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Igniting the Engines of Regional Economic Development: An Overview of the Roles of Colleges and Universities

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Regional economic development] activities are likely to expand in the next few years and become more important in the lives of both universities and communities they serve. University economic development activities, including continuing education and technology transfer, are a new part of the innovative, entrepreneurial, expanding parameters of higher education (Matkin 1997, 41).

Gary Matkin's forecasting has its roots not in Nostradamus or the occult but in a thoughtful analysis of a number of societal trends. First and foremost of these has been hard economic realities. Universities, working with various industrial and business organizations, have been instrumental in helping to increase the revenues of those entities. Coopers and Lybrand's "Trend Setter Barometer" survey indicates that when companies utilize university resources we see "productivity rates that are 59 percent higher than their industry counterparts . . . projected annual revenues that are 21 percent higher and capital investments that are 23 percent greater" (Maturi 1995).

Even without this survey, it was accepted that universities were indeed "engines of regional economic development" (Maturi 1995). In the early 1970s, the so-called "Massachusetts Miracle" of economic prosperity was attributed partially to the presence of Harvard and Massachusetts Institute of Technology in that state. The emergence of Silicon Valley in California was an outgrowth of research activities at Stanford University and several of the University of California campuses. The North Carolina Research Triangle has been seen as a key element of the business growth of that state. The sustained growth of these areas has led economic-development professionals to perceive universities as a key element in the strategic mix needed for regional prosperity.

This perception has been clearly fostered and encouraged by university presidents or government-relations officers who promise state legislatures that they will fuel economic growth in their states if their institutions receive increased allocations. While institutions have not always been able to deliver on such rhetoric, conventional wisdom among politicians is that support for higher education equals support for economic development. The emergence and institutionalization of technology-transfer offices on most of our nation's campuses has been a key initiative among institutions of higher education for the last decade (Matkin 1997). Numerous other trends have supported the importance of higher-education communities' engagement in economic development. The decades from 1960 through the 1980s were, on balance, periods of good legislative support, ever-increasing tuition rates, and readily available grant funds and rising indirect cost rates from a number of federal agencies.

More recently, however, we have witnessed a reluctance on the part of legislators to increase state allocations to higher education, partly because of competing needs in corrections and human services. At the same time, popular media are supporting a consumers' revolt against ever-rising tuition rates. Further, federal budget balancing has limited federal granting by many of the agencies with capping of indirect costs.

As a result, higher-education leadership at all levels is now seeking new ways for universities to become more "engaged" with their constituent communities (NASULGC 1998; Muse 1995). The consulting group KPMG and others argue that participation in regional economic development can provide new revenue streams and is perceived very positively by constituents (Lamb and McPhail 1998). Using a variety of analyses or trend data, it becomes clear there is a convergence of economic realities, political desires, and institutional budget moves that will continually foster college and university involvement in regional economic development (Pappas 1997, 16-19).

Wyman identified three distinguishable emphases or waves in the economic-development process (1997, 5-6). The first, which occurred during the World War II era, was generally known as "smokestack chasing." During that period, segments of the country — e.g., the South and the West — used low wages, availability of land, and tax breaks to bring industrial plants into their communities. Institutions of higher education had only limited involvement and were happy to remain focused on instruction and curiosity-based scholarship (with the exception of agricultural extension divisions, which helped to fuel one of the successes of education-based economic development).

The second era occurred in the 1970s, when U.S. industrial and political leaders realized the nation faced significant product competition from Japan and Western Europe and that low-cost, work-intensive items increasingly were being made in the Far East. During that period, higher education's involvement in economic

development was limited to the initiatives of high-prestige research universities that started the technology-transfer movement. As Wyman has suggested, we are now moving into a third wave (1997, 5-6). In this wave, all institutions of higher education likely will be involved to some degree in the economic-development activities of their regions.

Indirect Involvement in Economic Development

Whether the college or university makes an overt strategic decision to involve itself in economic development activities, it is already involved in some indirect ways. While most institutions realize this, it is important to emphasize these indirect involvements, as they are a part of the overall mix of institutional contributions to regional prosperity and deserve recognition.

