Local Economic Development Planning in the Knowledge Economy: Examining the Role of Research Universities

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By

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A Plan B Paper

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Master in International Planning Studies

School of Planning, Design, and Construction

2007

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This paper is dedicated to my parents
Elizabeth Stewart Minifee and George Minifee, Jr.
Their love, teaching, commitment and sacrifice forged a path
so I could think and thus be.

ACKNOWLEDGEMENTS

First and foremost, I give all praises to my Creator.

To my wife, Bridget La'Shae: without your love and support, this accomplishment would have been much more difficult. I humbly and lovingly say: Thank you for being my blessing. I love you.

To my heart (Courtney), my soul (Zakiya) and my breath (Cyel): Thank you for your love and inspiration.

To Dr. Ellen Bassett (my mentor in this endeavor): thank you for your patience, your understanding, your insight, your guidance, your tutelage and your je ne sais quoi that only you possess. You are indelibly etched in my mind. I thank you for being.

To Dr. Mark Wilson: thank you for your insight and your kind open door policy. This enabled me to make a more focused paper. Your help was invaluable.

To Dr. Hebert Norman, Jr.: Your support and counseling and trust were motivating factors throughout my entire graduate school experience. Thank you.

To Dawn Brown: you were the shield I was able to lean on. Your presence and guidance were incalculable. Without you, everybody in this program would have experienced many untold difficulties. You are an angel! Thank you.

To Dr. June Manning Thomas: thank you for opening my eyes to Urban Planning, which in turn gave me a new perspective. Whatever planning eye I have is derived from your teaching. Thank you.

Dr. Gil Chin-Lim, I will forever remember our late night discussions, which in reality turned out to be impromptu lessons for me. I thank my creator for our time together. Because of you, I have vision. May Peace and Blessings be upon you!

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Executive Summary

Since the mid 1980s, many local communities in the state of Michigan have had to struggle with the impact of expanding globalization. This expansion has resulted in numerous "manufacturing firms, retailers, banks, law firms, etc. being acquired and/or displaced by large national or multinational organizations with no particular interest or commitment to local Michigan communities" (Lester, 2005). The displacement of, and reduction of, manufacturing businesses, which Michigan was heavily dependent upon, has resulted in numerous local Michigan communities having to contend with a significant loss of revenues and resources that have eroded the quality of city services, impacted K-12 educational services, and decreased the quality of life.

Due to the consequences of globalization, many cities and metropolitan areas, especially those that are the seat of major research universities, are attempting to, or are strongly considering transitioning their economies from labor-oriented markets to knowledge-based markets. This change in economic focus has been fostered by the regional economic successes of the research university laden regions of Silicon Valley in northern California, Route 128 around Boston, and Research Triangle Park in North Carolina.

In transitioning from an industrial-based economy to a knowledge-based economy, knowledge-based businesses are not bound by traditional factors such as land cost, access to transportation, the availability of cheap labor, cheap energy, and access to raw materials. Now, many forward-looking businesses and new emerging businesses outside of manufacturing are considering factors relevant to the knowledge economy such as: (1) knowledge-intensive technology infrastructure, (2) the availability of a well-educated workforce, (3) the ability to attract creative talent, and (4) enjoyable quality of life amenities necessary to attract knowledge workers and the creative class.

Major research universities are essential to this new form of economic development. These universities are now recognized as important agents in technological augmentation, economic development, and as a source of advanced knowledge creation and technical

solutions. Moreover, many local economic development practitioners and state-governing officials are now viewing research universities as "major corporations with sophisticated administrators" (Miara, 2002) that are permanent fixtures in the local and state landscape.

The new appreciation of research universities is based on the fact that research universities are increasingly playing a key role in fostering applied research and development activities; attracting key scholars and talented graduate students; helping entrepreneurs and researchers mine for and identify new technologies with commercial potential; spinning off new companies; attracting technology-based firms; acting as magnets for federal and private sector funding; and as being a general source of ideas, employees, and consultants for high-technology and knowledge infrastructure companies (Sexton, 1986). "This technology model starts with discoveries by university researchers in their laboratories, and proceeds to disclosure by the inventors, patenting by the university or the inventor, and ultimately licensing of the technology, frequently to startup or early stage technology-based enterprises founded by the inventors themselves" (Lester, 2005, p.9).

In order for local/regional areas to take advantage of this new research university model, local and state governing bodies must form strategic partnerships with these universities, while simultaneously developing partnerships with businesses, local residents, and community stakeholders. Partnerships enhance investment in the knowledge infrastructure (world-class education, training, and technology), which is highly important for a locale's immersion into the knowledge economy. The reasoning for this strategy is simple: both existing and evolving companies need to have skilled workers and cutting-edge tools in order to compete globally. Communities, in turn, want burgeoning, high-tech businesses to create higher-paying jobs, which will generate sufficient revenues for quality services and investments. Major research universities in turn realize that evolving in this new economy is vital for their institutional development and economic prosperity.

Summary Findings:

While significant economic development can be derived from university patents and the licensing of university-owned technologies and discoveries, economic development practitioners and government officials need to be cognizant that patenting and licensing is only one of a number of means for the transfer of knowledge from universities to industry. "Firms may alternatively exploit recent university research published in open literature; or they may use university scientist as consultants to apply well-established engineering or scientific knowledge to the development of a particular product; or they may collaborate with university scientists and engineers to apply new scientific knowledge developed by researchers at other universities; or they may recruit the students of the leading university researcher in the field" (Branstetter, 2004, P.21).

In spite of research universities now being characterized as economic development engines for local and regional economic development, there has been a growing debate within scholarly literature conveying a note of skepticism about this characterization. Some of this literature contests the unproblematic and causal relationships between universities and local and regional economic development. Conversely, economic development practitioners and government officials are still finding it hard to refute the evidence emanating from Silicon Valley, Route 128, and Research Triangle Park. Hence, the process of emulating these successful regions will continue unless mounting evidence proves otherwise.

Purpose of this Paper

This paper analyzes the critical role that major research universities play in the new global/knowledge-based economy; and how the application of knowledge-based products, systems and methods stemming from research universities can impact the economic status of two Michigan cities (Ann Arbor and East Lansing). In addition, this paper intends to synthesize the literature dealing with the role of research universities as local and regional mechanisms for promoting the benefits, or ameliorating the negative impacts of a global/knowledge-based economy.

The specific research questions this paper seeks to answer are:

1. What is the "Knowledge economy"?
2. What are the requirements for the development of a knowledge-intensive economy to spur globally competitive economic developments in cities transitioning from labor-intensive, manufacturing based economies?
3. What is the role of major research universities in the knowledge economy?
4. What is the role of major research universities in local economic development planning?
5. Should cities that seat major research university consider investing in the development of, luring of, and clustering of knowledge-based businesses as an economic development strategy?
6. Are there any inherent impediments in using research universities in local economic development strategies?

Section 1: Introduction

"Knowledge is the only instrument of production that is not subject to diminishing returns"

—J.M. Clark
(Journal of Political Economy, Oct., 1927)

In January 2006, the General Motors Corporation and Ford Motor Company (the two largest American domestic auto makers) both announced massive "restructuring" programs to counter the significant decline of their American/Canadian market share. Their plans called for a combined layoff of approximately 66,500 employees (GM: 30,000 hourly workers and 2,500 salaried employees; Ford: 30,000 hourly employees and 4000 salaried workers and the approximate closure of 26 manufacturing plants [Woodyard, 2006]). These impending layoffs and plant closings will and are having a negative and, in some instances, a devastating effect on the local economies where these manufacturing facilities are located.

This serious and lingering economic condition is in stark contrast to Michigan's economic robust period of the 1940s thru the mid 1970s when the automobile and the manufacturing industries enjoyed enormous profits; and their unskilled and under educated workforce, based on union bargaining and leverage, were able to settle into a middle-income lifestyle. Now, the declining market-share of the auto industry and the exporting of labor-intensive work of other manufacturing firms to foreign states and countries have eroded Michigan's past economic status. Moreover, this shrinkage has also resulted in the two following negatives: (1) an increasing number of graduates from Michigan universities are leaving the state for, perceived, or and justly so, economic advantages in other states; and (2) service sector jobs (many of which were tied to manufacturing facilities by economic multiplier effects) have also impacted those whose income hovers closer to the poverty line. This economic downturn, however, is not only restricted to the state of Michigan, rather, it appears to be endemic of other states that are

heavily dependent on the auto industry and other large manufacturing industries, e.g., Ohio, Pennsylvania, and western New York.

The fiscal problems facing GM and Ford have highlighted that the global economy is impacting the United State's economy. While some would attribute the decline of U.S. domestic auto manufacturing to a lack of automotive quality and design, the stark reality, is that competition from the likes of Toyota, Honda, Volkswagen, Hyundai, and other international marketing forces have affected American automakers. Evidence also suggests that an increase in university-based knowledge, technological advancement and cheaper labor cost in foreign countries have also contributed, in particular, to the decline of American manufacturing.

As this economic metamorphosis has been taking place, many economists who once had the long-standing view that "natural local unemployment rates could not possibly fall below 5%," were forced to alter their positions when the northern California region of Silicon Valley saw its unemployment rate fall to under 2% in the summer of 2000 and saw it housing prices rise to correspondingly outrageous levels" (Blakely, 2002, p.2). Similar economic development successes were had in regions like Route 128 around Boston, Massachusetts, the home of Harvard University, Massachusetts Institute of Technology, and Boston University; and Research Triangle Park in North Carolina, the home of Duke University, University of North Carolina and North Carolina State University. The common denominator among these economically successful regions is major research universities and their focus on applied research and entrepreneurship. This success has prompted many local economic development practitioners in Michigan and in other states and other metropolitan areas with research universities to assume that they could ride the same technological evolutionary wave as Silicon Valley, Route 128 and Research Triangle Park.

This change in the perspective of economic development practitioners in light of the initial phase of the knowledge-based economic evolution has been deemed comparable to the global transition that witnessed many societies developing from rural agrarian

economies to urban industrial economies in the 19th century. Now, however, with the advent of "digital electronic technologies that permit information in a myriad of forms to be generated, routed, and transmitted anywhere cheaply, nearly instantaneously, and at high volumes (Atkinson, 2001)," the new economic evolution is unmistakably underway, and evidence of this is seen in countries like India, China, Ireland, Malaysia, etc., which have almost completely transitioned from rural and urban industrial-based economies to knowledge-based / global economies.

This evolving new economy has also fostered new dynamics, new goals and new objectives for many communities with major research universities. These communities are now focusing on creating small indigenous firms as a means to diversify their economies, and to produce locally sustainable job creation and income generation (Hamlin, 1996). In fact, today's capricious business environment, which encourages entrepreneurship and challenges companies to be innovative and fast growing, is all about economic dynamism, global competition and volatility. Companies reflecting these qualities have been euphemistically nicknamed: "gazelles." And, the degree to which a metropolitan's economy is composed of gazelle firms has also become indicative of the degree to which a locality's economy is considered to be dynamic, adaptive, and a major participant in the knowledge-based/global economy.

