

The engaged university

Shiri M. Breznitz · Maryann P. Feldman

Published online: 17 July 2010
© Springer Science+Business Media, LLC 2010

Abstract Universities play a unique role in society, providing a community of experimentation and innovation. Even so, leaders around the world have had to push for university primacy to retain competitiveness in the global economy. This paper examines efforts taken by universities in the United States to evaluate their contribution to economic development. An emerging role for universities is one of active neighborhood involvement, in which they are engaged in projects with local communities. These projects include providing assistance to local firms and policy advice to state and local government, and getting involved in community outreach. In this role and in an unprecedented manner, universities are engaging on a wide range of topics with local communities, using these communities as labs to test new ideas and find better ways to achieve social and economic goals. This is precisely why it is important to consider the larger role of universities' in economic and social development.

Keywords Universities · Economic development · Technology transfer

JEL Classification O31 · O32 · O43 · O51

1 Introduction

Universities play a unique role in society, providing a community of experimentation and innovation. Even so, leaders around the world have had to push for university primacy to retain competitiveness in the global economy. This paper examines efforts taken by universities in the United States to evaluate their contribution to economic development. Universities have long existed as a venue in which novel ideas are developed, philosophical and ethical issues are debated and creativity is rewarded. Universities often have

S. M. Breznitz (✉)
School of Public Policy, Georgia Institute of Technology, Atlanta, GA, USA
e-mail: shiri.breznitz@pubpolicy.gatech.edu

M. P. Feldman
Department of Public Policy, University of North Carolina, Chapel Hill, NC, USA

progressive policies with regard to wages, salaries and other controversial topics. In addition, today these educational institutions are places of social and policy entrepreneurship. Yet, while universities are idealistic compared to the profit-oriented business sector and the pragmatic government sector, they are under increasing pressure to make an economic return to society, which requires many institutions to collaborate with both of these sectors. This has created tension between universities' social and money-generating roles, a tension that compromises their original mission.

Yet, in spite of any diminishment of their original purpose, universities today have a positive impact on economic growth, channeling funds to their local regions through student tuition, grants, government funding, and job sponsoring. In many locations, and depending on their resources and stature, some institutions of higher education have become the largest employers in their region.¹ This is the traditional economic multiplier, or impact analysis, that treats universities like other businesses: these actions show how the mere presence of a university is beneficial to a region. In many places, universities are the great hope for future economic development, recognized by many state and local governments as important engines of economic growth.

That said, it is important to note that universities are fundamentally different from other economic institutions because they generate broader economic benefits. First, their primary mission is teaching and augmenting human capital. This is perhaps the greatest impact of universities, although the process of education takes time. Second, universities provide long-term impact through research and subsequent knowledge transfer and technology commercialization, thus creating jobs and new businesses that promote local economic growth. Knowledge transfer may be direct through licensing or may be less direct through partnerships with local companies, through consulting or simply as a result of conversations.

It is also important to recognize that universities cannot make economic changes alone. In many cases, the socioeconomic conditions in each region have an impact on the ability of the region to absorb knowledge. Resources in the form of other universities, employment opportunities, government funding, culture and history all play important roles in the ability of a region to learn and compete in the global economy. If the ability of other regional players to absorb the knowledge and know-how of a university is limited, universities will not be able to prevail as central economic players. Students will be educated but, if there is no opportunity for local jobs, tax incentives and investments may slip away as students migrate to regions of greater opportunity. Similarly, university ideas will be commercialized in distant locations if there is limited local support to start firms, or if there are no nearby receptive companies. Thus, in the absence of other local committed actors, universities have become active in providing businesses assistance; in this role, they are increasingly involved in developing incubators and science parks and engaging in partnerships with entrepreneurs and large companies; at the same time, universities are a source of a wider base of ideas and actions that contribute to the local economy and, unlike teaching and research, this contribution has not been well studied, even though, increasingly, universities have become major employers in many cities and, consequently, can affect the stability and vitality of a local economy. This is the traditional "town and gown" debate. Universities can either be good neighbors, making positive contributions, or bad neighbors, imposing the negative externalities that come with co-location. An emerging role for universities is one of active neighborhood involvement, in which they are engaged in projects with local communities. These projects include providing assistance to local

¹ Universities differ in terms of their resources, their funding sources, whether they are public or private institutions, what programs and research level they offer.

firms and policy advice to state and local government, and getting involved in community outreach. In this role and in an unprecedented manner, universities are engaging on a wide range of topics with local communities, using these communities as labs to test new ideas and find better ways to achieve social and economic goals. This is precisely why it is important to consider the larger role of universities' in economic and social development.

2 The history of the university's roles

The modern university, as it was developed in the nineteenth century, is an important source of new knowledge and technology, with the potential to be commercialized (Scott 1977). The new model of the university has a public service component, offering a wider base for research and teaching—both with the power to promote social change. According to Scott (1977), the service component was a direct result of changes in modern society, i.e. growth in the number of students and demand for skilled workers. This concept of the university is not new. In 1963, in a series of lectures at Harvard University, Chancellor Clark Kerr of the University of California developed the term “multiversity”—a university highly engaged in the economics and culture of society. Kerr believed that universities are the future of society. As noted in his book *The Uses of the University* (Harvard 1963), “What the railroads did for the second half of the last century and the automobile for the first half of this century may be done for the second half of this century by the knowledge industry” (Kerr 1963).

This service component, added to modern universities' mission, was influenced by a neo-liberal economic perspective in which universities are evaluated on the basis of their contribution to the economy. In fact in most countries, universities that rely heavily on public funding are pressured to “pay back the community” and be a responsible citizen (Russell 1993). Yet, while training the labor force has always been part of their mission, this has become extremely expensive. Martin Kenney notes that the training of qualified labor increasingly requires more investment, which no individual company would support. Companies do not like to make such an investment if their output benefits other corporations.

This is a case of ‘prisoners’ dilemma.’ If one company contributes enormous resources to support and maintain a university, other companies will receive the benefits of that funding. Therefore, the first company cannot afford to contribute too much.

(Kenney 1986, p. 32)

Hence, the public sector is increasingly pressured to fund universities' expenses for training and research. Martin Kenney, aware of the pressure universities are facing as providers of the labor force and as creators of “new” knowledge, emphasizes the role of universities as providers of basic knowledge that may in the future be transformed into a profitable product. According to Kenney, universities should be free from financial restrictions, allowing them to conduct research whether it proves useful to society or not.

In any case, the pressure on modern universities to pay back to the community has created what is known as the “third role” of universities, by which many universities are now obliged to make a contribution to society through research and development (R&D), collaborations, and technology transfer with industry (Minshall et al. 2004). Collaborating with industry is a significant change from the original mission, representing an expectation of service that many universities are not ready or willing to make. On the contrary, at some

universities, faculty members resent the idea of making a return on university research—instead supporting the ideal of the university as an institution free to conduct research in any field without any other purpose beyond research excellence.