Most communities recognize that the presence of a university or college provides a "clean industry" that often supplies the largest local payroll. For a number of rural or small communities, the local college is often the only major industry; state legislators from rural areas have long recognized that "getting a school or a prison in your district is a great way to assist in the economic development of the community" (Reid 1998). Many large residential state and land-grant universities are located in small communities, and their populations (including staff and students) are larger than those of their host communities.

Lamb and McPhail (1995) suggest that communities do not have to be small to feel the economic impact of higher education. For example, the University of Alabama at Birmingham (UAB), located in a key metropolitan area in that state, is a welcome presence. UAB is the largest employer in the region with more than twice as many workers as the private sector's biggest employer, South Central Bell. It employs more than 15,000 workers and has a payroll of more than \$476 million on its various campuses in the region. If one includes the other universities and colleges in the Birmingham area, "the Chamber of Commerce's economic-overview report shows just how coveted and valuable higher education can be" in that metropolitan area (Lamb and McPhail 1995). Higher education employs hundreds of thousands of people and has an economic impact of billions of dollars annually. The presence of higher education in a community often is an economic-development success in and of itself.

Beyond campus payrolls and budgets, indirect benefits include quality of life characteristics that are necessary to support economic development or to foster attraction and retention of business. Universities support cultural and sporting events and the arts. These are attractive (and in some cases essential) to business executives who make location decisions as well as to workers who must live in a community. Another indirect benefit arises from the presence of colleges of engineering, business, and science that provide a readily available faculty pool of management and technology consultants. Those same units also provide low-cost part-time student workers to supplement core industry workforces. Add to those advantages

colleges of education, which often strengthen local schools by the placement of student teachers and providing classroom laboratories. Corporate executives' ratings of site-selection factors indicate that public schools are among the first quality-of-life elements considered in plant or business relocation (Maturi 1995).

Direct Involvement in Economic Development

Institutions of higher education, however, are no longer assuming that these indirect benefits are sufficient to elicit constituency support or to add revenue to their budgets. They are now engaging old and new proactive tactics to involve themselves in the economic-development process. These include: technology transfer through the commercialization and licensing of academic research and instruction products; workforce development ranging from community college literacy programs to mid-career executive master's degrees; development of research parks and/or business incubators; expansion of conferences, short courses, training institutes; and, perhaps most important, participation in industry/university partnerships or alliances that foster economic development. Each of these direct approaches to economic development will be further explored with illustrative institutional examples. It should be recognized that these approaches are not mutually exclusive and that their implementation often overlaps.

Technology Transfer and Commercialization of Academic Products

Technology transfer generally means the transfer of basic and applied research to the design, development, production, and commercialization of new or improved products, services, or processes (Matkin 1997, 28-32). As mentioned earlier, the formalization of university technology transfer is a relatively new phenomenon, typically dating from the late 1970s. At the core of this process is the discovery of some sort of research product (e.g., an artificial limb, a plastic synthetic, a process for fuel manufacture) or some type of instructional or social technology (e.g., a site location formula for convenience stores, a conferencing software for use on the Internet, a videotaped lecture from a prominent faculty member). As technology transfer becomes increasingly institutionalized, a number of internal administrative issues are emerging that institutions must address. Because of the limited focus of this article, these issues will not be considered in depth, but the reader should note that one of the interesting consequences of greater involvement in economic development is the need to clarify: (1) what the organizational forms of technology transfer and economic development will be, (2) what business arrangements can be made with faculty for their disclosure and participation in commercialization of discoveries, and (3) what are the intellectual property rights for instructional materials created in the new information-technology environment.

