Research and Knowledge Creation in the Caribbean for Endogenous Development and Building Autonomous Knowledge Societies: The University of Puerto Rico and Beyond

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Abstract

1. Overview of the Issue and its national/regional/international context

- This analytical paper examines the new context for developing research capacity and knowledge creation in the Caribbean region as a new higher education 'network collaboration paradigm' emerges oriented towards endogenous development and for building knowledge societies in the region.
- In the current context of 'dependence and underdevelopment', the feasibility of endogenous development in the Caribbean is analyzed.
- Policy measures for increasing research capacity through network knowledge creation are discussed.
- Recommendations are made to strengthen the undergoing research capacity building and knowledge creation initiatives.

2. Current or proposed policy framework

- Knowledge Economy Paradigm: Knowledge creation and learning in emerging knowledge societies is linked to investment in information and communication technologies in a new international division of labor and a knowledge distribution system and higher education networks.
- In developing countries, there is limited access of researchers and students to the developed countries' higher education knowledge production-distribution systems.
- There is a world wide trend toward the commercialization of higher education as a result of neo liberal policies (state fiscal crisis, privatization, trade liberalization-integration agreements, market oriented provision of education; and knowledge production of economic-value) in and outside (government-industry-university alliances) higher education institutions, (Aponte, 2003).
- Research and knowledge creation plays a central role both in creating the conditions for (1) economic growth (2) attracting global capital investment and fostering local capital accumulation (3) managing and compensating the impact of economic restructuring and globalization, locally.

- There is an underdevelopment of research capacity and technological infrastructure in the developing countries, which is the key to new forms of integration, network interaction and local development strategies.

3. Research results in support of this framework

- Since knowledge continues to be produced and distributed unequally, its utility and value plays a determinant role in creating the conditions and dynamics for local economic growth, and for compensating locally the un-equalizing, social effects of the new global economy (Castells, 1998; Aponte, 2001)
- If Caribbean developing countries are to enter the competitive global economy, development policies will have transform and develop higher education institutions to overcome the prevailing conditions such as self-sufficiency of higher education institutions in the Caribbean to meet demands and needs of the region's economy and Caribbean societies, pool resources in a sub-regional basis, allocation of resources for L-R&D in the Caribbean region, threats to Caribbean higher education institutions of transnational education commercial providers, and limited technological transfer (Howe, 2000; Aponte, and Molina Iturrondo, 2002; IESALC/UNESCO, 2006).
- Local ability to respond and conduct their own development and mobilized the economic potential, is an attribute of the endogenous development action approach (Vazquez-Barquero, 2002).
- Learning, knowledge creation and dissemination have become more important than ever, as it allows individuals, institutions and countries to generate rapid changes in knowledge, and how to cope with these changes in the emerging 'knowledge societies' (Jarvis, 2001).

4. Recommendations for policy makers

In the Caribbean, the trend is toward the 'developmental innovation university" (Didriksson, 2000; Aponte, 2003) with the aim to:

- Strengthen the level of research and student learning in order to achieve a greater number of researchers and well trained professionals.
- Create books, texts, physical facilities train technicians, teachers and professionals; develop and incorporate learning technologies.
- Create more job opportunities for young professionals and research opportunities for researchers in order to avoid under-employment and "brain-drain'.
- Include local needs in the research agenda of the academy, industry and government; priority should be given to increase the country's competitive capacity.
- Encourage and incentive (resource allocations, tax incentives, financial sources, loans) research on local development needs.
- Promote research into problems of local relevance, while at the same time, internationalize universities in order for local researchers to create, enter and interact with world wide research networks.

- Develop assessment processes and accountability procedures to enhance continuous improvement, relevance, quality, and to increase learning-research funding sources.
- Develop a multi sector financial strategy to increase research capacity and sustain the L-R&D policies programs.
- Provide support to researchers and students who identify, and are committed to R&D, solving social problems and community development.