As a response to the pressure to make a return, some universities conducted studies to show their direct and indirect economic impact. For example, the impact of spending by UC San Diego in the City of San Diego was \$2.275 billion in total spending, 20,790 jobs, and \$1.228 billion in personal income, excluding UC San Diego employees” (CB Richard Ellis Consulting 2008, p. 52). Similarly, in 2006, Georgia Institute of Technology reported an impact of \$3.9 billion and 44,425 jobs (Huron Consulting Group 2008). However, there are many services and activities provided by universities, such as community and volunteer work that cannot easily be quantified and is not recognized by the public. Even the basic impact of teaching undergraduate students only recently has been considered as a valuable service provided by universities. Recognizing the importance of reporting their impact, some universities have now started to track and capture these figures (State of Iowa Board of Regents 2006; The ARCHE Report 2006).

3 The new roles of universities

In the late 1980s and early 1990s, the development of the knowledge economy, where knowledge is a product, led to an increased reliance on universities’ contribution to financial economic development by way of focusing on outcomes of academic research (Etzkowitz and Leydesdorff 1997; Goddard and Chatterton 1999). As a result, universities have played a central role in contributing to regional and national economies. While many universities, such as MIT and San Francisco State University, were created with the expectation of contributing to local economies, this trend has not bypassed private research universities (Maurasse 2001). However, not all universities started as good neighbors.

Many were started on the outskirts of urban areas or in rural areas; in time, they were incorporated into cities and tensions developed.² For example, in the past, the University of Vermont in Burlington, Vermont and Yale University in New Haven, Connecticut were recognized as not having had good relationships with their communities and limited engagement in their local economies (Blumenstyk 1990a, b; Breznitz 2007). Given this situation, it is evident that many local initiatives recently undertaken by universities have not been purely altruistic. In Burlington, Vermont, changes to its university programs, as well as changes toward its local region in the 1990s, were the result of conflicts with the local government over the university’s plan to build a biotechnology research center—for which local financial support was needed to sponsor its annual operating budget (Blumenstyk 1990a, b). Similarly forced by circumstances, Yale University engaged in its local region only as a result of the death of one of its students (Sedgwick 1994; Atlas 1996; Ball 1999; Breznitz et al. 2008). A university within a city, Yale had to fight local crime to insure the safety of its students by working with the city to revitalize the downtown area and help its employees purchase homes in the city. Specifically, a \$2 million project in 1993–1994 put streetlights on nearly every corner of the Yale campus; emergency campus

² In many cases, the tensions between universities and cities developed over the fact that universities are independent entities. Universities govern themselves; if they are a private institution they also do not rely on public funding, and even though the city must service the institution, universities as educational institutions do not pay property taxes.

phones and electronic entryways were installed (Breznitz 2007). Similarly, other universities, such as the University of Pennsylvania and Xavier University in Louisiana, have become more involved in the local community, engaging the maximum number of relevant stakeholders to work towards improving the surrounding neighborhoods (Maurrasse 2001).

In some regions, universities are a major provider of employment. This is not surprising in cities such as Cambridge, Massachusetts, Ann-Arbor, Michigan, and New Haven, Connecticut, where universities control much of the local real estate. But even in developed urban areas like Pittsburgh, a city previously dominated by manufacturing industries, the University of Pittsburgh Medical Center (UPMC) has become one of the city's largest employers. During the 1950s and 1960s, Pittsburgh's largest employers were US Steel, LTV Corp, Crucible Steel and Gulf Oil among others. However, these manufacturers gradually closed their operations. Beginning in the late 1980s, job growth in Pittsburgh came from health care, professional services, financial services, and education. The city has also hosted over a dozen life science start-up companies (University of Pittsburgh 2009). These companies benefit from the knowledge and research experience generated by the University of Pittsburgh (Gannon 2008).

Thus, universities are major employers across the US. For example, Emory University in Atlanta, Georgia was the second largest employer in 2008 (Emory University 2009). The University of Texas was one of the largest employers in Austin in 2002, as was the University of Pennsylvania in Philadelphia (Ramos 2002; The Austin Chronicle 2002). These are all large metropolitan centers that have experienced a shift in the workforce from manufacturing industries (and thus manufacturing jobs) to universities as a steady supplier of new high growth companies and new technology. As major employers and as innovation and technology hubs, universities have moved from the traditional role of teaching and research to providing public policy development, technology commercialization, becoming more engaged in economic initiatives. With this focus on economic development, universities have opened new offices or chosen to provide a wide range of services, including business development, through technology transfer offices, many of which are jointly sponsored by the university as well as the local government, and even by the U.S. Department of Commerce.

Figure 1, below, describes the five fundamental roles of the university. In this paper, we focus on the three newest roles: knowledge transfer, policy development, and economic initiatives (Table 1).

Knowledge transfer is the *third role* of universities. This encompasses a wider scope of university initiatives that contribute to economic growth. Some of the basic technology commercialization activities, such as licenses and university spinout companies, have been studied in-depth and quantified in order to demonstrate how universities contribute to local economic growth (Jaffe et al. 1993; Feldman 1994; Etzkowitz 1995; Felsenstein 1996; Keeble 2001; Miner et al. 2001; Jensen et al. 2003; Druilhe and Garnsey 2004; Minshall et al. 2004). By and large, technology commercialization, formalized by Bayh-Dole, demonstrates a paradigm shift, as universities seek to gain greater relevance. With these new roles, universities have been working with private-sector firms on an unprecedented level.³ These collaborative efforts have been frequently criticized. This paper goes beyond the commercialization of technology to describe how universities are engaging with local businesses in order to guide organizations to achieve greater development and growth. In addition, while bricks and mortar are visible, through advising and participating in policy

³ Faculties have been working with industry for a long time, but collaboration has mainly focused on research. This section discusses the changes toward applicability and commercialization.

