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REGIONAL ECONOMIC DEVELOPMENT: COMPARATIVE CASE STUDIES IN THE US AND FINLAND

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Regional Economic Development: Comparative Case Studies in the US and Finland

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ABSTRACT

In context globalization of industries and increased level of competition and rapid changes in technology, firms have formed alliances with many types of organizations, including universities. Universities on the other hand, have faced increasing budgetary challenges and sought to expand their roles. Planning agencies at various levels are considering universities as sources of regional economic development. Studies in regional economics strongly point to the fact that proximity to a university is often associated with recent growth of high tech industries in these regions. Examples of the Silicon Valley and its proximity to Stanford University and the University of California, the industrial belt on Route 128 in Massachusetts and its proximity to MIT, and role of Cambridge University in the UK are commonly cited as the important role of universities in regional development.

Although these examples point to the importance of universities in regional development, the process is indeed a complex one. The dynamics of the relationship between the industrial firms in one hand and the governmental agencies on the other hand is the subject of a multi country study at the Industrial Performance Center at MIT. Our research questions deal with the changing role of the universities in knowledge generation, diffusion and implementation. In the last area, we postulate that universities play a significant role in interpretation of the technological opportunities as solution for business needs. Finally, universities also contribute to the development of social capital form the region promoting economic growth of the regions.

In this paper we draw from the experience of four technological universities in the US and compare them with four technical universities in Finland. Although, Finland and the US differ a great deal in many socio-economic dimensions, the process followed by each of the universities illuminate the complexity of the process.

All of these universities faced the challenge to help develop their regions. Finland faced a very difficult economic recession in the early nineties when its main trading partner, the Soviet Russia disintegrated and the value of Roubles plummeted. Since then, Finland's

economy has grown as it changed its industrial base significantly and became a leader in wireless communication. Technical universities in Finland, primarily the Helsinki University of Technology and the Technical University in Tamepere contributed to the growth of the mobile communication industry. In contrast, the four technical universities in the eastern Unite States were involved in growth of their immediate regions. The strategies followed by these universities are the result of a complex interaction among the governmental policies, local economy and local policies.

Introduction

The competitive environment for most firms has been transformed by global competition, rapid changes in technology and shorter product life cycles (Ali, 1994: Bettis & Hitt, 1995: Quinn, 2000). Innovation has become increasingly important to competitive outcomes in this environment (Quinn, 2000). The average life cycle of the products in many industries has declined. Moreover, the diversity of performance standards across national boundaries, combined with rapid changes in these standards as technologies evolve, is exacerbating the uncertainty and complexity. Many companies have sought to reduce the costs and risks of innovation by outsourcing elements of the innovation process.

Quinn (2000) provides several compelling reasons for outsourcing innovation. Continued growth of the world economy has opened new market opportunities, requiring detailed, usually locally-based knowledge of market characteristics. Scientific and technological capabilities are more widely distributed across the world, while the development of information and communication technologies has aided effective coordination among geographically distributed groups. Finally, governments and financial institutions are providing new incentives for inter-organizational collaboration.

The potential sources of technology include competing firms, research organizations, government laboratories, industry research associations, and universities. Universities have certain unique attributes in this regard. Not only can a firm obtain knowledge and technology, but it can also recruit graduates and faculty to serve as employees or consultants. While much of the literature on interorganizational

collaboration in new product development has focused on the interactions between firms, we concentrate here on university-industry interactions. Industry-university alliances represent an evolving trend for advancing knowledge and new technologies (Cohen, et al., 1998; NSB, 2000; Okubo & Sjoberg, 2000; SRI International, 1997).

Universities provide a range of functions in the process of innovation (Lindholm-Dahlstrand and Jacobson, 2002). They help create and diffuse knowledge, not only by pursuing groundbreaking research themselves, but also by diffusing knowledge drawn from the accumulated stock of systematized, codified knowledge in the world. They also influence the direction of technological advance. Lately, many universities have been actively involved in attempting to start new companies based on research carried out by faculty, staff and students. Pavitt (1998) summed up the benefits of academic research as follows: "the main practical benefits of academic research are not easily transmissible information, ideas and discoveries available on equal terms to anyone in the world. Instead, they are various elements of problem-solving capacity, involving the transmission of often tacit (i.e., non-codifiable) knowledge through personal mobility and face-to-face contacts. The benefits therefore tend to be geographically and linguistically localised."

