

## FRANKLY SPEAKING.....

### **TECHNOLOGY TRANSFER (or Yeast for the Development bread).**

The literature on economic development is filled with prescriptions on how “lagging” economies might leap across the development gap. These include suggestions of embracing a political philosophy of self-reliance combined with strong communal co-operation. Other theories support introduction of central planning with various degrees of state entrepreneurship. Some proponents indicate that there are stages in the evolution of economies from pre-agrarianism to post-industrialization and the challenge is one of expediting this transformation. Whatever the favorite recipe, there needs to be an explicit consideration of the cultural and social milieu of the society in question, including its geographical setting, issues of size and resource endowment, educational levels of its citizens and the institutional maturity and stability suitable to promote development, among others.

It is well-accepted that countries emerging from a primarily agricultural economy are invariably associated with a release of surplus rural labour, perhaps both as a cause and an effect. It is also well-known that the emergence of a viable secondary processing sector is partly contingent on the accumulation of surplus capital from an increasingly more efficient agricultural sector, leading to an expanding local investment potential. And it is also common knowledge that alternatively (or in combination with home-grown capital), the inflow of investment capital from outside the country can accelerate the local economic growth process.

The potential role for financial transfers from outside the local economy, whether as grants-in-aid or low interest (soft) loans, or through preferential concessionary trading arrangements for exports or subsidized imports may also contribute to an environment that fosters economic transformation. Contributors to these discussions have also addressed the role of foreign direct investments (FDI) and the generative effects of capital infusions from outside private sources. The public sector itself, in the course of providing new and improved public physical and social

infrastructure to assist the economic transformation process can contribute to the development march. This potential impact is even more significant if public utilities and quasi-public (para-statal) entities are considered as part of this generative process.

This commentary offers a platform for discussion on the critical role that might be played by an aggressive, cost-effective and relevant technology in the modernization of developing economies and the transformation of lesser developed economies into modern, mature and self-sustaining societies. Whether adopted wholesale from outside sources or by adaptation of imported technology to fit local conditions, local host societies must select intelligently those methodologies, processes, techniques and equipment which are most appropriate in fostering rapid economic growth within the framework of a stable national community. This process of borrowing demands serious thought and cannot be left to chance and un-monitored private discretion. Policy-makers must continue to ensure that the type, nature, magnitude, conditions, costs and impacts of new technology are consistent with national planning agenda.

#### Conducive Environments.

Historically, countries with the technical knowledge that might be applied to modern management, financial activity, production, distribution, marketing and promotional services appear to share the following characteristics:

- (a) significant production surpluses which can be applied to research and production towards improved performance;
- (b) government funding of research institutions, including universities, institutes of science and technology and even subsidies to corporations for in-house production development;
- (c) more generalized incentives of subsidies, tax exemptions, tax reductions, in designated growth sectors and activities;
- (d) seamless transference of inventions and innovations from the laboratory to the factory floor or commercial applications;

- (e) strict enforcement of effective patent and copyright legislation for the protection of intellectual property.

With these parameters in place, national governments in progressive societies have been able to enjoy the benefits of home-grown technological advances, secure in the protection against foreign copying or “borrowing”. Equally, one cannot ignore the fact that a significant effect of the technological agenda is a change to a decreased dependency on foreign sources for food and other essential supplies through substitution of locally produced alternatives. Secondly, the technological trend appears to address the expanding discretionary goods market (generally high-priced, leisure or life-style products) as a consequence of increasing disposable incomes. Thirdly, technology appears to be focused on objectives production and productivity expansion, cost reduction, increasing efficiency, product differentiation, market creation and penetration with a particular accent on cross-border sales (including sales under quotas, licences or prices support.

