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**INDUSTRIALIZATION, NEW TECHNOLOGIES AND COMPETITIVENESS
IN THE CARIBBEAN**

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Introduction

The present global economic climate and new trading regimes demand that Caribbean countries become more competitive in all their activities and not just in the manufacturing or agricultural sectors, the main focus of most discussions on trade liberalization. On the surface, there seem to be few areas in which small States with limited resources can become competitive, except in tourism, that does not in itself require technological developments by the States themselves. The use of appropriate technologies and policies to properly manage the resource is not always seen as vital to the continued survival of the industry. In such a scenario, States that play catch-up and continue to depend solely on imported technologies and processes, thereby replacing their indigenous knowledge base and activities, may never attain competitiveness in their products.¹

While technological development and its link to competitiveness has been long recognized, countries of the Caribbean, like most developing countries, depend on technology transfer more than technological development for their needs. The often cited reason is that a particular problem of developing countries is the lack of finance needed for endogenous research for technological development. There exist, therefore, a number of programmes promoting technology transfer from developed countries. However, while some countries have been able to take advantage of these transfers and benefit from them, the overall record of technology transfer to developing countries has not been encouraging. The results suggest, therefore, that there is no real substitute for indigenous technology generation to augment imported technologies.²

The lessons from the history of science and technology suggest that competitiveness is usually achieved when interventions are made in the products and processes that are already endemic in the society. Thus, the Europeans could borrow gunpowder from the Chinese and, by using it as a main instrument of war, were able to subjugate the inventors. Shakakan could transform a small tribe in Africa into a mighty fighting force that threatened the British army by simply reducing the length of the spear that was already in use, and making it a thrusting weapon rather than a throwing weapon. The Internet is now blossoming on the world stage from its modest beginnings in 1955 in the United States Defense Department.³

Another important component of the technological equation that leads to competitiveness is integration of activities that support, rely on and reinforce each other, thus creating true industries. This is a critical point that seems to have been missed in the region and the word “industry” has come to mean any simple or one stage activity. The

¹ Dunning, John. H and Hamdain, Khalil – The New Globalization and Developing Countries (United Nations University Press, UN, 1997)

² Girvan and Jefferson - Caribbean Political Economy (New World, 1967)

³ DeGregori, Thomas – A Theory of Technology: Continuity and Change in Human Development (The Iowa State University Press, 1985)

word “sector” may have been a better word to denote these activities. Take the apple for example. Besides the fresh fruit that floods the Caribbean market, there is apple juice, cider and vinegar, all sold in the Caribbean from the United States. Research work and technological interventions to develop new products helped to create a truly integrated industry around the apple fruit. Can the same be done for bananas, mango, breadfruit or any of the many fruits and vegetables that are in abundance in the region?⁴

The paper will analyze selected sectors in the subregion namely, the banana industry, the food sector, tourism and small and medium-sized enterprises to show how industrialization, through technological development, can lead to competitiveness. It will also suggest some policy implications, actions to be undertaken and hurdles to overcome if the region is to benefit from its abundance of flora and fauna and to manage these for the betterment of its people.

The banana industry

The recent problems facing the banana “industry” in the Caribbean serves to highlight the nexus between competitiveness and technological development. Besides pointing to the need for intelligence gathering in markets, and the need to develop or promote technological inputs to meet the needs of future markets, the crisis also highlights the need for integration of activities and the development of ancillary products from local raw materials to help sustain activities in the sector. Nowhere is that need more critical than in the agricultural and food sectors in the region. The decline in agriculture, especially primary agricultural exports, as well as the high food import bill make it necessary that immediate action be taken to reverse these two trends if the region is to provide an adequate standard of living for its population. In order to develop the policies that would enable a reversal of these negative trends, it is necessary that a critical analysis be undertaken of past activities in the agricultural and food sectors in the context of the relationship between technological development, industrialization and competitiveness in the region.

A brief history of the banana sector

The introduction of beet sugar in the United States in the late 1950s virtually sealed the fate of the sugar cane producing countries of the Caribbean. Although some countries continue to grow the crop, the islands in the Windward chain moved in the early 1960s to replace sugar cane with bananas. Unlike sugarcane which was a seasonal crop, bananas can be grown and harvested year round, lends itself to small farming conditions and, by so doing, provides a weekly income to the farmers.⁵

These very conditions, however, allowed for the introduction of the crop without proper policy for its long-term survival. Small farmers or peasants suddenly became politically important and every perceived barrier was broken down to allow for an

⁴ von Schlebrugge, Karin – Research for Development (Swedish Agency for Research Cooperation with Developing Countries (SAREC), 1991)

⁵ Organization of Eastern Caribbean States – The Economic and Social Contribution of the Banana Industry in the OECS (High Level meeting of Windward Islands Banana Exporting Countries 1997)

increase of production. Especially critical were the planting of bananas on steep slopes; indiscriminate application of pesticides; inadequate quality control measures; poor agronomic practices that contributed significantly to soil erosion, and clearing of forested areas for the cultivation of the crop.⁶

From the above it becomes clear that the sector was developed on the basis of poor scientific and technological considerations with economics and politics playing a more significant role. Within a protected market in the United Kingdom there was little problem in marketing the fruit as these islands were still colonies of the United Kingdom. The demand for the fresh fruit was also so high that scant attention was paid to the quality of the fruit that was being exported, or the effect that the bad agronomic practices were having on the local environment.