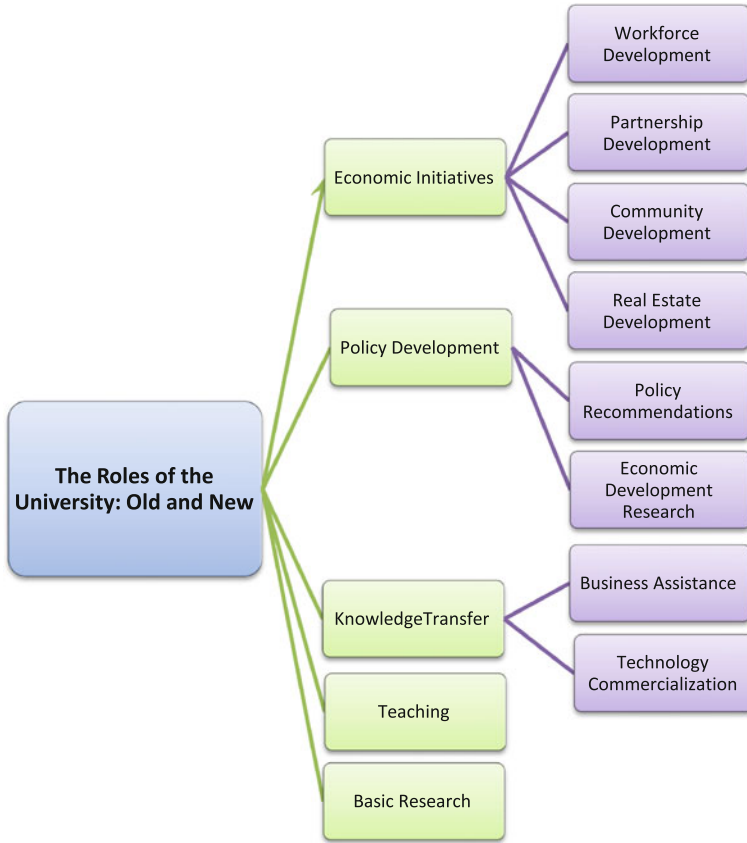


Fig. 1 The roles of the university. Universities’ involvement in economic development is taking many forms

development and implementation, universities are also engaged in communities in less tangible or more tacit ways. This paper describes how universities can contribute to policy development through such research projects and policy recommendations at all levels of government.

One of the more notable roles universities have taken on is evident in their various economic initiatives. As will be discussed in the following sections of the paper, these activities are categorized into four programs: (1) workforce development (2) partnership development (3) community development and (4) real estate development. Through these programs, universities engage with and nurture the local community, contributing to economic growth. Workforce development programs involve workforce education and training. Partnership programs provide opportunities for universities, as social entities, to connect businesses, not-for-profits, and government agencies so these groups can debate and collaborate on issues that, in turn, contribute to economic growth. Community development projects range from working with local community groups to investing directly in public education through local schools. Lastly, as a benefit to students and faculty, universities contribute to real estate development in order to improve their adjacent neighborhoods. In the case of Yale University and the University of Pennsylvania,

Table 1 The new roles of the university

University role	Program	Characteristics
Knowledge transfer	Technology commercialization	Patents, licenses, and spinout companies transfer knowledge from the university to private sector
	Business assistance	Assistance in business education, the writing of business plans, and assistance with facility
Policy development	Economic development and policy research	Research conducted by university faculty and students provided to state and local government/s
	Policy recommendations	Using faculty expertise and research to provide policy recommendations on a variety of issues important to the economic base of the region
Economic initiatives	Workforce development	Programs to provide new skills or employment and education in workers' rights and compensation
	Partnerships	Connecting different stakeholders to the region in order to promote local economic success
	Community development	Improving local business growth and neighborhoods through entrepreneurship
	Real estate development	Improving both residential and business real estate in adjacent neighborhoods

investment in real estate has expedited the development process and cut much of the local government's red tape. In many cases this was undertaken with the cooperation of these governments. This paper continues by elaborating on each of these new university roles. We begin with a discussion on knowledge transfer, followed by policy development, and last we examine universities through economic initiatives.

4 Knowledge transfer

According to studies, universities' knowledge transfer is the most influential factor that increases opportunities for technology commercialization. Studies have found that the success of university commercialization depends on historical, environmental, and intra-university factors (i.e., institutional incentives and organizational practices) (Kenney and Goe 2004; Siegal and Phan 2005). Historical factors, which relate to national, international, and regional policies (i.e., intellectual property rights laws and tax incentives), play an important role in the ability of universities to succeed in their technology commercialization and promote relationships between universities and private sector industries (O'Shea et al. 2005). Environmental factors, such as the systems of innovation theories that analyze the relationships between institutions on national and regional levels, depend on the ability of the institutions to transfer knowledge and hence to impact the ability of a locality to innovate. Levels of innovation increase through information sharing and collaborating with other institutions at a shared location (Nelson 1993). Intra-university factors (i.e., university technology transfer culture, policy, and organization) are built on academic prestige, funding availability and networking (Roberts 1991; Clark 1998; Zucker et al. 1998; Kenney and Goe 2004; Shane 2004; Lockett and Wright 2005).

Universities implement a variety of mechanisms to transfer knowledge to industry. Each mechanism offers trade-offs with regard to achieving the objectives of the university. Because knowledge transfer is a relatively new activity for universities, there has been

experimentation in the use of these mechanisms, along with the terms of the agreements that are made with industry. Formal mechanisms include: sponsored research agreements with industry; inventions disclosures, patents, licenses of university intellectual property to firms; and the formation of spin-off companies. Informal mechanisms, such as industry hiring of students, faculty consulting, and knowledge trading among friendship networks, also contribute to technology transfer but do not fall under the auspices of the TTO (Feldman and Breznitz 2009).

Notably, there is also vast differentiation in the ability of technology transfer offices to commercialize technology. The distribution of licensing revenues is highly skewed, with a few big commercial successes generating large returns for a small number of universities. For example, the cancer-fighting drug Taxol, based on intellectual property owned by Florida State University, has worldwide annual sales worth \$1.2 billion and yielded some \$60 million in licensing revenue in 2000 (Zacks 2000). Successes like Cohen-Boyer, Taxol, Gatorade (University of Florida), cisplatin and carboplatin (Michigan State), and fax technology (Iowa State) are well-known, but they are exceptional. Most university technology transfer operations do not break even. Their licensing revenues are not sufficient to cover administrative costs and the costs of filing and maintaining patents. In 2004, 22 out of 145 universities generated 77% of all American universities licensing income.

Importantly, the creation of local spinoff companies is considered the most direct way for universities to contribute to economic development. University spinoffs tend to be located in close proximity to their origin university, and, as such, contribute to their local economy (Feldman 1999; Zucker et al. 2002; Breznitz and Anderson 2006).

Researchers have proposed four ways in which spinoffs encourage local economic activity. First, they generate significant economic value by producing innovative products that satisfy customer wants and needs. Second, they generate jobs, particularly for high educated people. Third, they induce investment in development of university technology, furthering the advance of that technology. Fourth, they have highly localized economic impact.