In some cases, successful technological innovation has been reinforced by regimes of protectionism in foreign investment and trade. The consequence has been a virtual domination by the major metropolitan centres of North America and Western Europe in the world production and marketing of agricultural products, manufactured goods and for personal, profession and business services. This would include medical, educational, recreational, entertainment services management and distribution. Investment overseas from the “metropolises” appears to offer a major opportunity for dissemination of such advances in technology, and to stunt or even abort the emergence of an appropriate technology response solution in the subordinate impact areas. This technological transfer occurs predominantly under conditions of licence and high cost maintenance and service agreements with the local licensee operating within an enclave of protection and privilege. Another oddity in some situations might be the emergence of “dual societies and economies” within a single country, the one being an efficient,

modern, “high-tech” sub-economy oriented to a high income segment of the local population; the other, a traditional, low efficiency lower cost production sector serving predominantly the local population.

### Bridging the Gap.

There have been several attempts in the past to break this virtual monopoly of the “technological edge” exercised by the major economic powers. Some developing countries have resorted to creating imitations of foreign technologies. Others have simply copied the foreign technology, ignoring patent infringements and possible legal sanctions. Products generated this way, often under counterfeit brands may even be marketed internationally at a fraction of the cost of the western originals. Recognizing this threat, corporations harboring new technological innovations have resorted to locating branch plants in many such low-cost, high threat countries such as China, India, Pakistan, Japan, Hong Kong, Singapore and Malaysia, to name a few, in order to preserve their edge.

### Enter Globalization.

Globalization of world economies and the extensiveness of the resulting impacts have been both cause and effect of attempts to recapture and contain the benefits of technological innovation. In theory, the liberalization of trading agreements should have allowed lesser developed partners to have access to the know-how, material, services and markets of the more developed countries. However, these arrangements also encumber them with high and uncontrollable exposure to competitive forces from abroad. (The doctrine of “equal access” to each other’s jurisdiction between unequal partners is a fallacy yet to be satisfactorily addressed in these agreements being multiplied daily and is destined to be an oppressive yoke). Consequently, smaller, less developed states risk being besieged by inflows of surplus, often subsidized products from abroad and/or the entry of trader, financiers, non-national technicians all protected under

an umbrella of regulations and penalties which might be applied on the less developed country, including retaliation and litigation.

Widening patterns of trading agreements such as are envisaged in the EU-Economic Partnership Agreements, the Free Trade Area of the Americas and the Canada- CARICOM Free Trade Area should have heralded an opening up of markets in the “Northern” developed countries to imports from their Southern” less developed countries including the Caribbean. This is far from certain. Confronted by a variety of import controls, lesser developed (exporting) countries find themselves under severe limitations of quality controls in production almost to the same or similar technological standards as the importing developed countries. Developing countries may be faced with a disturbing dilemma. They should have learned from the mistakes of some developed countries but are now doomed to repeat them! For example, “northern” agricultural practices while efficient have evolved at great impact on the social, environmental and ecological fabric of many of these countries. One might list some of the more glaring cases of concern.....disappearance of the family farm and displacement of the farm family; clearing of large tracts of land and ecological devastation from heavy mechanization; re-engineering of the landscape by massive hydraulic systems of dams and irrigation; heavy application of chemical fertilizers and pesticides; loss of wildlife and habitats for critical species such as pollinators; disappearance of traditional, non-staple crops in favour of export, market-susceptible staples. The devastation occurring in the Amazon basin and the phenomenon of the Three Rivers Dam in China are but part of a growing response to the oppressive dictates of globalization. A similar analysis and range of illustrations is equally possible for manufacturing/processing and for the services sectors.

#### Implications for Small Island Developing States (SIDS).

Faced with these insensitivities and all of the physical, resource, demographical, social and institutional constraints of small island

developing jurisdictions what response opportunities exist? First and foremost is the challenge of selecting affordable and appropriate technologies for each unique situation. This selection would rely on at least the following four considerations:

- (a) production/conversion efficiency;
- (b) cost-effectiveness of innovations;
- (c) social/institutional stability;
- (d) environmental/ecological sustainability.

