Michigan's Knowledge Economy:

A Comparative Analysis

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Dedicated

To

Olubukunola Abiodun, Williams(My wife)

Precious Mary Olaoluwa, Williams (Daughter),

Oluwatobi Emmanuel Akanbi Williams (Son), and

My Parents

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CHAPTER ONE

1.0 Introduction

The twenty-first century has witnessed technological development which has impacted every sphere of human life and community development is no exception. Technological innovation in Information and Communications technology have emerged as a vital factor in developmental initiatives. Thus, understanding the Information and Communication Technology (ICT) industry and how it modifies the various indicators that are used in measuring improved qualities of life in our communities becomes fundamental. This also calls for foresight and vision in planning and regional development efforts.

Communities that fail to have a proper vision of the future stands to be left behind in this era of technological advancement, innovation and globalization.

"Technological progress driven by the extensive use of digital technology has gradually brought a shift from a predominant demand for manual labor to a widespread need for people working in a modern production to be highly qualified. This marks a transition from the traditional concept of 'manpower' to the more modern one of 'mindpower'... It appears clear that 'brains that know how to move the hands' will replace the 'hands that execute" (Callieri, 2001:228).

For communities to develop and survive the technological revolution, they must not fail to re-educate and equip members with new skills. Those who are not willing will join the jobless and the have-nots while communities that are able to improve its members' skills will become the haves and the empowered. For survival and improvements in the standard of living in the various communities,

there is the need to discuss the kind of people that are likely to inhabit our communities tomorrow, and the types of communities that may eventually evolve in our societies in the near future. These dire conditions put economic planners' visioneering ability to task when the discussion of their community's viability comes to the roundtable.

The sustainability of and survival of most communities have come under attack due to lack of skilled manpower. Most communities are losing jobs, experiencing less growth, and have become less competitive economically. In Michigan, for example, Michigan Economic Development Corporation (MEDC 2002:5) asserts that Michigan's economic competitiveness is under the threat of shortage of skilled workers. Thus, its future economic growth is in jeopardy in part due to the drying ocean of in-migration of workers, low birth rates, and increasing rates of outward migration of its citizens. Hence, the state's economic development planners are being challenged to provide timely response to these problems. In order to be equipped with the right answers to the problem, it is imperative to understand the problem in and of itself (Sawyer, 2000.; Jackson 2000).

Information and Communications Technology (ICT) has introduced lots of changes in our lives. Some say it has speeded up our lives; therefore, this calls for community's a re-evaluation of its ICT status. Businesses have also had to re-evaluate their ways of "conducting business" and modus operandi of employment requirements. In a recent study done by Ferris State University, it asserts that the "lack of basic work skills is increasing, especially among

workforce entrants. In addition to this lack of skills, there is a large perception gap between future workers' views on their employability skills (ability to work in teams, dependability, written and oral communication) and expectations of employers" (MEDC, 2002:1).

Therefore, these changes introduced by ICT demand that communities that seek to survive and develop must be part of the digital economy. It also demands that similar communities must not only adequately educate its populace, but must also provide high-speed broadband network for its inhabitants (CSPP, 1998:1). Many communities in Michigan cannot afford to be left behind in this race for technological know-how and electronic readiness, else they will be cut-off from the rest of the world.

This new economy, according to Progressive Policy Institute, is "a knowledge- and idea-based economy where the key to higher standards of living and job creation is the extent to which innovative ideas and technologies are embedded in services, products, and manufacturing processes. It is an economy where risk, uncertainty, and constant change are the rule, rather than the exception. It is an economy where hierarchical organizations are being replaced by networked learning organizations" (PPI, 2000:2). It is therefore imperative that communities understand the role of the digital revolution and the challenges it poses in their planning and development efforts.

1.1 Objectives

The aim of this study is two fold. First, to describe the nature of the knowledge economy vis-à-vis its impact on the economy as a whole, and show

why planners in community economic development have to understand it and be able to incorporate it in the planning of their communities. Secondly, to wrap the analysis in the context of where Michigan communities lie in the United States' knowledge economy spatial structure and what steps will be fundamental in their effort to progressively impact the lives of all its citizens.

Workforce education, high-tech infrastructure, and R&D (research and development) funding are three vital requirements that will determine how a state will perform well or be rated in this new knowledge economy (Corey, 2002: 27; PPI, 1999 & 2002.; Stilglitz, 1999:2). This paper advocates that the knowledge economy plays a critical role and importance in Michigan's economy and recognizes the need to put in place structures that will promote and advance these sectors. This paper will discuss workforce development and further emphasize the importance of high-tech infrastructural development as well as the importance of providing, developing, and funding research's in today's new economy.

It is time that community planners incorporate the principles of knowledge economy into the planning of their local communities so that such communities are brought up-to-date and their participation are equally ensured in this new era.

Learning and innovation are essential requirements in the knowledge economy; hence, planners and their constituents must start to learn from other communities. Communities, far and near, must be aware of new developments, progress, processes and difficulties encountered in or during such community development efforts so as to suitably adapt those innovations that have proven

successful to their community to further enhance their growth and positive development. This paper proposes a prototype of a template for planners conducting metropolitan plans and economic development plans for their communities.

1.2 Methodology

This paper is based on the study done by Progressive Policy Institute, Washington D.C in 1999 and 2002 that measures the status of states in the new/knowledge economy. This paper tries to replicate the indicators presented in this report for the State of Michigan by looking at existing statewide data available. Such data on information and communications technology in Michigan are used in presenting a state of preparedness and readiness of some Michigan counties and regional areas to integrate information technology into Michigan spatial development. This paper draws on on going research at the Michigan State University Center for Urban Affairs, Michigan Partnership for Economic Development Assistance, a U.S. Department of Commerce, Economic Development Administration's University Center that examines the impact of information and communications technology on spatial growth and future land use patterns in Michigan.

The level of comparative analysis used here is the six states in the U.S Department of Commerce, Economic Development Administrative Midwest Region. This includes the state of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin. Much of the data used for this analysis will be based on the

1999 and 2002 report of the Progressive Policy Institute document on the new economy.

1.3 Chapter Organization

Chapter one of this research paper introduces the study and the aims of the study. It also describes the method used in conducting the study, as well as describing how the chapters are organized. The second chapter commences with a cursory look at the behaviors of communities to the emerging ICT by showing the relationship between cities whose population are growing and cities that are declining as a result of their access to high tech infrastructures. It also identifies what role education plays in the knowledge economy. The chapter further answers the question of what technology has done to our community and what it is likely to do if we do not pay particular attention to it now. Experts' ideas, opinions and submissions are presented here to support the variation of impact and discussions currently going on regarding the matter, and to highlight the effects of what the potential lack of attention to the knowledge economy can have on our communities. Chapter three presents an in-depth analysis of where Michigan lies in the knowledge economy. In the concluding chapter four, the study pays particular attention to Michigan's workforce potential, problems and possibilities. The study will analyze the state's capabilities and potentials, its ability to meet the demands of the 21st century workforce, and finally it provides some useful recommendations at meeting these standards.

CHAPTER TWO

2.0 Communities Without Information & Communications Technology

Communities that in the past failed to give cognizant attention to integrating new information and communications technologies into the fabric of their development systems, or keeping abreast with the pace of development are today places of economic disinvestment. They are also places lacking state-of-the-art tech-infrastructural facilities, thus producing problems of technological divide and also presently experiencing population loss.

According to an observation made by Sawyer (2002:2), most of the old American central cities, particularly those incorporated before 1950 in the United State, have not been able to triple their population to date. Part of the problem is attributable to lack of modern technological infrastructures to encourage newer businesses and industries. In the U.S Department of Commerce, Economic Development Administrative (EDA) region (Midwest Region), 25 of those depopulating cities can be found in the State of Ohio alone, 23 in Illinois state, 19 in Wisconsin, 15 in Indiana, 13 cities in Michigan, and 9 cities in Minnesota. These cities were noted then for their regional economic base contribution to the state and national economy, but today due to the loss and inability to keep pace with new technology and the dynamism that it requires they have become disinvested "rust belt cities".

Hill and Brennan's (1999:2) study of 92 U.S metropolitan areas, between 1993-1996, also shows that "52 of 94 America's largest central cities had positive

employment growth rates from 1993-1996, but their suburbs grew at a faster rate...median difference between central city and suburban employment growth was –8.3 percent, meaning that half of the cities were outpaced by their suburbs by more than 8.3 percentage points and the other half by less than 8.3 percentage points".

These emerging suburban cities attribute their growth not only to the American ideal of a large yard and white picket fence, but also to the availability of modern technology which requires additional space for the networking of the modern equipment. Since most central cities do not have these modern facilities, the alternatives for these businesses are to move into areas where the requirements for full operation is conducive, where the economical benefits are high, and where the incentives offered are most generous or enticing. These peripheral new growth become predators on the technically abundant labor force existing in the adjacent communities where "many of the skilled trades workers and professionals had moved or were moving to the suburbs, leaving behind cities that had disproportionate numbers of poor, uneducated, and unskilled residents (Rich, 1989:126)."

As the problem of infrastructure continues to be a major concern, also emerging is the problem of workforce development. This new economy has introduced new infrastructures that will be requiring new sets of workforce education and ethics. It will require additional schooling, workforce training in a timely manner, and life-long experiential learning. Therefore, the question arises, will the present high school qualification of workers be able to sustain the

demand of the growing industries today? If not, what level of education will be adequate to fully service the demand that will emerge? Can the present supply rate of an educationed workforce by all institutions of learning keep pace with the workforce requirement? If not, what measures will be required to address these dynamic issues such that the State of Michigan is not found lagging behind all other states in the knowledge economy? Is it really important to be a "knowledge driven economy"? What advantages and disadvantages can emanate from this focus on knowledge economy? Accordingly, significant parts of these questions will be answered in chapter three while chapter four will discuss the latter portion of these questions at length.

The emergence of the knowledge economy has created major concern regarding the educational level of the 21st Century worker. Workforce requirements in every field emphasize computer literacy as basic knowledge and for being considered for job interviews and positions. To be able to work in these high-tech industries, additional schooling will be required. It has become known that the workers will need qualitative education in the line of computers and will need to undergo constant workshop retraining to fully cope.

Now that access to high-tech infrastructure has a spatial relationship to an area's population growth, improving public access to these vital infrastructures has continued to become a major concern of the State of Michigan's Economic Development Corporation (MEDC, 2001:2). Their main objective being the improvement of Michigan's communities so that all areas can have equal chances of growth so that one is not disadvantaged to another.

2.1 Information Technology and Community Interface.

As information and communication technologies continue to evolve, the nature, state, and condition of our communities also continue to change. The "Internet is transforming all aspects of everyday life, from how we communicate with family and friends to how we obtain information, earn a degree, participate in government and buy goods and services" (Jackson, L. A. 2000). The way we read is dynamically changing from orthodox schooling to virtual learning (www.jtap.ac.uk/reports/). Our mode of interactions is also changing from face to face contact to electronic media e.g. e-mail and teleconferencing. Business transactions no longer have to be at a physical place or space, businessmen no longer have to travel great distances, and electronic commerce (e-commerce) has made contact that was not before possible (www.jtap.ac.uk/reports/).

The wealth of resources, opportunities, and the convenience of getting necessary and important information are now a function of what degree of change we as persons or we as a community are willing to take from information and communication technology. Now, we have available to us various choices like the modem connection, the DSL and the broadband connection. The way we get information or do our business now depends on how fast we are connected, what access we have as persons, communities, counties, and regions to information and communication technologies. Some of these changes are beyond the control of the efforts of some communities that lack the technology. Such communities suffer a lag such as the "digital divide" of the recent past. These underserved communities that lack new infrastructural

access are gradually becoming communities of neglect to businesses and skilled manpower because these infrastructures are becoming important factors when people are making location choices.

The gap between several places in the world today is expanding in some communities it is also reasonable to observe that it is gradually being closed in other communities by the growth of information and communications technologies through the Internet. Thus, knowledge some time ago that was considered remotely far away is now at our fingertips through the World Wide Web. Much of this information, some close and others far away from us, is presently emerging at a faster rate on the World Wide Web through the help of information and communications technology. The questions therefore arise, what is this "Knowledge Economy"? And how important is it to the community? Why should planners be concerned? And why should administrators take heed?

2.2 The Knowledge Economy and its Drivers

In 1997, a general discussion occurred in the economic arena that considered whether the continuous productivity growth recorded in the 90's American economy indicated another era of new economy, one characterized by high growth and low inflation, continuous rise in stock prices and business formations (Surowiecki, 2002; Delong, et al 2001).

Three distinct views emerged from the heated debate: supporters that accented to the emergence of a new economy, denouncers that avowed nothing is new about it, the doubters who straddle the fence. Note, this paper refuses to be caught-up in the trivialities of the economists' controversy about what this

economic condition is; rather, this analysis makes the practical observation of it. The fact that the economy we have now has created some economic impacts in our communities is not new, and as real community economic developers this has consequential growth, impact, effect and affect in our jurisdictions. Thus, the need to adequately address these changes is highly imperative and as well a timely issue. It is, however, necessary to review some of their contradictory opinions on the matter to assist us in distinguishing facts from fictions or fads.

Landefeld and Fraumeni (2000:1) of the Bureau of Economic Analysis defined new economy as the "expansion characterized by unprecedented length, strong growth in real GDP and real GDP per capita, a pick-up in productivity, higher profitability, higher rates of investment, low inflation, low unemployment, and a somewhat more equitable distribution of the gains in income".

DeLong, Berkeley, Lawrence and Summers (2001:1) agree that the "pace of technological progress in the leading sectors driving the 'new economy are very rapid indeed, and will continue to be very rapid for the foreseeable future' and that the computers, switches, cables, and programs that are the products (and drivers) of today's leading sectors are general-purpose technologies, hence demand for them is likely to be extremely elastic".

According to the *Business Week* commentary of 1997 (www.businessweek.com/1997), the new economy exists and it can be recognized in two notable areas. The first observable indicator is the growth in global business levels and private business levels. Globalization of businesses through the spreading of capitalism has introduced market forces, freer trade,

and widespread deregulation that strongly support greater involvement in international trading and investment. For example, U.S imports twenty years ago accounted for 17% of the economy but is now 25% of the economy.

Secondly, the revolutionary contribution of information technology includes the production of communication equipments like fax machines, cellular phones, personal computers, and modems. The digitization of all forms of words, pictures, data, and the Internet has led to the creation of new industries and businesses all over the world. The *Business Week* claimed these lines of businesses created about 11 new companies every week in the Silicon Valley area alone, though not all succeeded.

Skeptics like Jeff Madrick (1995 in Surowiecki, 2002) believe that the new economy is a euphoria produced by the over-indulgence of the media, while Roach Stephen, chief economist of Morgan Stanley (the worldwide financial advising and executing company), also half-heartedly believe that it is a representation of a short economic rise that will eventually backlash. In Surowiecki's paraphrasing of Roach's comments, he states that the "U.S can look forward only to 'very subdued growth' until it works off 'the bubble-induced excesses of the late 1990's"

Other scholars in the field of economics discovered that global economics have been greatly influenced by factors called knowledge, learning, and innovation (Stiglitz, 1999:2). That is, economies no longer survive because of their ability to control land, labor, capital, and entrepreneur. The survival of economies today, to a greater extent is contingent on the quality of an

enterprisess ability to innovate, collaborate, and learn in an open environment different from the orthodox top-down approaches of the past.

This evolution in the business arena is what Davenport (2002) referred to as the "human capital metaphor." Davenport recognized the transformation going on in some corporate terms that acknowledges that "employees aren't just important contributors—they've become their companies' 'most valuable assets.' Capable executives aren't just hard to come by—companies are waging a 'war for talent.' People don't just bring their background and experience to their work, they contribute their 'human capital'."

The knowledge economy phenomena and the value of human capital were first spotted and mentioned by Peter Drucker in 1969 (Kelly, 1997:1) when he perceived that knowledge workers would gradually emerge in today's economy. Then he referred to the knowledge economy as the "information economy" because of the superior role that information gathering played in the creation of wealth as opposed to material things and capital resources (Kelly, 1997:1).

In acknowledgement of the shift in the whole economy by the information technology or the knowledge economy, Kevin Kelly, (Wired's executive director and editor) who would rather prefer to refer [to] this new phenomena as the "'Network economy" because to him information is not enough to explain it all if all we are doing is "about a grand scheme of augmenting, amplifying, enhancing, and extending the relationships between all beings and all objects". Kelly

observed that computer technology has speeded up our lives a bit and as well introduced some new rules".

One new rule, according to Kelly, is that "wealth in this new regime flows directly from innovation, not optimization; that is, wealth is not gained by perfecting the known, but by imperfectly seizing the unknown" (Kelly, 1997:1). This area is where major part of this thesis recommendation will focus. It will concentrate mainly on the values and benefits inherent in opening opportunities for the Michigan workforce to be able to contribute positively and be able to participate functionally in this wealth creation. It is a matter of not leaving behind the majority of the people, but bringing the majority along in this crucial journey of new economic determinants that posses great opportunities, the impact of which we cannot ignore.

The second new rule, according to Kelly, is that "the ideal environment for cultivating the unknown is to nurture the supreme agility and nimbleness of networks." In other words, understanding how the network operates is a fundamental principle crucial to its optimal utilization and that timeliness or agility is crucial to recording success in this economy. It also means that the basic standard of education is fundamental to workforce productivity in the knowledge economy.

His third rule states that "the domestication of the unknown inevitably means abandoning the highly successful known- undoing the perfected", which implies that exploring new world of ideas, principles, policies and challenges are not bad exercise because they challenge the existing dogmas. They are the

essentials that lead to the creation of ingenuous ideas, which leads to the motivation and creativity of new principles.

Lastly, he opined that in this new era "the cycle of "'find, nurture, destroy happens faster and more intensely than ever before' and that given the rate of change, this economic arrangement may not endure more than a generation or two... Once the networks have saturated every space in our lives, an entire new set of rules will take hold". We have been seeing this in the rate of turnover in dot.com and Internet businesses vis-à-vis the rate at which they die.

One thing that seems constant throughout the discussion of the knowledge economy is that knowledge dexterity, most especially that acquired through extra schooling, has become very important in today's new economy. Gilomen's work on the impact of education in the new economy in Switzerland further reaffirmed this when he said that:

> *"Technological Progress driven by the extensive use of digital technology has gradually brought a shift from a predominant demand for manual labor to a widespread need for people working in a modern production to be highly qualified. This marks a transition from the traditional concept of 'manpower' to the more modern one of 'mindpower'... It appears clear that 'brains that know how to move the hands' will replace the 'hands that execute'. This is how Carlo Callieri, the former Vice-Chairman of Confindustria in Rome, summarized the challenges that occur at the interface between the New Economy and education" (Callieri 2001, p. 228).*

Stiglitz, J. (1999:13), a Senior Vice President and Chief Economist of the World Bank Group, also attests to the fact that the drivers to a successful knowledge economy inclusion are a trained labor force that is equipped with the required knowledge to bring out creativity and a high ordered cognitive skills in addition to their basic skills. Stilglitz further articulated that the development of any region or areas of knowledge economy depends on its development of its science and technology educational system, with particular on the graduate level.

Furthermore, Stiglitz supported that this system must be operating in an educational system that is competitively based and institutionally oriented for it to produce the needed creativity and innovation.

In light of the above, the knowledge economy can be **defined as *that economy that uses an highly educated, cognitive, and innovative workforce to produce essentially scarce and rare sets of commodities for a dynamically progressive market economy.*** This set of workers, with a wide view of the global market, use their knowledge in creating a uniquely different commodity based on their intuitive, perceptive, and visioneering knowledge that the demand for such commodities will in the immediate and moderately projected future rise appreciably. They exploit the power of advertising in all kinds of media, most especially the encompassing Internet Super Highway to reach the larger audience streaming, dealing, purchasing, and bargaining on the cyberspace for the global marketing of there products.

Table 1: Some Elements of the Old and New Economy.