Introduction

Learning (technological literacy), research (capacity) and development (L-R&D) are extremely unevenly developed in the world. Science and technology are "globally" integrated where all major research centers have connectors to developing countries, but still are highly asymmetrical. This concentration including information technology, research capacity and development, is largely in the "knowledge economy" where science and technology are critical components of the production-distribution processes, and of the research capacity linked to knowledge creation for economic growth and development.

The impact of this uneven process can be summarized in three trends: (1)"knowledge creation and learning in emerging knowledge societies is linked to investment in information and communication technologies in a new international division of labor and a knowledge distribution system and higher education networks, (2) in developing countries, limited access of researchers and students to the developed countries higher education knowledge production-distribution systems, (3) a world wide trend toward the commercialization of higher education as a result of neo liberal policies (state fiscal crisis, privatization, trade liberalization-integration agreements, market oriented provision of education; and knowledge production of economic-value, in and outside (government-industry-university alliances) higher education institutions, (Aponte, 2002).

Thus, the new economy has a different weight in different countries, regions and localities. Education, research capacity, knowledge creation and distribution are the key elements to enhance competitiveness, economic growth and endogenous development regardless of the country's size, population, and natural resources. Research and knowledge creation plays a central role both in creating the conditions for (1) economic growth (2) attracting global capital investment and fostering local capital accumulation (3) managing and compensating the impact of economic restructuring and globalization, locally. However, there is an underdevelopment of research capacity and technological infrastructure in the developing countries, which is the key to new forms of integration, network interaction and local development strategies.

The relationship between education and development, (learning/knowledge creation) relies on the capacity to process knowledge efficiently and apply it to production and distribution of goods and services in order to enhance the overall quality of life. Since knowledge continue to be produce and distributed unequally, its utility and value plays a determinant role in creating the conditions and dynamics for local economic growth, and for compensating locally the un-equalizing, social effects of the new global economy (Castells, 1998; Aponte, 2002) Hence, the new modes of learning, research capacity, the technological infrastructure, and the research and development initiatives (R&D) have essential elements of the local competitive strategies and endogenous development policies. Those countries lacking these elements can become locked in 'underdevelopment dynamics', and in a greater "dependency path". Since the global economy is knowledge based, if a country does not perform under the new parameters,

they will fall in to ‘low-value added’ production and will loose opportunities for capital accumulation, economic growth and development.

Networking and flexibility makes, possible the connection for the variables and discard the devaluable.

Moreover, the new economy is based on the combination of technological infrastructure, learning-knowledge creation capacity; connectivity, and ‘intellectual capital’ formation.

The challenge for higher education in developing countries is to transform higher education institutions in order to: improve general basic education; train medium-skill and first level professionals for the growing service sectors; and, train highly skilled researchers to create knowledge, foster innovation and productivity in order to enhance competitiveness and building ‘autonomous knowledge societies’.

If Caribbean developing countries are to enter the competitive global economy, development policies will have transform and develop higher education institutions to overcome the following prevailing conditions (Howe, 2000; Aponte, and Molina, 2002; IESALC/UNESCO, 2006):

- No higher education institution in the Caribbean can be self-sufficient in attempting to meet the higher education demands and needs of the region’s economy and the Caribbean societies. Higher education expansion has gone to careers and program of secondary impact on the endogenous development process.

- The pooling of resources in a sub-regional basis is a essential not only as an strategy, but also from the perspective of cost to contribute to the research capacity linked to the development strategies for scientific /technological knowledge creation to enhance competitiveness.

-Resource allocation to L-R&D is less than 1.0% of the GDP in most of the Caribbean island-countries. Most of the knowledge creation is done in Cuba, Puerto Rico, Jamaica Barbados and Trinidad-Tobago universities where research capacity is still low and related to academic knowledge creation.