In light of this, it would appear that small high-tech firms would be considered the catalyst for the expansion and revitalizations of cities and regions. Conversely, statistics indicates "it was not small firms per se that were the key. Rather, it was the relatively small number of fast-growing firms of all sizes that accounted for the lion's share of new jobs created in the 1990s. Between 1994 and 1998, gazelles [which numbered over 355,000] generated practically as many jobs [10.7 million] as the entire U.S. economy [11.1 million]" (Atkinson, 1998). If this reported change in economic activity could be systematically stable enough to endure market downturns/adjustments, then, presumably, this economic activity can have the dramatic effect of altering current and future spatial distribution of universities, businesses, residents of cities and metropolitan regions.

In response to the competitiveness of the global economy, many governmental agencies, business, and university leaders are forming coalitions to innovate and implement new economic development strategies. These strategies are intended to aid the development of local knowledge-based businesses while simultaneously attracting foreign knowledge-based businesses to specific local areas. The desired end result of these strategies would be the clustering of knowledge-based businesses that would lead to an agglomeration economy. Such an economy would not only enhance the revenue streams of these communities, but they would also help to counter one of the paradoxes and perplexities of a competitive global market place: the ensuing problem of continuingly successful, expanding knowledge-based businesses succumbing to the practice of offshore outsourcing (a type of business process whereby the knowledge intensive work from the United States and other developed countries are exported to other areas of the world where there is both political stability and lower labor cost or tax savings).

This dynamic partnering of institutions is also intended to garner pre-seed loans, angel funding, venture capital funding, grant procurement, direct subsides, and tax incentives to "help entrepreneurs and researchers mine for and identify technology with current and future commercial potential, and to transform those ensuing developments into viable businesses" (Michigan Economic Development Corporation, 2002) that will cause a domino effect resulting in the creation of quality jobs and widening local tax-bases.

Section 2: Literature Review: The Role of Knowledge in the New Economy

In recent years, national economies and their businesses have been increasingly pressured by global economic competition to enhance the role and utilization of knowledge as an apparatus for economic growth. This pressure to continuously augment and enhance the transfer of knowledge has also affected major research universities and their operational procedures and their relationships with local, state, and federal governing bodies. This pressure has also impacted businesses and their operational and developmental processes. Moreover, transitioning from a labor-intensive economy to a knowledge-based global economy has triggered two questions: What exactly is the Knowledge Economy, and what are the characteristics of economic development based on the knowledge economy?

The knowledge economy is "characterized by the recognition of knowledge as a source of competitiveness; the increasing importance of science, research, technology and innovation in knowledge creation; and the use of computers and the Internet to generate, share and apply that knowledge" (Department of Further Education Employment Science and Technology). This new view of knowledge and it non-tangible properties have recently generated a change in the traditional view of economics. Economics use to be based solely on the perception that land, production and labor were the catalyst for economic standing. Now, it appears to a sizable degree that knowledge and some of its intangible aspects are viewed as economic means of production worthy of financial investments due to an expectation of financial returns.

2.1 New Growth Theory of the Knowledge Economy

For at least two hundred years, economists have only acknowledged capital, labor and land as the means of production. Knowledge, productivity, education, and intellectual resources were all regarded as factors external to the economic process. Nevertheless, Paul Romer, a Stanford University economist, has gained considerable adulation for countering this view with his "New Growth Theory." This theory "viewed technological progress as products of economic activity. Secondly, it held that not unlike physical

objects, knowledge and technology are characterized by increasing returns, and these increasing returns drive the process of economic growth" (Cortright, 2001). Hence, according to Romer's theory, knowledge has become a prominent factor in the means of economic production.

This theory of Romer varies significantly from the Classical, the Marginalist, and the Neo-classical version of economics. The commonly held thread of these traditional forms of economics is that there are, simply put, diminishing returns on investments. Romer and his fellow theorists have also counter this view by arguing that knowledge is a basic form of capital, which can lead to increasing rather than diminishing returns on technological investments, and economic growth is driven by the accumulation of knowledge (Romer, 1990). These "New Growth" theorists have further noted that knowledge is also a non-rivalrous good (goods that can be enjoyed simultaneously by an unlimited number of consumers [Economist.com]), whereas the production and the allocation of ordinary goods and services are rivalrous (good whose consumption by one consumer prevents simultaneous consumption by other consumers [Economist.com]); and excludability (often established in law) has the ability to socially and legally exclude people from using the goods of others.

The focal point of the New Growth Theory is "the role knowledge plays in making growth possible." Knowledge, according to Romer, includes everything that is known about the world, from the basic laws of physics, to the blueprint for the microprocessor. However, one special aspect of knowledge makes it critical to growth: knowledge has the ability to solve problems and extend human capabilities (Massachusetts Department of Education, 2005). Thus, advance knowledge generation, according to Romer, explains why developed countries can sustain economic growth with a limited labor pool and why developing economies, even those with unlimited labor and ample capital, cannot attain growth (Romer, 1990). In essence, a labor-intensive, undereducated market will have a harder time competing in the new knowledge economy.

2.2 Tacit and Formal Knowledge

If knowledge is now considered the catalyst to economic growth, then economic development strategies and procedures must be adapted to this new economic arena. These strategies must be developed to provide governmental entities, businesses, universities, and local communities with better ways of managing knowledge and comprehending why it is important for economic development. At any rate, before knowledge management can be utilized most effectively in this new age of science and technology, it is important to understand the significance of 'tacit' knowledge as defined by Michael Polanyi, who introduced the concept of tacit knowledge, which is now being bandied about by many business management courses. Tacit knowledge is the ability to quickly utilize knowledge and information so as to make decisions and solve problems in an intuitive manner. "It is this ability to develop and then utilize tacit knowledge that distinguishes an expert—be it a line worker in a paper mill, a brain surgeon or a computer software developer" (Jarboe, 2001). Formal knowledge, on the other hand, is derived from the homogenized array of knowledge that commands logical, methodical and technological reasoning processes. Access to this form of knowledge resides in the aptitude of reading, writing, and exercising reasoning to execute mathematical operations. Without both of these basic proficiencies, it is almost impracticable to successfully operate in today's knowledge-based economic environment—unlike the past economical climate when muscles and endurance were sufficient in many cases. Undeniably, with the proliferation of knowledge and information, the intuitive use of problem solving skills have become significantly more important, economically and socially.

The global economic transition to a knowledge-based economy has amplified the utilization of tacit and formal knowledge, which are the drivers of information/communication technology, biotechnology, nanotechnology, bioengineering, biopharmaceuticals, life sciences, etc. Simplistic evidence of the advance utilization of tacit knowledge resides in the fact that the use of computers and the Internet, which use to solely be in the realm of those who had gained formal knowledge, are expeditiously

becoming ubiquitous in the workplace and the home (see charts1 and 2) where tacit knowledge has more prevalence. This resulting augmentation of both realms of knowledge has also allowed an enormous amount of creative energy and faster economic growth potential to be emancipated.

Chart 1: Derived from American FactFinder of the U.S. Census Bureau

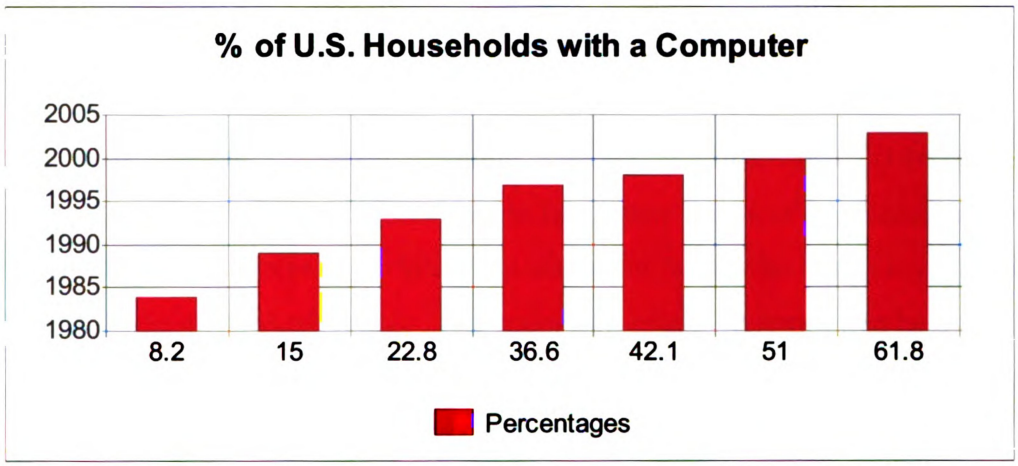
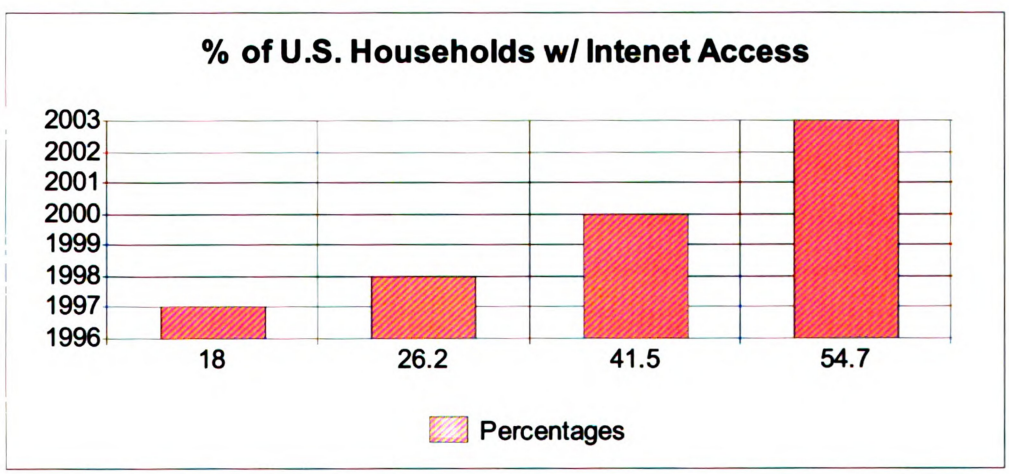


Chart 2:Derived from American FactFinder of the U.S. Census Bureau



Ultimately, formal knowledge, which will to some degree morph into tacit knowledge, will be a required to nurture the transition from a labor-intensive market to a knowledge-based economy. This is because tacit and formal knowledge are correlational concepts:

tacit knowledge fosters individual(s) to utilize both elements in ways that are unique to and for specific situations. It also allows individuals to surpass the present boundaries that are ascribed to formal knowledge. Creativity, intuition and innovation, which are now needed in the knowledge-based economic development process, owe much to the ability to tap into the reservoir of tacit knowledge (Jarboe, 2001, p.3).