In spite of such tensions, it is clear many universities are extremely successful and effective at such technology-transfer

activities that have concomitant positive results on regional economic development. In fact, a recent study indicates thousands of successful examples across the country demonstrate how products can bring new revenues to an institution and to a faculty discoverer (Pappas 1997). Baltimore's Osiris Therapeutics recently purchased exclusive rights from Case Western University for a tissue-regeneration technology developed at that institution. At the same time, Osiris entered a joint-venture arrangement with Johns Hopkins School of Medicine to target commercial applications of a blood-regeneration technology it developed. James Burns, founder and CEO of Osiris, says, "Strong ongoing university relationships benefit us in a number of ways." He says these relationships have allowed the emergence of new technologies in ways that will be profitable both to the institutions and the commercializing company. He points out that the availability of well-qualified biotech university researchers and involved federal regulators made private development a relatively easy task (Maturi 1995). David Kjos, a manager for Kaiser Aluminum and Chemical Company who has worked with a number of Washington state institutions, suggests that the technology-transfer process is critical to economic development. He says:

Linking the resources of higher education with business requirements enriches the area's economic liability and ability to compete in the global market. Companies benefit from access to new knowledge and technology, the educational community benefits from hands-on experience and the community benefits from increased high paying, technological jobs. It's a win/win/win situation (Maturi 1995).

With the presence of such positive business-community responses and significant revenue returns to the institutions, technology transfer remains a critical part of institutions' economic development activities.

Workforce Development

In a general way, post-secondary institutions have always been involved in workforce development. However, their involvement traditionally has been somewhat abstract, encased in disciplinary silos and focused on entry-level workers. As Hall and his associates have indicated, the career development of workers in this last decade has changed dramatically and is directly related to regional economic development (Hall and Associates 1996). The half-life of undergraduate education for engineers and scientists is typically five years and the rapidly accelerating rate of information technologies has suggested that the workforce must be "modernized" through continual upgrading of knowledge and skills. Pritchett describes a new world for employees where job turbulence eliminates as many as 50,000 to 60,000 jobs annually — but creates that many new jobs to replace them. In his scenario, workers no longer make simply two or

three job and/or company changes in a lifetime, but often make five and six job-sector and category changes in a typical career (Pritchett 1994). These changes demand acquisition of knowledge and must be considered in the planning process if colleges and universities are to be effective in providing the kinds of workers needed for their regions' economic development.

While universities recently have recommitted themselves to the undergraduate experience, in technology areas they are not moving as quickly as necessary (Muse et al. 1995). With the availability of research and technology, significant curricular revamping must become a priority for universities in this decade. Such a transformation will require reallocation of internal funds and clear prioritization of programs to be supported. While the "church steeple" or "research stars" models have been discussed extensively, most colleges and universities are not willing to make the budgetary reallocations necessary to have very strong departments in a few areas. The pressures for technological and economic development and up-to-the-minute information and management training will further push institutions to consider such specialization. While larger institutions that are heavily endowed or have significant state allocations may be able to be all things to all people, most moderate to small institutions will be forced to make niche decisions or become part of larger consortia. This will also create considerable pressure on faculty for their own professional upgrading and development.

Participation in workforce-development activities to support regional economic development will be driven by state departments of commerce and/or state workforce initiatives. Economic developers and the Commission on Workforce and Community Development of the American Association of Community Colleges suggest that state officials increasingly will become more assertive in demanding trained local workers for industries they wish to attract or retrained displaced workers whose industries have been eliminated —e.g., Dupont Chemical engineers being retrained as financial analysts (Gissy 1998; Waterhouse 1997). Part of the reason universities and colleges should consider involvement in workforce-related training is access to new revenue streams supplied by the changes in federal block-grant funding for targeted jobs. In most states, workforce-development systems are now being linked to economic-development networks, and departments of commerce and politicians are demanding that such funds have direct applications to industry and business, rather than general education. Community colleges and universities that can adapt to this change by creating academic emphases or continuing-education training programs for targeted state industries will have access to new funds. In some states, we may see the earmarking of traditional higher-education funds for professionals with economic-development targets. Already there is emerging the concept of "designated education and training institutions" for state industries (Muse et al. 1995).