(Shane 2004, p. 20)

According to Cohen (2000), between 1980 and 1999, American university spinoffs generated \$33.5 billion in value added. This contribution related to the long-term impact of universities, which we referred to in the introduction of this chapter. Other studies view the creation of a high technology cluster on Route 128 in Boston and Silicon Valley in California as a direct result of university spinoffs from MIT and Stanford (Saxenian 1994; Shane 2004). Similarly, the “Cambridge Phenomenon” in Cambridge, UK is considered a direct result of technology transfer from the University of Cambridge (Segal Quince Wicksteed 1985; Segal Quince Wicksteed 2000).

Moreover, University spinoffs create jobs. According to the Association of University Technology Managers (AUTM), American spinoffs companies generated 280,000 jobs from 1980 to 1999 (Cohen 2000; Shane 2004). Other benefits of university spinoffs include the development of early stage inventions. According to Thursby and Thursby (2000) these inventions need large amounts of funding for development and thus larger firms, which, rather than license inventions in late stages of development, will not license them.

Importantly, spinoffs train students and help in attracting faculty and students (Shane 2004). Yale University made a choice to assist its spinoff companies to locate in proximity to the university in order to attract both students and faculty. Hence, the university helped companies to retain incubator space and brought developers to build two science parks in close proximity to the university (Breznitz, O’Shea et al. 2008).

4.1 Technology commercialization

Technology transfer offices are the vehicles by which the university moves technology generated from university research into to the public domain.

Academic technology transfer—the licensing of innovations by universities, teaching hospitals, research institutes and patent management firms—adds billions of dollars to the U.S. economy and supports hundreds of thousands of jobs. It contributes to the spawning of new businesses, creating new industries and opening new markets. Most important, technology transfer from universities to the commercial sector has led to new products and services that improve our quality of life.

(Association of University Technology Managers 2005)

An example of one the oldest dedicated technology transfer operations is the Wisconsin Alumni Research Foundation (WARF), founded in 1925. In 1923 Harry Steenbock, a professor at the University of Wisconsin, invented a process for using ultraviolet radiation to add vitamin D to milk and other foods. The discovery had scientific significance as it virtually eliminated Ricketts, a crippling childhood disease. It also had economic significance for Wisconsin's dairy industry. Steenbock patented his invention independently and worked with companies and the dairy industry association to commercialize the invention. The university refused to be involved. To aid these efforts, Professor Steenbock created, with the help of several alumni, the Wisconsin Alumni Research Foundation (WARF). WARF's principal objectives were to seek patents to protect inventions made by university scientists and to promote the public benefit of these inventions through licensing agreements with companies. WARF filed patents and licensed them out, paying the university via an annual grant (Apple, 1989). WARF was so successful in achieving public dissemination and returning substantial revenues to the university that it became the de facto model for other universities.

Other universities have established technology transfer offices as early as 1935, starting with the University of Iowa, followed by MIT (1940), the Kansas State University Research Foundation (1942), with the University of California system (1950) not far behind. Notably all of these early institutions were public land-grant universities, as might be expected given their public service mission.

The pace of TTO's founding accelerated after the 1980 passage of the Bayh-Dole Act. Figure 2 presents the number of university offices by establishment date to track the diffusion of dedicated technology transfer offices. In general, two factors are associated with early establishment of technology transfer: the presence of a medical school, and the status of the university as a land-grant institution. It is no accident that the presence of a medical school would hasten the establishment of a TTO: most commercially valuable university intellectual property arises from biomedical research (Mowery 1999). By 2004, virtually all American research universities had established dedicated technology transfer offices (Feldman and Breznitz 2009).

4.2 Business assistance

Many universities, through their technology transfer offices or other programs they create, support and promote local businesses. For example, Pennsylvania State University offers consulting services and educational programs to entrepreneurs looking to start or grow small businesses. Virginia Tech's Technical Assistance Program, offered through Tech's Continuing Education unit, connects businesses with expert faculty advice.

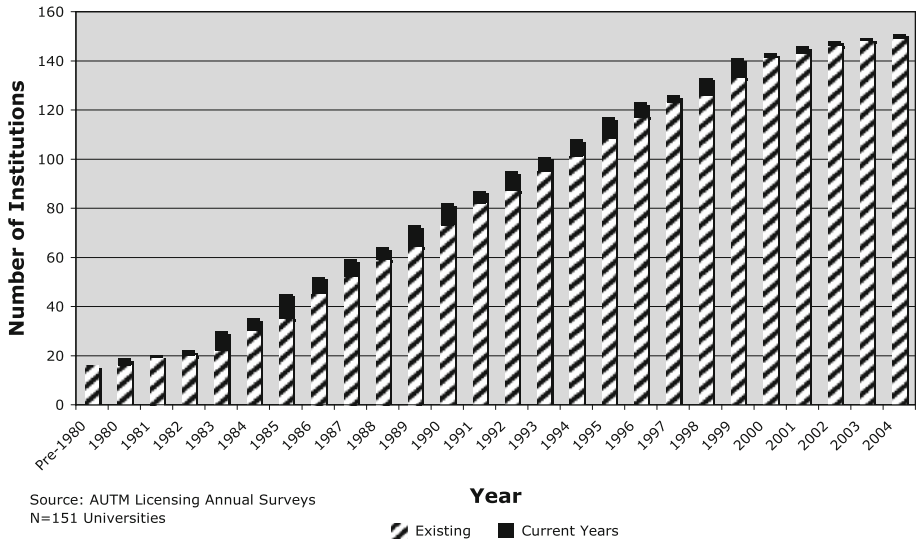


Fig. 2 Growth in the establishment of technology transfer offices after Bayh-Dole

Further business assistance is delivered through incubator and science parks developed and located in close proximity to universities.⁴ The University of Arizona Bioscience Park provides a separate facility designed especially for companies working in biosciences, biotechnology, life sciences and pharmaceuticals. MIT leased the land on which “university Park at MIT” was built. Today this park houses mainly biotechnology and pharmaceutical firms. The Southeast Missouri State University Innovation Center offers business incubator space, entrepreneurial training, business development services, technical oversight and easy access to services needed by start-up entities. As stated on its website:

The focus of the center is to eliminate the wide gap in average per capita income in Southeast Missouri as compared with the state as a whole by assisting entrepreneurs in creating new businesses that will grow and produce quality, lasting employment opportunities to boost local economies. The focus of the Southeast Innovation Center is to develop and maintain entrepreneurs and their businesses.

(Missouri State University 2008)

Some programs focus on a particular industry. Starting in 1976, the Auburn Technical Assistance Center focuses on manufacturers and service industries, providing services to improve their performance utilizing the expertise and resources of Auburn University. Specifically, the Center offers companies or organizations consulting services, training in lean manufacturing, and in the Six Sigma Program that aims to improve productivity (Auburn Technical Assistance Center 2009).

⁴ Some incubators and science park are owned or partially owned by the university. Others are private but still located in close proximity to the university.