Operations

Initially the operations of the industry were run by an association of farmers, both large and small, with government control of the Board. The Board was responsible for setting policy and decisions and the day-to-day management was carried out by the Association. The Association purchased fruits from the farmers and then sold to Geest Industries, a United Kingdom company, which was both the shipping and marketing agent. The Association bought inputs such as fertilizer, boxes, weedicide, etc. in bulk and distributed to farmers on credit. The price paid to the farmer for his fruit was determined by the Association in conjunction with Geest Industries. Recently, WIBDECO, a company formed by the associations and the individual farmers to market their bananas has taken over the assets of Geest Industries and is now responsible for all marketing arrangements in the United Kingdom.

Research and technological development

Research and development work, primarily confined to agronomic practices, was undertaken by WINBAN, a grouping of the four Associations of the Windward Islands. A cess was levied on farmers for the financing of WINBAN with some funds allocated by Geest Industries. Throughout its operations WINBAN engaged primarily in agronomic research and not research that would lead to new product development in agro-industry.

Although some agronomic practices had been shown to significantly improve fruit quality there was little incentive to encourage farmers to adopt those practices. It was not until the quality of fruit had deteriorated considerably that a Certified Farmer Programme was introduced placing emphasis on individual farmers and their products, for which a price differential was given to the better producers.⁷ The Certified Farmer Programme

⁶ Ahmed, Belal and Afroz, Sultana – The Political Economy of Food and Agriculture in the Caribbean (Ian Randle Publishers; James Currey Publishers, 1996)

⁷ Organization of Eastern Caribbean States (OECS) – High Level Meeting of Windward Islands Banana Exporting Countries: The Macroeconomy of the Windward Islands and Banana Adjustment Initiatives (1997)

required that a farmer introduce into his field a systemic programme of technological practices that had been developed by WINBAN. These included proper field sanitation practices, timely and adequate fertilizer applications, sleeving to protect the bunch from insect, scratches, etc., and post harvest practices in handling the fruit from the field to the selling depot. These practices required a level of sophistication on the part of the farmer that proved difficult for the very small farmers, especially the discipline required and the increased capital outlay to meet these new standards.

With the introduction of the Programme a number of very small farmers could not meet the new standards and, therefore, went out of banana production, with some simply abandoning their fields, causing an increase of insect and pest infestations through lack of field sanitation. The introduction of the Certified Farmer Programme, however, brought increased benefits to the other farmers as the quality of the fruit now produced was of a higher standard that fetched a better price on the market. The average price for the fruit moved from 30cents/pound to 45cents/pound in the low period, an increase of almost 75 percent. This provided some viability to the farmers. However, to the extent that bananas are still being cultivated on slopes, where erosion remains a problem and soil fertility is seriously affected, the continued need to increase fertilizer applications to offset soil fertility loss will render the operations uneconomical in the long run due to increased production costs.⁸

While there have been considerable discussions on diversification, the emphasis has been put on the cultivation of other crops, such as cashew, rather than on a programme to integrate within the industry by producing other products from the bananas that failed to meet the new standards. These crops, of course, required a longer gestation time than bananas, are seasonal and required initial capital outlay on the part of the farmers. Ironically, in the 1970s the Ministry of Agriculture encouraged mixed cultivation of bananas, cocoa and citrus. However, in the drive to meet the ever-increasing market share, mixed cultivation was abandoned in favour of monoculture. With that shift, whatever safety net the farmers had against reduction in price was removed.⁹

Although not part of any systematic integration programme, in the 1970s some attempt was made, with assistance from Germany and the Caribbean Development Bank (CDB), to develop a fiber from the banana. However the stem of the plant was used and it was found not to be profitable since, among other things, the fiber ratio was low and the cost of transportation was high. In addition, the stem contained large amounts of water that added to the weight factor. The project was abandoned without exploring the use of alternative parts of the plant that have greater concentrations of fiber. *Ironically the stalk of the banana is now used in Costa Rica and Japan for the production of the fiber.*¹⁰

⁸ International Labour Organization (ILO)/Caribbean Office and Multidisciplinary Advisory Team (CAMAT) – Restructuring and the loss of Preferences – Labour Challenges for the Caribbean Banana Industry (1999)

⁹ Organization of Eastern Caribbean States (OECS) – Progress and Prospects for Diversification of the Agricultural and Export Sectors (1997)

¹⁰ UNECLAC/CCST – Report of the Workshop on Alternative Uses of Banana and Banana Products (1997)

The present state of research suggests that the banana stalk can be put through a preliminary digestion process in the field by farmers. The semi-processed product can then be dried using a solar dryer and sold to processors for the final processing. This would significantly reduce the cost of transportation and increase the revenue to the farmer. A similar arrangement can be made for the excess fresh bananas that do not meet market standards.

Products identified from the banana

Apart from the fresh fruit, the banana, when ripe can be used for making puree, ketchup and wine. As a green fruit it can be used as a staple, made into chips and banana salad. From the plant a fiber can be extracted to make paper, twine and cardboard boxes. **(Annex I)**. The latex is itself a very powerful stain. Banana puree can therefore replace tomato puree as a base for a number of products. The twine from the fiber can be used to prop up the banana plant. Exercise books, notepads, made from banana fiber can be marketed as environmentally friendly products. The latex can be used as a stain in the crafting of batik cloth. The green banana can also be used as a feed-base for animal feed especially in the pig industry. (For a more complete list see **Annex II**).