- The new modes of delivery of education as a result of technological development matched with increasing penetration of transnational education commercial providers, threatens Caribbean institutions with respect to retention of their share in students/services, not to speak of the potential expansion and diversification towards endogenous niches of knowledge creation and dissemination to increase competitive capacity, growth, and development of autonomous knowledge societies.
- Limited technological transfer from developed countries to developing countries and migration of competent professional and students to core economies.

Globalization, the Knowledge Economy and Endogenous Development

Post- industrial economic restructuring and globalization have refueled the feasibility of 'local endogenous development'. Given that the global economy is asymmetric and polycentric, the path of development is determined by local capacity to respond and adapt to the challenge of market worldwide market competition. Location in the peripheries does conditions economic dynamics to some extent, but does not determines them. Localities and regions will gain or loose in function of their human and natural resources and of their links to the networks of the global economy (Castells, 1998)

In this new context, locality and the regional approach to development is no longer a place where resources and economic activities are located. Hence, the starting point for development of a locality or a region is the economic, institutional, organizational, culture and human resources; which constitute its potential for development. Local communities have their own needs and identity that have lead them to launch initiatives for development. When organizational capability is developed, external enterprises and institutional investment can reinforce local-regional development potential and strengthen their development process. This local ability to respond and conduct their own development and mobilized the economic potential, is an attribute of the endogenous development action approach (Vazquez-Barquero, 2002).

Capital Accumulation and Endogenous Development

Local and regional economies grow when innovation and knowledge is diffused among local enterprises and territories in such way that productivity and output are increased, production costs are reduced, and scale economies are improved. Growth and development occurs when the organization of production becomes more flexible, and networks and alliances are formed which fosters internal and external economies of scale and improve the competitive positioning of localities and regions. Moreover, local and regional economies expand when are located in innovative and dynamic regions, and when institutional networks are broader, complex and flexible. Each one of these mechanism can becomes an efficiency factor in the process of capital accumulation to the extent that they stimulate economies of scale, external economies and reduction of transaction costs, i.e. increased productivity and investment returns.

Under neo-liberal state-economic policy-societal development dynamics have exacerbate 'uncertainty' as a feature of every day, life. Many decisions are made based on limited and uncertain knowledge about past present and future events; about opportunities investment and productivity in terms of other people's needs and social well being. Since knowledge has become the key factor determine growth and development, and there is a risk in creating knowledge through education, learning by doing or research and development (R&D), it is unavoidable to consider 'uncertainty' in the process of building research capacity and creating locally 'contextualized knowledge' for endogenous societal development (De Hek, 1999; Nowotny,Sccott,Gibbons,2002).

In a growing interdependent worldwide economy local endogenous development is a process of growth and structural change, which provides more well being to a locality or a region, as a result of transfer of resources from traditional to modern activities, the employment of external economies, knowledge creation and the introduction of diffusion of innovation. Development takes place when the local community is able to put its development potential to work and conduct structural change. Thus, endogenous development is based on the idea that localities and regions have economic, institutions, cultural resources and human potential, as well as hidden economies of scale, which constitute their development potential. A productive system capable of generating increasing returns by applying available resources, creating knowledge, introducing and diffusing innovation for creating wealth and local-regional well being. The concept of endogenous development combines following elements (Vazquez-Barquero, 2002) in a unique configuration:

- Endogenous development process refers to capital accumulation-reinvestment in specific localities-regions

- Factors contributing to accumulation are: education and labor capability; entrepreneur and organizational capability, and a flexible productive system where knowledge creation and technical innovations are diffused for increasing competitive capacity.

- The organization of local production systems into networks contributes to generate economics of scale and reduce transaction costs, increasing returns and economic growth.

- The uncertain environment of competition in which local actors make decisions concerning investment and control, is transformed as a process of capital accumulation, define the economic dynamics. Thus, a locality or region can undertake new investment projects in their own initiatives which will put them on the path of competitive capacity for development.

- Thus, endogenous development is the result economic and social transformation generated as a response of localities and regions to the

> challenge of global competition, in which local actors take up strategies and initiatives aimed at improving the well being of the community and development goals.

