

Research Paper

Science and Society in Cuba in the Context of Techno-economic Globalization

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Abstract: This paper is in continuation of the author's earlier work on Cuba. It builds upon a similar presentation at the 14th International Scientific Congress held in Havana, Cuba in late June-early July 2005. The eclectic theoretical background for this analysis is provided by the general Modernization Theory and the World System Theory. The focus is on the problems and prospects for the development of science and society in Cuba within the context of interdependent economic and technology relations in global society. It is argued that the recent experiences of some of the other newly industrializing non-western societies may be highly instructive for Cuban development planning in the 21st century.

Introduction

Globalization is opening up new opportunities for techno-economic development in the newly industrializing countries. The notion of techno-economic development in the context of globalization implies an interdependent relationship between technological and economic development in that one dovetails the other. It also implies that economic and technological activities in both the developed and the developing countries are now increasingly interconnected, shared, and traded through multilateral arrangements, such as international patents, licenses, royalties, joint ventures, outsourcing, and a variety of other human and financial capital transfers [1,2]. Participation in these activities requires major shifts in public and international policies of nations to align their developmental priorities with the realities of a globally interdependent world [3,4]. For the developing countries, participation in this global techno-economic system is no longer a matter of choice. It is a necessity for their survival and growth. But it is a necessity that involves both costs and benefits. These must be weighed in terms of short and long term social, economic, political, and environmental consequences that such participation entails [5,6]. This paper will highlight recent shifts and alignments that are now occurring globally and discuss some of their implications for the development of science, technology, and society in Cuba in view of its current strengths and weaknesses.

There is paucity of information in the international literary sources about science, technology, and society relations in Cuba. The following analysis is duly informed by my two visits to Cuba – in June 2000 and June-July 2005. During these visits, I participated in a number of meetings, seminars, and symposia and interviewed numerous Cuban scientists, scholars, and educators. Following the first visit, a detailed study on the implications of globalization for Cuban society was published in the fall of 2001 [7]. The implications were examined through the opposite perspectives of general Modernization Theory and the World System or the Dependency Theory [8,9,10]. The conceptual framework for this analysis also resides in the critical dimensions

of the very same perspectives. Informed by these perspectives, it is assumed that the correct path for overall development of the less developed societies at this historical juncture lies somewhere between independence and dependence, between autarky and subservience.

It is argued in this paper that globalization of technology has made it possible for a developing country with Cuba's knowledge base to buy or borrow from abroad appropriate technologies for local needs, as well as to undertake collaborative R&D (research and development) with international partners. Cuba should also be able to transfer locally developed products and processes from areas of particular strength (e.g. biotechnology) to other developing countries according to their own specific needs. Such multidirectional transfers are now occurring in almost all the major scientific fields [11]. But if not planned and executed properly, they may pose serious threats to local cultures, economies, and environments [12, 13].

Globalization of Technology: Opportunities and Threats for Cuba

Some of Cuba's scientific and technological strengths and weaknesses are shared by almost all the developing countries. These include abundance of natural and human resources while their full utilization is often marred by shortages of capital, advanced technologies, and other internal and external pressures. This is not to deny the special problems and inventiveness to resolve them that may be unique to particular societies. The Cuban experience too is indeed unique in many ways. Pre-revolutionary Cuba was a corrupt and bankrupt society. In 1958, it experienced one of the most significant social revolutions of the 20th century, only to face massive problems of redistribution of national resources for the common good, while threatened and embargoed by its powerful neighbor next door. This turmoil notwithstanding, Cuba's resolve to build an effective science, technology, and education infrastructure for societal development has remained unshaken for the past half a century.

“Today, Cuba is a society where some consumer goods are not available. But not a single school has been closed, nor a single hospital, nor are there children that sleep in the street for lack of shelter, nor the sick left abandoned for their survival. In spite of the present day difficulties, the average Cuban today retains a strong safety net that his or her counterparts lacked in the pre-revolutionary era” [14].