5 Policy development

Policy development is one of the most common roles for universities with regard to promoting economic development due to their multifarious nature and the range of experts who work in these various specialized fields. Many academics are individually involved in policy research and development. Therefore, it is not surprising that some universities choose to form taskforces that improve the local economies by means of policy-decisions. Moreover, many universities now find themselves as a major employer in their respective regions, which means that they have an interest in being involved in the development of local and national policy. This role can be divided into two categories: policy research and policy recommendations.

5.1 Economic development research

An emerging role for universities is economic development research, which stems from their traditional research role. Thus, it is not surprising that the majority of university research centers dedicated to economic development also have research projects that look at these issues: by linking research to economic development, universities can improve their local communities by focusing on their community's needs. There are many examples of this kind of endeavor. One is the Virginia Tech/Office of Economic Development, which conducts feasibility and economic impact studies, sustainable development, community entrepreneurship, and industry cluster analysis and specific industry-based research projects. Currently, Virginia Tech and Virginia Commonwealth University have been asked by the county to determine the future of the Cobb Creek Reservoir. Using data analysis and survey methods, the Office of Economic Development will determine whether the reservoir will be used for recreational, commercial, or residential development.

The University Center for Economic Development (UCED) at the University of Nevada, Reno was established in 1992 in response to the growing need for economic development research, technical assistance, and educational services within the state. Its objective is:

Fostering economic development throughout Nevada by making the extensive resources of University of Nevada, Reno available to organizations and areas that can benefit from job and income creation and job retention efforts.

(The University of Nevada 2008)

One of the projects conducted by UCED was an analysis of the impact that the closure of a power plant will have on employment in the Laughlin area. The analysis determined that the salary of 300 employees, along with local business income that amounts to \$20 million in goods each year, will be lost with the plant's closure. However, these losses can be recouped by an increase of visitors to the local casinos, the second largest industry in the region. However, it was concluded that the economic dependencies of the area are weighted on a narrow base, and that diversification is needed in order to improve economic stability (Borden and Fletcher 2002).

In January 2008, the Office of Economic and Policy at the University of Arizona conducted a study of the concentration of optics firms and organizations in southern Arizona. The purpose of the study was to examine the industry, which included the newly developed field of nanotechnology, to reveal the challenges facing these companies. The report provides four recommendations to ensure the stability and success of this industry cluster: (1) the creation of a taskforce to develop education and training programs; (2) the

implementation of market development programs; (3) provisions for funding of basic and applied research in optics and nanotechnology; and (4) provision of better services for cluster members. These different research projects locate universities at the hub of innovation. Furthermore, the combination of economic debate and links between universities and local communities can promote economic growth.

5.2 Policy recommendations

It is not surprising to find that universities are involved in policy development: individual faculty members around the world are participating in policy analysis. Even so, there are not as many universities that dedicate centers and resources to the field of policy. We found examples of such centers at several universities, both public and private. For example, the University of Arizona has been providing reports for town hall debates, with background reports prepared by the Office of Economic Development (OED), which assembled a team of experts from across the university. In recent years, contributors have come from the School of Family and Consumer Resources, Water Resources Research Center, Udall Center for Studies in Public Policy, Drachman Institute for Land and Regional Development Studies as well as OED. These background reports serve as policy primers on Arizona issues, including recent policy discussions of aging, water management, growth and environmental preservation, youth at risk, and free trade in North America.

In this way, in their efforts to contribute to local economic growth, universities are working on current issues that will benefit the local community. For example, at the University of North Carolina in Chapel Hill, the Environmental Finance Center is working with water systems utility companies and local counties to develop a water protection plan for surface water and groundwater. The outcomes of this study will become policy that outlines activities and approaches that communities may take to reduce and control existing threats to the water supply now and in the future.

6 Economic initiatives

Examining the economic initiatives undertaken by universities, we find that educational institutions have been engaged with their local communities since the late 1860s, following the Morrill Act of 1862 and 1890 (Mowery 1999; O'Mara 2004). The development of each of these programs was influenced by various historical and local conditions, i.e., the death of a Yale student in New Haven, CT, in contrast to local governmental pressure in Cambridge, Massachusetts and to real estate issues in Burlington, Vermont (Blumenstyk 1990a, b; Blumenstyk 1990a, b; Breznitz 2007). However, all of these programs—as evident in workforce initiatives, business communication and accessibility, and revitalization of neighborhoods and city centers—have contributed to economic growth.

6.1 Workforce development

Workforce development initiatives provided by universities in support of economic development can be seen through training programs that reach out to the local workforce. Moreover, we find universities direct their student recruiting efforts at the local community, with an emphasis on recruiting minorities (Rodin 2007). This is a change in attitude for many urban universities, which previously outsourced area recruitment and provided only low paying part-time jobs for the local unskilled community (Maurrasse 2001).

Many universities have created programs that contribute to employment in their respective regions. Programs primarily sponsored by local governments in collaboration with local universities can provide: on-the-job professional training, continued education classes, technical training, and profession-specific training. From our analysis, we found that there are a variety of programs directed at private-sector employees, individuals and unions. For example, the University at Buffalo in New York State offered Six Sigma Black Belt training through the Center for Industrial Effectiveness (TCIE). These classes focus on improving business performance. After this training, it is anticipated that participants will return to their respective companies and apply the tools and methodologies learned. Oklahoma State University offers a free certified Nurse Aid Training Program. This is gratis based on the condition that participants will agree to work in a long-term care facility following the training. At the University of Massachusetts in Lowell, the Labor Extension Program offers customized training and education programs for local unions and labor councils, and a variety of open enrollment classes, conferences, and seminars. Some of the issues covered in these educational forums include: (1) Strategic Contract Campaigns and Contract Bargaining (2) Dealing with Changing Technology and Work Restructuring Programs, and (3) Leadership Development.

6.2 Partnership development

Development of high-technology industries often requires multidisciplinary knowledge; thus, it is necessary to bring together many experts from different fields. Lawson and Lorenz (1999) believe that these processes occur in high-technology regions as a result of accidental meetings and labor mobility that brings together individuals with different expertise. Moreover, individuals who participate in these processes also study or work at the same university, which allows them to work collaboratively to create new technological concepts. There are many ways such an interaction can occur. Most notably are the following two venues for interactions: (1) inter-firm collaboration or labor mobility, and (2) a central institution such as a large producer or university. Lawson and Lorenz (1999) expand upon the significance of such interactions between participants and the venues in which they are facilitated:

In some cases this shared knowledge will be unique to particular product areas and will have emerged from a rich history of local interaction between users and producers of the technology... In other cases the critical factor may be the way the multidisciplinary culture of a local university, combined with a history of spin-offs, serve to diffuse it widely amongst local producers.