Linkages with other sectors

Although identified and discussed in many forums, there was very little linkage between the banana industry and the tourism industry. There were hardly any campaigns to promote the use of ripe bananas on a large scale in the hotels, nor was an aggressive home-economics/food preparation programme mounted to develop alternative dishes from the banana. As a locally produced fruit its use as a staple by the general population is minimal, either cooked or as a fresh fruit. *In Martinique however, in order to increase local use, the fruit is now available at supermarkets in a prepared package that can be used immediately or refrigerated and cooked when needed. This technological intervention has significantly increased the use of the banana as a staple.*¹¹

A stated policy of many Caribbean governments is to attain self-sufficiency in meat products for the protein requirements of their population. In a number of countries the poultry and pork industries have been identified as the areas that can lend themselves to that self-sufficiency. However, a costly item in the production of meats is the feed, the bulk of which, at present, is imported from the United States. Research has shown that the banana can be a good substitute for the corn base that is used in the imported feed. Even with the volume of reject banana available, no effort has been made to develop a feed based in the banana.¹²

Banana cultivation could also be linked to the paper sector in the region especially exercise books and note pads. The technology exists for developing good quality paper from the banana plant and, with the addition of the other *Musa spp* in the region, e.g.,

¹¹ Fontenard, Silvanius (Organization of American States) (OAS)) – Project Proposal for the Processing and Marketing of Banana Products in Saint Lucia, West Indies (1986)

¹² Report of the Secretary General, Caribbean Community 1977 - 1979

plantain and bloggoy, could provided a reliable source of raw materials for an ecology friendly paper programme. Research in the United Kingdom has also shown that the fiber from the banana can be used in soil erosion control projects on road banks and is also an excellent material for absorbing oil in oil spill clean-up efforts.¹³

While some may argue, even without data, that such ventures may not be economical, it must be borne in mind that the objective is not only to reduce the cost of imported paper but also to increase the returns from the banana cultivation and thus make it profitable and competitive.

Benefits

There is no doubt that the banana industry brought tremendous benefits to the islands. However the income from the sale of the fresh fruit was not utilized in integrating the industry, or establishing research and development capabilities in agro-processing using the banana as a base. To the extent that that was not done, an opportunity was lost in developing in-house capability and integrating banana cultivation into a true industrial business.¹⁴

Consequence of the policy

Historically, agricultural development in the Caribbean has concentrated on the production of primary goods for the export market. Although, in the case of sugarcane, a secondary product, rum, has been produced in the region, very little new technology has been introduced in the industry, particularly in the area of yeast or fermentation technology, an important component of the rum industry. For all practical purposes, bagasse, a by-product of sugarcane is wasted, being burnt in the furnaces. Only in Guyana is it used as a source of electricity to power the area of the plant and some adjoining houses in the community.

When beet sugar was introduced into the world market the price of cane sugar slumped and Caribbean producers suffered losses because of high cost of production. In addition, the absence of other products from sugar that could have increased the earnings of producers and thus upkeep the industry added to the problem of production cost and non-viability. With that lesson in the background, one would have expected that the introduction of the banana as the crop to replace sugarcane would have been done on a sound technological and industrial basis. Unfortunately that was not to be. Efforts were concentrated on the fresh fruit with little attention paid to industrial integration.

At present banana farmers depend solely on the sale of fresh fruit for income. However, given the high percentage of rejects that cannot meet stipulated standards,

¹³ Rickson, R.J. – Natural Fibre Mats for Erosion Control and Vegetation Establishment (Paper given at PIRA Conference on non-wood fibres for Industry at the Silsa Research Institute, 1994)

¹⁴ Rickson, R.J. – The Potential of Banana Plant Products in the Manufacture and Application of Geotextiles (Paper presented at a workshop on the Alternative Uses of bananas and Banana Products in Saint Lucia, 1994)

production costs remain high with returns low. The reason is that the cost of inputs and efforts applied to the field is realized only on the sale of the fresh fruit and no income is derived from the rejected fruit. An industrial programme to utilize the extra produce would increase the return to the farmer and thus make banana farming more competitive as an integrated industry.¹⁵

Food sector and Caribbean cuisine

Much has been written and said about the links that need to be developed between the agricultural sector and the tourism sector with respect to the provision of fresh produce to hotels, restaurants and other establishments that cater to tourists. The smaller hotels very often grow their own produce or purchase produce directly from farmers. With trade liberalization, local farmers have to find creative ways to improve the quality and quantity of produce to supply the hotels, restaurants, etc. Caribbean chefs have to devise creative ways of providing the North American and European tourist with food that is both Caribbean in flavour, but tasty enough for foreign palates. Competitiveness can be achieved by a simple method of import substitution where local fruits and vegetables are used. For example, Trinidad housewives make “apple” pies using the christophene, a local vegetable. By pureeing the pulp, adding vanilla flavouring and apple cider purchased in the supermarket a filling is made that is very close in taste and consistency to that used in apple pies. Caribbean cuisine is as varied as the people that make up the islands and this may be used as one of the selling points.

A number of students take Home Economics in school as an academic subject and may even take an examination on the subject. However, upon leaving school there is no opportunity to translate what was learned into a practical business. Thus, at a school function, it is not unusual to taste some very good delicacies prepared by the home economics class. Things like breadfruit balls, banana salad, tamarind juice and a host of other products made from local fruits and vegetables. However, out of the school system and in the restaurants, it is not uncommon to find that potato salad is substituted for green-banana salad and macaroni pie for breadfruit balls; carbonated beverages quickly replace tamarind and guava juices.