In the course of considering whether technology, as an instrument of change, is to be adopted from outside, imported and adapted to local conditions or should be home-grown, in the course of economic transformation, there should be conscious or at least an implicit consideration of the above four criteria. The issue is not “whether or not technology” since all human endeavour requiring planned activity towards an agreed objective comprises “technology”, however rudimentary. The question is, what is the appropriate technology in any given situation?

Technology is more than abstract knowledge, the academic understanding of what things are and how they work. It is more than imitative incorporation of outside experience into local undertakings. It is both informed understanding of the principles that underpin responses to particular problems as well as the ability to apply knowledge to solving problems. The initiative to develop that competency may be publicly financed, for instance, through institutes of higher learning or through technology centers. It may be privately financed as research and development facets of corporations’ new product programs. More commonly, it is a function made possible and promoted by private initiative under various funding arrangements with governments through outright grants or through tax relief. One indicator of a developing, maturing economy is the percentage of its Gross Domestic Product (GDP) that it spends on all aspects of research and development. Small, resource-poor island economies are by their nature unable to generate the same percentage level of support for new product/process development

as large developed countries. Yet, that does not exempt them from identifying and addresses the more critical areas of their economy requiring a uniquely local response!

Even within the context of developing a more efficient, cost-effective, stable and environmentally sustainable agricultural production system or in the exploitation of its mineral resources, few developing countries have demonstrated the interest, ability or capacity in designing and implementing a local technology capable of meeting international market demands. Within the Caribbean, Neither Jamaica nor Guyana which are major world producers of bauxite have matured into manufacturers of aluminum nor have they grown a technological competency towards significant manufactured value-added. The same might be said for the petroleum production and oil refining in Trinidad and Tobago despite the high regional import bill for plastics, synthetic fibres, chemicals and pesticides. Similarly, although sugar production has dominated the economies and societies of most Caribbean whether described in terms of percent farm acreages, number of persons employed, contribution to GDP, net foreign income earnings etc, precious little technological innovation has resulted in significant crop yield (tonnage/acre/year, sugar content) or in the production process to reduce the worst aspects of cultivation and harvesting. Further, despite the number of complementary products prevalent within the area such as spices, cocoa, coffee, citrus fruits, root crops, aromatic herbs and nuts, it has been left to extra-regional initiative and investigation to design technologies to develop and exploit the synergies from combining these ingredients into high-value market-ready products. Even so, the opportunities have not been exhausted but in research-poor islands these will remain dormant until non-regional interest, innovation and intent intrudes upon the prevalent local apathy.

Research and development is also capable of economic transformation and progress in related areas such as product differentiation, product packaging, marketing and through re-combination of composites to create unique products. Many

traditional local items and products whether in their natural or cultivated form show the capacity for being transformed into new and exciting marketable products and require only imaginative and creative transformation to bring them to the attention of a discriminating consumer. Some illustrative possibilities in the case of Dominica, for example, come to mind.

Initial Inputs	Potential
Market Products.	
Sugar – Cocoa – coffee – spices – herbs – chocolates - cakes	Teas – candies
Rum – fruits – spices – aromatic herbs sauces – condiments – preserves etc.	Liquors –
Fruits – vegetables – alcohol – herbs potions – nutraceuticals – soups - meals	Lotions –
Oils – essences – vegetables – herbs products, pharmaceuticals	Health/beauty
Wood – pulp – vines – shells – nuts – stones clothing – furniture – fashion products	Fabrics -
Leather – metal –wood fashion items – interior decoration	Bags – shoes –
Rock – sand – aggregate material – tiles – pipes – ornaments	Building

In the above examples, it is assumed that a competitive advantage exists in the local availability of the “Initial Inputs” required to produce the “Market Product” and that a market edge will arise out of design, creativity, quality, and reasonable pricing.