Another development that will reinforce these workforce-development trends is the emergence of one-stop career centers. Because of a number of factors — worker displacement, inadequately trained graduates, "fractionated" and often-competitive government services, and emerging welfare-reform programs — states are now

being asked to create one-stop career centers that will be electronically linked to industry, educational settings, libraries, small business development centers, and employment security and workforce-training programs. These centers have become gateways between employees and employers. Many states are using these as vehicles to focus on re-education for economic development in their states. Unfortunately, many colleges and universities often are not aware or involved in providing information for these centers' databases (Pappas 1997). With the creation of such centers and electronic systems that can make quick "matches" between educational curricula and job requirements, direct workforce applications will be simplified.

Research Park and Business Incubators

For most major universities, having a research park is now as important as having a basketball arena. A research park represents a tangible demonstration of economic development, entrepreneurship and research and technology transfer. While an expensive financial commitment, it signals that the university is starting to dismantle some of its ivy-covered walls. University research parks also create fixed relationships with tenants that lead not only to research contracts and graduate jobs but also to scholarships, industry positioning, and enhanced community support.

For a tenant, the park creates proximity to university facilities, research laboratories, the student and faculty human-resource pool, specialized libraries and databases, and an attractive setting for its R&D function (which in turn helps to retain research scientists). While there are numerous examples, the recent development in Richmond of the Virginia Biotechnical Research Park, which is the result of an industry/university collaboration between Virginia Commonwealth University and the Medical College of Virginia, clearly illustrates the dramatic impact such a facility can have. The first of three buildings, comprising more than 200,000 square feet, is now operating with nine tenants including Abbott Laboratories, Bristol-Myers Squibb Company, and the Syntex Corporation.

The presence of the Richmond research park also has attracted the semiconductor industry to the area. In 1995, Motorola announced it had purchased land near the research park; the economic impact would include 5,000 jobs and more than \$1 billion in investment. Gregory H. Wingfield, president of the Richmond Partnership which helped create the park, stated: "One of the attractions for Motorola is the ability to endow chairs and help set the direction of the curriculum at the new School of Engineering being established at VCU" (Maturi 1995, 30).

Wingfield added that Motorola, with its history of university collaboration in places like Austin, Texas, and Phoenix, Arizona, understands the importance of strategically locating near universities (Maturi 1995). While most research parks will not be this monumental in scope, Wingfield's comments underscore the importance of these parks to economic development.

Many universities also are developing business incubators as part of their research parks or as a separate facility. Although small-

business incubators have existed in the United States for more than thirty years, only thirteen effective incubators were established by 1980; by 1985, the number had risen to seventy-eight. Currently some 500 incubators are in operation and are growing in number at an accelerating rate. Most of the new ones seem to be developing near universities or colleges and often have as their primary tenants faculty start-up or small-business companies. The strategy for such incubators is generally to provide, if possible: (1) promising industry clusters that reflect the region's business strengths, (2) low-cost or free office space, (3) a combination of public and private funding, and (4) a business plan which allows self-sufficiency for the companies and the incubator after a three- to five-year period (Munroe, Luo, and Jackman 1995). Such incubators rely on state departments of commerce to locate venture capitalists. A number of institutions — e.g., Pennsylvania State University, Rensselaer Polytechnic Institute, and Oklahoma State University — have successful incubators.

While numerous financial benefits promise to support the creation of research parks or incubators, recent discussions with university research-park developers suggest that such developments must be seen as long term. They require a strong, supportive external business group; creation of special financial and campus procedures; willingness on the part of host communities to provide tax abatements and special infrastructure support (e.g., water supplies, road developments); and a campus "champion" willing to push the implementation process (Mueller 1997). Few institutions or faculty groups would deny the value of research parks, yet few are willing to experience the administrative pains that accompany their creation. Most professional economic developers suggest that while research parks or incubators are the most critical piece of the economic-development process, they are also the most difficult to implement.

Conferences and Institutes

Colleges and universities have long sponsored conferences and institutes for the post-graduate training of professionals in various fields; a review of the numerous brochures of most major colleges or universities would confirm these learning opportunities are the most typical ways of supporting regional economic development. The author's own experiences demonstrate how such activities can support local industry.