In the 1970s a number of Produce Chemist Laboratories (PCLs) were established in the Organization of Eastern Caribbean States (OECS) in order to promote agro-processing. While a number of products were developed at these institutions using local raw materials, these were never translated into viable businesses. A number of reasons have been advanced for this failure. The following three reasons seem most plausible:

- (a) With the sale of the fresh banana fruit at its peak there was very little interest in agro-processing by the general population.
- (b) The newly-found wealth made it easy to acquire foreign tastes and products that were being promoted by the business sector through advertising.

¹⁵ OECS – Modernisation of the Banana Industry through the use of Appropriate Technology

(c) No system was put in place to bring the results from the laboratory to prospective businesses as the same food chemists were the ones responsible for market and business development. They were not trained for these varied tasks.

The lack of apparent success of these institutions resulted in diminished support for them and most are now in a state of limbo. A critical analysis of the problem would have shown that the fault was not with the institutions but with the lack of a proper policy for the promotion of agro-processing and a lack of understanding on the mechanisms of technology transfer and business development.¹⁶

Tourism

With the exception of Trinidad and Tobago, Jamaica and Guyana, the majority of the English-speaking Caribbean countries are not considered rich in natural resources and therefore have to depend on tourism as a major source of income. While Jamaica is also rich in natural resources, however, they have long since recognized that natural resources are finite and have therefore developed a very vibrant tourism sector to the extent that in 1998 tourism was the country's largest foreign exchange earner, producing US \$1.2 billion.¹⁷ According to information from the Caribbean Tourism Organization (CTO) over 500,000 people are employed in the tourism industry in the Caribbean which means that every one in four jobs falls within this sector. Over the next decade an estimated 36 percent increase in tourist arrivals is anticipated, therefore, travel and tourism has the potential of expanding by 70 percent creating 2.2 million jobs by 2007. The United States remains the most important source of tourists to the region, despite the steady fall in its share of total tourist arrivals to the region in recent years. The United States' share has declined from 61.8 percent of total arrivals in 1987 to 48.5 percent in 1996. On the other hand, while there has been no significant increase in tourist arrivals from Europe in the past 10 years and the figures when compared with their American counterparts are low, Europeans generally stay longer than visitors from other major markets and thus account for a higher share of total bed nights spent by tourists in the region than their numbers would suggest. Intra-Caribbean tourism is being targeted for future growth as well. Travel and tourism along with telecommunications and information technology are predicted to be the three leading services in the twenty-first century's economy.¹⁸

Tourism will therefore continue to be a major source of income for most Caribbean countries. It is precisely because of the growing awareness of tourism as an industry and a catalyst for economic growth and development that competition for the tourist and for tourism expenditures has been significant in recent decades. It is a highly competitive industry which is often manipulated by forces in the marketplace to bring visitors to a destination by offering group travel discounts, incentive off-season rates, and volume commission over-rides. Caribbean countries, as a destination for tourists, promote the region with spiels of *inter alia* great climate, stable currencies, easy air links,

¹⁶ Bacchus-Taylor, Gail – The Produce Chemist laboratories (PCL's) in the English-speaking Caribbean Islands: A case Study (1995)

¹⁷ Caribbean/Latin America Profile 2000 – Caribbean Publishing Company Limited (1998)

¹⁸ Tourism in the Caribbean – <http://www.cha-cast.com/tourism.htm>

regular shipping services. This may indeed be true, but the fact is that many other destinations world-wide can boast of the same advantages. Competitiveness cannot therefore solely be achieved by promotions and advertising and world-class marketing strategies. These tools may be used to attract visitors to the Caribbean but once here it is up to the local populace including government and the private sector to ensure that they tell their friends and associates and encourage repeat visits. This can only be achieved by using technology to produce a quality service at reduced rates and attract a higher percentage of the market.

Imported technology is used in the region and this has been the case for decades. Hotel rooms are air-conditioned, the type of food served and goods utilized are imported from Europe, North America and increasingly from Asian countries like Taiwan and Hong Kong. These all have implications for the cost of providing services and if competitiveness is to be achieved in the industry then a closer look must be taken at those areas where change may be brought about by utilizing and/or adapting the technology that is available. Because each of the countries is at varying stages in the evolution of the tourism industries, it may be easier in some cases than others to achieve competitiveness.

While technology can be utilized to increase competitiveness, it cannot be done in a vacuum. The World Travel and Tourism Council (WTTC) advises that governments and the industry must work together to make travel and tourism a strategic economic development and employment priority. In other words, factor tourism into mainstream policy decisions. Tourism plays a major role in growth and job creation across the economy.¹⁹ It is woven into the fabric of domestic and international commerce through travelers' actions and consumption patterns. Its component sectors, such as transport, accommodation, catering, entertainment and travel services, are closely linked to other industries that utilize technology. In many Caribbean countries these links, are recognized but, unfortunately, not fully developed.

Small developing countries, especially when poor, face difficulties in institutionalizing the scientific and technological services and of necessity will have to choose which technology to support and develop and which to seek from developed nations. Simple technology, not necessarily imported, therefore, may be utilized in many areas of the tourism sector starting with accommodation - from the furnishings and furniture used in our hotels to the myriad of energy and water saving and/or recycling devices and methods available. Science and technology could also be applied in areas such as cuisine, transportation and entertainment, all of which make up a significant portion of employment, expenditure and income within the sector.

This section seeks to examine some of the areas whereby competitiveness may be increased in the tourism sector by using available the technology.