2.3 Consequences of Transitioning to a Knowledge-based Economy

Ironically, the consequence of transitioning economically from brawn to brain has been extremely upsetting for many Americans. In fact, many facets of this transition appear to be diminishing the promise of middle-class wages for those who have only completed a high school education. Additionally, this economic evolution appears to be a catalyst for the weakening of unions and, subsequently, the job security their members have attained. Consequently, many American workers who lack the prerequisite of a creative, innovative, knowledge-based education will lack the ability for full emersion and success in the knowledge economy.

The transition from a labor-intensive market to a knowledge-based economy has also resulted in faster "job churning" (the masking of steady growth in employment by the creation and destruction of jobs, as less innovative and efficient companies downsize or go out of business and more innovative and efficient companies grow and take their place). This is exemplified by the following: during the economic boom of the 1990s, a total of 3.5 million private sector jobs were added to the U.S. economy between 1994 and 1995, but that was after new firms had created 5.7 million jobs, failing firms eliminated 4.5 million jobs, expanding firms added 10.5 million jobs, and contracting firms eliminated 8.2 million others (Atkinson, 2003). This churning has accelerated over the last three decades as the number of new start-ups and existing business failures per year has grown. While such turbulence increases the economic risk faced by workers, companies, local economies, and even regions, it is also a major driver of economic innovation and growth (Atkinson, 2003). Regardless, the loss of manufacturing jobs via churning, and the lack of new manufacturing businesses being developed has

significantly impacted the less educated and those communities solely built around manufacturing industries.

2.4 The Growth and Effects of the Knowledge Economy

Most participants in economic development planning understand that knowledge-intensive end-products, in particular those spinning out of research institutions allied with major research universities, or those products spinning directly out of major research universities, can display network effects that generate and concentrate their speedy development. Network affects work this way: a new technology is introduced into the market place, and initial users realize its value due to their complex needs; to the same degree, the network of users expands and the technology increases value for everyone in the network. This expansion encourages additional purchases and additional growth in the network and incites further technological innovation in that particular field. Network expansion, as a result, presents higher economic returns to all participants, including the early adopters of the technology, without further investment on their part (Bee, 2003).

Section 3: The Role of Research Universities in Economic Development

Historically, most American universities were considered to be somewhat insular and had little direct effect on local and regional economies in terms of benefits measured by spin-off firms or university-industry cooperative relationships (Feldman, 1994). Traditionally, these universities focused primarily on academic pursuits such as teaching, educating, conducting basic research, and employing support staff. These measures were also considered the primary employment and economic stimulation to local economies prior to the advent of the knowledge economy. This academic insularity from their host communities, coupled with the local cultural distinction from these university towns or cities, has lead to some discomfort or outright conflict between local residents and university members over political, economic, and social issues. Now, however, the long-established divide between town and gown appears to be diminishing—especially for public research universities.

The most obvious reason for this change in the town and gown happenings has been the political pressure connected with state governmental funding procedures. "State legislators, who must balance request for higher education funding against a plethora of other financial needs, such as prisons, Medicaid, K-12 education and the like, are now finding it increasingly important to maximize their economic returns when funding public universities" (Zumeta, 2003). This pressure has caused many public university officials and many local governing officials to reexamine the relations between cities and universities. This examination process has resulted in some university faculty and administrators committing themselves to the sponsorship of programs and projects that are not only influential in the body politic, but also within the local and regional community, as well. Programs such as faculty consulting, extension programs, and the development of high-tech incubators for the possible development of new commercial products have aided in the university/city partnership process.

Public research universities have also responded to legislative actions by evolving into significant components of the knowledge-based economy. These institutions of higher learning are, as stated above, no longer restricted to the traditional roles of teaching and conducting basic research. Now these major research universities are increasingly being viewed by policymakers as initiators of innovation and conduits of economic development with "large untapped reservoirs of potentially commercializable [sic] knowledge waiting to be taken up by knowledge-based firms" (Wolff, 2005). However, this new one-sided perception can be skewed by the fact that the commercialization process of product development may not be as forthcoming and economically stimulating for all communities that seat research universities.

The potential economic significance of the new research university model, as well as its assurance in the realm of economic development, has frequently been extolled. Part of this problem is due to a failure to acknowledge that the best-known accomplishments are out of the ordinary. Vastly successful research university spinout companies like Google and Yahoo, which grew out of Stanford University, are renowned. Seldom cited,

however, is the fact that the new spinout firms development around research university patented science and technology is a small fraction – probably no more than 2-3% - of the total rate of new business starts in the U.S. (Association of University Technology Managers). This fact contrasts the economic development augmentation that has taken place in Silicon Valley, Route 128, and Research Triangle Park.

In spite of the lack of assurances that economic vitality goes hand in hand with the new research university model, many government officials and economic development practitioners are absorbed with the idea of their local research university generating the next technological breakthrough and spinning off new economic developing firms. In reality, there exist a considerable amount of naivety surrounding this concept. These officials need to realize that one good piece of research and a patent does not make a company; as a matter of fact, if a university is not generating a large volume of patented innovations the likelihood of a significant economic development boom is reduced.

The presence of a research university in a community is not in itself sufficient to solely rouse and accelerate strong economic growth in a city or a region. However, these institutions can make considerable contributions to the process. History has shown that universities like the University of Michigan in Ann Arbor and Michigan State University in East Lansing can work in conjunction with their home cities to "create a dynamic partnerships ideally suited for creating new knowledge and developing solutions that have long-term economic benefits" (Steins, 2003).

Essentially, "much of the economic development thrust for economic development practitioners and other state and local officials resides in the notion that research universities are the catalyst for producing startup companies through knowledge spillover and technology transfer. In addition, this university "startup" approach has been given more credence via estimates derived from the National Business Incubator Association, which indicated that over 100 technology incubators (where many startups graduate from) are associated with universities in the United States (Bee, 2002). However, this cookie cutter approach of trying to emulate the Silicon Valley phenomenon begs the

question: are the commercialization activities of research universities the most important element in a city or a region's economic development success?

Despite the recently gained accolades, measures of influence and political clout, research universities are still lacking in the area where the technological rubber meets the economic development road: 1) patent activity and 2) licensing of intellectual property rights. Evidence that universities are not as prominent in the area of patent activity resides in the fact that in 2005, one company, IBM (International Business Machine), performed more R&D (research & Development) and received more patents (2972) than did a combination of top ten research universities in the U.S. (1274) (See Table 1). Despite the fact the research universities aren't competing in patent activity with knowledge-based businesses, it can't be ignored that in 1998, "Universities and Federally Funded Research and Development Centers [FFRDC's] performed about 60 percent of the nation's basic research, which generated $34 billion of expenditures and employed about 66,000 Ph.D. scientists and engineers" (Bee, 2002). Nor can it be ignored that "applied research which is a larger component of the R&D infrastructure than basic research, generated $61 billion of expenditures and employed 95,000 scientist and engineers, while also employing about 408,000 total workers" (Bee, 2002). When considering the volume of money and workers engaged in the knowledge economy, and the potential for an even larger pool of knowledge production, the desires of economic development practitioners to forge ahead into the research university – community collaboration with an expectation of profitable outcomes has to be viewed as probable.

Table 1: Comparative Statistics of Patents Received by Companies and Universities

The number of companies receiving the most patents for inventions in 2005			The number of research universities receiving the most patents for inventions in 2005.		
Rank in 2005	**Number of Patents in 2005**	**U.S. Company**	**U.S. University**	**Rank in 2005**	**Number of Patents in 2005**
1	2972	IBM	University of California	1	390
2	1837	Canon KK	Massachusetts Institute of Technology	2	136
3	1801	Hewlett-Packard Development Co.	California Institute of Technology	3	101
4	1720	Matsushita Electric Industrial Co.	Stanford University / University of Texas	4**	90
5	1645	Samsung Electronics Co.	University of Wisconsin	5	77
6	1561	Micron Technology Inc.	John Hopkins University / University of Michigan	6**	71
7	1551	Intel Corp.	University of Florida	7	64
8	1293	Hitachi LTD	Columbia University	8	57
9	1288	Toshiba Corp.	Georgia Institute of Technology / University of Pennsylvania	9**	43
10	1168	Fujitsu LTD	Cornell University	10	41
Total:	**16,836**			**Total:**	**1,274**

** Denotes a tie in ranking. Data derived from the United States Patent and Trademark Office

Universities alone cannot be the primary means of morphing communities into technology leaders. However, the potential for economic development contributions from research universities to a local community cannot be ignored. Essentially, if research universities are to be highly successful in spurring local and regional economic development, while also expanding their financial base in all directions, they must not only continue the transformation process initiated by state legislators, they must exceed it by generating more applied scientific knowledge that's needed and utilized by local knowledge-based firms to enhance their businesses and augment their competitiveness.

Quintessentially, research universities need to morph into "entrepreneurial research universities that are actively engaged in the process of economic development" (Tornatzky, 2002). This means that research universities must be committed to:

- Maintaining the traditional mechanisms of universities: educating and training highly qualified personnel (undergraduates, graduates, Ph.D. candidates); and being a source of basic knowledge, technical solutions and skilled workers for industry; and aligning skills with a local community's employment needs.
- Generating new and applied scientific knowledge that is needed and used by local knowledge-based businesses to expand businesses and maintain their competitiveness.
- Partnering with local developers and community groups on projects that stimulate local economic development, while also meeting university and community needs, such as Virginia Commonwealth University (VCU), which "built a recreation center, a parking garage, a bookstore, a 396-bed dormitory, and an art school in a long-neglected area near its campus; which, in turned spurred the private-sector into responding by adding 445 units of housing, a large home-improvement retail store and a giant supermarket" (Miara, 2002).
- Bridging the gap between research universities and private research institutes. This provides the keys for social interaction, networking capacity, and successful collaboration, which is essential for tapping into the shared intelligence of research universities and private knowledge-based firms.
- Shoring up and expanding the licensing of intellectual property in the form of patents, and promoting the formation of spin-off firms in order to facilitate technology transfer and financial dynamism at a more exponential rate (The University of Wisconsin-Madison exemplifies this model through its Wisconsin Alumni Research Foundation, a private, non-profit organization which patents inventions arising from university research, licensing the technology to companies for commercialization, and returning licensing income to the University of Wisconsin-Madison to support further scientific endeavors).

