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# ASSESSING THE INDUSTRY CLUSTER APPROACH TO ECONOMIC DEVELOPMENT: IDENTIFYING CHALLENGES TO GROWING PUERTO RICO'S DIGITAL ECONOMY

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economic development strategies*

## **INTRODUCTION**

As many regions in the United States are thriving in the information age, experts in Puerto Rico are left wondering how to get the island up to speed with its mainland counterparts. In the 1990's, high-tech output has grown four times faster than the economy as a whole<sup>1</sup>. In the U.S., information technology industries now comprise 8.2 percent of GDP – up from 4.9 percent in 1985 – and are expected to account for approximately 15 percent of GDP in 2020<sup>2</sup>. Although high-tech development overwhelmingly occurs in America's metropolitan areas, cities in Puerto Rico have barely contributed to this growth. The top 114 metro areas in the U.S. contain 67 percent of jobs, yet they account for 81 percent of all high-tech development<sup>3</sup>. This dense concentration of activity is an indication of industry clustering, the dominant trend in high-tech industry growth. Most industry clusters have emerged on their own, even though a growing number of regions are now enacting economic development policies designed to foster industry cluster formation and expansion. Some have advised that this is the best approach for Puerto Rico to take in order to spur community renewal and revitalization. However, as policy makers in Puerto Rico commit to this strategy they must fully assess the benefits and drawbacks of industry clusters, identify the implementation challenges for Puerto Rico, and work towards decreasing the obstacles for the success of the approach.

## **HIGH-TECH CLUSTERING: PROS AND CONS**

There are as many definitions of industry clusters as there are authors that have written on the subject. However, Dr. Edward Feser from the University of North Carolina at Chapel Hill provides the most useful definition of an industry cluster as “a group of business enterprises and non-business organizations for whom membership within the group is an important element of each member firm's individual competitiveness”<sup>4</sup>. Feser's definition is precise because, unlike many other definitions, it incorporates non-business organizations such as universities, R&D firms and non-profits, which are all crucial to the success of many clusters. The purpose of this paper is to evaluate the

high-tech industry cluster method to economic development, and identify challenges for Puerto Rico in the New Economy. “High-tech” does not refer to one individual industry, rather it is comprised of a number of new technological industries. This paper will refer to clusters of high tech industries in general, including but not limited to telecommunications, internet services, software, hardware, and biotechnology rather than in a specific segment of an industry.

Studies indicate that healthy clusters confer competitive advantages to firms because they promote innovation, offer benefits through agglomeration economies, and foster strong, high-skilled labor markets. Although these are strong reasons to advocate clustering, any region looking to implement the approach should be cautious of the dangers of overspecialization. Finally, in order to make high-tech clustering a viable option for Puerto Rico, economic-development policy makers are challenged to create a skilled workforce, invest in infrastructure for innovation, and improve the quality of life on the island.

## **INNOVATION**

In the information age, innovative capacity is a firm’s greatest asset, and a position in an industry cluster will certainly cultivate this asset. The New Economy puts a premium on what Nobel Laureate economist Douglas North calls ‘adaptive efficiency’ which is the ability of institutions to innovate, continuously learn, and productively change<sup>5</sup>. In order to stay competitive in a world changing at the speed of thought, having a medium for exchanging ideas is critical. “Knowledge spillovers,” when information gets from one firm to another, occurs most frequently via informal channels such as employee turnover. Thus, this exchange is more likely among firms in a cluster which are in close geographic proximity, than among isolated firms. For example, when a software firm in suburban Washington, DC, announced its closing, employees were flooded with job offers from competitors within the cluster even before the company shut down<sup>6</sup>. This illustrates a perfect opportunity for knowledge transfer. Knowledge spillovers are also more likely to occur among firms in clusters through formal channels such as conferences, special events, and close proximity to R&D institutions.

In his book *The Competitive Advantage Of Nations*, Michael Porter offers another explanation of how industry clusters facilitate innovation. He argues that close proximity between competitive firms within a cluster accentuates rivalry thus providing a greater impetus to be creative and innovative<sup>7</sup>. Indeed industry clusters can have a positive effect on a firm's long-term future since ultimately, innovation will increase productivity and stimulate growth.