Elements of Old Economy	Elements of Knowledge Economy
Emphasize on propulsive manufaturing/industrial economy	Emphasis is on fast growing small and medium-sized firms
manpower-might is power	mindpower-mind is power
required some high level innovation	sensitive to high level innovation but relied heavily on constant and dynamic innovation
Required basic knwoledge	Required highly cognitive knowledge
basic education	higher level education a must
	high-tech infrastructure needed
Depends on R&D	Depend heavily on R&D
Required large capital investment	Depends on patent and can survive on venture capital
Depend on large labor	Insensitive to large labor to operate
Training and long years in servic can subsitute experience	Life-long educationing system is a must because upon it lies timely innovation.
high-tech literate not a must (this is actually changing now)	The use of ICT in all aspect of the economy
concentration is around transportation means like road, rail, and water	concentration is in clusters and are found around interstate, interchanges and sometimes downtown areas or the fringe of central metropolitan cities
Depended heavily on road,rail, and water transportation	High-Tech Infrastructures like broadband access plays important role in small to medium firm growth

The table above (table 1) highlights some elements that distinguish the old economy from the new economy. This is by no means an exhaustive list of these differentiating elements. This list contains only some noticeable elements that distinguishes the old from the new economy and because this knowledge economy encompasses our entire economy, political arena, and social activities, it can possibly not be fully accounted for.

Summary

Since the advent of computer technology, its use has gradually crept into our individual lives and as its importance continues to grow at home and at our workplaces, our dependence upon it grows deeper and deeper. Today, the type of service we have as a person or community, be it modem, DSL or broadband,

is significantly dictating the information we can work with or download and the kind of businesses that we can operate. The new economy as some experts see it as some impact in how we do business. It has created enormous growth in global businesses and private businesses too, which in turn have affected our communities through its trickle down effect. Experts like Landefeld and Fraumeni, DeLong, Berkeley, and Lawrence agreed that these growths are visible in our economy and they have resultant bouncing effects that need to be addressed. Skeptics like Madrick and Roach had their own feelings of a general false alarm but one thing that is share between the two is their belief that the 21st century workforce is required by present employers to be more educated. This education is essential to productivity, innovation, and the new learning process that the new jobs are requiring. It is also essential for the new dynamism that the new economy requires from all the industries that are contributing to the economy. Davenport emphasized the present wave of employee importance going on in the corporate world. Stilglitz and Gilomen mentioned how knowledge will be playing very important part in the coming economy. Since the economic development activities happening in our communities are micro-reflections of the larger global economic pictures, and the decisions to locate or relocate a large company like General Motors, Wal-Mart, or K-Mart as a trickle down impact on job retention, property taxes, ability to maintain our schools or improving community's standard of living then it is important to evaluate and take actions on this changes. It is imperative that community planners know how to adapt this

knowledge of theirs to the larger economy and be able to create potential positive development for their communities.

In light of the above, an analysis of the indicators of the new economy is bound to buttress the fact that some changes are presently in place in our communities due to the impact of the knowledge economy. This cursory examination of the indicators will look at the position of the State of Michigan in the knowledge economy ladder vis-à-vis its ranking in the "Chicago Economic Development Region". This analysis is necessary to establish the fact that the State of Michigan needs to initiate some vital changes in its economic focus so as not to be left behind in the already existing knowledge economy. And as earlier mentioned, much of the focus of this paper will be concentrated on workforce development.

CHAPTE THREE

This chapter explains the twenty-four indicators used by the Progressive Policy Institute (PPI) in measuring the knowledge economy. In this chapter, I will introduce the indicators individually by explaining how the PPI measured them. I will elaborate on their importance as a measurement of the knowledge economy, and show a map of each indicator that explains Michigan's regional competitiveness among the five other states in the region.

3.0 Progressive Policy Institute and the New Economy Measures.

The "Progressive Policy Institute" (PPI) located in Washington D.C, is a professional body of researchers monitoring the new economic trend. The PPI characterized the new economy (or the knowledge economy, as the author will use interchangeably), as an economy comprised of a complex array of economic forces. Theses forces are considered to cause "the reorganization of firms, [to create] more efficient and dynamic capital markets, more economic 'churning' and entrepreneurial dynamism, relentless globalization, continuing economic competition and increasingly volatile labor markets" (PPI, 2002)

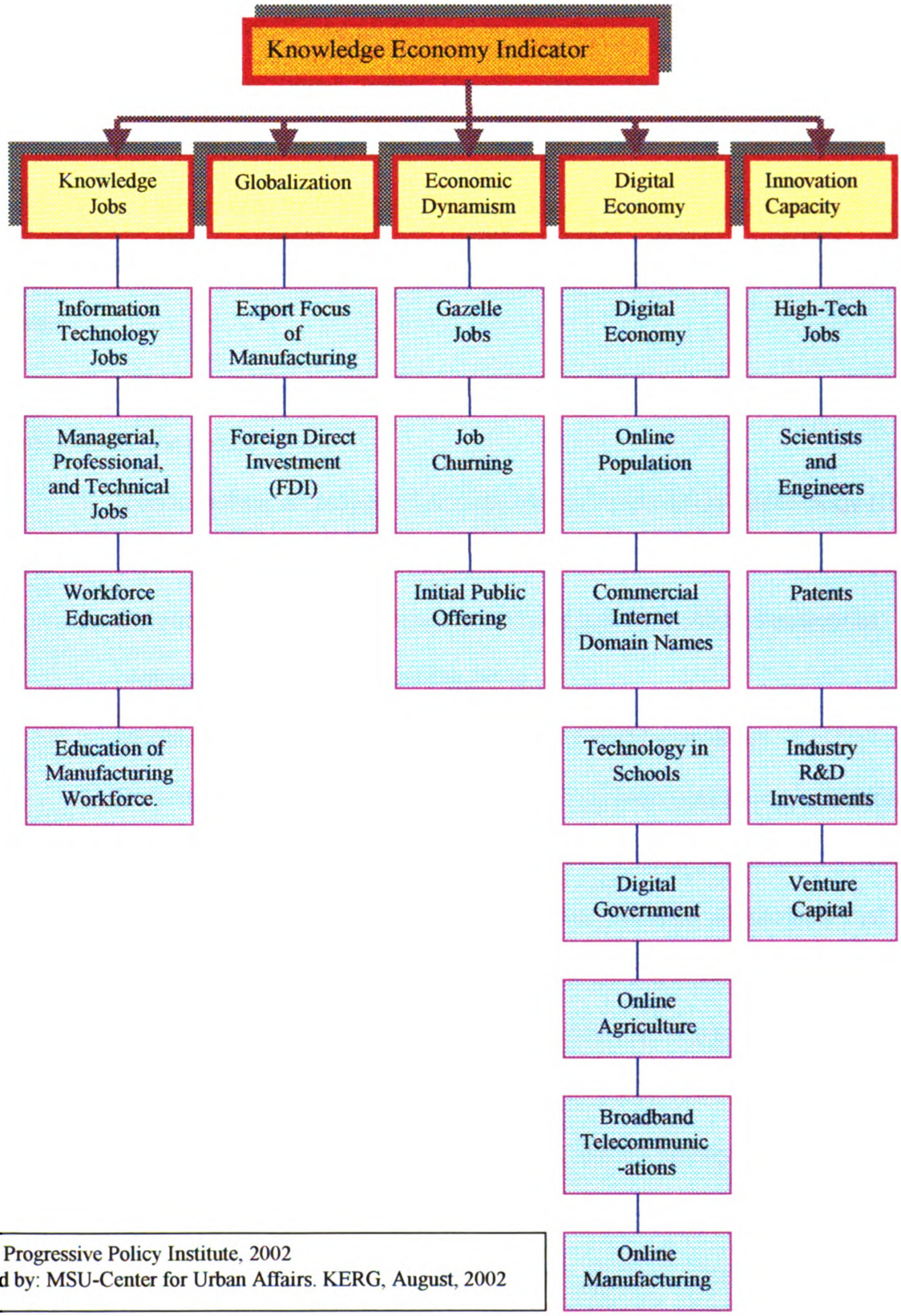
The institute constructed eighteen indicators in 1999 that were used to measure the impact of this economic phenomenon on the pattern of economy growth among American states. Since this subject is new and is presently in an evolutionary stage, one would expect that changes are inevitable and that additional findings will occasionally be added to the study.

In the year 2002, the PPI researchers added six new indicators to the existing eighteen totaling twenty-four. These indicators are briefly described and their relevance to Michigan's are presented in the following map.

Placing these indicators under considerable scrutiny, it will be important to mention that many states may choose to contest the relevance and validity of some of these indicators vis-à-vis their own economy. They may not consider some of these as strong indicators that drive their economy, which is logical and acceptable. But it should also be stressed that they are very significant indicators in the economies of those states that are presently making important headway in the knowledge economy. This is in no way to say that any discounting will be done to the ranking information presented by the report. This paper abides with the ranking profile presented by the PPI report and uses such data to analyze Michigan's position in its economic region, i.e., the U.S Department of Community Economic Development Administrative Midwest Regional Office.

Analyzing Michigan's knowledge economy in the context of the Midwest Regional Office will afford this research the opportunity to compare and evaluate the state of readiness of Michigan and the region as a whole for the knowledge economy. In my map analysis, four terms, *"Leaders, Contenders, Followers, and Laggards"* are frequently used. These terms, while perhaps provocative, are judged to be descriptive terms indicating how well the states are doing in comparison to each other.

Map 1: Knowledge Economy Indicator Map



Source: Progressive Policy Institute, 2002
Prepared by: MSU-Center for Urban Affairs. KERG, August, 2002

3.1 Knowledge Jobs

According to the PPI report (2002:13), the old economy was the era for workers whose skill depended on their hands and who could perform repetitive as well as menial tasks, but today's knowledge jobs will be filled with workers who will be working with their minds. Most of these jobs are expected to be located in information technology at the managerial, professional and technical levels.

For states to measure how they fared in their knowledge jobs contribution, they must:

1. Measure their employment contribution in Information Technology (IT) occupations and in non-IT sectors
2. Determine what share of their workforce is employed in managerial, professional, and technical positions
3. Measure the education level of the entire workforce, and
4. Determine the educational level of workers employed in manufacturing.

Economies that are knowledge oriented exhibit strong relationship in their strength of IT workers. The pattern of growth in their managerial, professional, and technical workers must also be positively sloping. The education level of their workforce as well as education level of their manufacturing workers must be relatively high for it to produce the needed innovation, invention, and creativity that positively direct the economy towards growth. States having positive growth in these areas qualify to be referred as a knowledge economy state.

3.2 Information Technology Jobs

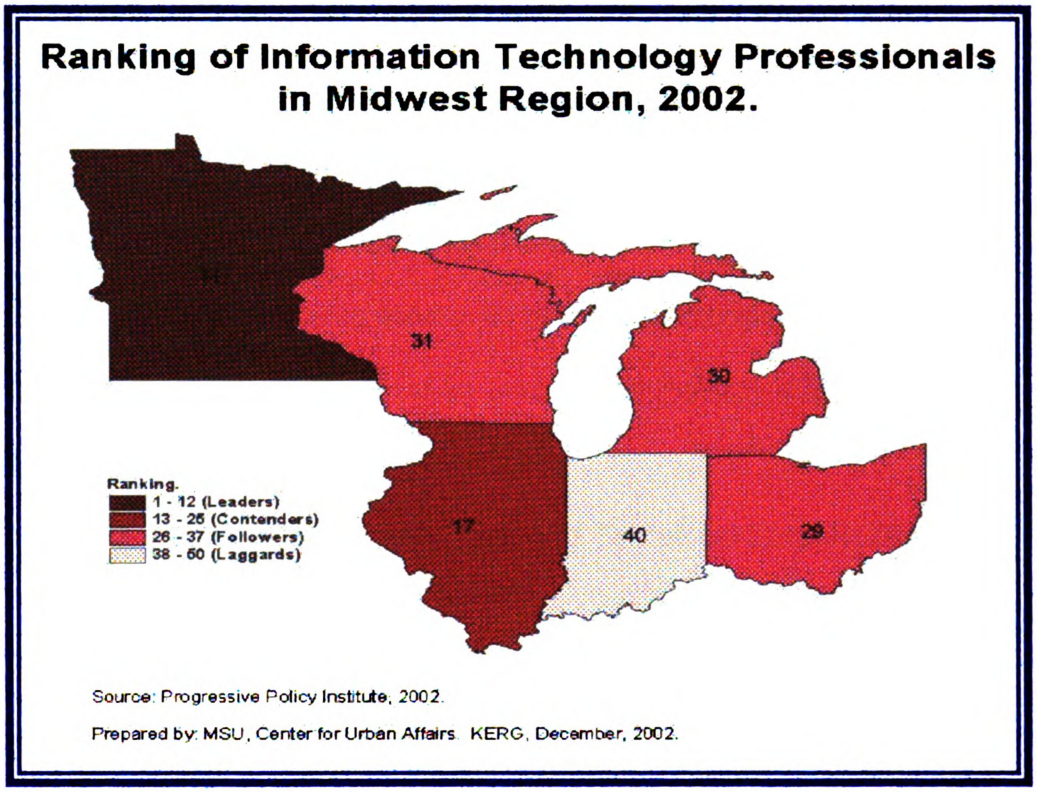
The present ubiquitous growth in the use of computer at home and at work, and its contribution to productivity has continued to reinforce its requirement as a vital job skill requirement. Private and public owned businesses now require at least some basic entry-level skills before an applicant can be considered for a job opening. Because its effect on productivity has been great, states with large shares of trained as well as a skilled ICT workforce will do better than those with a small share (PPI, 2002:14).

Information technology jobs are not confined only to jobs created in computer and software companies, but also to jobs in other traditional employment fields like manufacturing, insurance, banking, and even landscaping or planning professions. In order to gain employment in the above stated professions today, the knowledge of computer related information system is not an option but a fundamental requirement. The better you are with IT, the greater your chances of gainful employment. Hence, the greater the share of a state's skilled workforce in information technology jobs the better. According to the PPI ranking, Michigan ranked 24th in 1999 and 30th in 2002, meaning that the state is a follower in information technology jobs on a nationwide analysis. According to the map below, Illinois, Minnesota, and Ohio ranked better than Michigan in 1999 and 2002.

In the region Minnesota's 11th ranking placed it the only leader, i.e., the only state doing exceeding well in the region and Illinois 17th ranking makes it the runner's up and only contender as well. Ohio's 29th, Michigan

30th, and Wisconsin's 31st rankings qualify them as the region's followers, while Indiana's 40th ranking makes it the only laggard in the region.

Map 2: Information Technology Professional Jobs in Midwest Region



Minnesota and Illinois are the only two states that qualify as knowledge economies under this indicator. Devotion to the development of a well integrated IT infrastructure will lend credence to the use of technology Michigan schools and the improvement of the skills of the schools' graduating labor force. All these improvements will later show in the form of a qualified workforce that is capable of timely productivity in the dynamic knowledge economy.

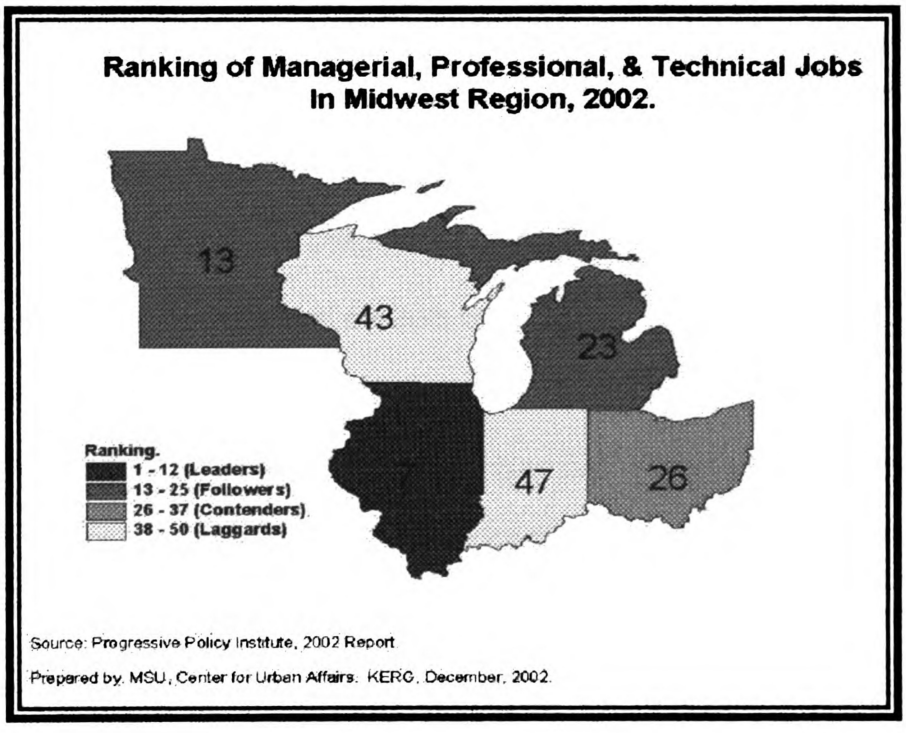
3.3 Managerial, Professional, and Technical Jobs

According to the PPI report, nearly 2/3 of the jobs created in 1992 to 1999 were managerial jobs. This has led to the creation of new industries, new jobs,

new managerial techniques and new systems of organization. Therefore, managerial and professional jobs have increased as a share of total employment. The bigger a state's share of the total workforce is in this category, the better a state progressively moves into the knowledge economy. According to the PPI report, Michigan improved from its 45th position in 1999 to 23rd in the year 2002 (see map 3).

Looking at this improvement on a county data level, gains are largely recorded in metropolitan cities than in its counterpart rural areas, thus reemphasizing the difference in urban and rural dichotomy that already separates the two economic areas.

Map 3: Managerial Professional and Technical Jobs in Midwest Region



Consequentially, where there are no high tech infrastructures, businesses will not prefer to locate there which may account for their low managerial, professional, and technical jobs.

Illinois 7th ranking led Minnesota's 13th and Michigan's 23rd ranking demonstrates the trio as the best in the region. Close behind Michigan was the 26th ranking of Ohio State, while the 43rd and 47th ranking of Wisconsin and Indiana placed them as the laggard in the region. The states in the region can benefit well from relevant executive training and retraining programs that focus on bridging the gap of the executives with cutting-edge developments in ICT.

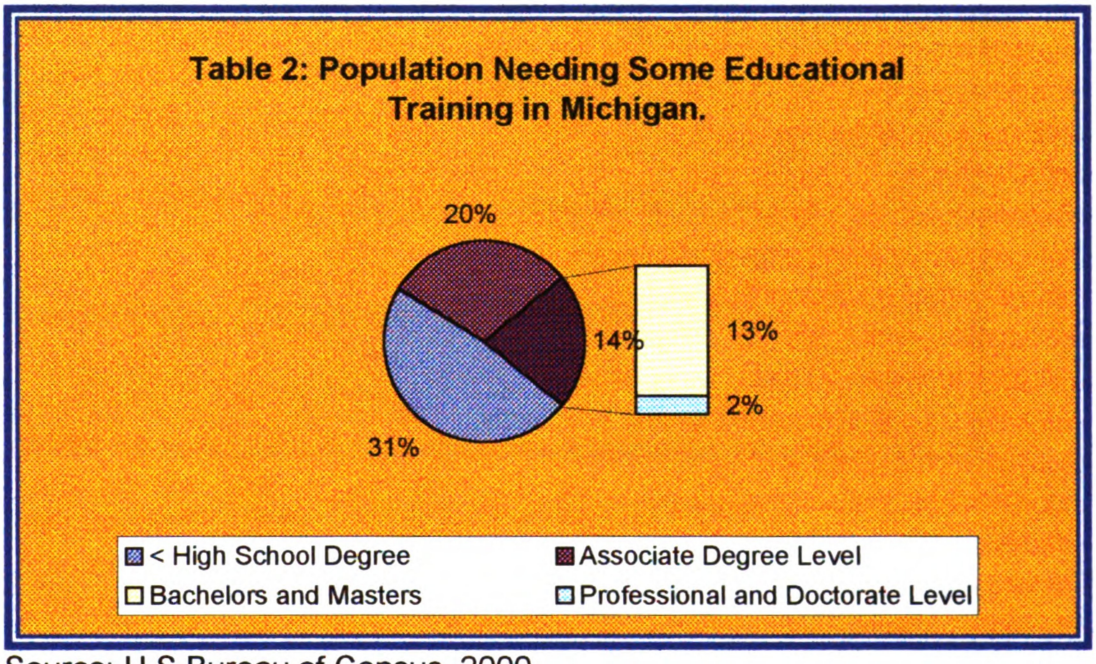
3.4 Workforce Education

As noted earlier by Kelly, "computer technology has speeded up our lives a bit and as well introduced some new rules," these new rules include speed of reaction to work, flexibility, innovation and speed of productivity. To measure well in this knowledge economy, a worker must have a cognitive education in information technology and this knowledge is not specific to particular fields or areas of profession but all the various economical branches contributing to that nation's or state's gross national product or revenue.