At a United States Economic Development Administration symposium, Elson Floyd, the President of the University of Missouri, delivered a speech at a session on "University-led Economic Development." In his remarks, Floyd detailed very clearly and succinctly how research universities are becoming more immersed in local/regional economic development, and how important intellectual property rights were to the financial bottom line of universities. He further advised that: "The long-established role of the universities has been pertaining to knowledge and the transference of this knowledge to produce an educated workforce. In the ethos of economic development, that role changes to some extent. Knowledge is created. Then the commercial value of knowledge is determined and transformed into a new product or a new service. Then the creative class, in some instances, markets the product or service and cultivates and/or identifies a customer base. If there are enough customers, a positive return is realized. When this happens, some of the returns are reinvested and additional new knowledge is created. This end product/new knowledge is defined as intellectual property, and is identified as profit" (Floyd, 2005). More simply put, intellectual property is a huge business that encompasses the end result of basic research and applied research.

3.1 A Means of Proliferating University-led Knowledge Transfer

Research universities, whether they are linked to technology-based incubators/clusters, or not, offer significant benefits to technology-based firms. These universities have a predisposition and a propensity, based on their clustering of knowledgeable and creative personnel, to spin-off high-tech firms. And as a consequence to this factor, many of the firms that spin-off from universities are likely to remain close to these universities in order to have more readily accessible communications with faculty member (who in some instances are the entrepreneurs). It is via this method of operation that sets the stages for augmenting knowledge transfer methods (via the alteration of university intellectual property rights policies), developing high-tech incubators (to enhance the commercialization and viability of potential businesses), and the spinning out of university-connected businesses into clusters of high-tech businesses. However, many government officials and economic development practitioners lack the insight to

understand that technology projects don't develop quickly. Technology companies based on MIT research, for example, don't begin to create significant jobs and revenue for eight years from the date that [intellectual property rights] licenses are signed. Tech startups in particular require lots of R&D before productions begins; and lots of economic development practitioners over-promise on the cost and rewards of technology efforts (Lester, 2005).

In forging new economic development plans for certain communities to advance in the knowledge economy arena, research universities must be afforded with the means of regional connectivity. This means developing linkage between universities and local industry clusters, promoting externships for students and faculty, and creating other linkage programs and policies (Atkinson, 2002). Developing a sector strategy with a substantial networking component, especially promoting contacts among people active in the knowledge industry and encouraging the formation of industry associations and "continuous improvement" user groups, can be highly effective in generating the kind of interaction that generates new companies and innovations. This also turns out to be an effective vehicle for building relationships between key institutions (university researchers, venture capitalists) and "wannabe" entrepreneurs (Atkinson, 2002).

Most major research universities involved in economic development partnerships are located in or near urban areas. This reality is coupled with the following facts: there has been a noticeable transformation in the thinking of 19 – 34 year olds (they consider cites "cool" again) and applications for urban universities have increased exponentially. As a result of this transformation, many of the largest cities in the United States have added college graduates, and this has been occurring despite the fact that many of these cities have lost population during the past three decades. Subsequently, for economic development practitioners and the cities they represent, urban research universities must be competitive in attracting promising, high caliber students, whose interest outside of academia resides in an active nightlife and vital retail neighborhoods that experience a minimal amount of crime. In order for these urban research universities to implement actions worthy of being recognized as urban planning and economic development

communities, they must analyze and synthesize the following aspects, which impact most urban research universities:

- Universities need better facilities to obtain research grants. New technologies require new buildings (Campbell, 2005).
- Universities must entice youthful prospects with new amenities, social activities, sports, and cultural facilities, even dorm rooms big enough to hold all their media equipment (Campbell, 2005).
- Areas adjacent to universities must provide entertainment and nightlife, or risk losing both faculty and students (Campbell, 2005).
- Universities need an engaged, vital, and vibrant surrounding community (Campbell, 2005).
- Universities must attract private spin-offs that want to locate near them. That's an indirect kind of university expansion, but an important one (Campbell, 2005).

In America today, research universities must also accept the fact that they must be congenial neighbors with their surrounding communities and develop strong community ties beyond the notion of economic development. It behooves universities to view local communities as pools from which basic and applied research can be drawn from; and, from these drawn ideas are possible products and commercialization options. This, then, should preclude universities from unilaterally implementing development plans that may perceivably cause negative impacts within or near their surrounding communities. Thus, universities involved in planning and implementing development projects should employ the public relation tactic of sincerely reaching out to community leaders, stakeholders and residents, instead of providing lip service.

Section 4: Tools for Initiating University-led Economic Development

In order for major research universities propagate long-term community/regional economic development in the knowledge economy, they must utilize the following tools: 1) partner with local governmental entities and local businesses to evolve local knowledge-related firms into competitive, world-class businesses; 2) attract foreign (both

interstate and international) business; and 3) establishing high-technology infrastructure(s) that will lead to the clustering of university related, knowledge driven businesses.

4.1 Technology Incubators: Shoring Up University Spinout businesses

One of the primary methods used to facilitate the above economic development objectives is the development and implementation of high-tech incubators (which provide entrepreneurial firms with an array of resources such as management assistance, access to capital and equipment, coordinated exposure to vital business and/or technical support services, shared office services, accommodating leases and expandable space—all in one facility) (Jarboe, 2001, p.8). However, studies have also indicated that in order for these incubators to be fully integrated into local communities, and have the ability to survive, economic development partners must provide, at a minimum, the following micro complementary business services: (1) business plan development, 2) intellectual property protection assistance, 3) legal services, 4) secretarial assistance, 5) accounting and bookkeeping services, and 6) presentation training (Jarboe, 2001, p.8).

This adopted position of investing in, and hoping for the survival of, business incubators by economic development officials appears to strongly counter a 1998 survey of 151 economic development officials from different U.S. cities. In that survey it was found that those officials perceived business incubation to be one of the less effective strategies for spurring growth (Jarboe, 2001, p.12). Some of the following limitations, at that time, were listed as reasons for taking an effective pause in the wholesale adoption of technology incubators:

- Many incubators showed a lack of consistent measures of success
- There was a failure to compile reliable data on incubator graduates
- The nascent nature of technology incubator industry was speculative
- There was a lack of research on incubators that failed or were less than successful
- There were selection bias and small sample sizes of technology incubators

Recent studies, however, now indicate that business incubation can be considered a cost-effective economic development strategy for state and local governments in terms of public sector cost per job. The evidence suggest that if a thorough and objective feasibility study is performed and best practices are followed, which include providing the enduring provision of sufficient funding, business incubators can ensure the survival of graduate firms at a significantly higher rate than the general population of new ventures (Jarboe, p.24). Furthermore, there is a high probability that the incubated firms will locate in the region of the host incubator, so they are likely to provide some return on the public investment through taxes paid by firms and their employees. There is also evidence that business incubation may help regenerate public confidence in the face of the loss of a major employer and overall economic decline (Allen, 1990).

4.2 University-based Industry Clusters: An Ideal Economic Development Outcome

A second tool is for the university to facilitate the formation of clusters. To gain access to knowledge-based workers, many firms want to be located near other firms in their industry. A university-based industry cluster can be defined as a geographically concentrated group of business enterprises and non-business organizations (e.g. training centers, professional associations) with a bond around common products and markets, common distribution channels, common technologies, common labor pools, and/or buyer-supplier relationships (Bergman, 1999). From a Smart Growth perspective, clustering would enable developers to build at higher densities in certain areas, which would allow for preserving natural features in other areas (McKeever, 1968). Also, the contemporary economy seems to attach an importance to proximity. Placing businesses, shops, homes and recreation in a convenient distance enhances business opportunities, facilitates in developing a sense of place, and can aid in luring a knowledgeable and talented workforce. Furthermore, if clustering is strategically planned and developed in urban areas, they can contribute to some initiatives like revitalizing housing, creating places with around-the-clock activity, and allocating businesses with opportunities to spread out their peaks in services. These smart growth measures coupled with "the desirability for office space in mixed-use setting with access to transportation choices has

been reflected in higher occupancy rates, property values and lease premiums" (Carroll, 2005).

Clustering also provides an opportunity for the development of an agglomeration economy through which an establishment gains from external linkages in a spatially concentrated location (Hackler, 2003). These benefits can come in the form of having access to large pools of creative, innovative thinkers from cutting-edge research universities within close proximity; enhancing knowledge development (both tacit and formal) and knowledge exchange; gaining better access to suppliers; and other productivity yields such as a more talented labor pool, broader markets, and cost-savings. However, the most beneficial aspect of clustering hi-tech/knowledge-based businesses is derived from encouraged innovation, development, and growth. Firms close to one another compete for customers, workers, financing, and preferential deals with suppliers. This competition can also spur creativity, which economically benefits a local community (Economic Development Administration, 2001). Counter analysis also indicates that the age of an industry cluster has a negative effect on the amount of new business activity, which suggest that the benefits of spatial proximity diminishes over time (Gabe, 2003).

If agglomeration can be had from a university-based clustering of similar knowledge-based technology firms, then it can be anticipated that benefits will be derived for lower-wage workers, as well. Service sector job creators, wishing to meet the likely demands for convenience held by the Creative Class and Knowledge Workers, would have a better economic base to hire lower-wage worker to meet those demands. More than likely, these jobs would fall into the realm of food service, cleaning services, delivery services, child-care services, etc. The possibility of lower-wage jobs stemming from the development of facilities that house high-wage jobs may also have a ripple effect of reducing violent crime (both personal and property). While statistical evidence cannot determine conclusively if there is a causal relationship or a correlation between crime and unemployment, some evidence suggest to a causal relationship. Blanden, (2003) noted "violent crime rose by 83 percent between 1973-1991. Between 1991 and 2001, when the U.S. experienced its greatest economic expansion ever, total reported crime declined between 24 and 46 percent [depending on the category]." Machin and Meghir, (2004) conversely considered the importance of low and

stifling wages as having a stronger causal relationship with crime. However, like most social scientists, they see little, if any, evidence for a relationship between unemployment and crime. Of course, if job creation has any effect on reducing crime, then clustering and its possible "bedrock attributes of developing a successful city district whereby, people feel personally safe and secure" (Jacobs, 1961) should be seriously contemplated. Thus, it's safe to say that despite the opposing theoretical views on crime and unemployment, a successful cluster of knowledge-based firms would seem to have a catalytic means of augmenting quality of life issues, which could also lead to larger economic development draws of people and businesses.

Section 5: Profiles: University of Michigan (Ann Arbor) & Michigan State University (East Lansing)

The theoretical arguments that innovation fosters economic growth and results in prosperity are fundamental to universities, businesses and governments, both locally and statewide. Accordingly, these entities are now collaboratively concentrating on advancing enterprises within their cities and regions; and they are doing so in a very precise and distinctive manner:

- Governmental leaders are assisting universities, entrepreneurs, and established businesses in creating and selling enhanced value-added products and services as a means of enhancing tax bases.
- Business leaders are encouraging communications between research universities, private research institutions, and innovative enterprises in order to utilize the knowledge of scientists, the outcomes of scientific research and human potential for the production of new technologies, products, and services.
- Universities are collecting financial resources for the creation of infrastructures suitable for the transmission of knowledge, instituting propitious environments for efficient interaction, collaboration and the fostering of innovative, knowledge-based production.