Each year the University of Oklahoma conducts the Laurance Reid Gas Conditioning Conference, Gas Compressor Short Course, Petroleum Landsman Training Institute, and the International Petroleum Production Conference. These conferences, which attract top engineers and scientists in the field of petroleum engineering, are seen by individuals in the energy industry as a key source of their workforce development and networking. These programs are strongly supported by state offices (e.g., the Department of Commerce and the Governor's Office), local foundations (e.g., Kerr

Foundation), local industry groups (e.g., Phillips, Texaco), and professionals (e.g., the American Association for Petroleum Landmen).

As economic development becomes critical to more and more universities, it is obvious that many of the developing conferences and institutes will be more focused on and supportive of research-park activities or business/university coalitions. In addition, a new role is emerging for these kinds of activities: "neutral convener" for governmental and industry activities for which political or vested interest issues make it difficult for coalitions or individual entities to serve as sponsors (Pappas and Eckart 1997, 97).

Again from personal experience, one such "neutral convening" event that occurred at the University of Oklahoma was the Partnership 21 series related to aviation education, training, and research. The University of Oklahoma has enjoyed a twenty-plus year relationship with the Federal Aviation Administration (FAA) and the aviation industry in activities such as air-traffic-controller training, global-positioning research, executive-engineering courses in composite materials, and aviation-management education.

In 1994, following a number of South American aviation accidents — along with increased reliance on global positioning for civil and commercial aviation and new developments in guidance-systems technologies — there emerged a pressing need for a forum at which parties could deal with such issues in the western hemisphere. Although FAA officials were concerned that they could not officially sanction commercial products or presume to establish a common standard for world aviation systems, they felt such a dialogue would be helpful. While there were a number of potential commercial sponsors, their role had to be limited in the eyes of governmental participants. The University of Oklahoma, therefore, became a convenient convener for such a forum since it was a neutral third party with no vested interest in the topics to be discussed. OU could accept co-sponsors such as the FAA and industry partners such as Motorola, Lockheed Martin, Fluor-Daniel, LB&M, United Airlines and American Airlines, as long as the university retained responsibility for the conference content and logistics. The symposium became Partnership 21 and attracted senior civil-aviation officials from thirty-five western hemispheric nations, including Cuba (which the university could invite), to discuss aviation infrastructure issues (e.g., air force facilities, aircraft, aviation workforce) and new systems (e.g., global positioning system, air traffic controller systems, weather systems).

The symposium also provided a setting for industry/business/government networking. The keynote speaker, then FAA Administrator David Hinson, said, "This symposium links countries from the Arctic to the Antarctic with U.S. businesses, universities, and federal agencies to cooperatively pursue common interests and ensure the highest-quality standards for the aviation industry of the western hemisphere" (Pappas and Eckart 1997, 97). Directors general and civil-aviation officials from Central, South and Latin American

countries, and Canada developed concepts for standardizing hemispheric aviation. As a result of the symposium, a number of spin-off business activities emerged for Oklahoma-based businesses. The program significantly positioned the Oklahoma aviation industry as a key player in future developments.

A variation of this convening role has been successfully developed at the University of California, San Diego (Walshok 1996, 37). Its CONNECT program is a university/community partnership supporting entrepreneurial high-tech companies. CONNECT's emphasis is on assisting new-company formation and job creation by providing educational, technical, networking, and cross-border activities in the San Diego region. The CONNECT program is funded by program fees and membership dues from nearly 500 high tech companies, business service providers, and financial institutions. Nearly sixty programs are conducted each year. Its various forums and conferences have significantly helped foster San Diego economic development (Walshok 1997, 24). As colleges and universities rethink their role in economic development, these convening functions may be logical extensions of current conferences and institutes. Walshok indicates that it is incumbent upon research universities to develop strategies to connect knowledge workers across the boundaries of universities and industry.