Cuba, and the rest of the world, are now faced with a new reality – the reality of a global society where a lot can be gained but a lot can also be lost. Globalization can lead to fast techno-economic and societal development in nonwestern societies, as it has already done in Japan, South Korea, Taiwan, and Hong Kong, and is now doing in China, India, and a host of other Asian and Latin countries. The hallmark of this experience is opening up to the rest of the world. But as suggested above, that could also be risky. Nascent local industries may suffer through international competition. Indigenous R&D efforts may be pushed to the back seats. Environmental pollution may set in otherwise unpolluted environments. Either wrong choices or missed opportunities to collaborate, buy or borrow in the global techno-economic market could cause serious developmental disabilities. Two cautionary notes are in order to help avoid these two types of errors. First, globalization of technology may neither be an unqualified boon nor an unmitigated bane for national development. Second, globalization, and its twin process of modernization, should not be rejected as a neo-colonial westernization of nonwestern societies; for none of these processes is entirely western or entirely new [15].

Cross-cultural fertilization of ideas and transfer of knowledge, goods, and services has been going on for centuries, although not always with positive intentions or results [16]. In the contemporary world system, serious techno-economic, and consequently political, power shifts are now occurring globally as countervailing forces to hegemonic power of few nations over the many [17,18]. The old dichotomies between East and West, Third World and First World, the core and

the periphery are no longer entirely valid [19,20,21]. These shifts can work for the benefit of developing countries. For example, there are powerful competing vendors of modern technologies around the globe. If one of them refuses to supply or sell these to a buyer for whatever reasons, there may be others willing to do so on competitive terms, as Cuba has learned to its enormous advantage in building its tourist, transport, and energy industries [22]. Such options and opportunities need to be carefully assessed and exploited by every developing country in need of advanced scientific and technical knowledge.

Cuba has a long history of planned development of science, technology, industry, and agriculture to serve human needs. It also has a long history of regional and international collaboration in these areas, first with the Soviet Block, and now with many European, Asian, and Latin countries. Cuba is an effective member of the North, Central, and South American community of nations, except the United States, which continues to ignore and blockade it. Canada, Mexico, Venezuela, Chile, and Brazil, for example, have established good economic and industrial relations with Cuba. Its abundant natural and human resources are effectively utilized in an increasingly diversified economy through such bilateral arrangements [23].

Biotechnology in Cuba

Like China and India, Cuba has shown the wisdom of combining its vast reservoir of ancient and modern knowledge to serve human needs. This intermixing is clearly seen in Cuba's biotechnology research, inventions and innovations, among the strongest in the developing countries. Biotechnology has received the greatest attention in the Cuban national science and technology policy. This policy began to take shape as early as 1964 with the inception of the parent research outfit called the National Center for Scientific Research (CNIC). CNIC spawned a number of other research institutions over the years, among them the most notable and prestigious Center for Genetic Engineering and Biotechnology (CIGB) in 1986. A network of four or five other centers is now affiliated with CIGB, specializing in such fields as immunology and

development and production of vaccines for human and animal diseases [24].

“Some of CIGB’s 160 products available in over 50 countries are a hepatitis B vaccine, human alpha interferon, certain enzymes, diagnostic kits including one for HIV, and a cattle tick vaccine” [25].

The list of CIGB accomplishments is endless. Currently it is pushing the development of HIV/AIDS and hepatitis C vaccines. Biotechnology may be the single-most important area in which Cuba can contribute to, as well as learn a great deal from other advanced players in this emerging scientific frontier. Further dissemination of these technologies globally would indeed require for Cuba to acquire international patents for its innovations and market them aggressively. This strategy was strongly recommended by several authors at the 14th International Scientific Congress in Havana during June 27-July 1, 2005, which I also attended along with approximately 1000 Cuban and international scientists [26, 27].

A small indication of Cuba’s contribution and potential in the field of biotechnology was clearly visible at the 14th International. A significant portion of the Congress’s agenda was devoted to the treatment of human, animal, and plant diseases through the eclectic approach of mixing folk knowledge with modern science. The symposium on biotechnology had 20 separate sessions simultaneously held in the large and modern convention center. Over 200 papers were presented in these sessions, mostly by Cuban scientists. There is urgent need for affordable treatment to improve human, plant, and animal health around the developing world. Cuban biotechnology research can indeed help fill this gap effectively and humanely.