According to the U.S Bureau of Census 2000 educational attainment figures of people 25 years and above, Michigan has 31% of its population (out of 9.9 million people) in the category of "no education or having an equivalent of a high school degree qualification". This percentage figure covers 3,074,994 people, while only 20% (1,944,688 people) has one year or two years equivalent of an associate degrees (see table 2 below).

Only 13% of Michigan's population has an equivalent of a bachelor's degree while only 2% accounted for graduate, doctorate and professional degree qualifications. If Stiglitz's (1999) graduate level educational standard is any measurement to go by, then 51% of Michigan's workforce needs to be retrained and updated to measure up to the knowledge economy requirement.

Table 2: Education Attainment of Population in Michigan

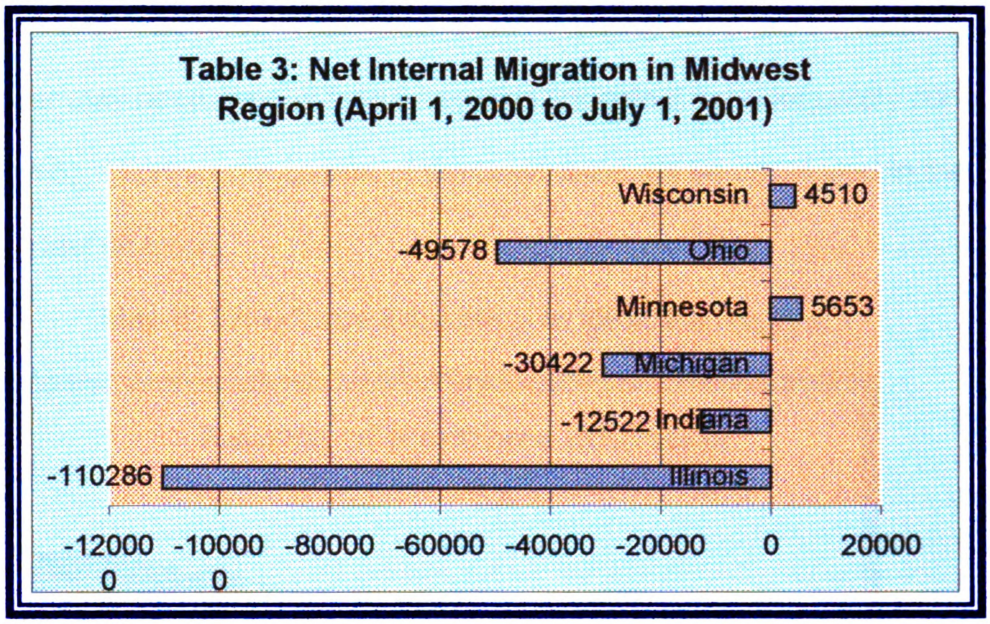


Source: U.S Bureau of Census, 2000.

The need for one form of work training or another is crucial to update both the executive arm of the workforce and the junior staff in order for them to be productive and technologically relevant to workplace innovation and technological advancement, which may result in this large cohort of active, healthy, and vibrant individuals facing unemployment while their technologically savvy counterparts prosper. What fundamental interpretation does this has for our communities? It could be enormous job loss, or population loss and even business loss. According to the U.S Census Bureau 2000 to 2001 estimates,

Michigan ranked third in the regions' net internal migration loss of its citizens. When four of the states were losing populations of 202,808, only Wisconsin and Minnesota gained a meager total of 10,163 people (see table 3 below).

Table 3: Net Internal Migration in Midwest Region



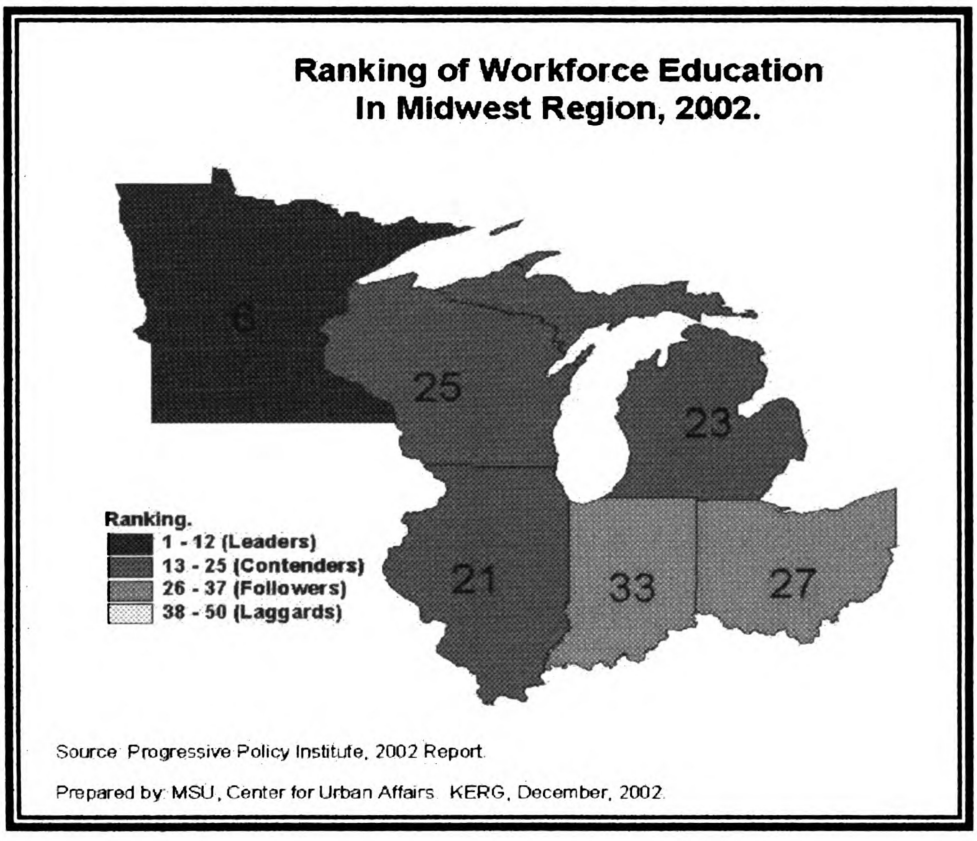
Source: U.S Census Bureau, County Estimates, 2000-2001

Table 3 futuristically interprets to loss of tax base, loss of property and sales tax on which our schools depend. It can also lead to large unemployment benefit claims and further impoverishment of lower class people whose future has been devastated by the digital divide gap of the recent past and who again are vulnerable to the IT infrastructural redlining that private internet providers are presently implementing.

According to the PPI ranking, Minnesota, the state with the highest positive net internal migration in the region, ranked 6th in the nation while other states having deficit net internal migration came up as contenders and followers respectively in the region. Although there is not enough data to prove that the

internal workforce migrants belong to the well-educated workforce MEDC's (2001) recent data on college migration patterns provide some valuable support to the assumption that this may be true (see map 4). The report confirms that Michigan's economy is only able to retain between 67%-84% of its technical graduates (PEP, 2001:5). This "brain drain" affecting the State's educated manpower may have serious future negative impacts if not adequately controlled (see map 5). (Further discussion of the brain drain will be concluded in the following last chapter).

Map 4: Workforce Education in Midwest Region



3.5 Education level of the Manufacturing Workforce

When organizational restructuring required workers to have greater autonomy and ability to work in self managed teams, businesses

and organizations were forced to abandon their old tools and adopt new technologies that improved productivity. Those needs created structural changes in the manufacturing industries particularly among its workforce, thus the deployment of new technologies necessitated the hiring of new workers with better educational qualifications. The degree to which a state has embraced the use of high-performance, technology-driven manufacturing systems will in part determine the educational level of its workforce because there exists a correlation between higher education and new technology. Hence, this indicator becomes an important measure of a state's manufacturing contribution in the knowledge economy.

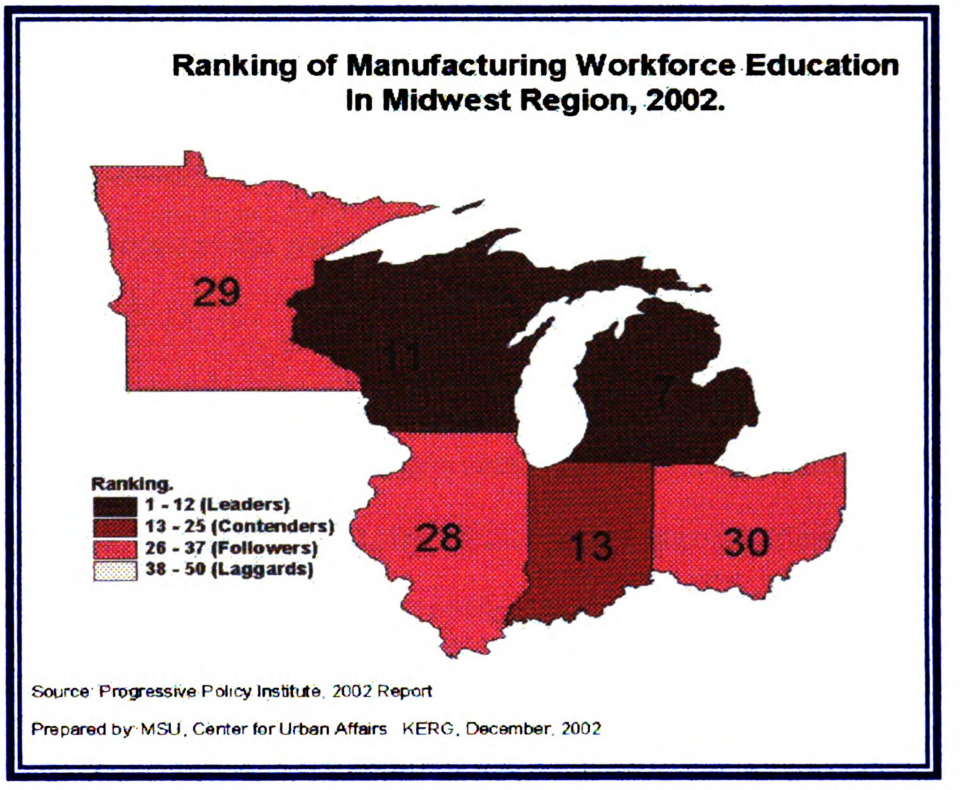
Being a manufacturing state, Michigan ranked high in this category. With her 7th ranking, she led all other Midwest states in PPI's 2002 report. However, likely to jeopardize this favorable ranking is the present "foot loose" behavior of many manufacturing companies in the state.

Globalization, factory automation and union demands have been cited as causes for business decay and manufacturing industrial migration in Detroit and other core cities like Flint, Saginaw, Lansing, Pontiac, and Michigan as a whole (Farley. 2001; Sugrue, 1996; Rich, 1989).

Though economists like Cohen and Zysman (in Rich, 1989:151) have argued that manufacturing will continue to be the fundamental core of economic development. Cohen and Zysman argue that services will only coexist with it, but for Michigan communities and community planners

of today, pertinent to sustaining the manufacturing industry is the educational requirement that the advance technology emanating from the information technology is producing.

Map 5: Manufacturing Workforce Education in Midwest Region



Also relevant is the knowledge of what aspects of manufacturing is controlling the market. For example, studies have shown that innovation and creativity continues to evolve at an astronomical rate in economic areas like pharmaceuticals, electronic equipment, and chemicals (Rycroft, 2002:5).

States that are concerned about their development will pay particular attention to acquiring this market knowledge in other to develop their comparative advantages to favor their economies. Michigan cannot afford to be left out in this

kind of knowledge gathering if its economy is expected to continue growing in the near future.

3.6 Globalization

Globalization has an indicator of knowledge economy aims to measure two important things:

1. The extent to which the state's manufacturing workforce is employed producing goods for export and,
2. The share of the workforce employed by foreign-owned companies (PPI, 2002:18)

According to PPI, about 7,000 multi-national companies were in the U.S in 1975. Due to the growth in the global market focus of industries, about 40,000 of them exist today. The efforts of small, mid-size and large businesses in accessing global markets to invest in market new efficient technology, and hunt for talented workforces have changed the focus of economic gains from local to global; therefore, making globalization a good indicator of the knowledge economy.

The impact of globalization on Michigan's economy has come in different forms. It has been rated enormous by scholars like Thomas, (1992) and Sugrue (1996), who argue that Michigan, being the "arsenal of democracy" in World War II and an "automobile state", has all but been eroded by globalization. The need to locate industries at economically beneficial areas has enormously reduced Michigan's coveted high paying manufacturing jobs and because these markets have been saturated with cutting-edge competition producers, they have

restructured and responded to technologically improving methods of production in order to stay in the business.

In order for Michigan to retain its economic base and continue to live up to its reputation as the prominent auto producing state, considerable attention must be paid to improving its workforce's cognitive knowledge and encouraging the location of foreign-owned investments in the state. This will produce commercially competitive economic environment that is innovative. This environment; filled with lots of creativity, will attract competitive and productive large and small firm that it needs to stimulate virile economic growth.

3.7 Export Focus of Manufacturing

The value of American Gross Domestic product (GDP) on exports continues to rise from 5.5% in 1950, to 11% in 1970, and eventually to 24% in the year 2000 (PPI. 202:19). This significant contribution has motivated America's GDP specialization in the areas of complex and highly valued goods and services, such that workers employed in industries that are export oriented earn at least 10% more than those in firms that export less. This significant contribution to the Gross Domestic Product (GDP) makes export focus of industries a good measurement of the knowledge economy, though not the best. In other to measure this indicator fairly, experts in PPI consider the following factors:

> *To better measure the propensity of all companies to export, export scores are calculated by controlling for the overall industrial mix in each state. This is done by measuring the overall propensity to export (or patent or*

investment in R&D) of each 2-digit manufacturing sector, and multiplying the number of jobs in each 2-digit sector for each state by the 2-digit national propensity to export factor. These were summed to create an adjusted total number of jobs for each state. A ratio was calculated comparing the unadjusted to the adjusted. If the ratio was higher than one, it means that the state industrial mix was slanted towards an industry that tends to export less. If it was lower than one, the state had more jobs than the national average in industries that export more. The total value of export was multiplied by the ratio for a final adjusted score" (PPI, 2002:50).

As Rycroft (2001:4) would argue, "globalization may be better measured by the movement of capital than the movement of goods and services". Capital investments, to Rycroft, measure long-term investments while exports measure short-term relationships. To therefore measure Foreign Direct Investments (FDI), three areas of importance must be considered: Businesses focusing on owning entire facilities in host countries; businesses focusing on joint ventures that embrace sharing ownership and control across borders; and foreign businesses acquiring control of existing enterprises in host countries.

With reference to the map below (map 6), Michigan's 11th and Minnesota's 13th ranking positions placed them as leaders in the region, while Illinois 19th position makes it the only contender in the region. Ohio state followed up as the only follower, while Indiana and Wisconsin states became the laggards in this category.

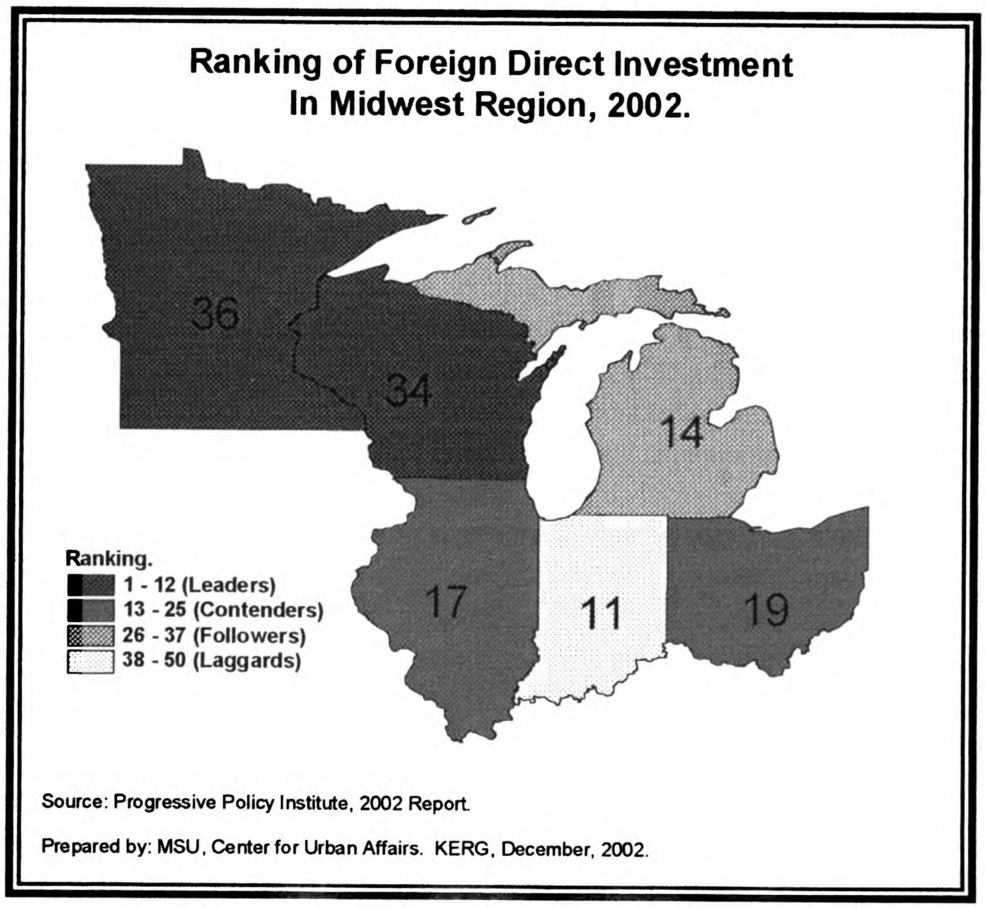
3.8 Foreign Direct Investment (FDI)

When foreign companies invest in a state, they bring in foreign capital, technology and more importantly they may employ a local workforce. Florida and Kenney (1993) affirmed in their paper "Beyond Mass Production" that the introduction of Japanese automobile plants in the Midwest region not only brought in foreign capital for investment, but also created some healthy competition in the line of product efficiency and modernized manufacturing services among American auto producers. Incoming FDI dollars into the American economy has been on the increase since 1979 from $139 billion, to $305 billion in 1989, and $451 billion in 1999 (PPI, 2002:20). This significant sum of dollars has contributed between 2.3% to about 4.9% to the national GDP.

Map 6: Export Focus of Manufacturing in Midwest Region

Foreign Direct Investment has impacted the economy in several ways between providing income, to improving household's disposable income, and motivating private investments in shares, bonds and stocks, thus having greater multiplier effect in the domestic economy of the state recipient. Michigan's performance ranking in FDI improved from 28th in 1999 to 14th in 2002, but this improvement is not as good as Ohio and Indiana, which according to the map below (see map 7), are leaders in the region. Many investors definitely must have been responding to several negative currents like the racial intolerance history of the state and strong union activities that demand higher wage rates.

Map 7: Foreign Direct Investment in Midwest Region



FDI is a vital incentive to community economic growth and it can help the economy to grow if the state continues to improve its performance. But integral to these are good telecommunication infrastructures, R&D investment, venture capital market and human relations.

3.9 Economic Dynamism

The faster that you can produce and supply your consumers makes substantial difference among economic competitors in today's market. In this economy, this epitomizes fast growing entrepreneurial companies. Innovation and timely production of ideas are a significant consideration among competitive companies. Timeliness of products will become the comparative advantage that firms will have against one another. This can be exemplified by the automation research started in the automobile industry in the 40's by Detroit's auto industrial giants. According to Sugrue (1996), the urban historian, General Motors (GM) initiated the research into automobile plant automation, but Ford motors implemented the first automated changes in Detroit; thereby, enjoying the first gains that accrued from mass production through automated plants.