Collaborations and Alliances

In looking at the Partnership 21 and CONNECT programs, it becomes evident that economic-development activities will require a variety of industry/university partnerships and genuine collaboration among the parties. Despite rhetoric to the contrary, higher education historically has not excelled in creating and maintaining such collaborations. Collaboration is made difficult by attitudes toward the traditional model of the faculty member professing knowledge, the individual principal investigator conducting independent research, and the subtle (but real) competition among institutions of higher education. Further, industries with proprietary financial interests in applied research, overt marketplace competition, and general distrust of the ivory tower — with its lack of "real-world experience" — further create problems. If there are to be genuine industry/university alliances, all parties must undergo a paradigm shift. The potential for economic gain in such collaborations is tremendous, and universities of the coming century must find ways to foster such collaborations. It will require new incentive and reward systems for faculty, new financial and contractual instruments between institutions and industry, and the commitment of campus administrators who go beyond bureaucratic management and are visionary leaders for their institutions and regions. This leadership was heralded by Indiana University President Myles Brand:

Our goal should be to make our constituencies as comfortable in our front yards as their own. But we must

not stop there. We, too, must venture forth and become active participants in the world around us. The message that we must convey is that we are not merely cases of studied intellectual reflection; we are also a vital life force contributing to change, growth, and innovation (1997).

This author is hopeful that kind of leadership will emerge and that collaborations and partnerships will become the norm of the coming century. Today's strong models demand imitators tomorrow.

An excellent example of multi-party collaboration is the Spokane Intercollegiate Research and Technology Institute (SIRTI), a technology alliance of business, industry, and government to advance regional economic growth. Educational institutions involved include Washington State University, Gonzaga University, Eastern Washington University, Witworth College, and the community colleges of Spokane. While the resources of a single educational institution may not be adequate, the consortial or team effort brings together resources that can solve most business problems and serves as a catalyst to identify new business opportunities or emerging business trends.

In addition to educational institutions, various business entities are a part of the institute, including XN Technologies, Inc., Kaiser Aluminum and Chemical, Washington Water Power, and various Washington-based computer companies. Examples of products that have emerged from the collaboration include medical electronics for fetal-monitor equipment, signal-routing equipment used in Universal Studio's *Back to the Future* ride, harsh-environment instrumentation for use in airplanes, and two types of fuel cell units. Bill Fuglevand of Washington Water Power has said about this consortium:

We can participate in a number of ways: as a potential buyer, marketer, or maintainer of energy technology products. We, of course, are interested in the commercialization of such technologies. At the same time, the universities and students gain a real world experience with practical applications of research and deadline and budget constraints (Maturi 1995).

This institute is one example of how future economic development will occur in regions. Even though the universities and industries involved face the same barriers as others across the country, they have solved the problem of how to work together and, in so doing, they have dramatically enhanced economic development in Spokane and Washington.

In summary, numerous trends and examples of how economic development occurs in colleges and universities include technology transfer, workforce-development activities, creation of research parks and business incubators, development of conferences and convening

of networks, and development of new collaborations and alliances. There are lessons to be learned from what has occurred and what is projected in the future. Colleges and universities must:

- understand and articulate the indirect benefits they now provide their communities and constituencies;
- develop new financial and contractual instruments that will facilitate collaborations, consortia, and alliances;
- develop effective linkages to governmental and business networks to ensure they will be attractive partners;
- develop internal organizational structures that support and facilitate technology transfer, continuous education, and interdisciplinary cooperation;
- establish research parks or business incubators which allow proximity to higher education's resources and are attractive magnets for industry; and
- foster in faculty and administrators new attitudes reflecting that economic development is an essential feature of the university of the twenty-first century.

Higher education must assume a visionary leadership role for economic development. Institutions are responsible for the creation and dissemination of knowledge and research technologies; in the future, this will often be carried out with corporate and governmental partners. Such activities are essential to economic development, and the dissemination of practical, application-based technology and knowledge is critical to make the United States competitive in the global economy. Higher education's commitment to creating cutting-edge technology and providing state-of-the-art education and training, indeed, can be the engine that fuels economic development. Colleges and universities are well positioned to be central players and, in many cases, are already performing this function. When colleagues on campus become hesitant, or when bureaucratic barriers arise, advocates of economic development and outreach must convince their administrative and faculty leaders that economic

development is not simply a good idea but that it is crucial to the future of our institutions.

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