¹⁹ <http://www.ttjobs.com/ttj/partner>

Accommodation

In local stores, many items targeted for visitors, while bearing the country logo or tropical motif, are produced in other countries, usually Asia, where labour costs are cheaper. Similarly, much of the furniture and soft furnishing are imported from Europe, North America, Singapore, Malaysia and other parts of Asia. Local artisans are rarely contracted to supply the hotels, with “poor quality” of local craftsmanship cited as one of the reasons for importation of goods. Very few of the countries have functional bureaus of standards or agencies with the facilities to encourage compliance to international standards of quality. Also, the required support systems to micro entrepreneurs is either lacking totally or, where they do exist, do not have the required resources for sustained development. Existing and new local micro and small-scale enterprises will benefit significantly from enhanced technological support. In addition to creating jobs and developing entrepreneurial skills, small-scale enterprises perform other functions. They provide services to markets not generally served by larger companies, encourage competition within the community and more often than not utilize local raw materials, thus encouraging both import substitution and export promotion.²⁰ It will therefore be necessary to first put into place, programmes that support the local artisan.

Energy saving technologies

Electricity and lighting - Lighting is one of the largest energy users within a hotel, typically contributing 30 percent to 40 percent of a hotel’s electricity costs. There are many options available to the hotelier in lighting fixtures and light bulb types that may be used to conserve energy and reduce costs. These include *inter alia* 20 watt-screw-in compact fluorescent bulbs for the 75-watt incandescent bulbs that are currently in use. Other options include solar lighting using photovoltaic technology that allows for the use of the sun’s energy to provide electricity for a building. While photovoltaic systems are expensive to install, modules last for at least 20 years and maintenance of the units is fairly simple. A simpler option for solar lighting is to purchase exterior light fixtures that have built-in solar panels. These fixtures will collect the sun’s energy to power them. While more expensive than typical lighting fixtures, they pay for themselves over time in electricity savings. If a hotel currently uses a 75-watt incandescent bulb in guest room fixtures, changing to a 20-watt screw-in type compact fluorescent bulb (a direct replacement requiring no fixture change) savings would amount to US\$18 per year, per bulb, in electric costs alone. It means that even at a cost of US\$15-\$20 per bulb, with an estimated four hours use per day, these bulbs will pay for themselves in about one year. One bulb lasts for approximately seven years, a point of fact that alone helps justify the increased cost of the bulb.²¹

Water heating - Solar energy may also be put to use in heating water. Solar water heating systems utilize flat, glass-covered boxes with a dark interior that retains heat to collect the sun’s energy. The two types of systems available (active and passive) both

²⁰Technological Dimensions of Economic Diversification and Development in the Caribbean, with Specific Reference to the OECS (UNECLAC LC/CAR/G.567, 1999)

²¹ Johnson, Alyssa – Green Buying Guide – Caribbean Hotel Association (CHA), 1999

require a provision for energy storage or a back-up system to replace or supplement energy when the sun is not available. Again, while fairly expensive to install, there is still a considerable reduction in annual energy consumption. Solar water heaters will reduce a hotel's energy bill and in many areas the savings can be substantial because of the high cost of electricity and natural gas. The solar water heater industry of Barbados is the best known example of the use of solar energy in the Caribbean. A solar water heater pays for itself in three years or less and after the repayment period is over, provides a return of 40 percent on the original capital investment of US\$1500 assuming an energy consumption of 4,000kWh per year at a cost of US\$0.15 per kWh.²²

Guest Room Air Conditioning – Most hotels use some type of air conditioning system to provide for the comfort of their guests. The system of choice is often a single-room system since these units are less expensive to purchase initially. The efficiency of an air conditioning unit is called the energy efficiency ratio (EER) and many of the single room systems installed have EERs of 9 or less whereas the newer models and systems boast EERs as high as 12 or 13. The benefits of upgrading to more efficient systems can be significant. For instance, a hotel with a room air conditioner that has an EER of 9 could cut the cost of operating the unit by 25 percent if upgraded to a unit with an EER of 12. In the Caribbean, these cost reductions could be substantial, since air conditioners are used year round and electric cost are especially high.²³

Water use - With the possibility of increasing tourist populations in the Caribbean, it is expected that water demand will continue to increase and if competitiveness is to be achieved, effective and efficient conservation measures must be taken. The technology already exists in the form of low-flow showerheads, faucet aerators and automated faucet controls, low flush toilets, energy and water-saving laundry equipment and laundry water re-use systems, just to name a few. All the above technology is already in use in some hotels in the region. In a report by the Caribbean Hotels Association (CHA) a case study done revealed that the Sweptaway Beach Resort in Jamaica installed 210 aerators with flows of 0.5 gallons per minute and also tightened faucet valves to reduce the flow of water from faucets. These initiatives saved an estimated 1,000 gallons of water per day. Prior to implementing their water conservation project (which also included repairing several leaks), the hotel was using 98,000 gallons of water per day. The property has reduced water use to only 49,000 gallons per day with very little expenditure. The hotel has reported no problems to date with the aerators and indicated that no extra maintenance was required.²⁴

Sustainable tourism

Hotels that already subscribe to the above technologies also subscribe to “Green Management” the term coined to describe “environmentally conscious” business entities.