This economic dynamism is aimed at measuring three important things:

1. The share of jobs in fast-growing gazelle firms.
2. The degree of job churning (which is a product of new business start-ups and existing business failures.
3. The value of companies Initial Public Offerings (IPO's).

Table 4: Economic Dynamism Ranking in Midwest Region

STATE NAME	Economic Dynamism (1999 Ranking)	Economic Dynamism (2002 Ranking)
Illinois	22	16
Indiana	34	30
Michigan	41	40
Minnesota	40	19
Ohio	30	44
Wisconsin	27	46
Source: Progressive Policy Institute, 1999 & 2002.		

According to PPI 1999 ranking, Michigan was ranked 41st and Michigan status improved to 40th in 2002 ranking (see table 4). This ranking continue to place Michigan as, one among others, the least dynamic economic environment in the region. Several factors can be attributed to this performance. First and most important, is that Michigan's economic environment provides secure jobs for its citizens. This stability is among several factors that policy makers and many economic development planners would like to see in an economy. Turbulent economies that produce different variations of economic synergies like constant death of firms, permanent loss of jobs, and change in administrative systems of networking fosters insecurity and uncertainty for visionary planning and forecasting in any region. Most states that faired well in this category are noted to be experiencing this constant death and rebirth of firms and economic conditions, especially those produced by the dot com businesses in Silicon Valley.

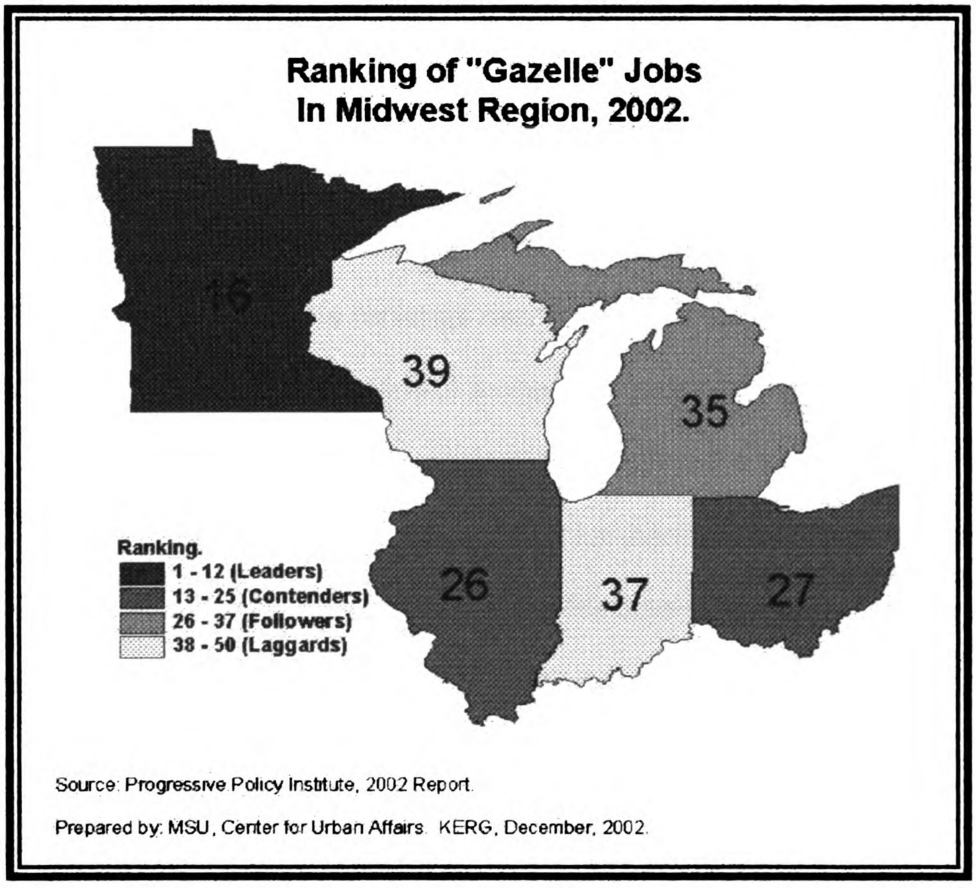
This is not in any way to say that birth and death of businesses are not occurring in Michigan and other states in the region, only that the rate is not as high in comparison to other communities. It will be of great strength and

advantage the states in the region can encourage the development of similar ICT businesses that are thriving in the "Sun Belt States" to support their economy here in the region. Only Illinois made the contender category in the 1999 ranking (ranked 22nd), while Minnesota joined the contenders in 2002 (ranked 19th). All other states made the laggards category in 1999 and 2002 rankings.

3.10 Gazelle Jobs

Gazelle jobs are the newly formed small, medium or big firms or businesses experiencing rapid growth rates and that show the extent of dynamic and adaptive nature of the state's economy.

Map 8: Gazelle Jobs in Midwest Region



This economic dynamism and adaptability are an important driver of the new economy. For example, between 1993 and 1999 the number of gazelle jobs in the U.S grew by 40% to over 350,000 (PPI. 2002:22). Michigan's share of the nation's gazelle jobs has been very small, thus accounting for her poor ranking in both years of the evaluation, 45th in 1999 and 35th in 2002 (see map 8 below).

Prior to the industrial migration out of Michigan, Michigan's economy had long been known to support fixed and stable jobs in her economy. Majorities of these jobs are large industrial firms. It has become evident that very important also are supporting small businesses and firms that can support large factory layoff and closure that is very rampant in Michigan's economy. The provision of uniform infrastructural and social amenities in the areas of high-tech and telecommunication facilities is a likely alternative that can guarantee this growth in small and medium firms.

Minnesota's 16th ranking qualified it as the only leader, while Illinois and Ohio's 26th and 27th respective rankings made them the contenders. Michigan's 35th ranking made her the only follower in this category and this ranking is bound to improve in subsequent studies considering several of the high-tech business initiatives of the state government. The states partnering with Pfizer Company and their 1 billion dollar plus investment in the life sciences corridor is bound to significantly impact the economy in years to come. It will create several synergies in the biomedical industries, in turn creating several jobs and research initiatives that may drive and pull several investors into the state.

3.11 Job Churning

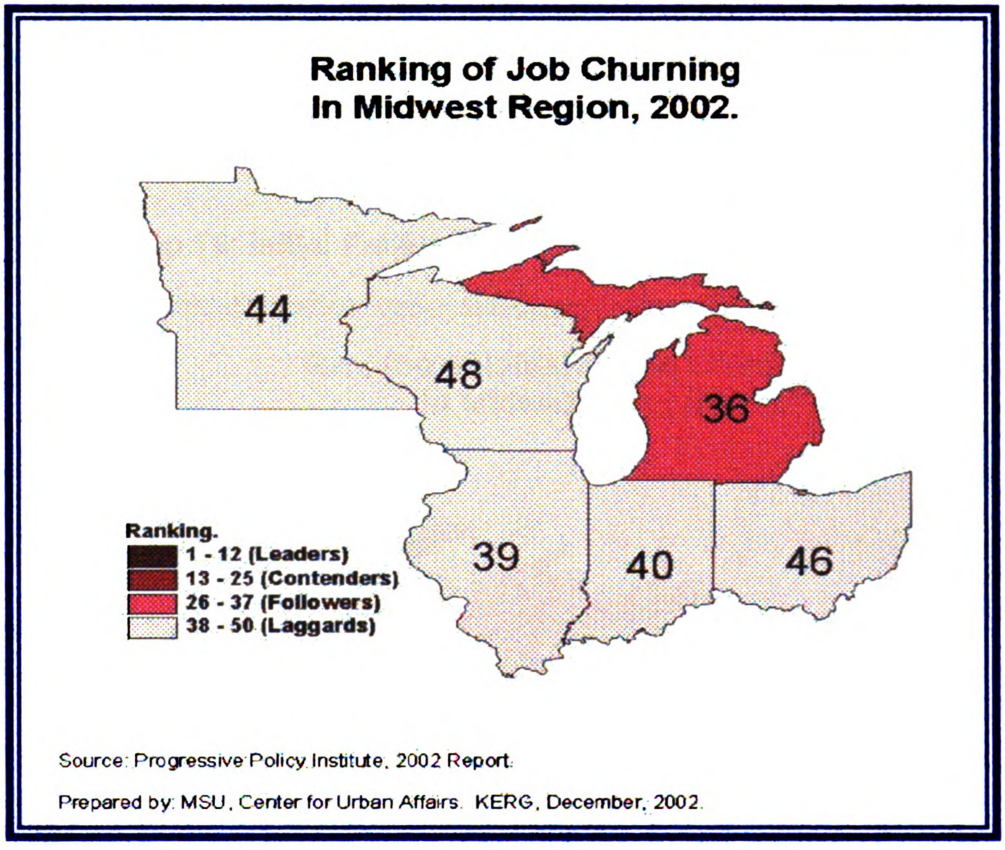
As companies continue to adapt to this new economy, many that can not keep up with the pace of technological innovation will be forced to close down while new firms and businesses meeting the new challenges will take their places. Though this economic turbulence may not speak well for workers in a region or state, job churning has played significant part in American economy in the recent past. Between 1997 and 1998 alone, the U.S economy recorded 5.6 million job losses and a 6.3 million job gains resulting in a net job gain of 650,000 jobs (op. cit)

Under this indicator in 2002, the ranking of each state plummeted from their 1999 ranking. Illinois suffered a 14-point drop from 24th to the 39th position, while Michigan suffered a 5-point drop from 31st to the 36th ranking. Minnesota, the only state that gained one point; from 45th to 44th still belonged to the laggard category (see map 9 below). As earlier mentioned, Michigan's life sciences corridor has started incubating new business, according to the MEDC (2002) report. Eighteen (18) life sciences companies successfully joined the existing 325 in Michigan in the year.

Each is exploring new territories such as biotechnology gene sequencing, neural intervention technologies, and endovascular techniques in treating aneurysm and neurovascular lesions. The state's effort in marrying its old manufacturing strength with modern information technology, design, and engineering is producing important waves in diversification of plastics, software

development, robotics and electronics in its auto industry (http://medc.michigan.org/AdvMfg/).

Map 9: Job Churning in Midwest Region



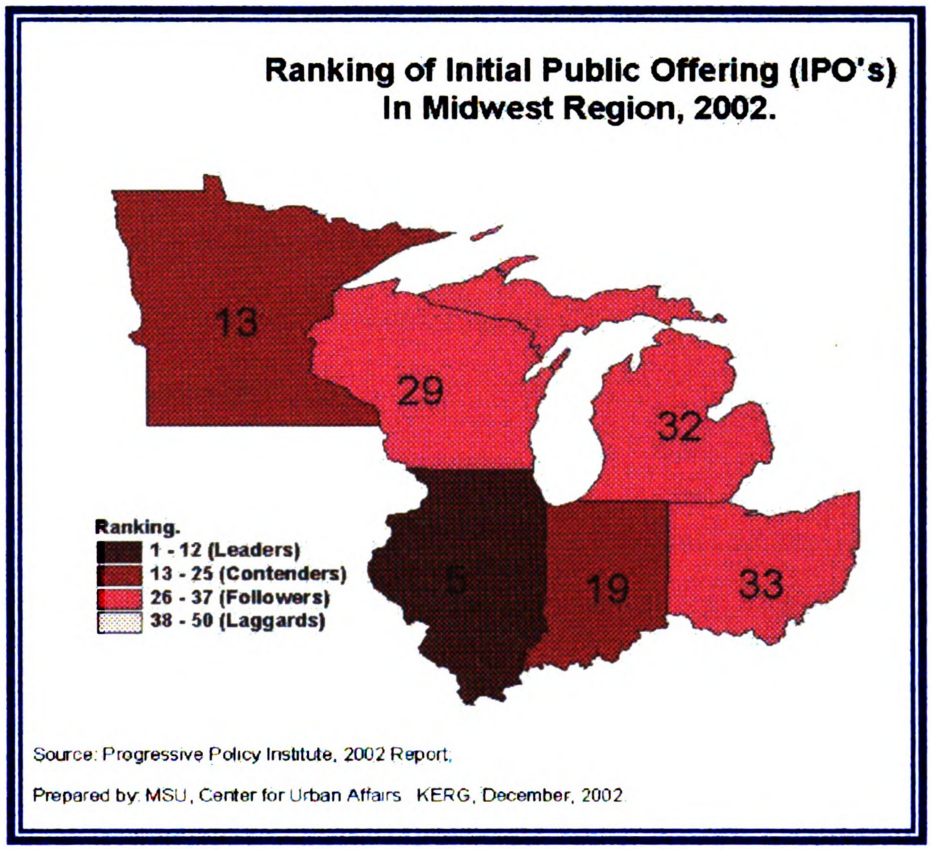
3.12 Initial Public Offering (IPO'S)

A weighted measure of the value and number of initial public stock offerings of companies as a share of gross state products (PPI, 2002:24).

"When a company sells stock to the public for the first time it is called an initial public offering. These shares are sold in the primary market at an offering price determined by the syndicate, following financing the shares are traded in the secondary market or what new issue pros call the aftermarket" (http://www.ipo.com/member_services/ipofaq.asp?p=IPO). This entrepreneurial

dynamic form of business funding/financing has continued to influence the economic arena since the 60's. It rose by "50% between the 1960's and 1990's and reached unprecedented levels in 2000. But even with the dramatic decline in IPO's in 2001, as the economy grows in 2002, IPO's are expected to rebound at least to the levels of relatively strong years like 1997 and 1998" (PPI, 2002:24).

Map 10: Initial Public Offering in Midwest Region



We see from map 10 below that Michigan's ranking jumped six ranks from its 38th position to 32nd in 2002 but these gains in rank are still far from Minnesota's 13th or Illinois's 5th in 2002 rankings. Illinois, Minnesota, and Indiana are the only three states faring well in this category. Wisconsin, Michigan, and Ohio are followers in this category. Michigan and these other states need to

expand on this indicator by finding dynamic ways of funding business investment and informing their citizens through education of the importance of participating in the development of their local areas.

3.13 The Digital Economy

The digital economy indicator measures the share of business and government transactions that are conducted on the digital electronic network. This indicator measures seven factors:

1. The percentage of the population online
2. Commercial (".com") Internet domain names
3. Deployment and use of information technology in K-12 public schools
4. The use of digital technologies to deliver state government services;
5. The percentage of farmers using computers and having asses to online resources
6. Use of the internet by manufacturers
7. Broadband telecommunications availability and use (op. cit).

As stated by the PPI, the U.S Internet economy's worth was $830 billion in 2000. The Internet host recorded a significant increase from 98 million to 117 million worldwide, and the Internet is forecasted to host about 1.5 billion by the year 2005. These figures are bound to significantly affect the economy worldwide (see table 5 for state's ranking in the region).

Therefore, it is of utmost importance that states in the region join the trend of development else development and growth will pass them by. Minnesota's 9th ranking made it the only leader in 1999, while Wisconsin's 14th ranking was the

only contender in the region. Indiana and Wisconsin's ranking plummeted in 2002, while others gained steps upward.

Table 5: Digital Economy in Midwest Region.

STATE_NAME	(1999 Ranking)	(2002 Ranking)
Illinois	44	20
Indiana	28	31
Michigan	33	23
Minnesota	9	9
Ohio	35	16
Wisconsin	14	27
Source: Progressive Policy Institute, 1999 & 2002 Report		

Michigan's 33rd ranking moved up by ten to 23rd in 2002. It is of importance that states in the region pay particular attention to this category because participation in the new economy is very important to their economic growth.

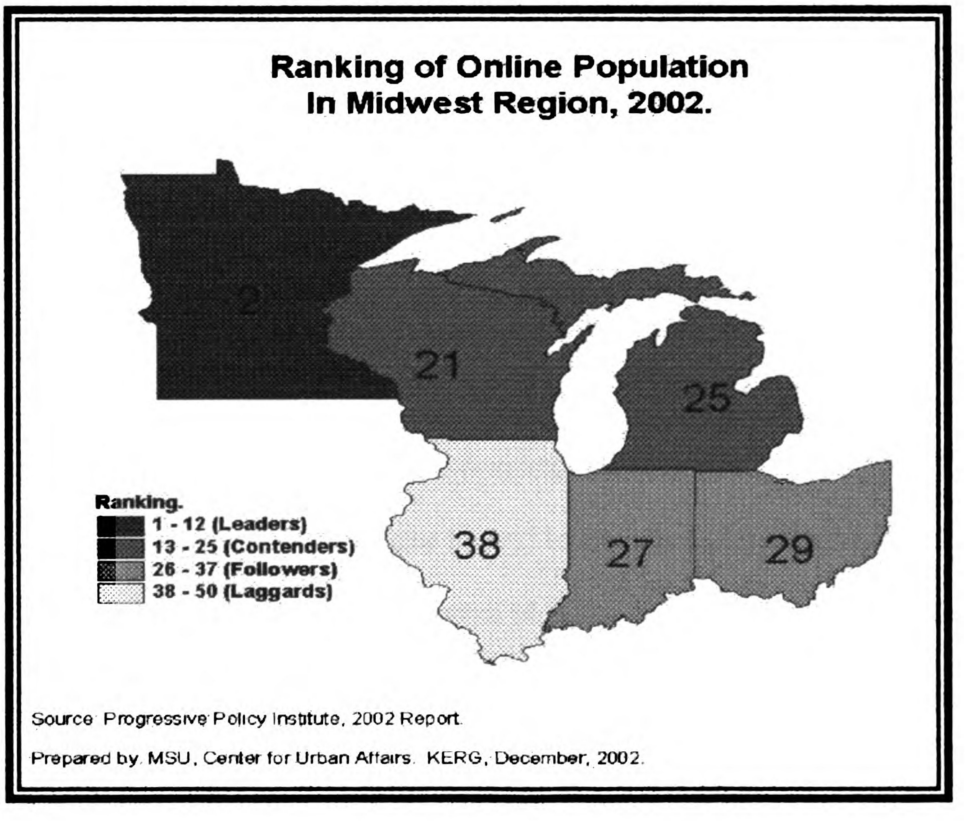
3.14 Online Population

The most significant measurement of a state's level of participation in the digital economy is how best the citizens are connected and how best they use the Internet. For example, in 1998 only about 1/3 of American households were connected to the Internet. By November 2001, the PPI institute reported that the level rose to about 50% (PPI). Education, race, and income appear to be major factors inhibiting citizen's online participation. But as the price of computers continues to drastically plummet, access to the Internet and computer facilities usage continues to improve among people that could not previously afford them. Today, as access to the Internet at work and access at schools continues to improve among low-income people, the online population has continue to increase and defy the widely held myth of education as a hindrance.

According to the PPI report, as average income and education levels of Internet users continue to drop, today's online population is now looking like the American population in general A greater percentage of adults are now using the Internet (p.26). This attitudinal change is very important if the earlier report that claimed that young people were the Internet users is to be considered. Michigan's 42nd position in 1999 was fifth in the region, but its leap to the 25th ranking in 2002 moved her to third in the region.

Minnesota continues to be the only leader with a second ranking. Wisconsin's 21st ranking was the closest, while Michigan's 25th ranking make the duo the contenders in the region. Indiana and Ohio were the followers, while Illinois was the only laggard as per online population (see map 11).

Map 11: Online Population in Midwest Region



If Michigan is to benefit from the ongoing e-commerce and e-business presently going on, it is crucial that it addresses its problem of infrastructural development. Michigan's policymakers should ensure that its private Internet Service Providers (ISP) do not create pockets of disadvantaged neighborhoods in its telecommunication infrastructural networks. Presently, this infrastructural redlining is leaving behind several counties and regional economic development areas whose future economic viability may be compromised if immediate measures are not taken now (see map 12).

In the map above, the Upper Peninsula and some half of the Northern part of the state, particularly EDA region 10, are evidently disadvantaged.