(Lawson and Lorenz 1999, p. 312)

Keeble and Wilkinson view these institutions as “regional collective agents”:

The most obvious are major universities characterized by either liberal or technological cultures, but major public sector research institutes, and large private technology and R&D consultancies, also appear to play an important role in certain cases.

(Keeble and Wilkinson 2000, p. 203)

Universities provide a venue where local firms meet, collaborate on, and share ideas that ultimately can result in collective regional learning. Those involved with universities share a common culture from which to operate, creating a labor force with a shared emphasis on a production problem, or entrepreneurs who bring together university and private sector

innovation. Furthermore, the university is a physical meeting space in which seminars, conferences, and workshops are held.

Our research points to the fact that universities offer a variety of programs that promote partnerships between government organizations, private firms, and universities, and also encourage economic growth on a regional, national, and international level. For example, to combat the problem of the all-time highest level of unemployment (3.4 percent) in the Texoma region, Southeastern Oklahoma State University and Southern Workforce Board and Workforce Solutions Texoma formed the Texoma Regional Consortium Steering Committee to address the shortage of adequately trained workforce members. Interestingly, this collaboration, which takes place within the local university, includes a two-state regional workforce and economic development coalition. Developing a working plan, this consortium, which called for consensus at all levels of the bureaucracy, resulted in a regional economic development plan, and healthcare and educational summits. Identifying seven strategies for the region, these efforts recently won national and international awards (Taxoma Regional Consortium 2009).

Similarly, in 2006, Xavier University in Louisiana collaborated with Seedco, a national technical assistance-to-community-development program, created the Xavier Triangle Neighborhood Development Corporation (XTNDC) in New Orleans.⁵ Acting as a channel between the residents, the university, and local businesses, the organization promotes such issues as economic development, home ownership, and neighborhood revitalization (Maurrasse 2001).

On an international level, the University of Arizona's Global Advantage Program, established in 2008, is composed of a network of cities and regions working collaboratively to enhance mutual technology-based economic development. Cities involved in this program include: Tucson, Arizona; Ottawa, Canada; Manchester, England; and Berlin, Germany. While the current focus is on optics and the solar market, this program demonstrated its success recently with the opening of a production facility for a Berlin-based firm in Tucson. Through the program, different organizations in participating cities create connections among their governments, research universities, research parks, business incubators, and technology companies to foster new research, technology, connect with global clients and suppliers, and reach new markets. In particular, the university creates alliances with other universities' research labs, government agencies and industries in partnered cities.

6.3 Community development

Community development programs at universities focus on economic and social projects that can help improve the local neighborhoods and region. Programs are run by different community groups in cooperation with a center or faculty at the local university. For example, the Carnegie Mellon University Center for Economic Development assists the University of Pittsburgh's Center for Social and Urban Research (UCSUR) in its operation of the Pittsburgh Neighborhood and Community Information System (PNCIS). PNCIS analyzes neighborhood conditions. The information collected by the PNCIS helps community leaders promote neighborhood investment and improve communities.

⁵ While providing fiscal funding and a location, the university holds only one-third of the seats on the XTNDC board. This way the university does not control the board and sees itself as another player in the community.

Another example of a community development program can be found at the University of Northern Iowa's Institute of Decision Making. A team of advisors from this institute provides guidance to public and private organizations with regard to improving economic development. The unit promotes economic development through courses and partnerships with the local community on problematic issues.

Some universities are involved more comprehensively in the local community through initiatives that devote resources to local schools. The University of Pennsylvania's Center for Community Partnership⁶ has helped to develop a program through which the university has been instrumental in establishing schools as a central meeting place for the university and the local community. Through the center, the university has also created a special volunteer program called Volunteers in Public Service (VIPS), which coordinates the volunteer work of students, faculty, and alumni who teach different programs at the local school system. In addition, as its flagship program, the university has also established the Sadie Tanner Mossell Alexander University of Pennsylvania Partnership School, built on university-owned land and funded by the Philadelphia School District. The university undertook the planning and management of this school, providing its operating budget of \$700,000, annually, over a period of ten years. In the end, the university chose to create a public school that served the local community by partnering with both the school district and the teachers' association. Through this partnership, the program provides assistance to the nearby Henry Lea Elementary School for three years to reduce the number of students per class.

6.4 Real estate development

Universities are increasingly involved in the urban development of their cities. Their reliance on university research for economic growth brought funding to and expansion of university facilities. Wiewel and Perry write that

the urban location and the centrality of universities to the nature and well-being of cities means that cities and countries can be expected to turn to their universities as part of strategies to respond to the new challenges and opportunities that global economic competition poses for urban regions.

(Wiewel and Perry 2008, p. 304)

For inner city universities, it is fundamental to work with local authorities in order to expand, and to take a central role in the decision-making process. By focusing their economic development efforts on Georgia Institute of Technology (Georgia Tech), Atlanta business leaders invested in suburban research parks, marketing the suburbs to attract scientists to the area. This resulted in an expansion of the suburbs and the development of science parks in the north of the city. However, factors such as racial tension and poverty in the city, tight financial control by state officials, and conflicting priorities between state government (i.e., focus on overall state projects) and local governments (i.e., specialized projects) have damaged the city's development options. Unlike Stanford University, where the university decided to build a science park in close proximity to the university, the leadership of Georgia Tech was ineffective in developing inner-city high technology parks. Thus, while the university has influenced the development of the city, most of the changes have occurred in the suburbs. As a result, Atlanta has not developed a high tech region on par with the Research Triangle in North Carolina or in Austin, Texas (O'Mara 2004).

⁶ The Center was created as a response to poor neighbourhood relations during the 1960–1970s' redevelopment and campus expansion efforts.

In another example, Yale University, which owns a large part of downtown New Haven, Connecticut, decided to invest in some of these properties to make the area safer and more livable. So in its Broadway Street properties, Yale created a mix of both local businesses and national chains—transforming the area into a vibrant shopping and late-night entertainment district (Breznitz 2007).

Similarly, with their growth strongly supported by state policymakers, Georgia Institute of Technology in Atlanta and the University of Texas in Austin have had a positive influence on the development of their respective downtown areas as an extension of these cities' political and racial debate (O'Mara 2004). Harvard University and the Massachusetts Institute of Technology (MIT), located in Cambridge, Massachusetts, and Cornell University in Ithaca, New York both hold annual meetings with their respective local city governments in order to coordinate their actions and provide financial contributions in return for city services (Blumenstyk 1990a, 1990b; Breznitz 2000). At MIT, University Park, a mixed-use real estate development, built privately on MIT-owned land, negotiated with the city to provide approximately 22% of 700 multifamily housing units as affordable and moderate rate housing. Moreover, open spaces and parks for the benefit of the general community are included in the areas of the park (Forest City Enterprises Inc 2008).