### **AGGLOMERATION ECONOMIES**

Agglomeration economies offer benefits because of the high concentration of industry-related firms in the same areas. In clusters, firms can cut costs because they can obtain goods from within the cluster. Clusters attract supplier specialization, competition and innovation. Therefore, in addition to getting lower prices in intermediate products, correspondence and shipping fees are also lower. Furthermore, "as industry concentration increases, individual businesses benefit from the development of sophisticated institutional and physical infrastructure tailored to the needs of specific industry. 'Such infrastructure includes' local product showrooms, foreign sales officers or distribution centers, supply centers, [and] common waste facilities"<sup>8</sup>. Firms can also put their resources together for greater effectiveness to address an industry-wide problem, or to reduce the cost of other common needs. Also, groups of strong firms in one geographic area can increase political influence since they can collectively provide funds and lobby for policies favorable to the industry. As the industry expands, the concentration of pro-industry stakeholder in the community increases, making it easier for firms to create many different mechanisms, which are conducive to the industry's growth.

### **LABOR MARKETS**

Knowledge workers are the driving force behind the success of a firm, especially for those in the IT industry. Therefore, every firm wishes to attract high-skilled labor, but firms within clusters have a distinct advantage. This is because studies suggest that one of the most important determinants of where a knowledge worker chooses to locate, is

the presence of an existing cluster of employment in their occupation<sup>9</sup>. Experts also indicate that clusters provide a distinct advantage in training and developing an unskilled labor force. This is important considering that according to a study conducted by the Information Technology Association of America, in 2001, over 425,000 job openings in the IT industry will be left unfilled due to a lack of qualified applicants<sup>10</sup>. Robert D. Atkinson, the director of the Technology, Innovation, and New Economy Project at the Progressive Policy Institute advises that in order to fill this void, industry involvement is critical. Atkinson stresses the importance of industry and universities forming partnerships so that educational goals are specific to the skills and knowledge needed for emerging jobs. He suggests that firms with similar skill requirements within clusters pool resources in order to lower training costs and achieve better results. In Tucson, the University of Arizona has formed partnerships with four high-tech clusters in Southern Arizona in order to determine the best allocation of funds generated by Proposition 301, a new economy initiative for the university. If cities wish to develop a high-skilled labor force, such alliances between educational institutions and industries will promise to play an invaluable role in the cultivation of skilled workforce.

The benefits of promoting industry clusters, especially in high-tech industry are many. However, simply having many institutions working in the same geographic area does not qualify as a cluster. The crucial difference is that a cluster is characterized by a high degree of interaction, information flow and interdependence among different firms. In order to achieve this, a social infrastructure, or a means of healthy communication must be established and maintained. AnnaLee Saxenian argues in her book *Regional Advantage* that social infrastructure was the main explanation for Silicon Valley's out-performing Route 128. Saxenian explains that Silicon Valley "has a regional network-based industrial system that promotes collective learning and flexible adjustment... [and] dense social networks and open labor markets [that] encourage experimentation and entrepreneurship"<sup>11</sup>. By contrast Route 128 is described as "dominated by a small number of relatively integrated corporations"<sup>12</sup>. Thus, it is no wonder why between 1986 and 1990, companies in Silicon Valley increased their market value twenty-five times their counterparts at Route 128<sup>13</sup>.

## **THE RISK AND NECESSITY OF SPECIALIZATION**

Despite the wide spread praise of the industry cluster concept, implementation of the approach does not come without its risks. Because clusters are specialized entities, a declining industry could result in economic disaster for an entire region. Luckily, as economists anticipate sustained growth of the information technology sector for decades, the window of opportunity to invest and grow in the New Economy remains open. On account of increasing demand and expansion, the high-tech industry is not as volatile as traditional clusters such as low-skilled manufacturing and tourism. However, regions wishing to avoid the risks of overspecialization by investing limited resources, will seldom find success in the high-tech industry. This is because firms located in high-tech clusters have grossly outperformed their counterparts in mixed economies. In the New Economy specialization is the key to competitiveness. A recent survey of 14 successful metropolitan areas in the United States with extensively developed high-tech clusters found that most often these clusters are based on one technology such as hardware, software or biotechnology; and seldom do the clusters incorporate more than one or two different technologies<sup>14</sup>. However, simply because most clusters have a specific focus does not make them easy to create. In fact, developing a cluster is quite difficult for Puerto Rico and other places like it, which are not already well invested in the high-tech industry.

In Puerto Rico, the government's economic development arm, PRIDCO, has embraced the policy of fostering clusters in Puerto Rico. However, in order for this plan to materialize it must go hand in hand with a firm strategy of creating a highly skilled labor force, encouraging and investing in infrastructure projects, and improving the quality of life on the island.