Structural framework for collaboration

Industry-university relationships have a long history (Bower, 1993, 1992). Today there are many reasons for industrial firms and universities to work together. We have discussed the benefits to firms of collaborating with prominent academic research institutions (Fombrun, 1996). For their part, universities see opportunities to generate additional funds, particularly for research (NSB, 1996; NSF, 1982a). Universities also want to expose students and faculty to practical problems, to create employment opportunities for their graduates, and to gain access to applied technological knowledge (NSB, 2000; NSB, 1996). University-industry

collaborations have been instrumental in helping firms advance knowledge and propel new technologies in many areas, e.g., in biotechnology (Pisano, 1990), pharmaceuticals (van Rossum and Cabo, 1995) and manufacturing (Frye, 1993).

Smilor, Dietrich and Gibson (1993) identified the following external influences on industry-university collaborations:

a. Policy changes at the federal and state levels promoting commercialization of technology;
b. Encouragement by government agencies to form university-industry alliances;
c. New demands on universities for accountability by the political leaders at the state and local levels;
d. Development of complex new technologies requiring multidisciplinary approaches and large-scale funding;
e. The increasing needs of industry for highly-educated employees;
f. The universities' need to develop alternative sources of funds.

Other factors internal to the university are also contributing to increased interest in research collaborations with industry, including:

a. The growing importance of multidisciplinary research in the emerging technological fields
b. Faculty seeking new entrepreneurial opportunities;
c. Champions within the universities who are trying to change the system;
d. The demand for new curricula emphasizing issues related to entrepreneurship and commercialization of new technology;
e. Changes in student's expectations regarding curricula
f. Need for continuing professional education.

Experience in the US and Finland

In our exploratory study of the role of universities in regional economic development, we will discuss the experience of eight universities, four in the eastern part of the United States and four in Finland. They are mostly technical universities, with the exception

of two comprehensive Finnish universities with strong technical faculties. The four universities in the US are: Lehigh University in Bethlehem, PA; Worcester Polytechnic Institute (WPI) in Worcester, MA; New Jersey Institute of Technology (NJIT) in Newark, NJ; and Rensselaer Polytechnic Institute (RPI) in Troy, NY. The universities in Finland are: Helsinki University of Technology in Helsinki, Tampere University of Technology at Tampere; the University of Turku in Turku; and the University of Oulu in Oulu.

During the early nineties, Finland experienced a deep recession with high unemployment, aggravated by the economic collapse of its principal trading partner, Soviet Russia. Universities at that time emerged as an important engine of economic development. Helsinki became a major center for growth in wireless communication and information technology. The University of Oulu helped build up the Oulu region's capabilities in electronics and information technology. Tampere focused on electro-mechanical and automation industries. The University of Turku contributed to the development of pharmaceuticals and chemistry based innovations.

Although none of the regions in which the US universities we studied are located experienced economic reversals as dramatic as those of Finland, each has had its share of economic crisis. Newark and its surrounding area have a long history of economic stagnation, and NJIT has embraced economic development as one of its missions. Worcester Polytechnic (WPI) is located in central Massachusetts, a region that has experienced an erosion of its economic base with the demise of many mechanical and electrical manufacturing industries. WPI has been a stimulus to regional growth through its contribution to the development of new industrial activity in information technology and more recently in biotechnology. In the Bethlehem area, long disadvantaged by the decline of the steel industry, Lehigh University has become a facilitator of economic development in the region. RPI is located in the capital district region of the state of New York, which has struggled through a series of economic cycles and whose dominant company, General Electric, has

continued to downsize its local operations including the corporate research center. Both RPI and the nearby State University have set up incubators for new companies and other related activities.

There are also some differences in the contextual conditions of these cases.. In Finland, it was national policy that targeted universities as key actors. Through its technology development agency, Tekes, the Finnish government has been proactive in technology development and implementation by the industry. While the National Science Foundation in the US developed programs to stimulate closer linkages between the industry and the universities, a coordinated national effort for post-competitive research and technology utilization has been lacking.

In both countries, universities have developed structures for collaborative and sponsored research. The U.S. universities have developed systems for intellectual property management, whereas the Finnish universities are still at an earlier stage in this process. Finnish university administrators believe that the legal basis for intellectual property arising from research done at universities needs modification.

The training of scientists and technical personnel is the most important function for the universities in both countries. The Finnish universities have generally shown more flexibility in introducing curricular reforms designed to respond to the needs of the industry.