Many universities choose to improve their local regions and economies through housing programs that provide opportunities for university employees to purchase housing. Moreau and Forrant (2008) provide examples whereby universities have provided economic development through such housing programs as:

6.4.1 *Clark's University park partnership*

- Renovated more than 200 apartment units in Worcester's Main South neighborhood.
- Sold 30 newly built homes.

6.4.2 *Trinity College's Trinity/SINA neighborhood initiative*

- Built 64 homes in Hartford.

6.4.3 *University of Louisville (HANDS and SUN initiatives)*

- Built 46 houses and 17 apartment buildings.
- Renovated three major apartment complexes in the city's East Russell neighborhood.

6.4.4 *UPenn (West Philadelphia):*

- Renovated an abandoned General Electric plant in its surrounding University City neighborhood into the 282-unit Left Bank apartment complex.
- Renovated 20 houses and created a neighborhood housing preservation and development fund administering more than 200 rental units.

6.4.5 *Northeastern University (Davenport Commons)*

- Development created 75 new affordable housing units in Boston's Lower Roxbury neighborhood.

Moreover, both Clark University and Penn encouraged their employees to purchase houses in proximity to their campuses (Moreau and Farrant 2008).

7 Conclusion

This paper analyzed the expanded roles of the university in economic development. We find that universities increasingly engage in activities to impact social development and economic growth. This is particularly interesting at a time where universities are facing pressure to make a financial return. Thus, it is intriguing to understand and appreciate how many efforts and resources universities place for activities that contribute to their local communities but cannot be quantified to show a return.

Not all universities' involvement in the local community is altruistic. They either have a specific problem they need to resolve or they become a central player in their region. As we have seen with the examples of Yale University and the University of Pennsylvania, losing students and faculty to a degrading neighborhood promotes concern within local regions. However, as in both of these cases and others we have discussed, universities went beyond a solution to their particular problem and chose to make a conscious contribution to these regions. Moreover, becoming major employers in their region, universities became further involved in the local policy and economic debate.

Even with knowledge transfer, which has come to be known as the third-role of universities following teaching and research, universities have taken on an extended role to make specific contributions to economic growth, moving beyond the traditional idea of commercializing technology, to ensure the development of a local industry. Universities directly assist local companies, with and without any past connections to the university (Georgia Institute of Technology), promote the localization of university spinouts (Yale University), play a central role in creating partnerships (Oklahoma State), and promote entrepreneurship (MIT). All of these services require universities to maintain close and continuous relationships with both governments and businesses.

Yet, we must ask, are we not expecting too much of our universities? Initially, when universities were created, they were havens of free-thinking and technological progress. These achievements were based on a free hand and separation from the daily concerns of both public and private organizations. Yet and through two world wars, the Cold War, and now with globalization, there is constant pressure on universities to work on applicable research and to focus their teaching and research efforts in ways that have a direct impact on their local regions, and, in turn, regional and national economies pressure universities to become leaders in today's global market (Sainsbury 1999). These new responsibilities place universities in a Catch 22: we expect universities to think outside the box, continuing their social and technological innovation, and we also expect them to make direct contributions to their local and national economies. This may be too much. Further studies on the influence these new roles have on universities and their local regions, and an impact study on what better serves the community, should be undertaken to allow universities to direct their efforts and resources to the most needed areas.

References

- Association of University Technology Managers. (2005). Frequently Asked Questions. http://www.autm.net/aboutTT/aboutTT_faqs.cfm#4.
- Atlas, S. (1996). *Yale student's killer convicted once again*. New Haven: Yale Daily News.

- Auburn Technical Assistance Center. (2009). About ATAC from <http://www.auburnworks.org/about.cfm>.
- Ball, M. (1999). Is Yale safe? *The Yale Herald*.
- Blumenstyk, G. (1990a). After years of stormy relations with City and State, U. of Vermont moves to improve its image and pacify its many critics. *The Chronicles of Higher Education*, 36.
- Blumenstyk, G. (1990b). Yale agrees to pay New Haven for some city services. *The Chronicle of Higher Education*, 36, A30.
- Borden, G. W., & Fletcher, R. R. (2002). *Contribution of the Mohave Generating Station to local economies*. University of Nevada, Reno: Reno.
- Breznitz, S. M. (2000). The geography of industrial districts: Why does the biotechnology industry in Massachusetts cluster in Cambridge? *Regional Economic & Social Development*. Lowell, University of Massachusetts, Lowell. Master's.
- Breznitz, S. M. (2007). From ivory tower to industrial promotion: The development of the biotechnology cluster in New haven, Connecticut. *Revue d'Economie Industrielle* no 120 (4eme trimestre): 115–134.
- Breznitz, S. M., & Anderson, W. (2006). Boston metropolitan area biotechnology cluster. *Canadian Journal of Regional Science*, 28(2), 249–264.
- Breznitz, S. M., O'Shea, R. P., & Allen, T. J. (2008). University commercialization strategies in the development of regional bioclusters. *Journal of Product Innovation Management*, 25(3), 129–142.
- CB Richard Ellis Consulting. (2008). *A study of the economic impact and benefits of UC San Diego Fiscal Year 2006–07*. CA: San Francisco.
- Clark, B. R. (1998). *Creating entrepreneurial universities: Organizational pathways of transformation*. Pergamon Press: Oxford.
- Cohen, W. (2000). Taking Care of Business. ASEE Prism Online.
- Druilhe, C., & Garnsey, E. (2004). Do academic spin-outs differ and does it matter? *Journal of Technology Transfer*, 29(3–4), 269–285.
- Emory University. (2009). Impact on Georgia, from <http://whsc.emory.edu/home/about/components-and-figures/impact-on-georgia.html>.
- Etzkowitz, H. (1995). The Triple Helix—university-industry-government relations: A laboratory for knowledge based economic development. *EASST Review*, 14, 9–14.
- Etzkowitz, H., & Leydesdorff, L. (1997). *Universities and the global knowledge economy: A Triple Helix of University-Industry-Government relations*. Pinter: London, UK.
- Feldman, M. P. (1994). *The geography of innovation*. Dordrecht: Kluwer.
- Feldman, M. P. (1999). The new economics of innovation, spillovers and agglomeration: A review of empirical studies. *Routledge*, 8, 5–25.
- Feldman, M. P., Breznitz, S. M. (2009). The American Experience in University Technology Transfer. European universities Learn to Compete: From Social Institutions to Knowledge Business. M. McKelvey and M. Holmen, Edward Elgar.
- Felsenstein, D. (1996). The university in the metropolitan arena: Impacts and public policy implications. *Urban Studies*, 33(9), 1565–1580.
- Forest City Enterprises Inc. (2008). History of University Park, from http://www.fceboston.com/portfolio_up_history.asp?node=1.
- Gannon, J. (2008). *Top 50: Region has seen steady shift from manufacturing*. Pittsburgh: Pittsburgh Post Gazette.
- Goddard, J., & Chatterton, P. (1999). Regional development agencies and the knowledge economy: Harnessing the potential of universities. *Environment and Planning C: Government and Policy*, 17, 685–699.
- Huron Consulting Group. (2008). Strategic economic development: A plan for the Georgia Institute of Technology.
- Jaffe, A. B., Trajtenberg, M., & Henderson, R. (1993). Geographic localization of knowledge spillovers as evidenced by patent citations. *The Quarterly Journal of Economics*, 108(3), 577–598.
- Jensen, R. A., Thursby, J. G., & Thursby, M. C. (2003). Disclosure and licensing of University inventions: 'The best we can do with the s**t we get to work with'. *International Journal of Industrial Organization*, 21(9), 1271–1300.
- Keeble, D. (2001). *University and technology: Science and technology parks in the Cambridge region*. Cambridge: Center for Business Research, University of Cambridge.
- Keeble, D., & Wilkinson, F. (2000). *High-technology clusters, networking, and collective learning in Europe*. England, Ashgate: Aldershot.
- Kenney, M. (1986). *Biotechnology: The university-industrial complex*. New Haven, CT: Yale University Press.
- Kenney, M., & Goe, R. W. (2004). The role of social embeddedness in professional entrepreneurship: A comparison of electrical engineering and computer science at UC Berkeley and Stanford. *Research Policy*, 33, 691–707.