Careful Considerations for the Future

Despite these accomplishments in biotechnology and other areas, gaps remain in several other areas. For example, Cuba’s manufacturing and service infrastructures for

consumer and electronics goods, automobile and aircraft industries, computer engineering and information sciences in general have a long way to go before reaching world standards. Advanced technology vendors in these and other deficient areas should be encouraged to enter the country at this stage in Cuba’s march to modernity. But a well-endowed nation like Cuba need not be too dependent on the global technology system, and consequently on the global economy. A healthy balance between independence, dependence, and interdependence should be worked out. These options may not be available to lesser developed countries with meager natural, human, and scientific resources.

As mentioned above, unchecked and deregulated entry of foreign capital and technology in a less developed country involves many risks. At the same time, too many restrictions on external inputs can quickly set back a developing country by decades, for such is the fast pace of global scientific and technological change. These types of experiences are not uncommon in the recent history of newly industrializing nations. The cases of both India and China may be highly instructive for the Cuban technology transfer strategy at this time in terms of costs and benefits of closing and opening up to the world techno-economic system as well as the costs and benefits of centralized control versus decentralized initiative and enterprise [28, 29].

I raise the following questions for further consideration of the Cuban science, technology, and development policy makers at the highest levels.

1. What does it mean to be self-reliant in the context of globalization? It certainly does not mean delinking from the global techno-economic system, for it is virtually impossible to do so and be able to survive. No country, not even the United States or any other major world economy is or can be totally self-reliant any more. The motto, long proposed by various organs of UNESCO (United Nations Educational, Scientific, and Cultural Organization) ought to be: “Make some, borrow some, and buy some.”

2. What should be the role of national science, technology, industry, and education in a rapidly globalizing, interdependent world? This is a vital question for a country like Cuba with substantial

local strengths in all these areas. Cuba, like other similarly situated countries, will have to find its own specific formulas in light of the above motto. Systematic demarcation of local strengths and weaknesses in each area will have to be done with one goal in mind - social, cultural, and economic development. It is through such demarcations that Cuba can participate in the process of globalization as an equal partner and fully benefit from it.

3. How to share Cuba's unique experience of pressing science, technology, industry, and education to serve human needs with other developing countries? International agencies, like the UNESCO and UNDP (United Nations Development Program), may take an active role in bringing the Cuban experience to the attention of others through conferences, joint research programs, scientific exchange, and transfer of technologies.

4. How to balance the acts between global information processing and participating in the global research, development, and manufacturing networks? Some developing countries - India, the Philippines, and the new members of the European Union are prime examples - are diverting their valuable technical expertise to information processing and customer service for giant multinational corporations. While this aspect of globalization may be mutually beneficial in the short run, such outsourcing may not prove beneficial either to the 'source' or the 'outsourced' in the long run. Cuba may tread on this false 'technology transfer' path with great caution.

5. How to further enhance the development and utilization of the national human capital? Cuba has made substantial investments in science and engineering education at all levels. But a significant number of its workforce is employed in the non-technical tourist industry. In order to fully participate in the global techno-economic system, the future generations of Cubans in both rural and urban areas need to be technically trained through distance education using advanced information technologies, with assistance from outside vendors.

6. How to build stronger scientific communities at the national level? Cuba may consider: (a) Making bigger investments in science and engineering education at all levels by providing

more scholarships, upgrading research laboratories, and modernizing instructional technologies in colleges and universities. (b) Building closer connections and exchange between Cuban and international scientific communities.

Endnote

Cuba is a small island nation with a large potential for scientific and technological modernization for social and economic development. It has overcome many hurdles in achieving these goals through a combination of local efforts and international collaboration and assistance. Its policy of planned but cautious approach to mobilize natural and human resources to build an effective developmental strategy and infrastructure seems to fall within a mixed rubric of Modernization and World System theories. This approach has helped Cuba achieve a measure of success without becoming an appendage of the global capitalism which runs through the global techno-economic system. But it has also slowed down the pace of modernization of science, technology, and society in Cuba. The dizzying pace of economic growth in the newly industrializing countries suggests that the massive sweep of globalization is insensitive to ideological, national, racial, or cultural differences. The winning strategy in this sweep is to remain focused on enlightened self-interest and to use one's own competitive advantage to exploit the explosion of opportunities in the wider world. In this context, greater participation in the global techno-economic system through international collaboration seems highly desirable at this time for Cuba in its continuing march to modernity and a rightful place for it in the community of nations - embargo or no embargo.

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