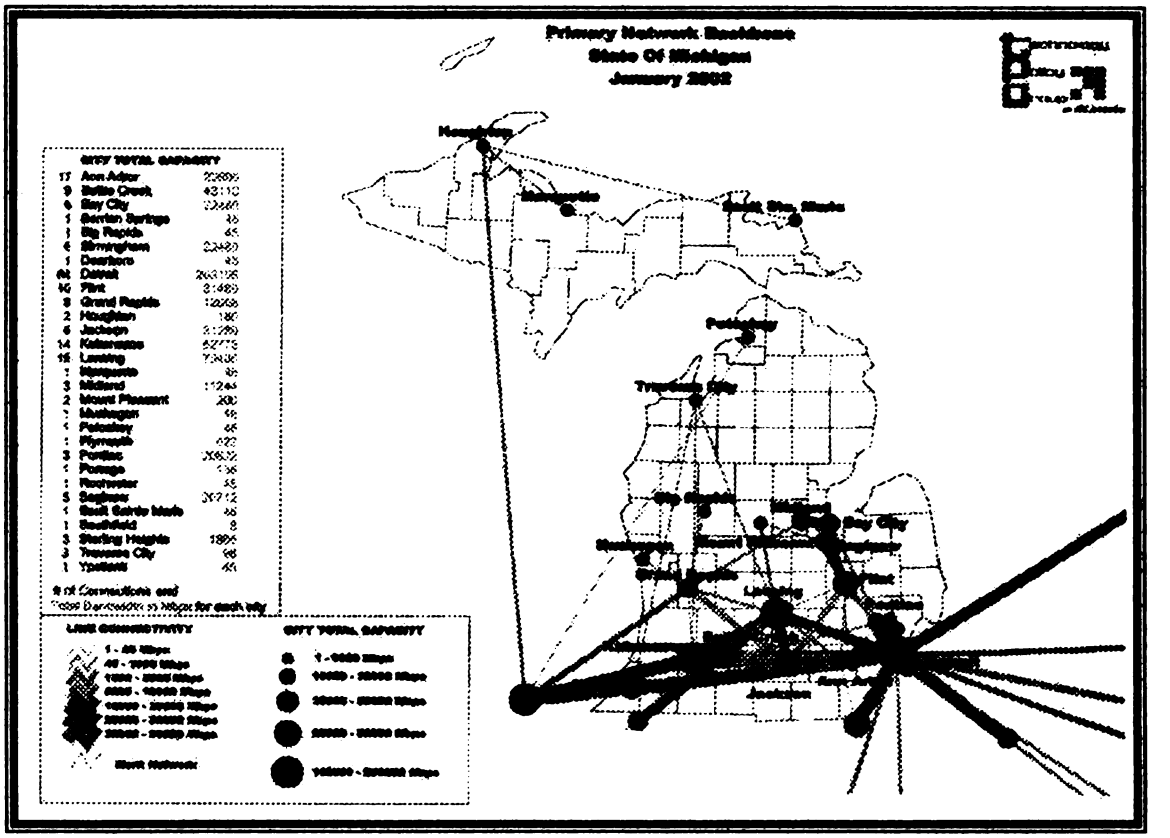
3.15 Commercial Internet Domain Names

Commercial Internet Domain names are the business addresses issued to companies (.com addresses) on the Internet. The more dot.com addresses issued to a state the more its businesses are participating on the Internet. The number of domain names issued, as at July 2000, was 9 million. This has increased considerably to 19 million as of July 2001 (PPI). This significant increase not only gives us the information on companies that are modernizing their ways of doing businesses, but also reflect those that are dynamically restructuring to the new directions of the emerging economy.

These businesses, old or new, are bound to be investing in new equipment, new staff, and modifying old ways of doing business. The more they are connected on to the Internet, the faster they have access to larger market opportunities and the faster they reap this profits. The State of Michigan cannot

afford to deprive its citizens of the opportunities of competing in this market (see map 13).

Map 12: Michigan Telecommunication Map

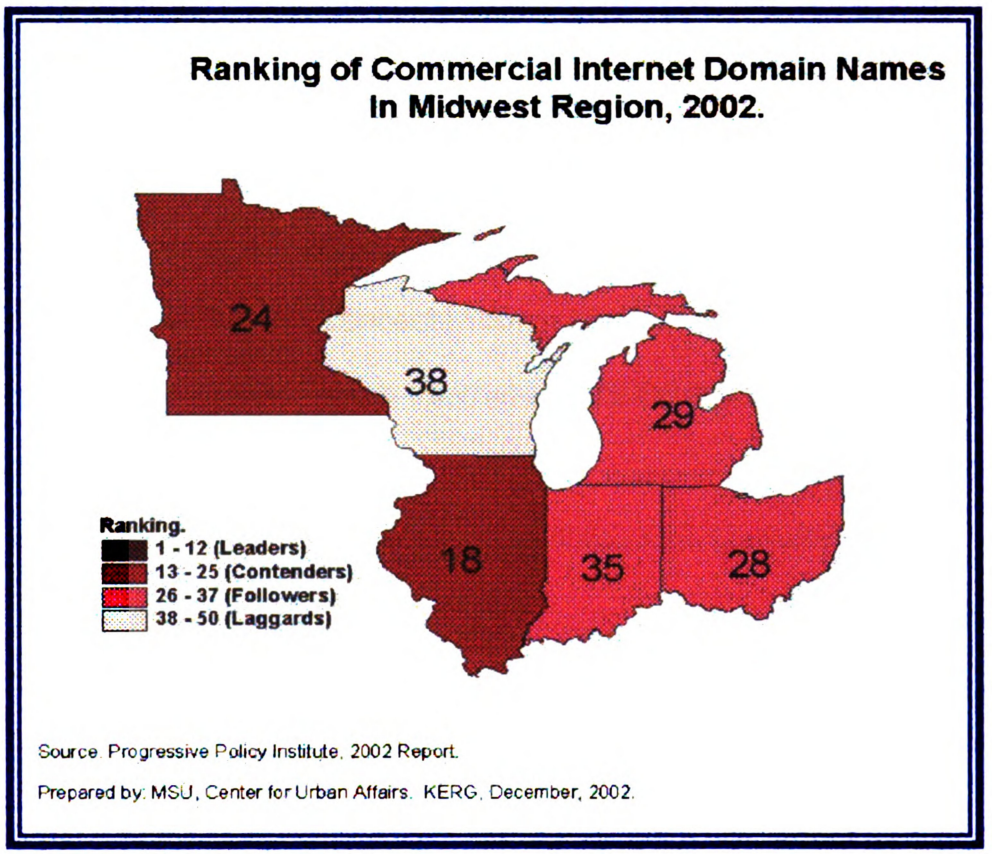


Illinois's 18th ranking and Minnesota's 24th position makes them the best in the region. Michigan, Ohio, and Indiana trailed as followers, while Wisconsin was the only laggard in the category. Businesses having Internet websites are seeing them as important avenues for their product advertising in today's new economy.

They also offer such businesses the opportunity of selling themselves and reaching out to international audiences. Now, they can place orders, receive orders, and do a variety of other innovative tasks that were not possible in the old

economy via their websites. Buying and selling have been improved in the recent past and improvements are being made to make it more efficient.

Map 13: Commercial Internet Domain Names in Midwest Region



Therefore, the State of Michigan should encourage its local businesses to explore the advantages offered by the Internet to boost their businesses's sales. The state should remember that the more profit the businesses make, the more company tax that comes to the state's coffers.

3.16 Technology in Schools

The use of technology in schools at all levels continues to be important. The rate of technological efficiency perfected at this school level definitely assures us a brighter future for the nations upcoming workforce. In the United

States the percentage of schools with at least one computer has increased from 78% in 1997 to 94% in 2000. The percentage of classrooms with Internet access has also increased from 27% in 1997 to 82% in the year 2000 (PPI, 2002; Harris, Leslie. 2002:8). This indicator will also play significant part in the level of preparedness and readiness of the future workforce for the challenges that the knowledge economy will present. This indicator considers five factors as very important:

1. Students per multimedia computer
2. Students per Internet connected computer
3. Percentage of schools with Internet access through a T1 or cable modem
4. Percentage of schools where at least 50% of the teachers use the internet in class
5. The percentage of schools where at least 50% of teachers have school-based email addresses (PPI, 2002:50)

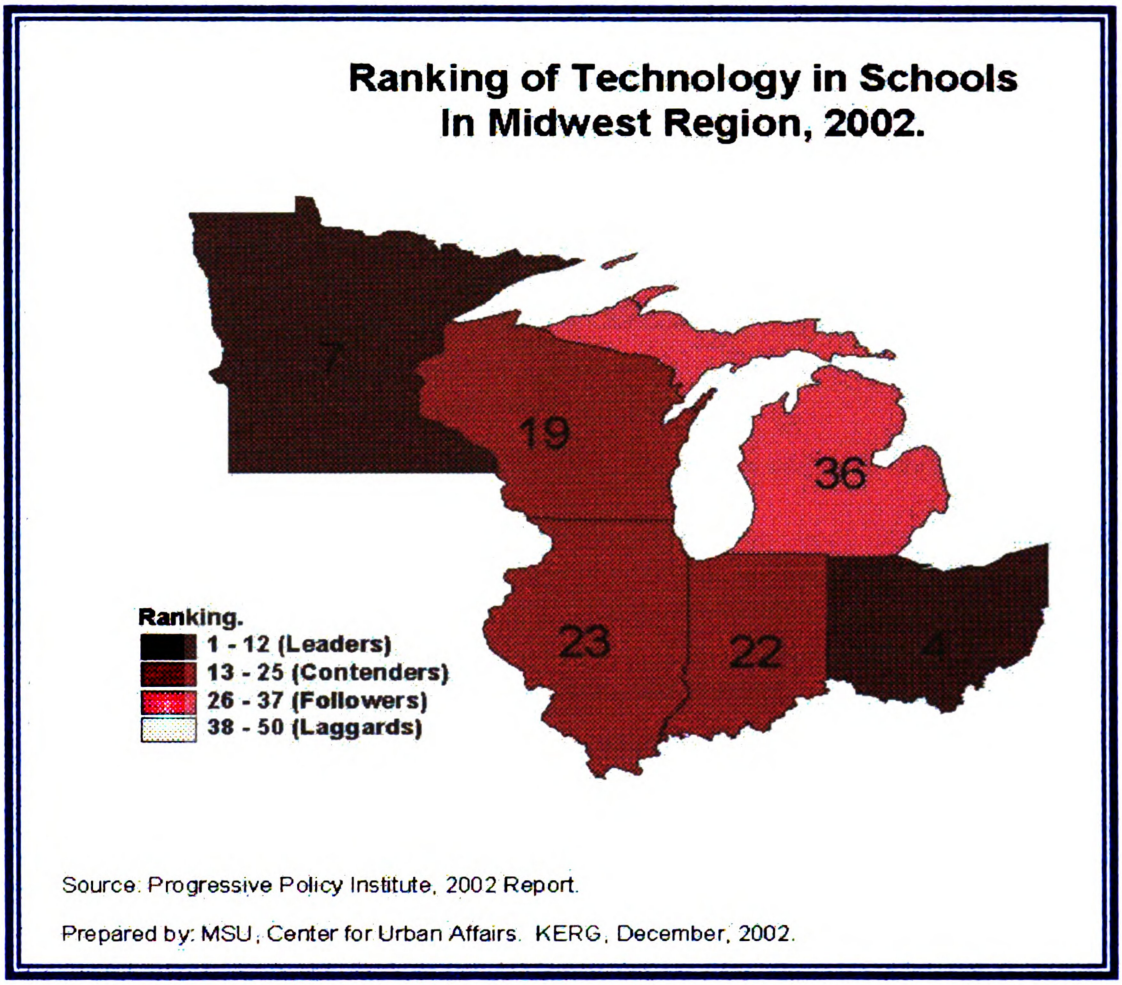
According to the Harris report (p.6), by September 2001, about 90% of all school children between the ages of 5-17 will have used a computer and 58.5 will have used the Internet in completing their school assignments. But only about 33.1% of low-income children only have home access to computer compared to 91.7% of high-income kids. Today, 80% of low-income children in the age bracket 10-17 have school access to computers compared to 88.7% of children from high-income.

In the map 14 that we see PPI's ranking of the state of technology in schools in the region, Ohio (4th), and Minnesota (7th) are the leaders in the region, while Wisconsin (19th), Indiana (22nd), and Illinois (23rd) are the contenders in the level of technology availability in schools. Michigan's 36th ranking makes it last and the only follower in the region. To improve on this indicator Michigan must ensure that its schools are adequately equipped with modern infrastructures like broadband access and Digital Service Links (DSL). It must liaise with computer companies that can support them with the supplies for computers either on philanthropic basis or at subsidized rates.

The states' policymakers should also be ready to address the geographic dichotomies existing between its ailing and affluent cities by providing relevant and timely infrastructures for the central cities whose IT facilities and educational infrastructures keep them behind their affluent suburban communities.

Since academic R&D will continue to play significant importance in states recognition in development, it will be very appropriate if Michigan can explore the advantages of its well-recognized higher institutions of learning in building a formidable research economic corridor. One that can help motivates researches and one that encourages development in different economic areas. I foresee Michigan communities benefiting from regional alliances if they can form regionally cooperative economic unions around the funding and sponsoring of such researches for the collective benefit of all member counties or regions in this alliance.

Map 14: Technology in Schools in Midwest Region



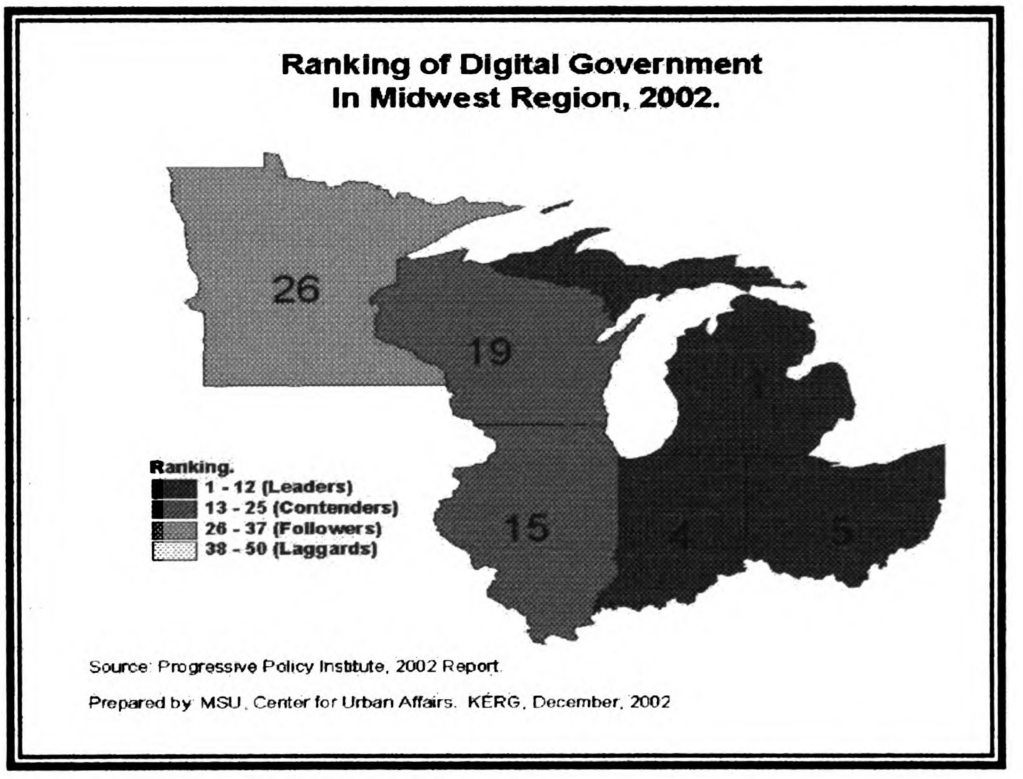
3.17 Digital Government

Digital government is the indicator that measures how a state has adapted the use of information technology to provide valuable services to its citizens. This attempt by government will not only provide good, timely, efficient self-services to its citizens but it will also encourage broader use of the system by the businesses in its jurisdiction. Many states today have initiated the first step which is owning a web site. Others have gone ahead by designing user-friendly web sites that promote easy interaction and usage. Though this system may necessitate reduction in workforce, in no doubt will improve productivity, easy

access to government services, and also serve to educate its users. In addition, the digital government has the potential of reducing the burden of handicapped citizens having to physically access government services. It also has the advantage of serving other citizens whose busy work schedules do not permit them to make necessary office time errands the chances to do so. Michigan's 9th ranking in 1999 moved to number one in the nation for digital government in 2002 (see map 15 below).

As seen in the map above, Indiana and Ohio joined Michigan in the leader's category, while Illinois and Wisconsin came up as contenders and Wisconsin as the follower in the region.

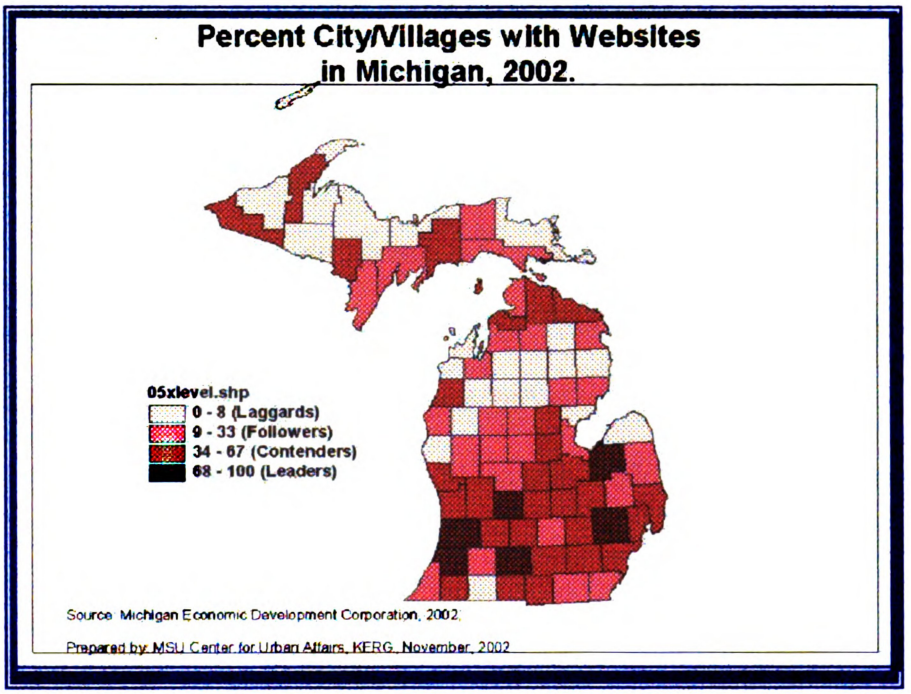
Map 15: Digital Government in Midwest Region



In a recent survey of cities and villages having web site in Michigan, data produced by the MEDC (2001) survey show a strong correlation between

metropolitan corridors of Michigan and the counties' ownership of web sites. These communities are exploiting the power of the web to provide valuable services for businesses locating in their communities and helping to disseminate timely information to their residents than their rural counterparts.

Map 16: Michigan City/Villages with Web Sites



Source: MEDC, 2002.

