behaviour.

In the ***development of production clusters***, it is recommended that:

At Country Level, Governments should:

- Be guided by the market and support existing private sector driven activities in clusters already in existence save and except where a national strategic objective dictates the seeding of new clusters;
- Develop cluster level incentives for greater efficiency;
- Incentivise new business formation within targeted clusters to develop critical mass of firms; collaborative rather than firm specific initiatives; activities higher up the value chain; public-private partnerships where inputs into the cluster are concentrated on foreign inputs; institutions of research and development to focus on technology innovation to improve productivity of economic clusters; and the development of a financing ecosystem to support the needs of clusters;
- Provide funding for the early stages of a cluster initiative, but ensure counterpart funding is provided in a model that over time reverses the funding formula;
- Support cluster initiatives through which competitiveness strategies are developed, implemented and managed. As a rule of thumb, such initiatives should be private sector led;
- Target incentives and support to strengthen weak cluster segments;
- Fund the training of technocrats and cluster stakeholders in clustering as a tool for industry growth;
- Rationalise state institutions and establish key performance indicators to ensure that they meet the needs of economic

clusters;

- Where government is involved in tertiary education, direct curriculum and research and development to meet the needs and growth trajectories of economic clusters.

At the **Country Level**, the *private sector* should:

- Develop leadership competencies to build trust towards working together;
- Initiate cluster initiatives;
- Educate government on the targeted support needed for growth;
- Collectively invest in productivity enhancing projects which serve the common interests of the cluster; and
- Create stronger linkages between cluster firms and institutions to encourage institutions to respond to the needs of the cluster for improved productivity and innovation.

At the **Regional level**, institutions such as the CDB should:

- Support the training of regional policy makers, private sector institutions and firms in clustering and cluster management. The European Union currently funds an annual program in “Cluster Excellence” which can be used as a model for the Caribbean;
- Establish and fund a regional cluster fund to support national cluster development along the best practices defined in this analysis. Clusters should have to apply for such funding based on annual calls for proposals. There should be a requirement of counterpart-funding from the cluster whether in cash or kind. Again, the European Union has a model which can be adapted for Caribbean use;
- Establish a “Regional Cluster Observatory” to collect and manage cluster data and monitor and evaluate cluster performance on an ongoing basis. There are many best practices from which the Caribbean can learn.
- Establish a special fund to promote “Regional Clusters” as distinct from country clusters with regional potential. Such a fund would support the operations of regional cluster initiatives, which are private sector-managed, to develop and execute competitive strategies.

Several of the recommendations can be incorporated in national development plans for productivity, growth, and development and also the CARICOM Strategic Plan. For example, Jamaica has established an Economic Growth Council and the OECS has formulated a Growth and Development Strategy. Furthermore, the Heads of Government have established a number of regional commissions (Economy, HRD and ICT) which can take some of the recommendations on board. The results of the study can complement work undertaken by the development partners namely the Caribbean Growth Forum and the Future of the Caribbean project.

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