- Kerr, C. (1963). *The uses of the university*. Harvard: Harvard University Press.
- Lawson, C., & Lorenz, E. (1999). Collective learning, tacit knowledge and regional innovative capacity. *Regional Studies*, 33(4), 305–317.
- Lockett, A., & Wright, M. (2005). Resources, capabilities, risk capital and the creation of university spin-out companies. *Research Policy*, 34(7), 1043–1057.
- Maurrasse, D. J. (2001). *Beyond the campus: How colleges and universities form partnerships with their communities*. New York: Routledge.
- Miner, A. S., Easley, D. T., Devaughn, M., & Rura-Polley, T. (2001). *The magic beanstalk vision: Commercializing university inventions and research*. *Entrepreneurial Dynamic*. Stanford: C. B. Schoonhoven and E. Romanelli, Stanford University Press.
- Minshall, T., Druilhe, C., & Probert, D. (2004). *The evolution of "Third Mission" activities at the university of Cambridge: Balancing strategic and operational considerations*. 12th High Tech Small Firms Conference. The Netherlands: University of Twente.
- Missouri State University. (2008). Jordan Valley Innovation Center, from <http://jvic.missouristate.edu/>.
- Moreau, R., & Farrant, R. (2008). *The university effect: UMass Lowell could help revitalize city housing*. *The Lowell Sun*. Massachusetts: Lowell.
- Mowery, D., Rosenberg, R. R. et al. (1999). The effects of the Bayh-Dole Act on U.S. University Research and Technology transfer. *Industrializing knowledge: University-industry linkages in Japan and the United States*.
- Nelson, R. R. (1993). *National innovation systems: A comparative analysis*. New York: Oxford University Press.
- O'Mara, M. P. (2004). *Cities of knowledge*. Princeton: Princeton University Press.
- O'Shea, R. P., Allen, T. J., Chevalier, A., & Roche, F. (2005). Entrepreneurial orientation, technology transfer and spinoff performance of U.S. universities. *Research Policy*, 34(7), 994–1009.
- Ramos, S. (2002) State: Wal-Mart tops Pa. list of largest private employers. *The Daily Pennsylvanian*.
- Roberts, E. B. (1991). *Entrepreneurs in high technology: Lessons from MIT and beyond*. New York: Oxford University Press.
- Rodin, J. (2007). *The university and urban revival*. Philadelphia: University of Pennsylvania Press.
- Russell, C. (1993). *Academic freedom*. London: Routledge.
- Sainsbury, L. (1999). Biotechnology clusters, Ministry of Science.
- Saxenian, A. (1994). *Regional advantage: Culture and competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.
- Scott, P. (1977). *What future for higher education*. London: Fabian Tracts.
- Sedgwick, J. (1994). The death of Yale. GQ.
- Shane, S. (2004). *Academic entrepreneurship: University Spinoffs and wealth creation*. Cheltenham: Edward Elgar.
- Siegal, D. S., & Phan, H. P. (2005). *Analyzing the effectiveness of university technology transfer: Implications for entrepreneurship education*. *University Entrepreneurship and Technology Transfer: Process, Design, and Intellectual Property*, 16. Amsterdam: D. G. Libecap, Elsevier.
- State of Iowa Board of Regents. (2006). Annual economic development and technology transfer report.
- Taxoma Regional Consortium. (2009). Leveraging the Power of Partnerships. from <http://www.trcteam.org/index.asp?Type=NONE&SEC={88AB5185-8A53-4400-912A-54EDE8BA7015}>.
- The ARCHE Report. (2006). Economic Impact.
- The Austin Chronicle. (2002). Best of Austin 2002, from <http://www.austinchronicle.com/gyrobase/Awards/BestOfAustin/?Year=2002&BOACategory=Politics%20%26%20Personalities&Poll=Readers>.
- The University of Nevada, R. (2008). Center for Economic Development, from <http://www.ag.unr.edu/uced/>.
- Thursby, J. G., & Thursby, M. C. (2000). Industry perspectives on licensing university technologies: Sources and problems. *The Journal of the Association of university technology Managers*, 12, 9–23.
- Wicksteed, S. Q. (1985). *The Cambridge phenomenon: The growth of high technology industry in a university town*. Segal Quince Wicksteed: Cambridge.
- Wicksteed, S. Q. (2000). *The Cambridge phenomenon revisited*. Segal Quince Wicksteed: Histon, UK.
- Wiewel, W., & Perry, D. (Eds.). (2008). *Global universities and urban development: Case studies and analysis*. *Cities and Contemporary Society*. Cambridge, Massachusetts: M. E. Sharpe.
- Zucker, L. G., Darby, M. R., & Armstrong, J. S. (2002). Commercializing knowledge: University science, knowledge capture, and firm performance in biotechnology. *Management Science*, 48(1), 138–153.
- Zucker, L. G., Darby, M. R., & Peng, Y. (1998). *Fundamentals or population dynamics and the geographic distribution of U.S. biotechnology enterprises, 1976–1989*. Cambridge, MA: National Bureau of Economic Research.