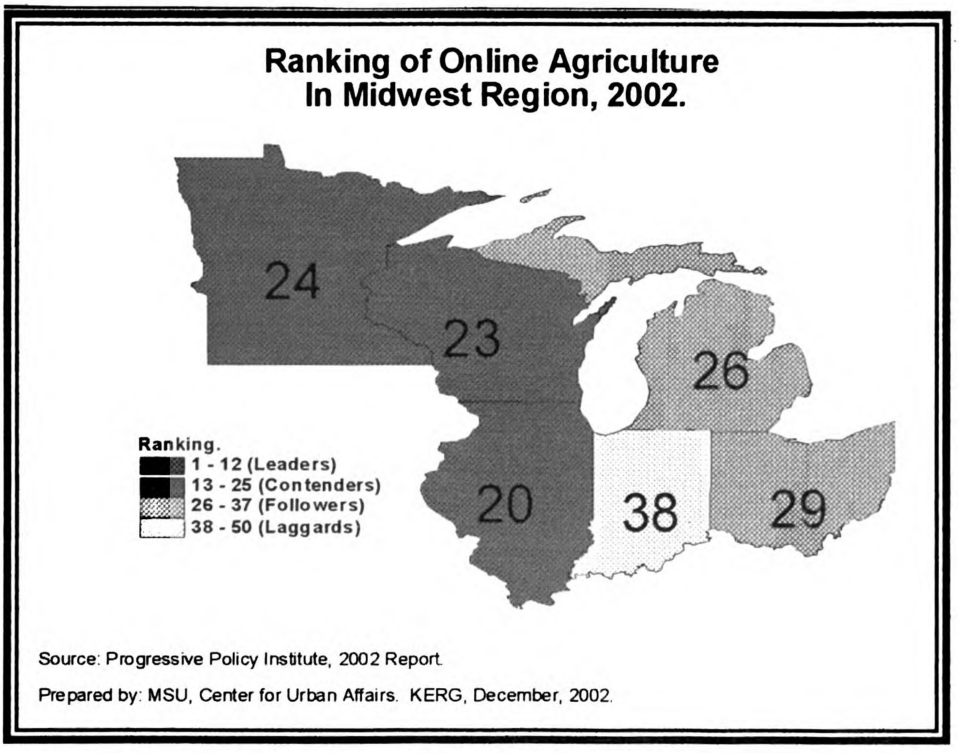
3.18 Online Agriculture

A measure of the percentage of farmers with Internet access and who use computers for business. As stated earlier, the new economy is not only about the computer-related businesses, but the inclusion of all other traditional occupations of the old economy that contributes to the Gross National Product. Since agriculture is an important part of the economy, today's farmers are using the Internet to buy seeds, crops and food products, and to make transactions on

farm equipment purchases and sales. Carrying out these transactions are not only important, but they also serve as a means of quantifying farmers' levels of competitiveness as well as their ability to successfully adjust to competition and innovation in the new economy.

In comparison map above, Illinois (20th), Wisconsin (23rd), and Minnesota (24th) faired better in the ranking and were the contenders in the region when there was no leader. Michigan's 26th and Ohio's 29th ranking made them the followers, while Indiana's 38th ranking qualified it as the only laggard in the region. Since it has been earlier established that there exists a lag between Michigan's rural communities and urbanized communities in ICT infrastructures, this explains why Michigan was ranked 26th in the nation. Michigan need to focus on bridging the network divide of her rural and urbanized communities for the needed uniform economic growth.

Map 17: Online Agriculture in Midwest Region

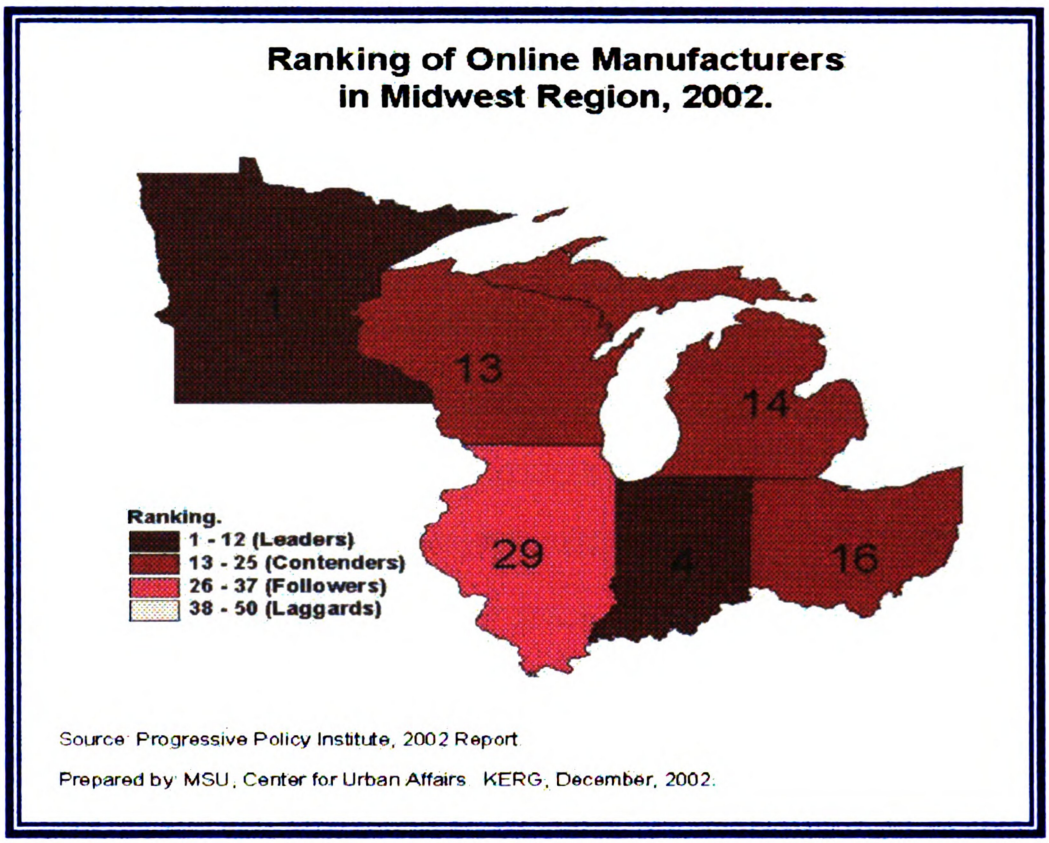


3.19 Online Manufacturers

As the improvement in technological information affects all the industries in the economy, the manufacturing sector has benefited as well. It has been forced to adopt new changes in their production system and in its products as well. The need to supply customers' demands or produce needed products on a timely manner is becoming a distinguishing factor among competing companies. Timeliness will determine which companies remain or survive in this competitive knowledge economy. Thus, it has become imperative that manufacturers have access to the Internet and the modern things that can enhance their production services. This one of the reasons why workers employed in these manufacturing sectors and having more technological experience are commanding greater pay (63% more) than their counterparts without the know-how (PPI, p.31).

Therefore, online manufacturing as a measure of the level of participation in the knowledge economy becomes very important (see map 18 for state's ranking). Minnesota ranked 1st in the nation and in the region for online manufacturers, Indiana ranked 4th in the nation and second in the region, while Wisconsin (13th), Michigan (14th), and Ohio (16th), came in as contenders in the region. Illinois came 29th and was the only follower. The exit of manufacturing industries in Michigan in response to globalization may be the reason for its third position in the region, and the adoption of newer technology and more efficient methods of production may be its answer for a come back.

Map 18: Online Manufacturers in Midwest Region



3.20 Broadband Telecommunications

The exchange of or transfer of information has become a vital part of the use of the Internet today. These transfers have moved from the need for small to memory documents like Microsoft Word into sending large memory picture files and encoded documents, such that the path, size of pipes, and the conduit that this messages passes through to get to their final recipient has become very crucial consideration. The ability to transfer large documents via the Internet is definitely a function of the bandwidth, which is the carrying capacity of the connection that exists between the sender and the recipient. The larger the bandwidth, the easier it is to send and receive large memory documents and or vital information at both ends. Hence, for the increasing number of businesses

that cater to customers in this category, access to high-speed lines like broadband services become axiomatic.

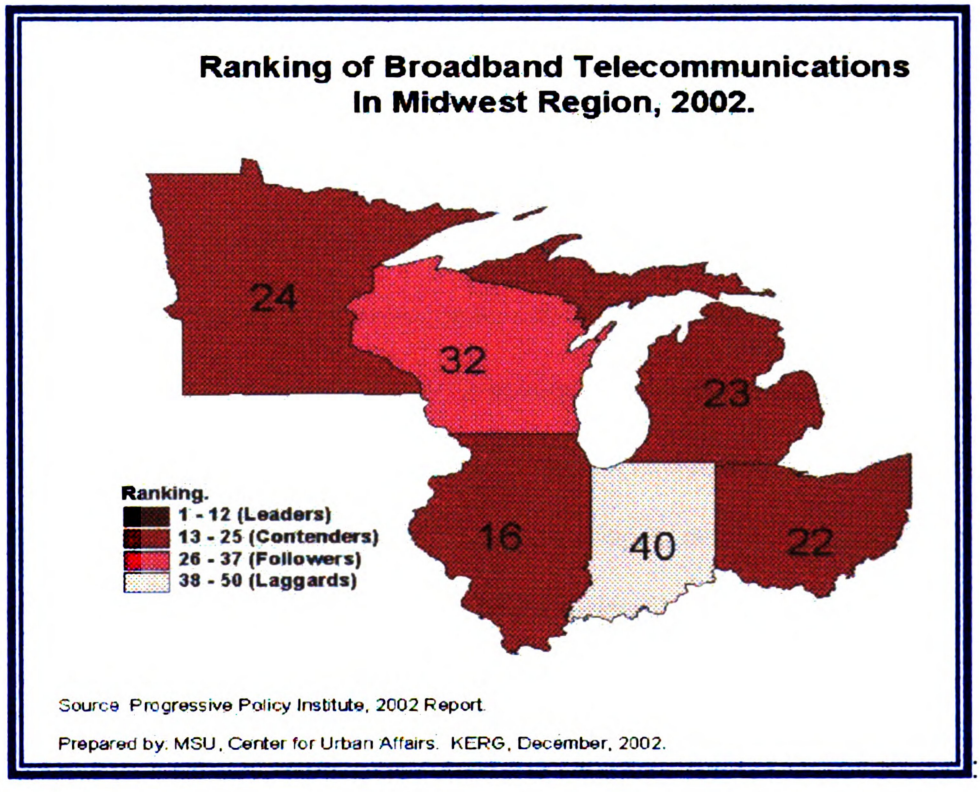
According to Michigan's Job Commission (1996), "there are more than 600 miles of fiber optic cable in the ground... and more than 90% of Michigan's population can dial the Internet through a local phone call." But the use of, and level of information now being handled on the Internet has rendered dialup networks inadequate for large companies and large memory information users. The frustrations associated with logging on, and getting kick-off, or being disconnected while downloading large document files have necessitated the innovation of the broadband network.

Furthermore, the increasing rate of people working from home makes household high-speed line connections quintessential to community economic development. The advantages of high-speed lines to communal development are invaluable. It not only help us to know the limiting factors affection residents participation in e-commerce, but also has the ability to inhibit telecommuting services, and tele-medicine services that are gradually impacting community economic development and job creations. Access to broadband network are presently dictating where distance-learning schools are located, and will play a significant role in household location choices in the near future. High-speed line connections are presently a part of the building requirements in some communities in Korea and Japan, making it an important indicator of knowledge economy and a measure of the quality of life. Thus, access to broadband networks will dictate development in Michigan communities in the future, and

community planners need to pay particular attention to this factor. See broadband telecommunications ranking map 19 indicating the states.

Four of the six states proved to be contenders in this indicator. Illinois (16th), Ohio (22nd), Michigan (23rd), and Minnesota's (24th) proved that an effort to connect the states with broadband services are underway, but each state needs to do better than trying before development pass them all by. As much as Michigan's focus on providing the international and intermediary backbones are essential, Michigan should organize municipal planning areas around how they will go through funding the "last mile" to their communities.

Map 19: Broadband Telecommunications in Midwest Region



Some communities in Michigan today are ignorant of their access to these backbone networks and are not exploiting the opportunities for their communities.

While others just do not have the resources to fund the "last mile", those that can and claim ignorance will have lost precious time for economic growth. This is why communities need to start forming alliances to solve their problems. When the cost of financing the completion of such an important project is unrealistic for many small communities, they should form finance-sharing alliances to achieve their community goals.

3.21 Innovation Capacity

Five important factors have continued to play vital roles in the field of innovation in the new economy:

1. The share of jobs in high-tech industries
2. Scientists and engineers as a share of the workforce
3. The number of patents relative to the size of the workforce
4. Industry in R&D as a share of GSP and
5. Venture capital invested as a share of GSP

Innovations in ICT have particularly improved the U.S economy more than any other sector in the last decade. It has engineered astronomical growth in per-capita incomes. According to Jarboe and Atkinson's 1998 report, technological innovation accounted for over two-thirds of per-capita economic growth, thus making it a useful index in the knowledge economy.

3.22 High -Tech Jobs

Data from the PPI report also support the fact that the contribution of high-tech industries to the GDP has been on the increase since 1990 when it was 5.5%. Due to this consistent growth in 1996, innovations in high tech industries

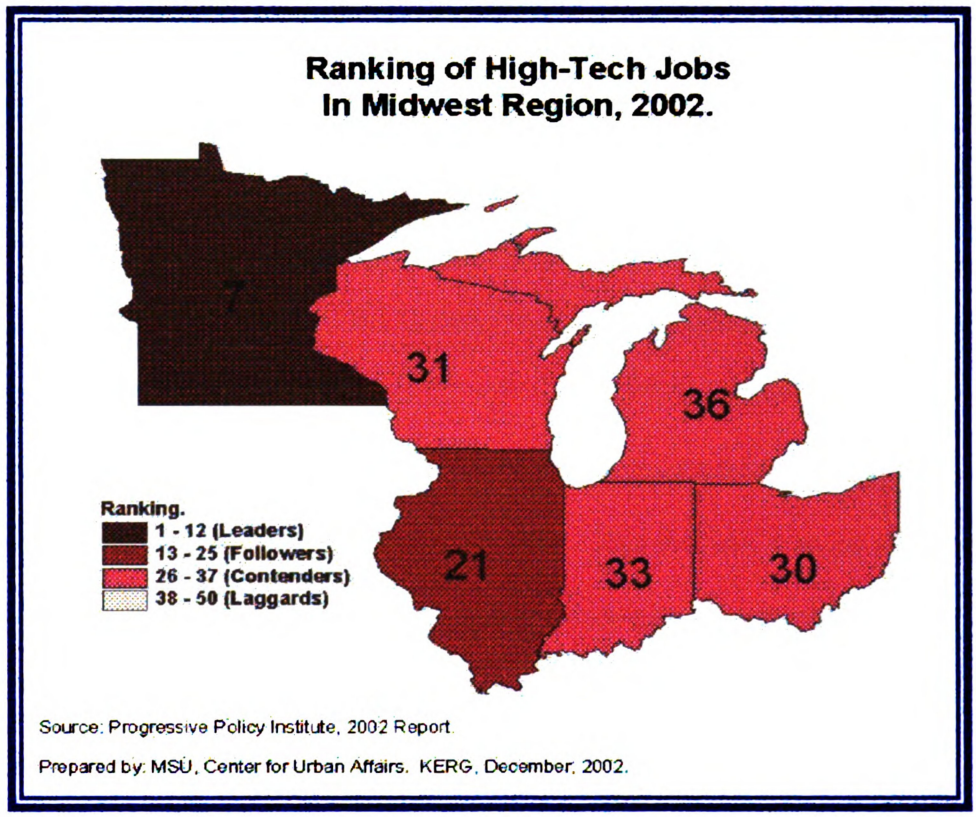
have contributed 6.2% and 8.3% in the year 2000. On wage comparison, it contributed a 73% growth rate in its sector; this was more than any other sector in the economy (PPI, 2002). This rise in high-tech jobs is expected to continue into future years as the prices of its product continues to fall and its affordability becomes reachable to the lower-income masses.

According to PPI, there are endless treasures of innovation that are waiting to be marketed: "smartcards, voice recognition, expert systems, cheap storage devices, new display devices, intelligent transportation systems, 'third generation' wireless communication devices, and robots" (2002:34). According to Jackson (2000:7) "by 2006 there will be about 900 million devices hooked to the Internet, essentially 900 million computers", the limit of which seems seamless now.

Current innovations in the health sectors such as human genome, biotechnology and biomedical projects are presently being maximally explored, and their contribution is bound to create sensational responses to the economy as a whole. The State of Michigan has made important investments in this latter field and is presently coordinating vital additional resources to become a major participant and a leader in this high-tech sector. It will be interesting to monitor the various spillover effects that this life sciences corridor, fuel cell and biomedical plants will produce in the years to come, and to see how they will impact the economies of communities around them and the economy of the State of Michigan as a whole.

Presently, Michigan's 34th position in 1999 fell in the 2002 ranking (36th), but as soon as the state experiments in the latest high-tech investment corridors, this ranking will hopefully improve.

Map 20: High-Tech Jobs in Midwest Region



Outstandingly showing in the region is Minnesota's 7th national ranking, Illinois managed to keep pace in the 21st position as contender, while all others including Michigan came up as followers. For Michigan to do well, it must develop a technological plan and make sure it links all its high-tech industries to this ICT infrastructure. It must also align this technological plan with workforce training and R&D investments (see map 20).

3.23 Scientists and Engineers

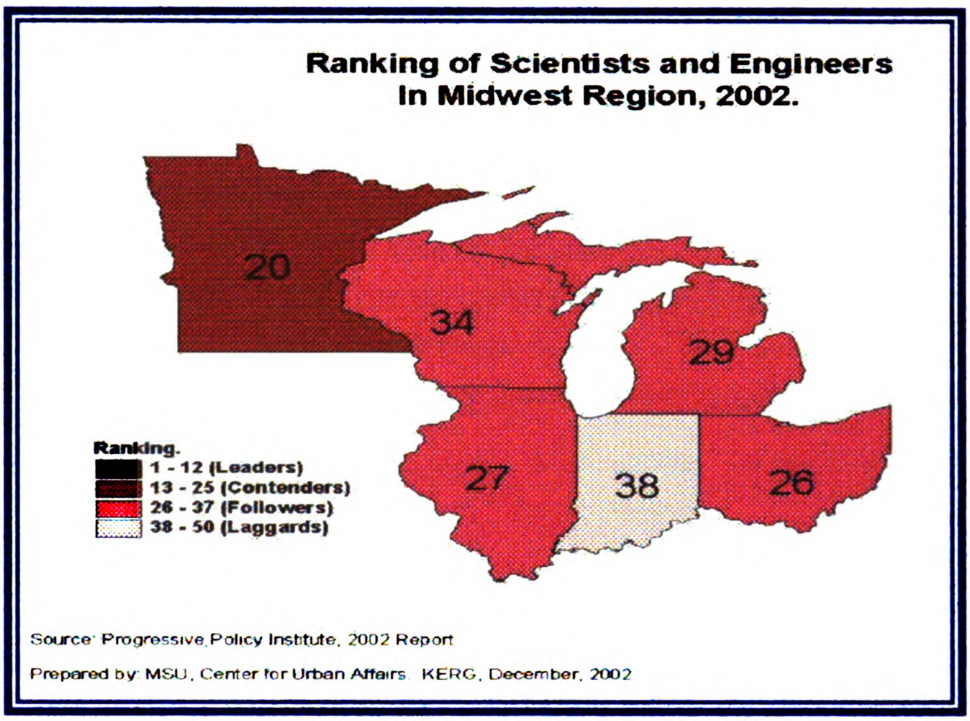
Civilian scientists and engineers as a percentage of the workforce higher levels of education have become a necessity in this knowledge economy because Ph.D's are the producers of these major innovations that are constantly referred to here. For example, innovations in human genomes, biotechnology and biomedicals have been consistently made by highly educated scientists. Higher caliber scientific and engineering professionals organized in a research-oriented manner will be needed to make the difference in this knowledge economy, and states or communities lacking these resourceful workers will lag behind.

According to PPI report, a correlation of 0.97 exists among universities in the number of Ph.D. graduates that they produce. This implies a huge shortage. Essentially, this will require states to increase the number of scientists and engineers in their areas, through importation from abroad, or through enticements and incentives to get them away from otherstates.

These highly educated groups are great enablers of innovation and creativity. They will choose their residential location based on improved quality of life and better standards of living among which will be access to improved technological services.

As we note from map 21, in the absence of a clear leader, Minnesota's 20th position was the contender, while Ohio (26th), Illinois (27th), Michigan (29th), and Wisconsin's (34th) positions met the follower's categorization. Indiana's 38th ranking became the laggard in the region.