CONCLUSIONS

From our preliminary investigation of eight universities in Finland and in the US, we observe that universities are playing significant roles in local and regional economic development. National policies and governmental agencies in both countries have played significant roles in promoting university-industry collaborations. Policies and practices differ significantly between the two countries, however. Companies, particularly large companies, in the US are reluctant to become involved in university relationships that encompass their core technology. Public agencies in the US also shy away from any projects that may benefit a specific firm. This leads to support for projects that are

at a pre-competitive stage and that will need a substantial amount of further development before they can be implemented commercially. In Finland, an agency such as Tekes is not as constrained by these policy considerations and tends to be more proactive in commercialization of technology.

Universities in the US differ widely in their research capabilities and reputation. The nature of the industry-university relationship is affected by the reputation or "tier" to which a university belongs. We did not the same level of overt differentiation among the Finnish universities. Large Finnish companies such as Nokia and Sonera have in fact been instrumental in strengthening the capabilities of the universities at Oulu and Tampere. This in turn helps develop the economies in these regions.

Our study has significant implications for three constituencies. Policymakers at both the local and national levels need to recognize the complexity and diversity of university-industry interactions and should develop policies accordingly. University administrators should consider additional structural and procedural changes to encourage faculty to interact effectively with industry.

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The Local Innovation Systems Project

The Local Innovation Systems Project, an international research partnership based at the Industrial Performance Center (IPC) at MIT, is addressing a central issue now confronting industrial practitioners and economic policymakers throughout the world: How can local economic communities survive and prosper in the rapidly changing global economy?

Our particular focus is on the role of innovation – in products, services, and processes – in promoting productivity growth and competitive advantage at the local and regional levels. National and local governments around the world, as well as other institutions with an interest in economic development, are greatly interested in creating and sustaining local environments that are attractive for innovation. Firms, too, recognize that their innovation performance is affected by their location.

The policy debate has been dominated by a few outstandingly successful centers of technological entrepreneurship, notably including Silicon Valley and the Boston area in the United States, and the Cambridge region in the U.K. But most locales do not have clusters of high-technology ventures of such scale, nor are they home to research and educational institutions with world-class strengths across a broad range of disciplines. Many, on the other hand, do have distinctive industrial capabilities and vibrant higher educational institutions, and some of these locales have been quite successful in harnessing new technology to revitalize their economies or even to reinvent themselves as centers of innovation and competitive advantage.

The Local Innovation Systems Project is investigating cases of actual and attempted industrial transformation in more than 20 locales in the United States, Europe, and Asia. Our research is aimed at developing new insights into how regional capabilities can spur innovation and economic growth. We seek ultimately to develop new models of innovation-led industrial development.

We are currently completing the initial year of a projected multi-year study. In the first phase of research, we are investigating the roles of universities and other public research institutions as creators, receptors, and interpreters of innovation and ideas; as sources of human capital; and as key components of social infrastructure and social capital. Later phases of our research will explore the process of enterprise growth and the ability of different locations to attract and retain innovating firms. We are also investigating different approaches to individual and institutional leadership in locally-based systems of innovation.

The founding research partners of the Local Innovation Systems Project consist of an interdisciplinary team of faculty, graduate students and research staff at the MIT Industrial Performance Center, together with their counterparts at the University of Tampere and the Helsinki University of Technology in Finland, the University of Cambridge in England, and the University of Tokyo, Japan.

Current research sites include several locations in the United States (Boston, MA; Rochester, NY; Akron, OH; Allentown, PA; Youngstown, OH; New Haven, CT; Charlotte, NC; and the Greenville-Spartanburg area of SC), Finland (Helsinki, Turku, Oulu, Tampere, Seinajöki, Pori), Japan (Hamamatsu, Kyoto), and the United Kingdom. Additional research

is being carried out in Ireland, India, Taiwan and Israel.

At each location, teams of researchers from the partner institutions are studying innovation trajectories and developing comparative case studies of growth and transformation in several industries, mature as well as new, including polymers, ceramics, optoelectronics, industrial machinery and automation, auto/motorsports, medical equipment, biotechnology, and wireless communications.

The outreach activities of the Local Innovation Systems Project will include the preparation of discussion papers and books, executive briefings and informal workshops, international conferences, and executive education and training programs for policymakers, research managers, and industry executives.

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