²² Professor Headley, Oliver – Solar Thermal Systems for Use in the Caribbean (proceedings of the Caribbean High Level Workshop on Renewable Energy Technologies – The World Solar Summit Process (UNESCO, CCST, UWICED), 1994)

²³ Johnson, Alyssa – Green Buying Guide – (Caribbean Hotel Association (CHA), 1999)

²⁴ Ibid

Another practice that is being promoted is that of sustainable tourism. The tourist industry in the Caribbean is primarily based on the region's natural and finite resources. Competitiveness can only be achieved within this context of resource use and renewability. It is a paradox that the notion of sustainable development has been promoted largely from the rich countries of the North which were primarily responsible for exploiting the natural resources of developing countries, such as those in the Caribbean. For us in the region, a crucial aspect of sustainability and perhaps increased competitiveness is the maintenance of the productivity of resources. One relatively easy means would be to seek a sustained increase in recovery and recycling. The use and further development of new technologies, in which the materials of production or its polluting effects are decreased, can also help achieve this (Pearson 1985).²⁵ Because this can be pursued without greatly affecting existing vested interests, it is attractive to us in the Caribbean. Recovery and recycling about which much has been written is one means of encouraging sustainability and competitiveness.

Sustainable tourism, however, is not simply about reusing and recycling but refers to a broad range of recreational activities occurring within the context of a natural environment. The environment considered here in its broadest sense as encompassing socio-economic and cultural phenomena as well as bio-physical elements represents not merely a constraint for tourism development, but a resource and an opportunity. Ideally, satisfying tourism settings grow out of complementary natural features and compatible social processes. According to John Pigram in a paper entitled *Alternative tourism: Tourism and sustainable resource management*, tourism can and does contribute to environmental degradation and it can be self-destructive, but it also has the potential to bring about significant enhancement of the environment. An emerging consensus is that sustainable tourism has identifiable niche markets, each with a unique set of characteristics.

But how could competitiveness be achieved within the context of sustainable development? Unlike the technologies that could be adopted that were outlined in the preceding paragraphs, the practice of sustainable tourism, the results of which are likely to lead to increased competitiveness, are more long-term than immediate.

In 1995, the WTTC, the World Tourism Organization (WTO) and the Earth Council – representing private, public and environmental viewpoints – unveiled a joint report, Agenda 21 for the Travel and Tourism Industry – Towards Sustainable Development. The report's central message is that achieving sustainability will depend on: (a) a balance of private initiative, economic instruments and regulation; (b) translating global principles into focused local action; and (c) new public-private sector delivery mechanisms. It proposes specific action areas for realising these goals, which the partner organizations are promoting with governments and industries worldwide. These cover detailed issues as prescribed above, such as waste utilisation, energy and non-renewable resource conservation, water management, local community involvement,

²⁵ de Kadt, Emanuel – *Making the Alternative Sustainable: Lessons from Development for Tourism from Tourism Alternatives: Potentials and Problems in the Development of Tourism* (University of Pennsylvania Press, 1992)

customer awareness and staff education and training. The report also suggests practical, locally driven mechanisms to bring together government, industry, community and environmentalist interests to constructively realize improvements in environment and development.²⁶

It should be noted that in all issues of sustainable development, community involvement must be highlighted. Without an integration of the local community any gains in competitiveness that might be achieved with the aid of technology will be short lived. The very nature of competitiveness demands that it be continuously increased. Visitors are to be encouraged and this can only be done when the local community buys into the gains to be derived from tourism and the locals are a part of the process.

Culture and entertainment

“We don’t want tourism. We don’t want to be degraded as servants and dancers. That is cultural prostitution. I don’t want to see a single one of you in Hawaii. There are no innocent tourists.” A few years ago, in a short note published in “Annals of Tourism Research”, George Pfafflin approvingly quoted those sentiments of a native Hawaiian, expressed at a church-sponsored conference on tourism and the Third World. In that note, Pfafflin repeated the view that the chances for genuine encounters between tourists and host populations are extremely poor. This was a widely held view in the 1970s and 1980s. The American anthropologist, P.F. McKean, admits that by opting for cultural tourism as a means to modernization, a country consents to transform its culture into a tourist product, its heritage into profit-making capital. In such cases, every society must construct its future by clinging to its past. This implies that the society turn back toward its past in order to construct out of its heritage touristically recognizable symbols of identity. The society has to prove that it is truly unique. On a treatise on tourism, Marie Françoise Lanfant and Nelson H.H. Graburn suggested that to choose one’s heritage as a symbol of identity leads to ambivalence. Should one restore it to the original state in which it was handed down by ancestors? Should one set it apart as an attraction for foreign tourists? For in this case, its restoration would follow the procedures of cultural engineering rather than of historical methods or subjective memorizing. Heritage would have to be managed by new criteria in order not only to be profitable but also added to the catalogue of world heritage.²⁷

One example of how culture and entertainment has been linked to create a special niche for tourism is reggae music in Jamaica. Jamaica’s popular music has achieved world fame through the emergence of this genre of music that emerged from traditional indigenous Jamaican music with African and Black American roots and shows no sign of abating. This music is heard and recognized world-wide with its own category in the prestigious United States of America’s Annual Grammy Awards. Jamaica has also managed to create an entire tourism industry subsector by the hosting of *Reggae*

²⁶ <http://www.ttjobs.com/ttj/partner>

²⁷ de Kadt, Emanuel – Making the Alternative Sustainable: Lessons from Development for Tourism
Tourism Alternatives: Potentials and Problems in the Development of Tourism (University of Pennsylvania Press, 1992)

Sunsplash, an annual concert festival that was inaugurated in 1978. The festival, featuring artistes of reggae music both local and foreign is internationally recognized with thousands of visitors annually. Synergy, the company that founded the festival with the support of the Jamaica Tourist Board proved that this was a musical event that attracted the interest of people all over the world. From a one-day event in 1978, *Reggae Sunsplash* has evolved into a week long festival that is filmed and broadcast in major world cities. A *Reggae Sunsplash* package tour in 1984 took shape resulting in a successful one-day show at the Crystal Palace in London, followed in successive years by tours to major cities in the United States, United Kingdom, Europe and Japan.²⁸

