Governing science–industry relations in the South

From networks of power to developmental coalitions

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1 Context

Policymakers in the South are searching for new developmental models and strategies to address their own difficulties. Some emerging countries, especially China, have witnessed outstanding improvements in science and technology (S&T) performance, and created new optimism for technological catch up and development. The international development community and Southern governments have therefore turned to S&T policies to help reduce poverty and improve prospects for improving productive capabilities and transitions to value-added, sustainable economic activities.

Policies that support the deepening of university–industry coalitions have become a critical component of a country's development strategy. From this perspective, S&T policies refer to intentional efforts by government to improve research and technological capabilities that are germane to the needs of societal actors, including firms, citizens and non-governmental organizations, industry groups, research institutes, and the state bureaucracy. Within the context of developing countries, informal structures are pervasive and have implications for developing domestic industrial capabilities, given the weak links of firms to research, fragmented administrative institutions, and institutional performance in meeting broad-based developmental objectives. The role of the state is often hindered by its limited governance capacity to coordinate relations between university researchers and industry players.

Searching for an S&T development model — Latin American scholars have increasingly sought to explain the widespread underperformance of S&T institutions in the region. Based on the innovation systems approach, they outline missing links or systemic failures to the effective design and implementation of S&T policies as a common feature in the poor performance of these countries. Innovation systems scholars often gloss over the critical role of politics in shaping outcomes and implementation of S&T policy. Transformation based on S&T investment depends on a number of variables, links, and processes that spur an indigenous process of capitalist transformation.

Networks of power and coalitions in developing countries — Relations among the scientific community, industrial sectors, and governance apparatus are structured by impersonal bureaucratic structures and informal channels. Relations are also shaped by the distribution of power and technical capabilities across different economic, bureaucratic, and political organizations. These observations reflect the political nature of S&T governance, and recognize that the nature of such interactions influence the process of learning and innovation.

In the STI domain, the actors and institutions in the network exercise varying levels of influence. The distribution of power can help to explain, for example, the influence of the business sector on STI policies, the capacity of industry associations to gather information and generate knowledge, the susceptibility of public-funded universities to policy or political struggles, or whether industrial research programs are subject to patronage and bargaining.

The state can use its power to design and implement policies that foster collective action and developmental coalitions to address productivity constraints and social development goals. The emergence of coalitions in various settings can result from deliberate efforts made in policy or from serendipitous reactions from informal networks. They respond to specific institutional, technological, and economic forces and triggers that prevail in a society to address particular problems.

2 Empirical Approach and Main Findings

To understand the historical and institutional evolution of S&T institutions in relation to Trinidad and Tobago's industrial development, the evolution of university – industry coalitions in domestic knowledge creation and human capital formation was examined.

S&T institutions and industrial development in Trinidad and Tobago — The institutional foundations for S&T were initially laid in the colonial period with the establishment of a number of research and administrative arms of the state. During this time, the British colonial government held the reins of power in terms of administration, policy stances toward industrial development, and the general direction of the economy. The Imperial College of Tropical Agriculture and the Cocoa Research Unit were both established and have since been integrated into the University of the West Indies. Since the declaration of independence in 1962, a series of Five-Year Development Plans have been developed with goals that oscillated between wooing fo-

reign industrialists through incentives and tax concessions to establish manufacturing operations in the country, to state led efforts to support domestic industries.

The offshore petroleum sector has continued to be an important sector, and it has remained largely in the hands of foreign capitalists. Most of the technological inputs and engineering and management capabilities were sourced from abroad with some expertise drawn from the local context. In 1968, the government established the National Scientific Advisory Committee (NSAC), which was instrumental in the resource-based transition from a petroleum economy to natural gas. A coalition of state, private companies, technology partners, and technical staff at the University of the West Indies (UWI) worked together to monetize natural gas in Trinidad and Tobago. In addition, in 1970, the Caribbean Industrial Research Institute (CARIRI) was established with support from UNIDO and UNDP. Until 1975, the main agents driving investments in S&T in the petroleum sector were state agents who comprised task forces and committees with links to the university and foreign companies. They were able to gain important concessions from the government for exploration and production activities. In its natural gas thrust, foreign consultants played an important role in framing decisions for government.

Efforts to institutionalize S&T in the economy were furthered by the creation of the National Institute of Higher Education, Research in Science and Technology (NIHERST) in 1984. NIHERST has become the focal point for research on S&T indicators and science popularization activities, but political changes that have weakened its statutory mandate.

In the 1980s with the onset of the debt crisis, and the end of the boom years, the government had to make adjustments, and invited the International Monetary Fund (IMF) and World Bank to assist. An important S&T development during the 1980s occurred at the Trinidad and Tobago External Telecommunications Company Limited (TEXTEL) and Trinidad and Tobago Telephone Company Limited (TELCO). TELCO had established an R&D department led by a locally trained engineer. The R&D department staffed with significant research, technical, and engineering capabilities were responsible for the engineering, installation and maintenance of the Digital Multiplex Switching (DMS) Systems, which placed the company at the forefront of this technology in the Americas. During this period, there were also collaboration among private-sector associations, namely the Coconut Growers' Association and CARIRI, which worked together to find a technological solution to dehusking tropical coconuts. Their collaboration lasted approximately 10 years before they invented a device by mere serendipity that automatically removed the outer shell of the coconut. This invention supported the growth of the coconut sector. These advances in the industrial research capabilities of local S&T institutions were then adversely affected by structural adjustment that reduced manufacturing activity.

Formal efforts to create an S&T policy in the early 2000s have been subjected to intra-organizational conflict, limited inter-agency collaboration across government, and little political commitment. In 2004, the Ministry of Science, Technology, and Tertiary Education was set up and sought to bring together stakeholders across government, the private sector, and the research community, but it had limited internal

expertise and lacked traction at the political level. In 2004, an S&T policy report outlined a number of measures, including greater funding and new institutional structures. There is presently some renewed vigour around university–industry partnerships in the UWI's Engineering Department and the promotion of energy services. Such proposals do not seem to have received wide support. The earlier coalitions that develop technologies for local problems have not been easily reproduced. Efforts have been stuck at the policy-design stage, impeded by powerful players, thereby curtailing efforts to nurture a thriving S&T ecosystem.

3 Main messages for policy and practice

This analysis has implications for creating the right mix of policies, institutional reforms, and political actions necessary for S&T in Trinidad and Tobago, as well as other developing countries. It is clear that political commitment and demand from private players matter. Though some policy input is necessary to spur interest from the private sector, this cannot be externally driven. Complex interactions and power dynamics are at play in university-industry coalitions and the governance capabilities of the state to coordinate and support those efforts is needed. In this way, developing country policymakers and actors can gradually build their S&T capabilities through collective action, cognisant that their local experiences matter in the promotion of developmental outcomes.

It is important to learn from in-country experiences to understand the political conditions, historical transitions, and institutional mechanisms that created periods of progress. In addition, identifying the constraints to sustained action is essential. Changing institutional and political contexts have transformed relations among the scientific community, government agencies, and the industrial sector. The coordination capabilities of the state need to be improved. Although multilateral bodies need to play a role, their distance from the process leaves them with little knowledge of the contextual specificities and the modus operandi that has fostered coalitions in the past. Their increased role cannot be ignored but their funding and technical support should in no way supplant local knowledge and experimentation, reduce the need to reinforce domestic capability building efforts in research and productive exchanges, or lead them to direct the process.