Map 21: Scientists and Engineers in Midwest Region

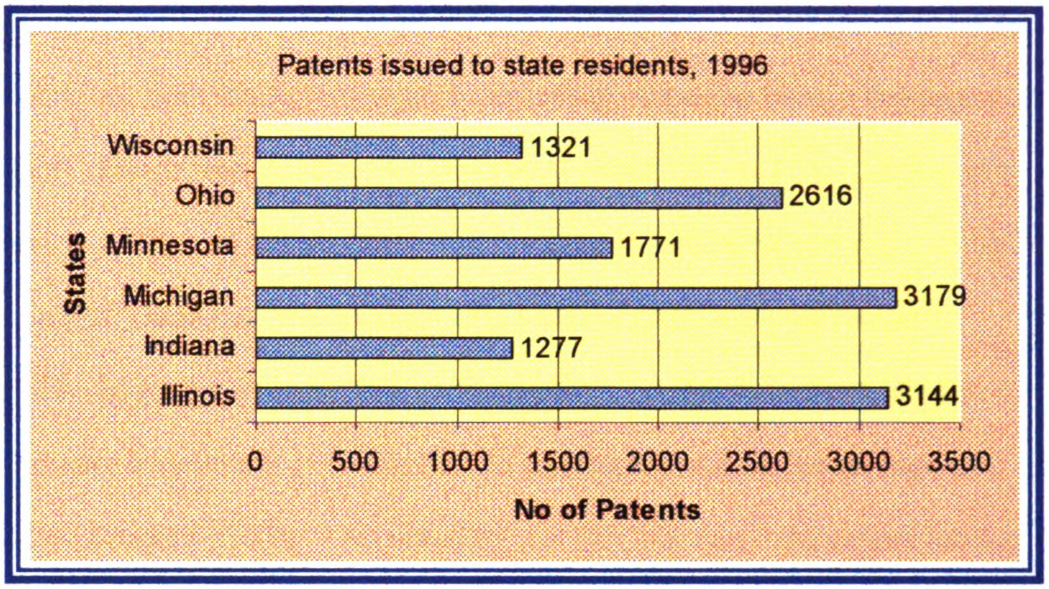


3.24 Patents

A patent is the best indicator in measuring the rate at which new products enter the production market. It is a good measure of a company's competitiveness and ability to pay the highest wage for the best composition of laborers that are in it. Since innovative technology has become very important in the American market, the number of patents issued per year has skyrocketed from 38,000 in 1984 to well over 85,000 in the year 2000.

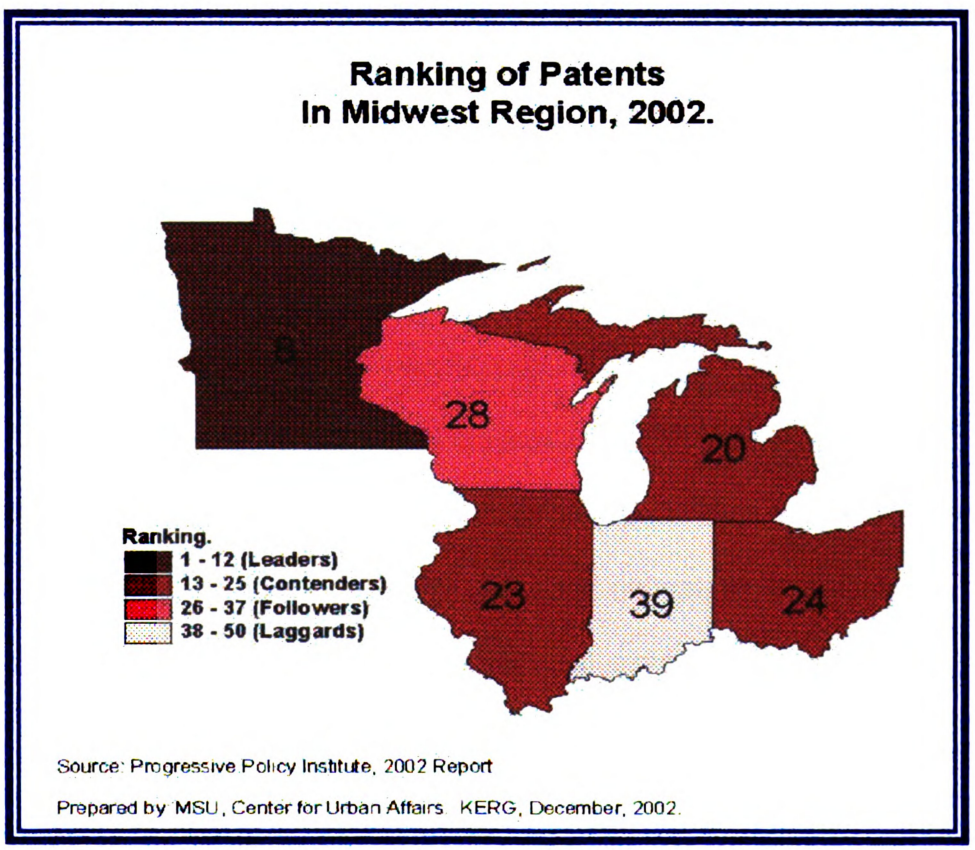
This astronomical increase make patents an important yardstick in the knowledge economy. In 1995, Michigan and Ohio led the Midwest region in the number of patents awarded. (See table 6).

Table 6: Patents Issued to State Residents in Midwest Region



Source: U.S Bureau of Census, (Fedstat), 2000.

Map 22: Patents in Midwest Region



But according to the PPI ranking in 1999, Michigan's patent ranking has been falling ever since. Michigan and Minnesota came up as laggards in PPI's 1999 report, but both made remarkable comeback to be the best in the region in 2002 report. Minnesota qualified as the leader with its 6th ranking. Michigan's (20th), Illinois (23rd) and Ohio's (24th) met the contenders categorization, while Wisconsin (28th) was the only follower and Indiana (39th) the only laggard.

3.25 Industry Investment in Research and Development (R&D)

Industry investment in research and development as a percentage of Gross State Product (GSP). As noted by the PPI, the rise in business-funded investment in R&D during the 1980's no doubt contributed greatly to the economic growth observed in the 1990's. Businesses are said to have contributed more than two-third of all R&D funding. Another rise in business-funded investment in R&D that already reached its peak in 2000 is also expected to produce some significant responses in the coming decade.

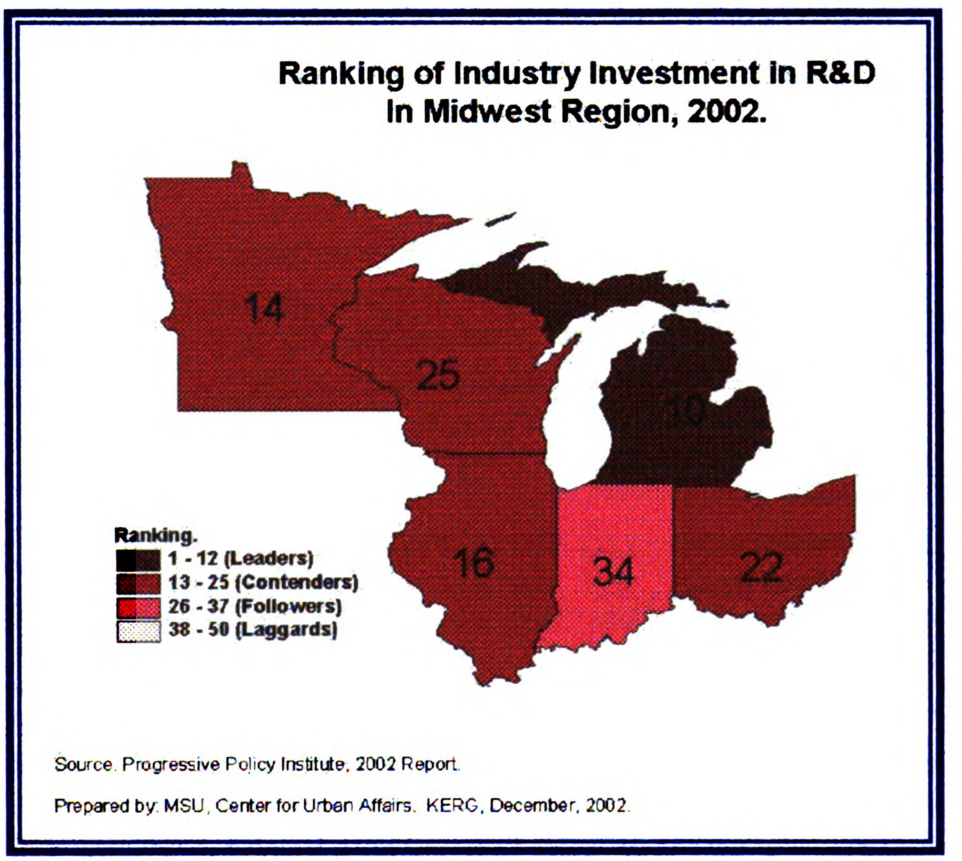
According to data published by National Science Foundation and the Division of Science Resources Studies in 1995 (U.S Census Bureau, 2002), industries contribution to R&D has been very strong in Michigan. Michigan ranked 2nd on the national scale in industries contributions to R&D. Illinois (7th) and Ohio's (11th) were the closest to Michigan in the region.

It can be noted that five different levels of federal obligations in state's R&D dictates the status of R&D in the U.S regions. For example, Rhode Island fared very well in this ranking because of the existence of some defense

electronic firms in the state. Alamos influenced Idaho's ranking, while the presence of Dupont influenced Delaware's (PPI, 2002).

According to the experts (PPI, 2002.; Stiglitz, 1999.), research organized around institutional settings will play a significant role in the wave of innovations that will soon drive the economy. Economic development planners will therefore need to organize their development planning to accommodate these changes.

Map 23: Research and Development in Midwest Region



Ailing, old cities will do better by forming regional alliances that focus on improving developments around their educational institutions; thus, creating what is called their "educational wealth advantage." Imperative to their success is a

well-developed education infrastructure and a coordinated curriculum, one that encouraged college education as well as technical education. This effort must begin at thestates' primary institutions of learning and must be extended to its professional levels of learning.

According to PPI's ranking, indicators in map 23 Michigan's 10th ranking led the region, while Minnesota (14th), Illinois (16th), Ohio (22nd) and Wisconsin (25th) rankings made them the regions contenders. Indiana's 34th ranking made it the only follower in the region.

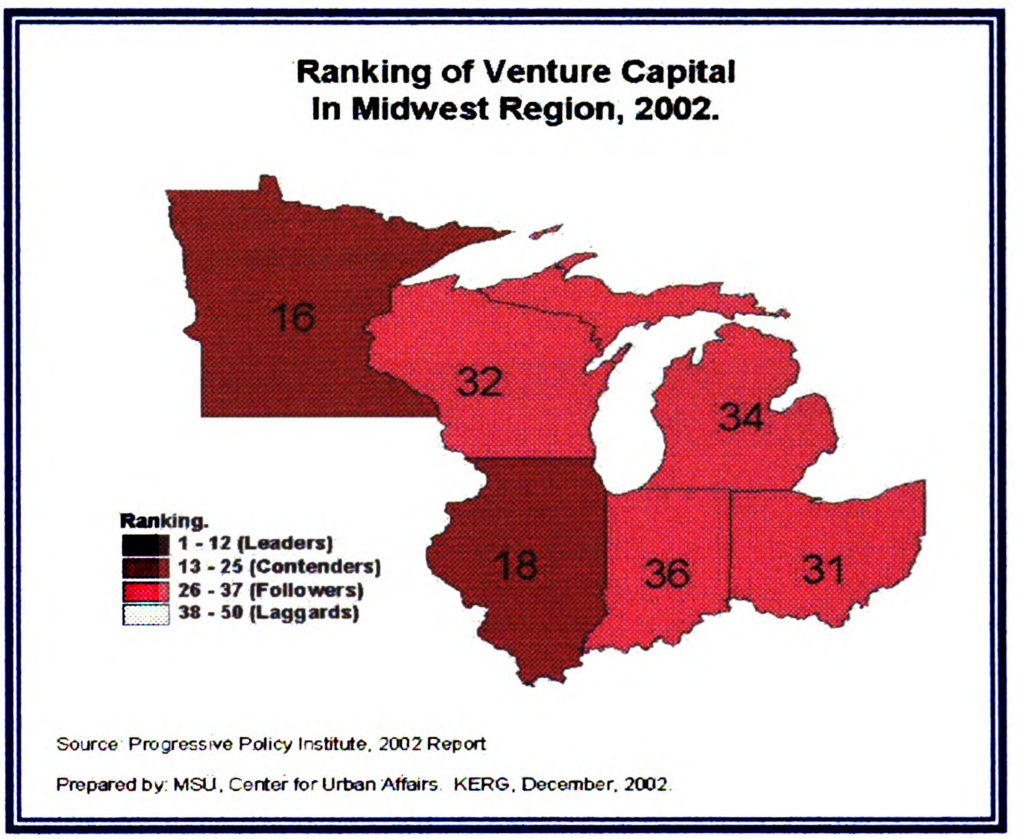
3.26 Venture Capital

With the wave of growth in new businesses in the U.S, venture capital, the entrepreneurial sources of funding new, fast growing businesses, continues to play a significant part in business financing. According to the PPI 2002 report, venture capital contributes about $38 billion in the nation's investment. The rise in the nation's venture capital started around 1980 when it averaged $7.5 billion and rose to $16 billion in 1997.

According to the Michigan Economic Development Corporation (2002), "Michigan's venture funding initiatives are designed to improve access to private venture capital for Michigan's growth-oriented firms." Michigan ranked 31st in 1999 and 34th in 2002 respectively, which implies that this method of business financing is not so common here. This definitely does not speak well for the start-up of new businesses or the entrepreneurial acumen of Michigan citizens.

Minnesota (16th) and Illinois (18th) are the contenders in the region, while Ohio (31st), Wisconsin (32nd), Michigan (34th), and Indiana's 36th ranking makes them all followers in the category.

Map 24: Venture Capital in Midwest Region



3.27 Michigan's Overall Status in the Knowledge Economy

According to the table 7 below Illinois did well in 13 indicators in 1999 and 12 in 2002, while Minnesota did better in 14 indicators in 1999 and 18 indicators in 2002. Minnesota can therefore be considered the leader in the region followed by Illinois State. All other states including Michigan had their best shot at only five indicators in 1999, though some like Michigan improved to nine indicators in 2002 ranking.

Hence, Michigan is not highly favored as a knowledge economy in the PPI report, however Michigan's overall ranking in 1999, which was 34th improved to 23rd in the 2002 ranking report. Michigan's most favorable ranking areas are industry investment in R&D (1st in 1999; 10th in 2002); digital government (9th in 1999; 1st in 2002); education level of manufacturing workers (7th in 2002); globalization (24th in 1999; 8th in 2002); and patents (10th in 1999; and 20th in 2002).

Table 7: States Performance on the Indicators.

	1 - 10 Ranking		11 - 20 Ranking		21 - Above Ranking	
	Year 1999	Year 2002	Year 1999	Year 2002	Year 1999	Year 2002
Illinois	3	2	10	12	9	12
Indiana	0	2	4	3	18	21
Michigan	3	4	2	5	17	17
Minnesota	10	8	4	10	8	8
Ohio	0	2	5	3	17	21
Wisconsin	2	0	2	4	18	22

Source: PPI, 1999 & 2002 reports.

With this 23rd overall ranking, at least, Michigan is in the middle of the distribution, which makes it an average state in the fifty states distribution. According to the reports consideration, State of Michigan is likely to improve on this position where proper policy directions addresses the problems at hand.

Summary

In this chapter reviewed all the indicators reported in the PPI report gave some explanations of what these indicators could mean to community development planning. It is imperative that planners pay significant attention to them and expand awareness about them in order to use them in a strategic

planning model for the growth of their communities. Planners cannot ignore the economic dynamism in and around them. Likewise, communities that strive to remain economically virile must adjust to these changes. Many communities' economic instabilities lie in their over-confidence about their expectations of a temporary recession and loss of population. Cities like Detroit, Flint, and Saginaw know the impact of not adjusting to timely, sensitive economic development issues like this. Therefore, others should heed their actions.

The following chapter will discuss the workforce implication of the knowledge economy in Michigan. The main focus of the chapter is to highlight the inadequacies that Michigan's workforce will be facing in the next couple of decades, and proffer recommendations on how community development planners can work their way out of these problems.

CHAPTER FOUR

4.0 Shortage of Highly-Skilled Workers in American Labor Market

Amidst the various glories and growths of the economic boom of the 1990s, America's workforce seems to lack the needed highly skilled workers that will sustain its economic growth. The 2002 Atkinson report documented that in 1990, the U.S Congress was divided on the decision whether to increase the number of highly skilled workforce through massive importation or to grow the needed ones within the nation. H-1B visas, the visas that regulate the number of highly skilled workers entering the country, was the subject of discussion.

According to Atkinson (2002), the argument produced two factions in Congress deliberations: 1) Those in favor of importing foreign skilled workers argued that the dearth of technically proficient workers here in the United States was leaving fast-growing businesses with no choice but to substitute these highly skilled workers with imported workers from abroad. 2) The opponents backed by organized labor, argued that importing these workers would be at the dire expense of American workers because it jeopardized their chances attaining the required skills and ability to work in those positions in the future.

Both arguments seem to have some level of validity. The people in favor of importing highly foreign skilled workers were concerned about the immediate business concerns generated by the high demand for highly skilled workers in the growing knowledge economy. The parties against importing the workers expressed their concerns about the future- i.e., how would American workers be

encouraged to acquire these skills when foreign substitutes were being provided for them at home.

Most frightening of all was the impact of globalization of industries in moving such jobs abroad and away from the American populace. This jeopardizes the future of on-coming workforce to work such jobs and gain valuable experience. Policy makers feared their inability to move these jobs or corporations back from these Less Developed Countries (LCD), most especially when employers' appetites were wet by the cheap labor that generated cheap costs of production and produced excessive profit turnover for them from the sales of such products.

The proposal of the Progressive Policy Institute to Congress came as a simple phrase that read like this, "lift the cap, but fill the gap." The "lift the cap" part of the proposal addressed the increase of H-1B visas from 65,000 to 115,000 in the year 1990 (43% increase), and an economic solution to locally produce workforce through intensive educational training. This training was planned to be funded by using the proceeds from importation to sponsor innovative training at home. The "fill the gap" aspect of the proposal was a long-term strategic planning solution that specified that a regional skills alliance be built, National Skills Corporation (NSC). This NSC was expected to be a new federal department modeled on the highly successful Wisconsin Regional Training Partnership (WRTP) program.

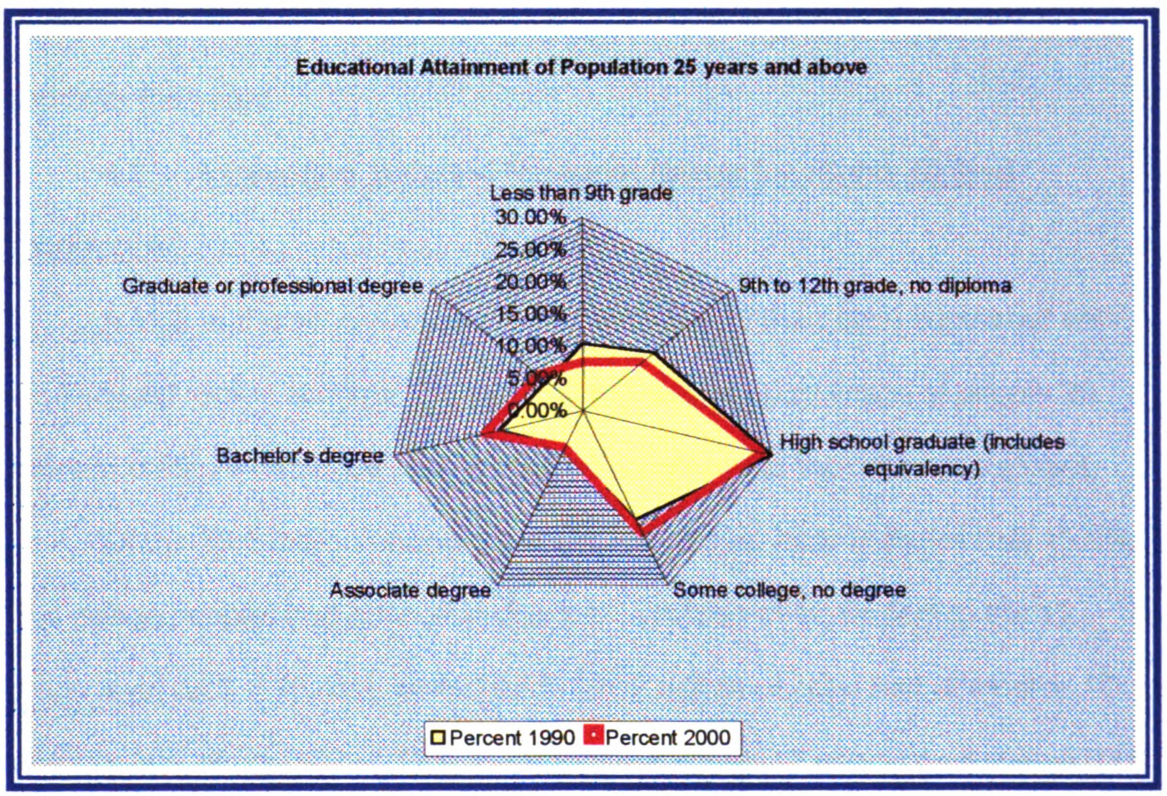
Consequently, several question arises: 1) Can we determine in the past few years what was the outcome of the "filling the gap effort"? 2) Is the Midwest

region short of these highly skilled workers? 3) If yes, can the WRTP model help the region in addressing this problem?