Endogenous development is a complex concept in which various rationales and perspectives of development theory come together. At the heart of local development is the rationale of the capitalist mode of production, where capital accumulation income distribution and capital reinvestment provide the logic and dynamics of growth and development. But the concept resolves around a central idea in development policy: The dynamic and transformation of local economies are necessarily anchored in the forces for change in the local community. Outside dependent development has been a strategy that has been demonstrated to fail in all kinds of local context economies. An alternative road to dependent development from 'outside' is opened to localities when they adopt their own institutional organizational development from 'inside' that shapes up the identity, and sense of belonging to a particular place that guides the search for 'local endogenous' strategic answers to the challenges of globalization (Arocena,1995).

Knowledge and Economic Development in the Caribbean

The Caribbean islands are heterogeneous by their historical background, size, race, ethnic, religion, language and cultural heritage. From a 'common' colonial past, these countries have become republics, commonwealth s, territories, departments and small nation states. The higher education 'system' is composed of institutions and programs unevenly distributed among the region, most of the institutions are teaching oriented and for professional training in which research and knowledge is largely imported. Most of the scientific and technological research is centered in a few countries around consortiums with developed countries or sponsored by international organizations like the World Bank, UNESCO, Inter-American Development Bank, among others (Ramos& Rivera, 2001; Yarzabal, 2001).

> Knowledge creation in higher education in Caribbean developing countries is crucial because research capacity is not a commodity that can be bought and put to work; rather it needs a local knowledge infrastructure that needs to be built in order to enter the knowledge economy where research capacity and knowledge creation are key factors in the strategies for overcoming underdevelopment. Therefore, learning, knowledge creation and dissemination have become more important than ever, as it allows individuals, institutions and countries to generate rapid changes in knowledge, and how to cope with these changes in the emerging 'knowledge societies' (Jarvis, 2001). Furthermore, Caribbean higher education institutions need to find ways of learning, organizing knowledge creation and dissemination (L-R&D capacity) that promote networking (Cross, Parker, Passon, 2003) inside and outside academic institutions with other sectors, and both locally and internationally.

> The L-R&D divide in the Caribbean developing countries is a complex situation in which government development policy does not allocate enough % of GDP to L-R&D,

due to the structure of production and local entrepreneurship which is characterized by: (1)low investment in R&D and innovation,(2) few firms employing researchers and limited number of institutions with licensed technologies and products and, (3) non existent or few available local researchers graduated from highly competitive higher education institutions.

Therefore, Caribbean universities do not face a strong increasing demand for science and technology from the government, business, and industry sectors. Because of the fiscal crisis of the state and the increasing social demands for social services, R&D is not a priority in short- run political platforms. Thus, the response has been to increase and develop research capacity through government-industry-academia alliances and collaboration networks. Within this context, here are three basic elements for successful alliances between government, industry and universities (Etzkowitz & Leydesdorf, 2001): (1) a high level of university research capability to allow researchers to participate in problem solution (2).industry and government need for high level technicians and professional knowledge users, and (3) individual efforts, teams and research networks should be able to combine their commitment and resources to long term problem solving agreements.

Trends and Policy Recommendations

Unlike the emergence of the entrepreneurial university (Clark, 1998) in developed countries, in Latin American developing countries, and more recently in the Caribbean, the trend is toward the 'developmental innovation university" (Aponte, 2003; Didriksson, 2000) with the aim to:

- Improve general basic education, student learning and teacher education; learning technological infrastructure, school efficiency-effectiveness.
- Strengthen the level of research and in order to achieve a greater number of researchers and well trained professionals (engineers, doctors, lawyers).
- Create books, texts, physical facilities train technicians, teachers and professionals; develop and incorporate learning technologies.
- Create more job opportunities for young professionals and research opportunities for researchers in order to avoid under-employment and "brain-drain'.
- Include local needs in the research agenda of the academy, industry and government; priority should be given to increase the country's competitive capacity.
- Encourage and incentive (resource allocations, tax incentives, financial sources, loans) research on local development needs.
- Promote research into problems of local relevance, while at the same time, internationalize universities in order for local researchers to create, enter and interact with world wide research networks.
- Develop assessment processes and accountability procedures to enhance continuous improvement, relevance, quality, and to increase learning- research funding sources.
- Develop a multi sector financial strategy to increase research capacity and sustain the L-R&D policies programs.
- Provide support to researchers and students who identify, and are committed to R&D, solving social problems and community development.

To get government support and aid from international multilateral organizations to endorse the agenda, knowledge must be recognized as a key element to local development. Public and private organizations and community efforts will have to work together to meet these goals. In order to transform universities, government, industry and business will need to be transformed as well. Governments, have a central role in devising development policies that foster demand for knowledge in order to increase research capacity and knowledge creation for helping other sectors to put knowledge to use effectively.

Towards an Alternative Scenario for Caribbean Endogenous Development and for Building 'Autonomous Knowledge Societies'

To address the challenges above and contending the change trends, an unfolding alternative scenario for higher education collaboration research-initiatives for transforming institutions and to enhance research capacity and knowledge creation for endogenous development in the region and beyond. To start with, the following initiatives can be mentioned:

- The Association of Caribbean Universities and Research Institutes-26 public and private-institutions founded in 1967 (UNICA) partnership (2004) with IESALC/UNESCO (Higher Education International Institute for Latin America and the Caribbean) to develop higher education collaboration networks in the region and beyond that will include a "Caribbean Virtual University" in 2008.

- The Macro universities Collaboration Network of Latin American and Caribbean of Public institutions (2003) for academic mobility, research training degrees, increase research capacity and network knowledge creation in eight strategic areas for regional endogenous development.

- The University of Puerto Rico ATLANTEA Caribbean Research Network founded in 1992 to enhance academic exchange, collaboration, research capacity, network knowledge creation and dissemination in the region.

- The UNICA initiative (2007) to create a Caribbean Collaboration Research Network to interact with the IESALC research projects and the Macro universities undergoing research efforts that can be supported by UNESCO Unitwin Chairs and networks.

- The University of Puerto Rico classified by the USA Carnegie Foundation as a Doctoral Research Institution with more than 65 Doctoral Programs, including a Doctorate in Caribbean English.

- The role of the UNESCO Chair of the University of Puerto Rico in Higher Education for Innovation, Management and Collaboration to enhance transformation, increase research capacity and knowledge creation at the

university entails: UPR entrance to the Macro universities Network of Latin-American and Caribbean Universities; initiate a Ph.D. program in 2007 to produce a 'generation of researchers' in higher education to train scholars from the region and beyond to foster transformation, increase research capacity and knowledge creation networks for endogenous development initiatives. The Higher Education Higher Education Research Center (2001-present) to support research projects and develop research capacity and knowledge creation efforts with the research centers, (such as the PuertoCouncil and Higher Education and IESAL/UNESCO initiatives) researchers, doctoral students; and the International FORUM (seminars, conferences, research meetings) for collaboration, disseminating and sharing knowledge between local institutions, researchers and leaders of the higher education institutions of the region and beyond.

- Other science and technology projects and initiatives through alliances and international academic collaboration agreements to enhance research capacity and knowledge, creation and dissemination such as INDUNIV alliance program between Industry and Universities, among others.

Conclusion

Policies and initiatives aimed towards transforming higher education in the Caribbean to enhance competitive capacity and greater contribution to development strategies will require a renewal convergence of thinking about the centrality of knowledge and workforce development for endogenous capacity building of the region knowledge societies. If Caribbean countries do not create collaborative research capacity, knowledge creation networks, and act together effectively, they could remain in the present dependent or under develop status instead of a self-reliant position in the current economic integration-regionalization processes.

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