These new capital investments by this new economic development coordination have caused a proliferation in the emergence of technological incubation as an economic development strategy (DiGiovanna & Lewis, 1998). This innovative spin on an old process is also believed to generate first mover benefits to the innovating firms, which, in turn can lead to new agglomerations of scale and economy; and this new agglomeration, in turn, is expected to increase the prospects for additional wealth generation in the host region (Lewis, 2001).

The following university/city profiles are summaries of how the University of Michigan and Michigan State University affected/stimulated the economic development process of each of its host cities via basic university/economic development processes, university-based technology incubators, and the clustering of knowledge-based businesses. Moreover, these profiles examine how these research institutions are at the cusp of possibly bringing about an economic transformation for Ann Arbor, Michigan and East Lansing, Michigan within the knowledge-driven global economy.

5.1 Profile: University of Michigan, Ann Arbor, Michigan

5.1.1 Introduction

The city of Ann Arbor was chosen as a city to profile because of four important criteria: (1) It is the home of the University of Michigan (U of M), which is one of the largest research universities in the United States; furthermore, it also has one of the largest endowments/returns on investments of any public university in the country. (2) The city of Ann Arbor and the University of Michigan, with its increasing enrollment, faculty, and support staff, have developed a long-standing partnership that has evolved into a powerful coalition of local business, governments and university leaders (Dolgon, 1999). (3) The duality of the City of Ann Arbor and the University of Michigan has attracted high-tech firms and other knowledge-based business to geographically cluster in the area with U of M as its center. This, in turn has imbued U of M with extensive government funding and corporate research dollars. (4) Ann Arbor's success has inspired and influenced economic development strategies employed regionally and by the state.

5.1.2 Background

Ann Arbor was founded in 1824; however, the transference of the University of Michigan (U of M) from the City of Detroit to Ann Arbor, undoubtedly, was the single most important event in Ann Arbor's development. The establishment of the university determined much of the subsequent history of the community. In 1837, the Michigan Legislature permanently seated the University of Michigan in Ann Arbor. This act solidified the indivisible and interdependent histories of Ann Arbor and U of M.

By 1900, Ann Arbor's economic base, beyond the university resided in light manufacturing, milling, furniture making, piano building, brewing, gas fixtures, and rug making (MOAA.org). The burgeoning automotive industry and its production, however, never succeeded in Ann Arbor, despite the fact that Detroit was only forty miles away.

The University of Michigan, which had long supplied a considerable economic base for Ann Arbor, contributed significantly to the city's expansion; and much of this expansion was the result of increased student enrollments. In 1899-1900, student enrollment stood at 3,441 students; by the 1919-1920 school year, student enrollment reached 12,000; by 1945, enrollment stood at 19,000; and in 1965, as the Vietnam war was beginning to escalate, student enrollments reached a high of 30,000 (MOAA.org). This increase in the student population also witnessed simultaneous student spending, which further stimulated commerce and the University building program, which employed local contractors. As faculty and students sought housing, residential development boomed. Thus in a quid pro quo fashion, Ann Arbor furnished the labor and materials for the university's expansion, and thereby aided in fueling its own economic development.

By the late 1950s the number of students, faculty, staff, and support personnel at the University of Michigan had expanded significantly. This expansion primarily developed from U of M's goal to meet the business, engineering, and technological research demands of the day. This focus on research enticed research-oriented industries to relocate to Ann Arbor. "In 1958, Parke Davis built a huge laboratory on the north edge of

town, which was soon followed by the Bendix Corporation, Conductron, Federal-Mogul, and Climax Molybdenum, among others" (MOAA.org). With the relocation of these major corporations to Ann Arbor, a multiplier effect ensued that allowed for the city to obtain a considerable industrial, which later included a research park on the south side of the city that was inaugurated in 1963.

5.1.3 Identification of Knowledge-base Infrastructure

The University of Michigan's Life Sciences Initiative began in 1999 as a campus-wide endeavor to facilitate life sciences research, teaching, and to formulate new collaborative linkage between the Medical, Engineering and Central Campuses. A letter followed up this action from then U of M President, Lee Bollinger to faculty, staff and students, in which he discussed the "Initiative" and the then pending "Life-Science Institute" (University of Michigan website). In September 2003, the Life-Science Institute, a new research unit, was established in "a $230 million interdisciplinary collaboration housed in state-of-the-art wet labs at the very center of the Ann Arbor campus" (University of Michigan website).

The formation of the Life-Sciences Initiative has been followed up by the University of Michigan's firm commitment to be the leading research institution in the life sciences arena. This commitment has been evidenced by U of M's development of additional new facilities, which includes "a new 140,000-square-foot teaching building for undergraduate science, and a 99,000-square-foot Commons building designed for meetings and small conferences. The Commons also houses the University's Bioinformatics Program. These efforts further reflect U of M's commitment to "recruit and retain the best faculty and students" (University of Michigan website).

Recently, a group of Ann Arbor and University of Michigan stakeholders formed Ann Arbor SPARK as an NGO (non-governmental organization) designed to develop the region's hi-tech community by retaining and luring knowledge workers, growing new companies and transferring University of Michigan technology to the market place. In

this economic development capacity, Ann Arbor SPARK has proven itself to be successful by luring a division of the Internet search engine giant Google into creating a marketing center in its downtown area, where it will employ approximately 1000 employees. Google announced that prime reason for its site selection was due to the close proximity it will have to the University of Michigan and the easier access it will have the advanced technology that is springing from the university.

5.1.4 The Implementation of Science and Technology as Economic Development

Prior to the auto industry becoming the economic lynchpin of Michigan's economy, the state had a contingent of successful life sciences companies that had been growing profitably and making beneficial discoveries in the areas of pharmaceuticals, medical devices, diagnostic instrumentation, and in other biotechnological fields of research and other subsidiary services. Hence, the primary concept for the Life Sciences Initiative to collaboratively concentrate on "the theoretical, empirical, and applied aspects of Complexity in the Life Sciences" (The Regents of the University of Michigan, 1999) has, what appears, to be a viable underpinning worth investing in. Resultantly, interaction between the state's leadership in business, public health, law and social research see the possible benefits and profits evolving from a focal point of a dialogue on the life sciences future.

The dialogue and collaboration of university, business and government leaders, along with University of Michigan faculty members have resulted in "over $2 billion invested in R&D each year and nearly 100 new companies since 2000; and furthermore, Michigan now leads the nation as one of the fastest growing life sciences states (University of Michigan). Michigan's life sciences strengths also include:

- 542 Companies (University of Michigan)
- 31,777 Employees (University of Michigan)
- $4.8 Billion in Sales (University of Michigan)

- Growth of Michigan's life sciences industry has exceeded growth of the U.S average, growing 27% in employment, 32% in number of companies and 165% in sales (University of Michigan).
- Michigan has led the nation in percentage growth of new companies from 1999-2002 (University of Michigan).
- #2 state for overall R&D expenditures (University of Michigan)
- #3 university in the nation for R&D (University of Michigan)
- 2nd most business friendly state in the nation, according to Site Selection magazine (University of Michigan)
- Michigan has invested $178 million over the past four years to foster growth in the state's life sciences sector (University of Michigan)

As a result of this investment and collaborative effort by the leadership in the academic world, the business community, and government officials, Michigan now has the 4th largest high-tech workforce in the nation (University of Michigan).

5.2 Profile: Michigan State University, East Lansing, Michigan

5.2.1 Introduction

Michigan State University (MSU) and its host city, East Lansing were selected as a city to profile because of their recent commitment to expand its collaborative and economic development efforts with businesses and local governments. Unlike its neighbor 60 miles southeast (the University of Michigan), Michigan State University has not extensively developed research/business partnerships that would spur extensive economic development in its host city and region. However, with its decision to formulate the 11th regional SmartZone (a state sanctioned program that encourages and advances the creation of IT/business incubators as a means to espouse new business initiatives), Michigan State University has promise of contributing significant economic development to its host city and region. This was made evident by the President of Michigan State University, Lou Anna Simon, when she stated: "The role of the 21st century land-grant university is to blend access to cutting-edge information, economic competitiveness and

quality of life. A key element of this is working with our stakeholders and partners to develop comprehensive and long-term strategic plans for viable economic growth" (Michigan State University, 2005). "More over, a strong region and a strong university go hand-in-hand, and today I'm excited that we're taking the first step in the revitalization of the region" (Michigan State University, 2005).

5.2.2 Background

Two acts by the Michigan Legislature were essential for the beginnings of the two entities now known as Michigan State University and the City of East Lansing, and the creation of their subsequent histories. First, the state, in 1847, moved its capital from the City of Detroit to Lansing Township. Secondly, eight years later, on February 12, 1855, it designated the Agricultural College of the State of Michigan, which became the first land-grant college in the United States under the Morrill Act. Following this decision, the State Legislature chose to seat the college approximately four miles east of Lansing, in between Meridian Township and Lansing Township.

In 1907 the people of the community surrounding the college petitioned the state for incorporation of a city to be named "College Park." After some haggling about the moniker of the city, the Legislature eventually agreed on the name: "East Lansing" (E.L. History).

"In 1925, Michigan Agricultural College became Michigan State College of Agriculture and Applied Science. In 1955 it changed its name again to Michigan State University of Agriculture and Applied Science, and by 1964 it was simply called Michigan State University" (Michigan State University, 2006).

Essentially and subsequently, Michigan State University and the City of East Lansing evolved as two intertwining parts of a larger whole, in ways both literal and historical. Neither could exist without the other; in fact, the MSU campus is administratively within the City of East Lansing, and the city itself is an outgrowth of the college. Yet, from the

perspective of land development and architectural history, the city and the campus took very different paths. In essence, the city of East Lansing has, more or less, "lived within the shadows of the Capitol that created it and the college that spawned it. Subsequently, the city of East Lansing has not been given the notice or the documentation of its own right" (East Lansing History, 2005).

Despite East Lansing's recognition as a university town (from a national perspective), it is a city with a suburban disposition, that's merging into a contemporary urban atmosphere. Since East Lansing gained its status as a city, it has striven to be a community that would be appreciated by its residents, and mostly it has. However, this municipal endeavor was enhanced after the end of World War ll. It was at this time that the city of East Lansing was being noticeably recognized for being a city with quality municipal services, quality neighborhoods that are safe, educational opportunities for all age groups, and quality of life amenities that its resident enjoy. Additionally, the public school system has become one of the best in the state, there are "things to do" both culturally and recreationally, and it has a diverse background and a friendly atmosphere. In essence, East Lansing has the potential to become that knowledge-based hub that its city officials desire, and what many other cities are also striving to become.