The success of reggae music and its attendant *Reggae Sunsplash*, while not solely the reason that Jamaica is renowned world-wide is one example of how culture and entertainment may be used to increase a country's competitiveness. There was a time when, if a Caribbean person were to say they were from the West Indies, they would be asked where that place was located in Jamaica. It has taken many years, but encouraged by the success of Jamaica's use of culture and entertainment, other Caribbean countries have more recently begun to organize cultural events as part of their strategy to promote their islands. Tourism officials in Trinidad and Tobago have only within the last decade been promoting their carnival internationally. There exist many other festivals in that country reflective of the races and religions that may be used to attract tourists and increase their competitive edge over other islands. Saint Lucia and Barbados have both utilised the concept of entertainment-based tourism with jazz festivals being organized on an annual basis and attracting visitors by inviting internationally recognised musicians to perform against a tropical background.

One way whereby the region's culture may be promoted by the use of technology is via extensive use of Internet. While all Caribbean countries are on the internet, it is only Jamaica and Trinidad and Tobago that have taken advantage of the interactive nature of this medium to broadcast cultural events. Carnival 2000 is one such example. A web site established by the Trinidad and Tobago Industrial Development Company (TIDCO), whose mandate is to promote industry and culture in that country, was responsible for the development of a web site that broadcasts segments of the parade of bands festival live. While still in its infant stages in the region, this is one use of technology that would have a positive impact on the promotion of the Caribbean as a tourist destination.

Competitiveness in any industry may be achieved by the use of technology as evidenced by some of the areas highlighted with respect to tourism. It should be noted however, that reduced operating expenditure does not necessarily translate into reduced rates. For the business it may simply be a means of increased profits. This is the short-term view and cannot sustain itself in the long run. It is only in offering quality at reduced and affordable prices that attract a significant share of the market can the tourism industry in the Caribbean become competitive.

²⁸ <http://www.reggaesunsplash.com/history.htm>

Small and medium-sized industries (SMEs)

In spite of the numerous programmes, projects, institutions and agencies providing assistance to small enterprises, there is as yet no systematic programme for the encouragement and/or promotion of competitiveness in this sector. A notable absence is the provision of an outreach or extension service to provide continuous technological information to this sector. It is still the norm to have irregular short-term training courses for practicing, with the emphasis on accounting and management. There exists no training in product development and very few quality assurance programmes, both of which require long-term monitoring. In the OECS for example, there are five agencies providing assistance to SMEs - the National Development Foundation (NDF), the Small Enterprise Development Unit (SEDU), the Small Business Development Association (SBDA) and the Chamber of Commerce. Yet with the exception of a newly established Bureau of Standards that is understaffed and lacking equipment, there is no research institution that can provide technological support to SMEs. The PCLs established in the 1970s to promote agro-industrial development have all but disappeared or are at various stages of neglect.

The situation is not different in the handicraft and woodwork enterprises. The community colleges provide initial training in these areas but there are no follow-up programmes except, as already noted, the occasional training seminar. In addition, the entrance requirements to these colleges are over and above the qualifications of most persons who are interested in these areas and often they are left out of the benefits of formal training.

In the furniture industry, headless iron nails are the preferred method of securing wood when there is no doubt that small brass screws or dowels will do a better job and last longer. The fact that corrosion is a serious problem on small islands has not come to be appreciated in most industries. As such, serious infrastructural damage is very common on the islands, damage that invariably increases the cost of production and loss of productivity.

In the past, woodworking was taught in primary schools, not as an examination subject, but to enable some students to have a skill from which to earn a living. Many a hairbrush, broom, mat from sisal, and chairs made by school children, found themselves on the market during annual district exhibitions. Spinning tops, kites and small toy trucks were also items handcrafted by students. A number of these students continued an apprenticeship programme in the village in the areas in which they were found to have an aptitude and earned, not a diploma, but money from their art after leaving school. Now, of course, these items are purchased from outside of the Caribbean region.

Promoting competitiveness through technological development

A serious divide has existed in developing countries about the nature of research and development that should be undertaken by the State in light of limited financial resources. Whereas some policy makers and researchers favour what is considered applied research, others insist that there is need for some basic research to support

applied research. The problem is usually compounded by the nature of training provided to would-be researchers. Budgetary constraints at the universities limit the opportunities for basic research, especially in terms of the availability of good quality laboratory equipment. Also, universities in developing countries tend to have limited linkages with industry so that practical and applied work can be promoted. For the most part efforts are concentrated on instruction and the little research that is done is geared more towards publication in reputable journals rather than solving practical problems. Graduates, therefore, are likely to have little preparation for solving some of the fundamental problems of development in the State. With limited industrial skills most graduates end up being employed in the public service. The following passage, taken from a proposal by a university for greater research funding outlines the direction of the university:

“Research does not fare well if it is maintained on a shoe string or, at best, if it is subject to feast and famine. Research is long-term sustainable development and cannot survive if it is expected to be turned on and off constantly....the region suffer in their research competitiveness and development because there is no significant competitive peer-review funding agency. In order to be more competitive for international funding we need to have an agency that will provide modest, but sustained funding for research, provided that, by international standards, the research is of a high quality. A criterion of general relevance to the needs of the country/region should also pertain”. It is interesting to note that the international standard requirements come first in the presentation and not the need to solve problems or supply practitioners to the society. The absence of a culture of research and development within the industries also contribute to the lag time in the introduction of new technologies. With the majority of industries controlled by foreign parent companies the branch plants acquire their technologies from abroad. Even the research into the adaptation of the foreign technologies is done abroad. There is, therefore, very little support for research work at the university and, *vice versa*, very little linkage between what is done at the university and what industry requires.