On another level, additional productive capacity can be built on the basis of imports of raw materials from regional or extra-regional sources and in combination with complementary local materials, skills, designs and tastes contribute to new Caribbean finished products for local, regional and foreign general and niche markets. Ideal areas for consideration are clothing and fashion, furniture and fixtures, personal hygiene and lifestyle products, recreational equipment and vehicles, printing and publishing. In the service sector, opportunities lie in sports recuperation and training facilities, health and wellness, music and entertainment, business services and data processing. The Caribbean is well-located, well-adapted and well-suited to take selective advantage of the growing potential of waste recovery and recycling of North American industry, businesses and households. In a world of rapidly depleting raw materials, the high costs of new explorations in increasingly remote source areas together with the environmental and social costs of conventional waste disposal cry out for utilization of usable stockpiles for conversion to second or third generation marketable products, subject to the four criteria already discussed! The opportunities are limited only by one's imagination, intuition and inventiveness. The key is technology and technical competence. The extent of research and development and the technological component of each opportunity can be expected to vary. The benefits in value added and revenue retained may be well worth the exercise.

#### Making Technology Available.

Most small island developing states (SIDS) may not be able to home-grow all of their technological requirements within the range, to the depth or at the cost which might render it suitable for cost-effective application. One alternative response might be to lure foreign corporations or specialized research entities to either bring with them or to develop locally the technology needed. Where suitable and appropriate technologies already exist externally, a further option might be to arrange for the acquisition of such capabilities under licence. Both options pose

hazards for the local economy in that available technology may be standard (or packaged), insensitive to local conditions and not amenable to modification. Occasionally, the technology imported may be applicable to only a part of the productive process, the remaining portions being subject to separate licensing agreements. Accordingly, should one provider leave for any reason, the issue of smooth replacements must be addressed.

The cost of technology purchase or acquisition under licence is typically exorbitant and subject to multiple constraints on diffusion or additional unauthorized applications. Maintenance and servicing charges, technician training, updating and replacements must be anticipated as an unavoidable cost in doing business. These are likely to place additional burdens on SIDS economies, compounded by even more unfavorable foreign exchange conditions.

#### Social Objectives.

Foreign corporations which are attracted to SIDS under a strong profit motive may, even with the best of intentions, run afoul of local development objectives where national governments may wish to prioritize social objectives such as employment creation, income distribution, gender equality, rural development etc. Technology imports and applications may displace or replace traditional production practices and operations and may need to be accompanied by an overt program of accommodation of impacted groups and interests within the “new economy”. The total feed-back within the production process must be identified, understood and accommodated within a short term and longer run planning framework. In most SIDS, production of market products lends itself to high vertical and horizontal integration so that the benefits of technological innovations may have explosive (positive) effects on the economy or alternatively may be frustrated by lags, bottlenecks or other shortcomings in the total supply chain.

The issue of technological absorption then needs to be addressed on a wider than industry or business-specific basis. It will certainly have wider than sector implications and may even raise issues of societal stability. This is in contrast with larger developed economies where there is greater resilience to change and where minimal technological innovations do not have as pervasive effects. One reaction to the destabilization effects of technological change in SIDS may be an even stronger negative re-enforcement of traditional sectors, relationships and practices building up stronger resistance to future innovations. Accordingly, the nature, location, rate and effects of technology must be sensitively managed to achieve the best and long lasting effects.

#### Integrated Regional Approaches.

An attractive recourse open to small island developing states (SIDS) is to enter into regional groupings in their combined search for appropriate technological responses towards accelerated, quality production processes. By definition, and to the degree cooperation among SIDS may be present, they will as a start release themselves from some of the limitations of geographic size, resource endowment, skills availability, market size towards an expanded state of economic integration. Even more beneficially, they make it a condition of foreign direct investment, that issues of production re-modeling and re-tooling be addressed and explicitly take account of local unique conditions. They may also learn from the experiences of other more advanced developing countries which may have already adapted First World technologies satisfactorily within their societies. These lessons may be more productive starters than going back to the originals.