5.2.3 The Implementation of High Technology as Economic Development

Michigan State University, which is the home of the premier rare isotope research facility in the nation, the National Superconducting Cyclotron Laboratory, in 2005 decided to jointly work with the cities of East Lansing and Lansing to launch the Lansing Regional SmartZone, the 11^{th} such location in the state of Michigan.

SmartZones are distinct geographical locations created by the Michigan State Legislature and administered by the Michigan Economic Development Corporation. This program coordinates all the community assets and services to support technology-based firms, entrepreneurs, and researchers within an environment that will assist in their endeavors to identify commercial opportunities, grow or attract businesses by providing incubator

space, entrepreneurial expertise (a group of knowledgeable individuals selected to help advise business owners regarding any number of business issues including marketing, sales, financing, expansion, etc.), exposure to potential markets, access to capital, and long-term profitable locations.

The Lansing Regional SmartZone will specifically be Supported by the Cities of Lansing and East Lansing, in partnership with Ingham County, the Lansing Regional Chamber of Commerce, MBI International (a biotechnology incubator), Michigan State University, the Michigan State University Foundation and the University Corporate Research Park. The goals of this SmartZone are to stimulate the growth of technology-based businesses in the Lansing region. It will focus on business attraction, creation and expansion in the fields of life sciences, advanced manufacturing and information technology (State News Service, 2006). Moreover, the city of East Lansing is in the planning stages of utilizing its Downtown Development Authority's tax increment financing, and brownfield redevelopment financing measures to expand its Downtown eastward into an area which has been tentatively been dubbed "East Village." The tentative site plan calls for the inclusion of a facility to support MSU technology spin-offs and the support other local high-tech ventures.

Michigan State University is also a part of the Michigan Economic Development Corporation's Life Sciences Corridor. While MSU is a strong participant in the Life Sciences Corridor, and it may derive intellectual property returns that may be sizable, it is uncertain if this project will provide a significant economic development boost to the East Lansing/Lansing region. Due to MSU's planned move of its medical school from the city of East Lansing to the City of Grand Rapids (located on the west side of the state), a greater economic development impact for the "Medical Mile" area of Grand Rapids may be had than in the city of East Lansing. A contrasting point of view is that other bioresearch will still be taking place in the East Lansing/Lansing region, thus enhancing intellectual property returns and subsequent investment and economic development in the East Lansing/Lansing region. Further, the income earned in Grand Rapids will, in most part, be channeled back to the main campus in East Lansing.

Also, during the 150th year anniversary of Michigan State University, MSU President, Lou Anna Simon, along with "a group of academic, community and business leaders came together to create the Prima Civitas Foundation, an NGO nonprofit, regional economic development organization. The mission of the foundation is to diversify Mid-Michigan's economy and transform the region into one of the most innovative in the world, while aligning the region's educational and training programs for the emerging jobs of the new economy. The mulitifunctional purpose of Prima Civitas Foundation multifunctional: to promote business, improve educational outcomes, enhance cultural opportunities, encourage municipal collaborations, develop regional strategies to recruit and retain skilled workers, and market the region as a center of innovation, collaboration, and entrepreneurship. While independent of MSU, Prima Civitas has a relationship with the University that focuses on commercialization of research and increased flow of technology transfer and intellectual property" (Prima Civitas Foundation.org).

President Simon has also stated that as president, her goal was to make the university a world leader in the post petroleum economy, this prompted the creation of the Center of Biomass Technology. The center's goal is to gather together MSU research and resources in the plant sciences, chemistry, agricultural sciences and engineering fields to help cultivate connections with public and private sector initiatives designed to transform Michigan's economy. These bold initiatives offer a great deal of optimism for the transformation and diversification of the Mid-Michigan economy.

In the 2004-05 school year, MSU had sponsored research totaling $351 million. This coincided with the Michigan Agricultural Experiment Station, which funded the research of more than 300 scientists on campus and in a network of 14 field research stations across the state (Michigan State University web page).

On 6/23/06, the State of Michigan was awarded a federally funded $15 million WIRED (Workforce Innovation in Regional Economic Development) grant, and MSU was assigned the lead university in the funding process. In meeting the obligations of this

grant, MSU will promote the emerging bio-economy. Other partners in the WIRED team will address employment opportunities in a variety of industry sectors, such as:

- Fuel cell training and provide graduate education in hybrid technologies.
- The growing demands of the health care sector.
- Training in the building and construction trades and in advanced manufacturing.
- Entrepreneurship training. (Michigan State University web page).

As the lead institution of higher learning in the WIRED funding, MSU has another forum to potentially augment the economic development status of the East Lansing region.

5.3 Profile Findings

In summary, the noted research universities have enormous potential to not only impact the economic vitality of the city in which they are seated, but they have the capability of augmenting the economic vitality of their regions as well.

Using the statistical attributes of Ann Arbor and East Lansing, along with their corresponding universities, to draw conclusions about which university/city has a better propensity to transform into the next Silicon Valley like region, it appears that Ann Arbor and the University of Michigan are, presently, better situated to achieve that status. This subjectively based finding is based on how the city of Ann Arbor/the University of Michigan faired against the city of East Lansing/Michigan State University (See Tables 2, 3 & 4). Table 2 provides evidence of the University of Michigan's ability to attract and matriculate students in the high-tech fields (at an exponential rate) who will contribute to the development of the knowledge economy; table 3 illustrates how much funding in the form of contracts and grants each profiled university receive; and table 4 indicates how these cities compare based on a number of "American Factfinder" data sets.

The University of Michigan, with its renowned reputation as a world-class research university; its enormous financial status; its long-standing relationship with private industry, the city of Ann Arbor and the state of Michigan; poises it and the city of Ann

Arbor to be on the cusp of becoming "the research center of the mid-west" (Dolgon, 1999).

While Michigan State University has been less open to collaborating with business leaders and government officials, it is now endeavoring to be more collaborative. This is very much illustrated in its participation in the Life Science Corridor initiative. While this and other expansive endeavors may not initiate a Silicon Valley like economic development for East Lansing and the Greater Lansing area, it may well have the possibility of significantly enhancing the economic vitality of the area.

Table 2: Number of Students Enrolled in Engineering Programs in 2004-2005

Variables	Michigan State University	University of Michigan
Number of undergraduate students enrolled in engineering programs in 2004 - 2005	2,839	**4,943**
Number of graduate students enrolled in engineering programs in 2004 – 2005	543	**2,579**
Number of engineering Bachelor degrees granted in 2004 -2005	614	**1,186**
Number of engineering Master degrees granted in 2004 -2005	90	**894**
Number of engineering Ph.D degrees granted in 2004 - 2005	72	**226**
Number of Bachelor degrees in computer science engineering granted in 2004 - 2005	73	**400**
Number of Master degrees in computer science engineering granted in 200- 2005	22	**141**
Number of Ph. D degrees in computer science engineering granted in 2004 - 2005	11	**70**

(data derived from website of respective universities)

Table 3: Information derived from each university's web site

Dollar Amount of Federal and Non-federal Contracts and Grants Awarded to Each Profiled University in Academic Year 2004-2005	
University of Michigan	**$643,650,000**
Michigan State University	**$349,000,000**

Table 4: Statistical Comparison of Profiled Cities Based on 2000 Data Set from American FactFinder of the U.S. Census (2005 data for noted cities not available)

Variables	City of Ann Arbor	City of East Lansing	State of Michigan	United States
Total Population	114,024	46,525	9,958,444	
Caucasian Population	74.7%	80.9%	80.2 %	75.1%
African-American Population	8.8%	7.4%	14.2%	12.3%
Asian Population	11.9%	8.2%	3.6%	3.6%
Latino Population	3.3%	2.7%	3.3%	12.5%
EDUCATION: Associate degrees	3.9%	5.3%	7.0%	6.3%
Bachelors degrees	29.8%	31.2%	13.7%	15.5%
Graduate and professional degrees	39.4%	39.2%	8.1%	10.0%
EMPLOYMENT: Civilian labor force	65.9%	63.6%	64.6%	71.5%
Employed civilian labor force	63.1%	57.0%	60.8%	63.9%
Unemployed civilian labor force	2.8%	6.6%	3.7%	5.9%
OCCUPATIONS: Professional and related occupations	61.0%	44.6%	31.5%	33.6%
Service occupations	12.4%	20.8%	14.8%	14.9%
INDUSTRY: Information	4.1%	4.3%	2.1%	
Professional, scientific, management, and waste Management	13.0%	7.6%	8.0%	
Median household Income	$46,299	$28,217	$44,667	$41,994
Median household value	$181,400	$144,300	$115,000	$119,600
Median household age	28.1	21.7	35.5	35.3

Section 6: Conclusion and Policy Recommendations

6.1 Recommendations for the State of Michigan

To revitalize and augment a particular local jurisdiction, state governments are advised to focus on producing private market outcomes by "carefully using both carrots and sticks to nudge the private sector in the proper direction. The stick represents laws and regulations that enforce the minimum standards of behavior; the carrot represents incentives for more optimal behavior. These incentives take the form of regulatory relaxation, financial inducements, coordination, or information, to name a few" (Lyons, 2001). A prime example in the state of Michigan of these inducements resides in the collaborative and investment process currently being undertaken by the State of Michigan's "SmartZone" and the Life Sciences Corridor Initiative. In both of these processes, the State of Michigan joined forces with its three major research universities: Wayne State University (located in Detroit), Michigan State University and the University of Michigan to embolden entrepreneurs and researchers in discovering and developing new technologies with commercial potential that can be converted into viable business platforms.

6.2 Recommendations for Michigan Cities

Michigan cities and regions that are transitioning to a knowledge-based economy must compete with other communities to lure and attract businesses, and in the process, many communities are utilizing substantial tax subsidies for these endeavors. These competing communities may want to consider on a pro rata basis whether to provide exorbitant tax breaks and other extreme subsidies to develop and/or attract high technology firms. Local governing officials in this situation might do progressively better by investing in K-12 education and workforce training, investing in the implementation of vibrant infrastructures for technological innovation, and more precisely at investing in developing an outstanding quality of life for current and potential residents.

6.2.1 Step1: Improve Quality of Life

Because knowledge and creativity are amorphous objects, they do not require fixed positions or locales in which to be manipulated or augmented. The individuals capable of innovating technological capacity, accentuating technological functions, maintaining technological operational processes, and problem solving within the perplexing realm of technology can be mobile. Subsequently, these creative and innovative workers, who are of dynamic importance to the global economy, can be virtually anywhere; accordingly, the physical locations of technological stations are not as significant as they use to be. To be more precise, in this new economy, the location of knowledge workers is a strategic factor in determining a place's economic success. It used to be that workers moved to where companies were located. In the Knowledge Economy, companies are, increasingly, looking to locate where creative and innovative knowledge workers want to live.