## **IMPLEMENTATION CHALLENGES FOR PUERTO RICO**

### **LABOR FORCE/ EDUCATION**

In order to be successful in the new economy, a region must have a high quality labor force. "High quality" implies a well-educated population which possesses the skills

needed to meet the demands in the high-tech industry. When IT companies seek to expand, regions with high skilled labor markets are most attractive. When assessing a region without a high-tech employment base such as Puerto Rico, the performance of the educational system best indicates the capacity to develop skilled-workers. Unfortunately, the performance of Puerto Rico's educational system leaves much to be desired. The University of Puerto Rico at Mayaguez, however, is one institution that provides much hope. This University located on the island's west coast, is one of the best performing engineering schools in the world, and could function as an excellent supply of labor for a high-tech cluster on the island since science, computer science and engineering majors are best prepared for work in the high-tech industry. While the University could fill the labor needs of a nascent cluster, eventually the cluster's labor demands would become greater than that which could be met by any single university.

A weak long-term outlook because of a poor educational infrastructure may prevent high-tech firms from making an initial investment in Puerto Rico. This underscores the need and urgency of preparing Puerto Rico's residents for work in the new economy by arming them with the appropriate skills. Other Universities on the island also need to develop their science, computer science and engineering curriculums. In addition, policy makers should invest in K-12 education, as this period is crucial in the development of human capital. Each passing day that this educational initiative is not the absolute priority of the island's policy makers, represents an increasing threat to Puerto Rico's successful entry into the New Economy.

## **INFRASTRUCTURE**

The internet, arguably the most important invention of our time has revolutionized the way we communicate, do business and live our lives. For the high-tech firm that relies very heavily on the exchange of information, the internet is especially critical. Therefore, in order for high-tech industry firms and clusters to prosper, they need a telecommunications infrastructure that provides broadly deployed, high-speed, broadband internet access at competitive prices. Unfortunately, in this area Puerto Rico lags behind as well. Puerto Rico's telecommunications market has been dominated by

the Puerto Rico Telephone Company (PRTC) since telecommunications were brought to the island. PRTC lacks strong competition and thus offers a modest infrastructure and limited, low-quality, expensive service. A T1 line, which provides high-speed, broadband, internet access, most commonly used by businesses, is at least three times more expensive in Puerto Rico than in the US<sup>15</sup>. Puerto Rico's poor telecommunications infrastructure also contributes to limited internet access among residents: 14% of households on the island use the internet<sup>16</sup> compared to 43% of the households elsewhere in the U.S.<sup>17</sup>. From an economic development perspective, this is not to be ignored especially since anecdotal evidence suggests that high-tech firms are attracted to areas where the rate of internet usage is high<sup>18</sup>. If Puerto Rico wishes to be a contender in the New Economy, an environment of robust competition needs to be developed in the island's telecommunications sector.

## **QUALITY OF LIFE**

Other than a skilled labor force and a first-world telecommunications structure, a jurisdiction's most valuable asset in the New Economy is a high quality of life. Knowledge workers are highly mobile since their labor is in great demand, and a good quality of life is necessary for a city to attract and keep these workers. Richard Florida from Carnegie Mellon advises that this new generation of skilled workers are not enticed by the cultural outlets of the old economy such as art galleries and opera houses. Instead, this mostly young crowd takes a greater interest in active outdoor recreation, nightclubs and the hustle and bustle of city life. With its museums, beaches, outdoor recreation, and clubs, Puerto Rico certainly has the culture necessary to attract knowledge workers. However, with 59 percent of the population living below the poverty line, Puerto Rico needs to substantially lessen poverty, which will otherwise surely deter prospective residents<sup>19</sup>. Lifting islanders out of poverty will not only augment Puerto Rico's appeal by eliminating the unsightliness of destitution, it will also reduce crime, drug abuse, and improve the economic well being of the island as a whole.

## CONCLUSION

As Puerto Rico seeks prosperity in the information age, policy makers must remember that success in the New Economy requires a new and refreshing approach to economic development. Calling for a shift in values, Robert D. Atkinson explains where many developers are misguided in their efforts:

Unfortunately, many states continue to pursue industrial age economic development strategies that seek to attract out-of-state investments through corporate tax subsidies, abatements, and assurances of low labor costs. These strategies are increasingly out of touch with the factors that constitute success in the New Economy: good public education, an R&D infrastructure and availability of job specific skills training, quality of life, and quality government<sup>20</sup>.

Sadly, Atkinson could easily be talking about Puerto Rico where some local policy makers continue to call for tax-incentives to attract manufacturing firms. With global trade barriers steadily being eliminated, it will not be long until Puerto Rico is unable to compete with third-world economies which have much cheaper labor, and less stringent environmental and other regulatory policies. Perhaps jobs will be created in the short run, but the island will surely suffer in the long term. The focus must be turned to attracting high-tech industry and developing specialized clusters wherever possible. Preparing for competitiveness in the New Economy by investing in education, developing a first-world telecommunications structure, and improving the quality of life, is the best possible course of action available for Puerto Rico. Transitioning will take time, but the sacrifice is critical, and the rewards are many.

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## ENDNOTES

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