#### Joint Venturing.

Where foreign technologies have been introduced into key SIDS economic sectors, the host jurisdiction would do well to require that such investment be subject to local investment participation

whether by public institutions or by the private sector. This proviso enables the local investment partners to continue with the project should the expatriate partner decide to divest for any reason. It also provides some assurance through local counterpart interests and oversight that the complete package was delivered and is being retained, both the canoe and the paddles.

### International Risks and Exposures.

Increasingly, SIDS are being forced by circumstances to enter into trading agreements and other relationships with larger developed economies, the terms of which generally impose onerous obligations on them for honoring conditions under which foreign technologies may be accessed. Through such mechanisms as royalties and licences, punitive penalties and retaliatory action for breaches, recourse to expensive arbitration tribunals, SIDS face intimidating prospects in bridging the technological (and development) gap. The cost of importing technology though seldom explicit is invariably high, and countries desiring to acquire "the latest and the best" might better focus on "the most affordable and appropriate". They should also ensure that local public and private ventures as well as local subsidiaries of transnational corporations or government agencies extract the maximum concessions in negotiating access to foreign technology, including full disclosure on all relevant aspects of the technology under application:

- (a) access to preliminary research and development;
- (b) access to design and engineering drawings and processes;
- (c) testing results for scale-down and full-blown prototypes including modifications/adjustments for unique factors;
- (d) assignment of counterpart local personnel to headquarters and/or laboratories as available for observation and training;
- (e) technical assistance to SIDS in remodeling and adapting imported technology;

- (f) explicit availability of “fail-safe” corrective and remedial measures;
- (g) access to post-operation restoration and clean-up technologies.

### Summary and Conclusions.

Infusions of imported technology, desirable and expedient as they may be, should be subject to continuous and critical evaluation within the overall development framework for small national economies. In all facets of the development process such as agriculture, agri-processing, manufacturing, infrastructural works such as water and energy, services and governmental functions, these are pressing and obvious advantages to assessing the required levels of technology firstly within the context local knowledge, traditional resources and established competencies. The primary thrust for delivering new technologies should not be to displace local home-grown and home-delivered technological capabilities, but to improve and render them more efficient. In this, the techniques, processes and approaches from other jurisdictions complemented by necessary and expedient adaptations for local uniqueness and local policy objectives deserve fullest consideration.

Even so, small island developing states (SIDS) are not relieved from the responsibility for positive, pro-active efforts to develop their own local solutions of what is effective “local technology”. Admittedly, it is not feasible to contemplate a full range of research and development together with applied technologies across the wide front of national development efforts. The resources necessary to accomplish this are simply not available. However, within a nationally integrated development program, the early identification of key strategic sectors requiring unavailable technology for an internationally competitive marketplace, and a planned approach to acquiring this missing component, SIDS can incorporate this critical “leaven for their development bread”. Better still, small island developing states such as the Eastern Caribbean islands, which are experiencing

similar development constraints, should seriously engage in specialized, complementary research with mutual sharing of results. This might be expedited through financing of tertiary educational institutions and/or subsidized private research entities or consortiums. Small Island Developing States of the Caribbean would do well to undertake a common program of enticing back their competent nationals working in priority fields in foreign countries to spearhead this regional initiative. Through such a “reverse brain drain” they might have immediate access to a fund of local knowledge, seasoned by foreign training and experience, flavored by international networks and nourished by nationalistic empathy and pride.

The continuing chronic failure by local and regional jurisdictions to look intelligently at the beckoning opportunities afforded by transferring, adapting, generating and absorbing relevant and appropriate technologies within a well-designed and integrated development framework within their home countries may well go down as the greatest betrayal of the 21<sup>st</sup> century, dooming the peoples of the Caribbean to an ever-widening development gap. Can the region afford such a legacy?

That’s the way I see it, anyway!

THIS IS THE FIRST IN A SERIES OF FOUR ESSAYS IN  
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