That scenario, originating from the plantation type economy of most developing countries, has been the major factor in the stagnation of research and development in developing countries and their lack of competitive products. The Caribbean is no exception. In fact, it is probably much more perverse in the Caribbean when the special problems of small States, e.g., limited natural resources, small market size, small GDP, etc., are taken into consideration. While it is fashionable to lay the blame on the plantation economy for the lack of competitiveness in developing countries the reality of the situation is that even after independence there was no concerted effort on the part of the political directorate to redirect development strategies and place emphasis on technological development. Few states in the region have well-defined science and technology policies for development and there is no regional blueprint for the development of or collaboration in science and technology. In a survey conducted by Gladstone Taylor on behalf of the Caribbean Council for Science and Technology (CCST) in 1996, one of the major findings was that among the territories visited and surveyed, there was no consensus as to what a science council was or what its functions should be. According to the study, the priority of functions assigned to a council

appeared to be dictated by the individual perception as to priority requirements of the country's science and technology infrastructure. Thus for some countries policy making was stressed, while for others an advisory function was most important. Still for others, the most important characteristics of a science council were the coordination of science and technology infrastructure, popularizing science and technology, facilitating research and development, gathering, storing and disseminating science and technology information and performing research and development activities. The study noted that none of the councils stressed the primary historical role of science councils which was to fund and support research and development, primarily at universities or research laboratories.²⁹ The predominance of economic instruments over technological considerations contributed to the easy way out approach. Thus by 1979 when the Vienna Programme of Action in Science and Technology was adopted at the United Nations, few Caribbean countries paid much attention to it or factored its contents into their development plans. But even as early as 1911 the lead role of technology in economic activity was recognised and written about.³⁰

Most actions on science and technology, therefore, cannot be appraised or accessed from a scientific standpoint or even an economic standpoint. However, while a policy document can help, the absence of that document should not in itself be seen as hampering development. Commonsense approaches, especially in small States, and building on existing practices through pointed and timely interventions of technology, can go a long way in promoting competitiveness. The policy, therefore, when developed, should spell out the methods and incentives that will be employed in the promotion of these technological interventions.

Unless a concerted effort in research and development is made to source and develop products and initiatives taken to determine national and regional needs, then the whole issue of competitiveness will continue to be elusive. The cosmetic industry in Europe and America by simply incorporating *aloe vera* derivatives into their mixtures is now minting tons of money from something that was common knowledge to Caribbean peoples of African descent. We are yet to market the qualities of coconut oil in any systematic way. Instead there is a move to give it up completely and adopt soya oil. On the other hand, New Zealand has been able to make the Kiwi fruit an international fruit with proper marketing. However, it must be remembered that the fruit was in widespread use in New Zealand before bursting on the world scene. In addition, international requirements for standards and certification will put pressure on developing countries to improve their research and development capabilities and bring their laboratories up to acceptable levels of sophistication.

The above points are made to show that to be competitive requires a thorough knowledge of both product and process. That knowledge is best resident in activities that are almost endemic to a society. The application of gun-powder to warfare is a good example of a people taking a foreign invention and incorporating it into what was a daily

²⁹ Taylor, Gladstone – A Review of Science and Technology Councils in the Caribbean: A survey conducted for the Caribbean Council for Science and Technology (1996)

³⁰ Schumpeter, Joseph A. – Theory of Economic Development (1912)

occurrence in their societies. That incorporation later gave them an advantage over the inventors.

With limited resources it will be almost impossible to out-perform in an activity borrowed from outside where the rules of the game change constantly. In addition, large amounts in foreign exchange are needed to pay for royalties and other fees for use of imported technology. The Caribbean, instead, should begin to take an inventory of products and processes indigenous to the region. A thorough analysis should be made of these and their potential for export and a strategy developed for their success. Once done, then the necessary technological interventions to make these products and processes to meet international standards should be undertaken either by technology transfer or endogenous technological development. To promote this type of competitiveness it is necessary to:

- (a) Provide minimal laboratory facilities at the national level that can be augmented by better and more sophisticated laboratories at the regional level.
- (b) Re-introduce an apprentice programme in the region.
- (c) Establish incubation centers with strong links to the community colleges and the bureaux of standards for product development and standardization.
- (d) Establish Technology Extensions Services that will provide technological and technical advice to SMEs on a continuous basis.
- (e) Conduct inventory of existing activities that can be significantly improved with technological interventions.
- (f) Initiate a programme whereby young persons may undertake training in product development, business management, sales and marketing, and accounting in order to prepare them for entering into private business.
- (g) Encourage and provide incentives to the banking sector to provide cheaper loans to entrepreneurs and to provide risk capital for research and development work.
- (h) Establish a One-Stop-Shop to provide information and guidance to potential entrepreneurs.
- (i) Promote public awareness and education campaigns to foster new attitudes to technological innovations.
- (j) Understand the culture of a people and how this influences technological development

Conclusion

It is clear that competitiveness cannot be achieved only by economic instruments. Research and development work through science and technology remains the single most critical element in competitiveness. It is only when the products of research and development are combined with good business instruments that competitiveness is achieved. While the market remains important, the product that is to be developed in the final analysis, is what will be judged.

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