In the knowledge-based economy, innovative knowledge workers are in extensive demand; ergo, they have some ability to be picky about whom they will work for and where they will work; thus, they can afford to choose locations that provide more than just a good job with a good income (Atkinson, 2002). Additionally, it appears that quality of life and significance of place have strong "pull" factors (aspects that lure people to a specific location) for knowledge workers and the creative class—particularly the younger ones. Many of the upper management personnel of knowledge-based industries purport that quality of life factors are important to the attraction and retention of managerial and selective technical employees (Hackler, 2003).

"In order to attract knowledge workers, particularly younger ones, the old urban cultural agenda of providing things like art galleries and opera houses - is not enough. These are good things, but knowledge workers usually want a more 'experiential' culture. The new quality-of-life agenda has to go beyond 'high culture' amenities to encompass outdoor recreation and "the new urbanism." The new quality of life amenities now includes both active outdoor recreation [hiking trails, wind surfing, paved and unpaved bike trails, rock climbing, urban kayaking, etc.] and European-like urban amenities [e.g., outdoor dining,

walking streets, geographically discrete neighborhoods, vibrant night life, good restaurants, river walks, impressive views, nightclubs, and a bustling street life]" (Florida, 2000). These observations were underscored by an EPIC-MRA survey of young Michigan adults. "The survey asked young survey respondents what they thought made for a cool city:

- 23 percent: Things to do (the lack of specificity reflects documented answers in the poll)
- 9 percent: The people
- 8 percent: Clean/environment
- 7 percent: Cultural
- 6 percent: Bars/night life
- 5 percent: Unique entertainment
- 4 percent: Diversity, lakes, size of city
- 3 percent: Attractions, good restaurants, parks/recreation, shopping, type of community
- 2 percent: Good sports, jobs, safety, weather
- 1 percent: Business district, colleges/good schools, historic, pedestrian access, services, and social life (Sarpolus, 2006).

On the other hand, location requirements tend to differ somewhat for those knowledge workers and members of the creative class, who are slightly older—especially those with children, or those who are contemplating starting families. For this sub-group, high-quality municipal services at competitive tax rates, high-quality schools, access to more green space, a subtler lifestyle, and the proximity to other creative people are the most important quality life issues (Salvesen, 2002).

Businesses, knowledge workers and the creative class all want to locate in areas that have high levels of municipal services. In order to have these high levels of service, municipalities have to possess an adequate revenue source from property, income, and sales taxes (Orfield, 2002). Coincidently, cities are assumed to be attractive and

competitive in securing business and population growth if they offer a wide range of services (Hackler, 2003) that enhance quality of life. All of these qualities appear to be significant factors for "footloose" firms. A company is considered footloose if its financial performance is relatively independent of its location. These firms are marked by a greater reliance on employees and less reliance on access to raw materials, land, labor capitol and transport cost, utility rates, and other cost factors (Salvesen, 2002).

Now, a new question is arising within the community of economic development practitioners. The question is: Can the above noted pull factors overpower market forces that have perpetuated the growth of offshore outsourcing of technology driven growth? As of now the tide seems to be flowing in the direction of offshore outsourcing for those firms that have reached a certain level of global economic competitiveness; however, during the initial startup phase of a hi-tech businesses, the significance of place, especially amongst the Creative Class and Knowledge workers seem to be a considerable factor.

Cities with major research universities must channel revenues into building infrastructure, improving educational performances, strengthening cooperation between public and private institutions, and utilize knowledge-based assets and technologies as economic development tools. Moreover, declining cities must invest in enhancing quality of life standings, especially in its urban core areas. If this investment is implemented properly, it should translate into investment by private investors, who might have been hesitant about investing in declining areas. Public and private investment into urban core redevelopment has the potential of transforming once blighted areas into attractive, urbane, and cosmopolitan environments that's alluring to knowledge-based professionals. This new dynamic means of urban redevelopment and thus new urban living counters the traditional American metropolitan area, which consisted of sprawling characterless suburbs that do not fit the concept of new dynamic economically developed regions.

6.2.2 Step 2: Develop a Knowledge-based Workforce

An abundant supply of highly educated, highly skilled workers is perhaps the most important dynamic for any metropolitan area wishing to sustain a high-tech, high value-added business sectors in the knowledge-based, global economy. Therefore, metropolitan-area governments need to adopt policies to ensure that American companies have the skilled workers they need to be productive, while simultaneously ensuring that American workers have the skills they need to navigate, adapt, and prosper in the Knowledge Economy where offshore outsourcing is intrinsic to its global composition. This requires creating an excellent K-12 school system and a workforce development system that meets the needs of employers and employees in the area.

The malaise in America's public educational system is a source for disquiet apprehension. Nationwide, K-12 performance has simply failed to keep up with the pressing need for a more skilled workforce - in spite of continued increases in spending (Atkins, 2002). A strong K-12 system in an area is important not only because it produces better workers, but also because it is a key amenity in drawing knowledge workers. It is impossible for a city or region to be a success in the Knowledge Economy over the long run if its schools are failing or even mediocre (Atkins, 2002).

Governmental bodies should counter current educational disquiet by formulating and implementing plans to enhance knowledge-based infrastructures. The expected outcome of these plans would be the establishment of basic elements whereby educators are proficient in the effective use of technology in the classroom and know how to incorporate this knowledge into their pedagogical exercises. This infrastructure development would, then, lead to the augmentation of formal and tacit formal knowledge: one of the underpinning of the knowledge-based economy. Additionally, the following elements should have governmental mandates:

- All K-12 public school classrooms should be equipped with computers
- All K-12 educational institutions should provide intense training in use of computer technology

- All public school high school graduates should possess basic reading, math, science, and information technology skills for entry level jobs in the knowledge-based businesses
- Develop future high technology innovators by stimulating creative thinking and innovation skills through problem-based learning (an instructional method that challenges students to work cooperatively in groups to seek solutions to real world problems. These problems are used to engage students' curiosity and initiate learning the subject matter [Duch, 1999]) in K-12, community colleges and universities
- High-speed, cost effective Internet access via broadband, wi-fi, etc. should be available for all educational institutions
- Assistance to displaced workers should be expanded to cover access to programs which would train them in basic knowledge-based skills

6.2.3 Step 3: Marketing and Branding Cities

In order to provide a better opportunity for a local economy to establish a successful knowledge-based economy, it should employ an intense marketing strategy aimed at achieving multiple economic development objectives including: attraction, retention and expansion of businesses; attraction and retention of residents and tourists; and, in the case of declining urban areas, improving the community's image locally, nationally and internationally. From an economic development standpoint, the relocation of one major business to a community has the potential to revitalize its economy by creating jobs, spinning off additional businesses and changing the image of the community as a business-friendly area. On the other hand, when businesses leave an area, they have the exact opposite effect: they contribute to job elimination and have negative economic consequences on other businesses in the area that had depended on their patronage. In the current environment where businesses and labor are increasingly footloose, communities need to exert a great deal of effort in marketing, specifically, their quality of life, their municipal services, their tax policies, and their available sites for economic benefit among others.

As a matter of fact, in today's media and marketing savvy society, localities need to look at residents, tourist, established businesses and potential firms as customers and potential customers. In the same vain, communities need to view themselves like businesses or companies seeking to maximize customer lifetime values (Rust, 2004). These values, local economies must realize, are driven by choice and those choices are driven by three considerations: (1) *value equity*, which is the objectively considered quality, price and convenience of the offering; (2) *brand equity*, which is the customers subjective assessment of a branded offering's worth above and beyond its objectively perceived value; and (3) relationship equity, which focuses on the customer's reluctance to go elsewhere because of learning curves, user-community benefits (*ibid*). In other words, localities that want their marketing to stand apart from the common place marketing that other economic development strategist employ, must look at branding the assets of their local economies competitively, and in a global fashion. This calls for communities to brand their ability to cater to individual needs as specifically as possible via amenities, quality services, quality schools, stable or escalating property values, etc.

Today, many organizations contribute to a community's marketing activities: state and local governments; universities; chambers of commerce; community development corporations; property developers; hospitals; hotel, convention and tourist bureaus; and regional organizations. The extent to which these organizations coordinate their activities around a shared aspiration is also critical in determining a local community's marketing and branding success.

6.3 Recommendations for Universities

Currently, one of the largest predictor of a community's economic well-being is determined by the percentage of college graduates who make up that city's population. This predictor has changed from the days when a city's prosperity was determined by the number of laborers employed by a major local industry. Today, research universities are replacing, to a large degree, the importance of a large, singular industry in a metropolitan area. Major research universities, now, perform a major function in a metropolitan's

economic development by expanding knowledge and technological advances that are capable of generating new industries and employment opportunities; they also provide technical support and specialized expertise and facilities for on-going firm-based R&D activities (Grossman, 2001).

Based on the established profits and means of gaining more profits from intellectual property, major research universities need to produce detailed and exhaustive enterprise development systems to advance an entrepreneurial approach to all aspects of their building expansion. This type of approach would cultivate university-emergent entrepreneurships with support for accessing financing and expanding market opportunities by coordinating information and advice for entrepreneurial sustainability.

In giving a more overall focus on the business side of the research university equation, it would probably behoove these institutions to take a look at establishing educational programs focusing on entrepreneurship in conjunction with technology. In this type of venue, universities would teach "business skills critical to identifying, exploiting, and establishing new commercial opportunities, with an emphasis on innovative technologies" (Bramwell, 2005). Endeavors of this nature could also provide a benefit to local communities if students who graduate from such a program are able to interface their abilities with business opportunities connected with the universities, and which may lead to the permanent residency of these entrepreneurs, and the establishing of tax-generating, job-generating businesses. Small educational/business measures like this could lead to firm and substantial university-led urban revitalization plans.

The economic prowess of major research universities has also imbued them with the ability to amass a significant amount of land holdings, and thus gain an ever-increasing ability to influence economic development planning around their campuses and increasingly within their host city. Therefore, these universities should work in conjunction with local officials and be open to input from nearby local citizens, who may be affected by any university site planning and development.

From an economic development standpoint, universities should take due diligence in site/economic development planning. This is because universities have the power to guide localized expenditures of students by the placement of their dorms and classrooms, and the building and destruction of its facilities.

Faculty and staff have a greater economic impact than students, but the impact of their expenditure is less localized. This is due to the fact that basically all university faculty and staff live beyond the proximity of these universities. However, In terms of where the salaried expenditure of faculty and staff is finally spent, there are obviously significant leakages within the regions where presumably they live.

The economic impact of universities making purchases should be considered in the economic development scheme of things, because they have the ability to impact local economies simply by making purchases for computing, libraries, advertising, cable and telephone services, capital projects, financial/legal/insurance services, etc. In the same manner, the most important aspect of university purchasing, within the context of a local economy near the university is the negotiating of purchasing agreements for the procurement of services such as catering, janitorial service, furniture, stationery and office supplies, etc. These purchases usually impact those who are in the service area, and those within lower-income strata.

In essence, the local community near a major research university has the least amount of influence on the actions of these universities within their mist. This is due to autonomy of universities, and the fact that most university governing boards (public universities) are elected by statewide elections, which lessens these officials responsiveness to local citizen concerns. Therefore it is incumbent upon the university to marshal a cohesive economic development plan that is accepting of citizen's input, and co-developed with city officials, partnered with business, and promoted and ushered along via responsive and congenial state governmental policies.

Bibliography

Allen, D. & E. Bazen. (1990). Value Added Contributions of Pennsylvania's Business Incubators to Tenant Firms and Local Economies. State College, PA: Appalachian Regional Commission and Pennsylvania Department of Commerce.

Atkinson, Robert D. & Paul D. Gottlieb. (1998). Economic Development Strategies. The Metropolitan New Economy Index, 2001. Accessed on 1/27/06 at http://neweconomyindex.org/metro/part6.html

Atkinson, Robert. (October 20, 2002). The Innovation Economy: A New Vision for Economic Growth in the 21st Century. Policy Report. Progressive Policy Institute.

Bee, Ed. (Spring 2002). Turning Community Inventions into Sustainable Technology Clusters: Finding the Right Strategy. The IEDC Economic Development Journal. Vol 1, No.2. P. 7.

Bee, Ed. (May 2003). Knowledge Networks and Technical Invention in America's Metropolitan Areas: A Paradigm for High-Technology Economic Development. Economic Development Quarterly, Vol. 17 No. 2. P.122

Bergman, Edward M. and Edward J. Feser. (1999). Industrial and Regional Clusters: Concepts and Comparative Applications. The Web Book of Regional Science, Regional Research Institute, West Virginia University.

Blakely, Edward J., and Ted K. Bradshaw. (2002). Planning Local Economic Development:: Theory and Practice. Sage Publication.

Blanden, Jo. (2003). An Economic Analysis of Crime. Lecture2. Accessed on 1/27/06 at http://www.econ.surrey.ac.uk/staff/j.blanden/crime.pdf

Bramwell, Allison and David A. Wolfe. (June 2005). Universities and Regional Economic Development: The Entrrepreneurial University of Waterloo. Accessed on 9/01/2006 at http://www.utoronto.ca/progris

Branstetter, Lee, and Kwon Hyeog Ug. (2004). The Restructuring of Japanese Research and Development: The Increasing Impact of Science on Japanese R&D. RIETI Discussion Paper, 04-E-021, April 30, 2004.

Campbell, Robert. (3/20/2005). Universities are New City Planners. Boston Globe.

Carroll, Brendan. (Summer 2005). Greater Boston Office Market. P.7.

Caulfield, Jon. (1989). Gentrification and Desire. Canadian Review of Sociology and Anthropology. Vol. 24. Pp. 617-629/

Clark, Terry, Nichols, Richard Lloyd, Kenneth K. Wong, and Amenities Drive Urban Growth Pushpam Jain. (2002). Journal of Urban Affairs, Vol. 24, No. 5, pp.493-515.

Cortright, Joseph. (2001). New Growth Theory, Technology and Learning: A Practitioners Guide. Reviews of Economic Development Literature and practice: No. 4. U.S. Economic Development Administration, 2001.

DiGiovanna, Sean, and David A. Lewis. (1998). The Future of Technology Incubation in New Jersey: A Strategy for the New Jersey Commission on Science and Technology. New Brunswick, New Jersey: Project on Regional and Industrial Economics, Rutgers University.

Dolgon, Corey. (1999). Ann Arbor, The Cutting Edge of Discipline: Postfordism, Postmodernism, and the New Bourgeoisie. Antipode, Vol.31, No.2, p129-162.

Doutriaux, Jerome. (2003). University-industry Linkages and the Development of Knowledge Clusters in Canada. Local Economy, Vol. 18, No. 1. P63-79.

Dutch, Barbara. Problem-Based Learning. The University of Delaware. Accessed on 2/13/2006 at http://www.udel.edu/pbl/

East Lansing History. Accessed on 11/13/2005 at http://www.elhistory.org/history.html

Economic Development Administration. (2001). Strategic Planning in the Technology-Drive world: A Guidebook for Innovation-Led Development.

Feldman, Maryann P. (1994). The University and Economic Development: The Case of John Hopkins University and Baltimore. Ecomomic Development Quaterly, Vol. 8, No. 1, pp.67-76.

Feldman, Maryann P. (March 2003). Research Universities and Local Economic Development: Lessons from the history of the John Hopkins University. Journal of Industry and Innovation, Vol.10, No.1, Pp.5-24.

Florida, Richard. (2000). Competing in the Age of Talent: Environment, Amenities, and the New Economy. Carnegie Mellon University. Accessed on 4/28/05 at http://www.heinz.cmu.edu/~florida/talent.pdf

Floyd, Elson and Lee Todd. (September 22, 2005). A Report on a Symposium for 21st Century Economic Development. Penn State University in Partnership with the United States Department of Commerce's Economic Development Administration. Arlington, Virginia.

Gabe, Todd. (Winter 2003). Local Industry Agglomeration and New Busienss Activity. Growth and Change, Vol.34, No.1, pp17-39.

Government of South Australia Department of Further Education, Employment, Science and Technology. Accessed on 4/28/05 at http://www.innovation.sa.gov.au/sti/a8_publish/modules/publish/content.asp?navgrp=gloss

Grossman, Jerome H., Proctor P. Reid, and Robert P. Morgan. (January 2001). Contributions of Academic Research to Industrial Performance in Five Industry Sections. Journal of Technology Transfer, Vol.26. No. 1-2, p.143-152.

Hackler, Darrene. (2003). High-Tech Location in Five Metropolitan Areas. Journal of Urban Affairs, Vol. 25, No. 5, p. 629.

Hamlin, Roger E. and Thomas S. Lyons. (1996). Economy Without Walls: Managing Local Development in a Restructuring World. Praeger Press, Westport.

Hecker, Daniel. (June 1999). High Technology Employment: A Broader View. Monthly Labor Review, pp.18-28.

Jacobs, Jane. (1961). The Death and Life of Great American Cities. Vintage Books, a division of Random House, Inc., New York.

Jarboe, Kenan Patrick & Athena Alliance. (2001). Knowledge Management as an Economic Development Strategy. Reviews of Economic Development Literature and Practice: No. 7. U.S. Economic Development Administration.

Lester, Richard L. (2005). Universities, Innovation, and the Competitiveness of Local Economies: A Summary Report from the Local Innovation System Project – Phase 1. Industrial Performance Center, Massachusetts Institute of Technology. December, 13, 2005.

Lyons, Thomas S., Roger E. Hamlin. (2001). Creating An Economic Development Plan: A Guide For Development Professionals. Revised And Updated Edition. Praeger.

Machin, Stephen and Costas Meghir. (2000). Crime and Economic Incentives. Journal of Human Resources. Vol. 39. Pp. 958-979.

(MOAA) Making of Ann Arbor, the. Accessed on 5/15/2005 at http://moaa.aadl.org/picthistory/1920-174.php

McKeever, Ross J., ed. (1968). The Community Builders' Handbook. The Urban Land Institute. Washington, D.C. P. 99.

Miara, Jim. (2002). In the Knowledge Economy, Universities are Powerful Resources. Banker & Tradesmen. Boston, October 7, 2002.

Michigan Economic Development Corporation (2002). MEDC Databook. Accessed on 1/27/2005 at http://medc.michigan.org/common/book/print.asp?BookID=1&BookName=Databook.

Michigan State University Accessed on 4/20/2006 at http://msu.edu.

Michigan State University. Accessed on 4/20/2006 at (http://newsroom.msu.edu/snav/184/page.htm)

Montes, Sabrina. (2003). Information Technologies in the U.S. Economy. Economic and Statistics Administration. Accessed on 1/27/2005 at http://www.esa.doc.gov

Moore, Joseph L. (1990). Strategic Planning Process. A Study Manual for the Comprehensive Planning Examination of the American Institute of Certified Planners, pp. 76-77.

National Business Incubation Association. Accessed on 4/28/05 at http://www.nbia.org/resource_center/what_is/index.php

Orfield, Myron. (2002). American Metro Politics: The New Suburban Reality. Brookings Institute Press, Washington, D.C.

Pressman, Lori. (February 4, 2000). Commercializing Institutional IP Prizes and Pitfalls. M.I.T. Technology Licensing Office. Accessed on 6/21/2005 at http://web.mit.edu/tlo/www/presentations.html.

Regents of the University of Michigan. (2/10/99) Challenges and Opportunity in Uniderstanding the Complexity of Living Systems. Report of the President's Commission on the Life Sciences.

Romer, Paul M. (1990). Endogenous Technological Change. Journal of Political Economy 98(5), pp. 71-102.

Rowthorn, Robert. (2001). Competitiveness, Productivity and the Knowledge Economy. National Competitive Summit. The Cambridge – MIT Institue. Accessed on 4/23/2005 at http://www.cambridge-mit.org/cgi-bin/default.pl?SID=6&NewsID=86

Rust, Roland T., Valarie A. Zeithaml and Katherine N. Lemon. (September 2004). Customer-Centered Brand Management. Harvard Business Review, pp. 110-118.

Salvesen, David & Henry Renski. (2002). The Importance of Quality of Life in the Location Decisions of New Economy Firms. Reviews of Economic Development Literature and Practice: No.15. U.S. Economic Development Administration.

Sarpolus, Ed. (April 2006). It's Not a Cool City If We Aren't Cool. The Greater Lansing Business Monthly, Vol. 19, Issue 4. pp. 6-7.

Sexton, D.L. & Raymond W. Smilor, eds. (1986). The Art and Science of Entrepreneurship. Cambridge, MA: Ballinger Publishing Company. Pp. 85-108

State News Service. (2006). Governor announces Lansing/East Lansing SmartZone.

Steins, Chris. (2/21/2003). Save Cities, Unlock Ivory Towers. Community and Economic Development. Christian Science Monitor.

Tornatzky, Louis, Paul Waugaman, and Denis Gray. (2002). Innovation U: New University Roles in a Knowledge Economy. Raleigh. Southern Growth Polices Board.

University of Michigan, the. Life Science Institute web page. Accessed on 1/16/2006 at http://www.umich.edu/

Wikipedia. Org. Accessed on 10/10/2006 @http://www.wikipedia.org.

Wolfe, David A. (2005). Innovation and Research Funding: The Role of Government Support. Toronto. University of Toronto Press.

Woodyard, Chris. (1/23/2006). USA Today. Accessed on 1/27/2006 at http://www.usatody.com/money/companies/earning/2006-01-23-ford-94_x.htm

Zumeta, William, (2003). Education Finances in Recession. The NEA 2003 Almanac of Higher Education. Washington, D.C.