4.1 Assessing the Effort of "Filling the Gap" Workforce Initiative

Using the U.S Census Bureau statistics for 2000, it can be reasonably proved that some improvement has been made in growing this necessary high-skilled workforce between 1990 when this issue first came up in Congress and now. But the degree of success has been very microscopic in nature.

Table 8: Education Attainment of Population 25 years and Above



Source: U.S Census Bureau, 1990 and 2000 data.

We see from Table 8 that four areas did had some positive growth between the ten year period. People with "some college education but with no degree" had a 3% growth from 19% of the total U.S population in 1990 to 21% in

2000. People with an associate degree increased from 6% in 1990 to 6.3% in 2000 recording a 0.3% growth. Bachelor degree holders increased from 13% of the national population in 1990 to 15.5% in 2000, while graduates and people with professional degrees increased from 7% of the national population to 8.9%. A growth rate of 1.9%. It is however difficult to know how much of this has been influenced by the importation of foreign workers imported from abroad within the ten-year period, and how much is accounted for by policies directed at growing the nations workforce. Also, it is not known whether the importation of highly skilled foreign workers stood at a constant of 115,000 people or less every year and over the years.

4.2 Evaluating Midwest Regional Needs for Highly-Skilled Workforce

A look at the education attainment statistics of the nation compared with the Midwest region confirms the fact that the region's population of people 25 years and above has a low representation compared to the national statistics.

Of the 38.6 million people 25 years and above, table 9 shows that 13.8% (5.4 million people) had education degrees less than or equivalent to the 12 grade level (U.S = 16.4%), while 79.6% (31.2 million people) had at most a 17 years or less of education. Only 6.7% had more than 17 years of education (U.S = 7.3%). These figures indicate that the Midwest region's share of less than 12 graders certificate is less than the national average, which is good. The Midwest region also had 79.6% of people with less than 17 years of education, which is greater than the national average and also considered good too. This implies

that for the region to do well they will need to concentrate on the development of the excess existing at the middle and move them to the category with 17 years over educational status.

Table 9: Educational Attainment level of Population 25 years and above.

	Pop. 25yrs + With ? 12 Grades	Pop. 25yrs + With ? Associate but < 17years Education	Pop. 25yrs + With ? 17 years Education	
Midwest Region	5,401,963 (13.8%)	31,247,524 (79.6%)	2,617,965	(6.7%)
U.S.	36,632,029 (16.4%)	170,246,997 (76.3%)	16,252,623	(7.3%)

Source: U.S Census Bureau, 2000.

A look at the region's active population group, people between 16 and 66 years shows that there are approximately 33.2 million people in this group (U.S Census Bureau, 2000). Again, in reference to the census statistics, only about 24.2 million are gainfully employed (civilians). About 1.3 million are unemployed, 0.44 million are employed by the armed forces and 13.0 million are categorized as " not in the labor force." The point to prove here is that only 6.7% of this regional workforce (2.6 million) have education of 17 years and above compared to approximately 26 million people who are supposed to be actively employed.

As mentioned earlier, if Stiglitz's recommendation that workers will need at most 17 years of education to be functionally relevant in the knowledge economy is anything to go by, and O'Reilly's (2002) projection that "in the next few years, two thirds of the new jobs created will require more than Grade 12," then the

region will be short of the needed manpower to push it into the knowledge economy phase.

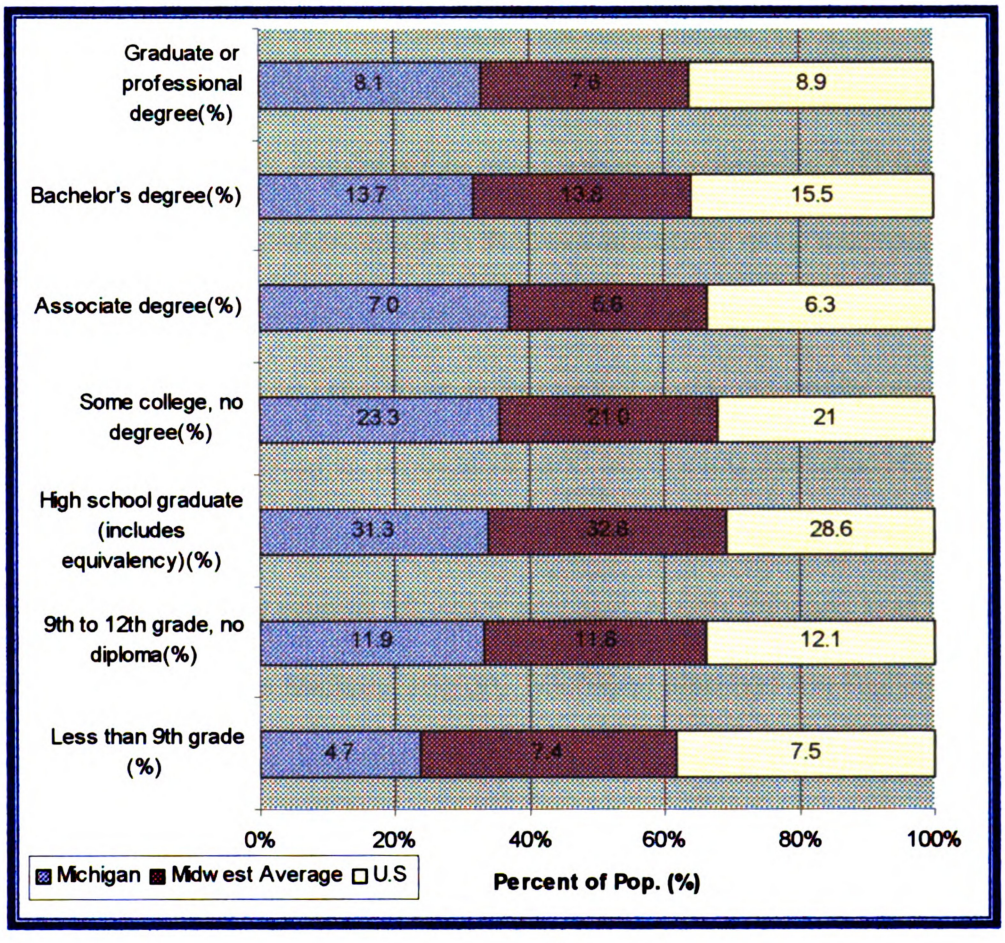
4.3 Substantiating Michigan's Need for Highly-Skilled Workers

In acknowledgement of a shortage of high-skilled level workers in Michigan, MEDC (2003) is presently conducting a $5 million dollar advertising campaign aimed at attracting and recruiting information technology specialists, engineers and scientists for Michigan companies from all over the federation (http://medc.michigan.org/miadvantage/laborforce/). Also, MEDC and some other economic development association's such as Michigan Works! Agencies (MWAs) and the, Michigan Department of Career Development (MDCD are using their access to about $31 million in the Michigan's streamlined employee training program (that can be disbursed to other eligible Michigan based companies) to organize workforce training. Presently, the Economic Development Job Training program (EDJT) has provided training services to 58,257 people (a minute fraction of its large active workforce), 86% of whom are current workers and about 14% new workers in the state (http://medc.michigan.org/miadvantage/laborforce/).

It is important to note that Michigan continues to do well in some distribution that contributes positively to knowledge economy development and bad in the areas that matters most to it. For example, its performance in "some college, no degree", Michigan had 23.3% of its population in this category (Mi: 23.3%; Midwest Region: 21%; U.S: 21%). Michigan's 7.0% led the region and U.S averages in people with "associates' degrees" (Midwest: 5.6%; U.S: 6.3%)

but its 13.7% fell below the Midwest region's average of 13.8% and the U.S average of 15.5% in people with bachelors degree qualifications. Michigan's "graduate, professionals and doctorate degrees" 8.1% was a 1.5% increase from the Midwest's regional average of 7.6%, but a little shy of the U.S national average of 8.6% (See table 10). In the short run, the ability of a state to strongly transform its economy will depend on its share of labor in these last two educational areas.

Table 10: Comparison of Michigan's Education Attainment.



Simply interpreted, Michigan is doing well in some areas but not necessarily in the important areas that will launch it into the knowledge economy.

This is why the state had to advertise and embark on serious retraining programs in order to meet its future requirements for workers in this new economy.

When rating Michigan's contribution vis-à-vis other states in the Midwest region, Illinois and Minnesota continue to lead Michigan in the important categories of educational attainment levels. Experts such as Stiglitz, (1999), Gilomen, (2001), and O'Reilly, (2002) considered this category to be very important in motivating innovation and higher productivity in today's ICT influenced knowledge economy.

In O'Reilly's (2002) book Skills for the New Economy, she contended that "in the next few years, two thirds of the new jobs created will require more than Grade 12. Almost half will require 17 or more years of education." O'Reilly also observed that workforce performance in the new economy must incorporate willingness and ability to continually learn (life-long education) as a necessary workforce quality in order to keep their skills current and functionally relevant in today's technologically dynamic, innovative, and advancing workplaces.

According to the U.S Census Bureau statistics, encouragingly Michigan has the lowest number of people 25 years and above with degrees less than 12 grade (13.9%) level in the Midwest region. Michigan also has the highest percentage of people with degrees less than the 17 grade (79.6%) level (see chart below). The implication that only Michigan and Wisconsin has the lowest of 6.5% of its workers with greater than 17 grade level degrees are compelling and imperative. Entry-level job opportunities are drying up in Michigan's labor market, such jobs now require additional technological experience, and training

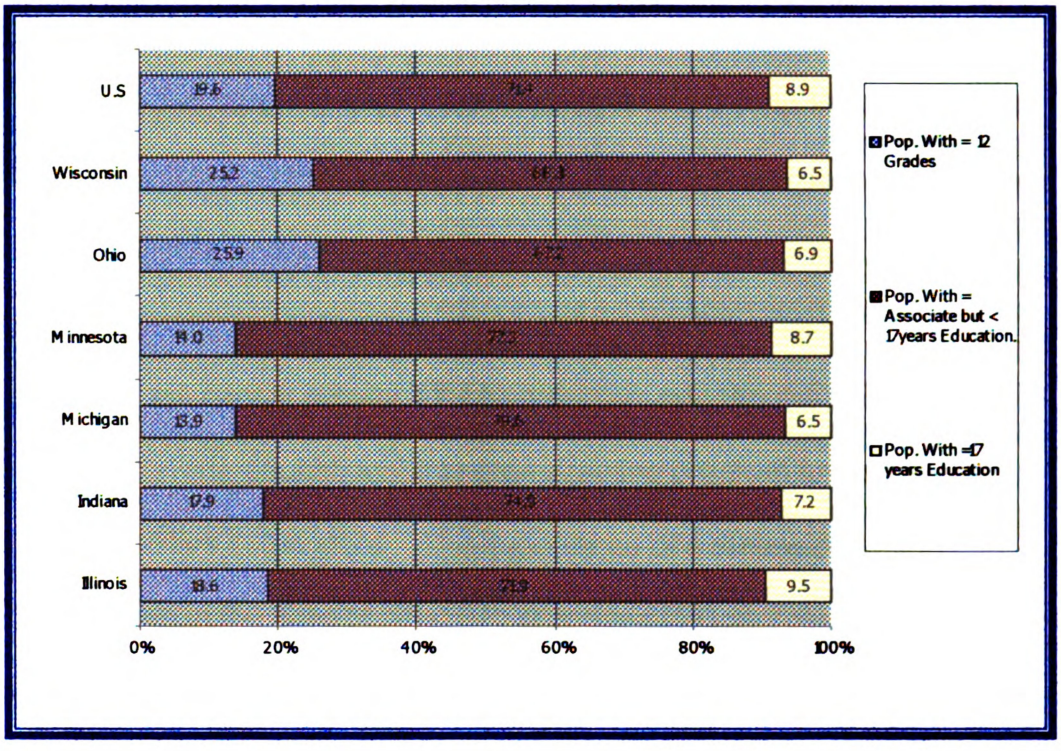
will be needed to move people into these transforming jobs. Highly skilled jobs will also be coming in large numbers, the need to encourage four year degree holders and master degree holders is becoming important

For economic development planners in Michigan whose communities economic growth is now a function of the number of 17 grade degree scholars living in it, new sets of challenges are presented from the new information. Among these challenges is the quest for the incentives that will encourage such people into such communities. It presents them with the challenge of determining what are the sets of motivational needs that can be attracted with. For the large percentage of people found below the 17 grade, the question of what kind of educational training will be sufficient to bring them to competing standards of productivity and innovation befitting the 21st Century worker.

In table 11 above, 9.5% of the population in Illinois of people 25 years and above held degrees 17 grades or higher. This led the region and the national average of 8.9% by a 0.6% positive margin, while Minnesota's 8.7% was just a little short of the national average. Michigan came in last.

The implications of this table to community economic development planners are numerous but simply put, for the region to fully benefit and transition into the required 21st Century knowledge economy, it must try three important things.

Table 11: Population and Years of Education in Midwest Region 2000



Source: U.S Census Bureau, 2000.

4.4 Recommendations

For Michigan to move forward in this crucial era, it must discard its conservationist behavior and confront the present problem confounding its economy with daring determination. The planners must be ready to explore fearlessly new ways like other communities are doing, and learn like other communities about how things operate in this new global economy that thrives on cooperation, alliance building, and cost sharing techniques. Some of these ways are exemplified below:

The Need for a Statewide Workforce Training/Retraining Program in Michigan

- Reorganizing its workforce training/retraining programs on a regional level surrounding new ideas that embrace present technological innovations

- As a growth initiated package, workforce retraining/training should be collectively seen or organized along with some citizen empowering programs that can help improve the asset(s) and wealth-stake of the lower classes in society. Planning this on a regional level will definitely bring in a regional standard, reduce costs, and encourage the diversion of redundant manpower to other useful and productive areas.

Michigan will benefit greatly if it can organize, coordinate, and guide a well-focused statewide educational training/retraining program to improve its workforce capabilities in the state. The importance of a statewide based workforce coalition in the likes of what PPI proposed to Congress would be important for any region that is thinking of broad-based development for the future. However, to successfully formulate a broad-based workforce training like this, some important pieces of planning data are necessary: the data about the people found in this category (focus group to work with), strategy to address the problem, stakeholders interested in the program, program formulation (treatment), monitoring and evaluation of program (post treatment).

This knowledge economy cannot afford to have large numbers of people being left behind. Leaving such people behind will amount to growth retardation and loss of valuable human resources because all valuable hands must be on deck. Vulnerable groups in this category are people of color and retirees/empty nesters.

According to a recent report on the Smart Michigan web site "findings show that more than two thirds of Michigan residents use the Internet, with

40.1% using the Internet daily, 17.6% frequently (1-4 times per week), 9.6% occasionally (2 times a month or less), and 32.7% never having used the Internet during the past year." On a racial prism, the statistics show that people of color are still lagging behind considerably (see table 12).

Supporting the full participation of minorities in the knowledge economy are crucial for the following reasons: 1) to narrow the technological literacy gap between the haves and the have nots; 2) to redistribute wealth and income through their employment in well paying ICT job opportunities; and 3) to maximize the strength of the state's able workforce. Four, 4) states that do not pay attention to this minority empowerment will be blamed for instituting structural pitfalls and administrative bottlenecks to frustrate the success of these groups.

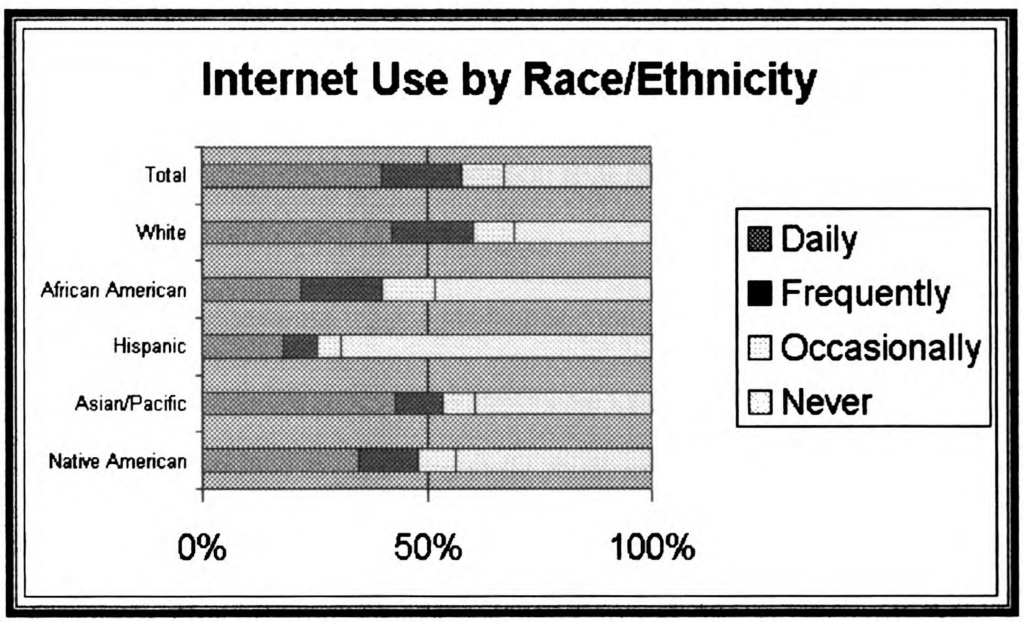
Some of these structural and administrative pitfalls are not physical but invisible stumbling blocks entrenched in the administrative system to favor some groups over others.

Due to the recent glitches in corporate malpractice, e.g. ENRON and MCI corporate embezzlement, and some unexpected economic recessions made worse by 9/11 national tragedy, and the national red alert for terrorist threats many retirees have lost their life savings, investments and pension funds. Many of them are falling quickly into poverty and even beyond the poverty lines due to rising cost of living, burgeoning medical bills, and day-to-day feeding expenses.

According to a survey conducted by Travelers Corporation and Affiliates (http://www.retirementplanner.org/working_after_retirement.html), findings show that "while

many returned workers said they derived social and emotional benefits from working, most said they went back to work to meet living expenses or pay for major special purchases...Many had retired early and therefore had lower Social Security and pension income than they might have had."

Table 12: Internet Use by Race/Ethnicity



Source: http://www.smartmichigan.org

Since they need to survive in this challenging society, it is predicted and expected that in this group are bound to make a second attempt at working because they know for sure that their Social Security Income (SSI) will never be able to cover their daily increasing sustenance bills.

Also of important note to community planners today is the survival rate among the elderly, most especially the baby boomers. Due to some landmark improvements, in health delivery system many people are living longer than before. According to Goode (In Cox H, 200:57), risk to some variety of illnesses "varies with relative wealth or poverty: the higher the rung on the socioeconomic

ladder, the lower the risk." But expectations from stem-cell research, DNR biomedical improvement, and therapeutic cloning may open several doors to the treatment of some diseases, and make the presence for some of our elders stay longer than expected in the system. Confining these people to early retirement and inactive lives exposes them to faster aging processes. Planners need to start planning for this group of people by first starting to include them in workforce training/retraining plans. Congress should also be prepared to look critically into the earnings limitation legislation that structures what retires are able to earn in such return to work by retirees.

The goal of a statewide training/retraining program should be focused on:

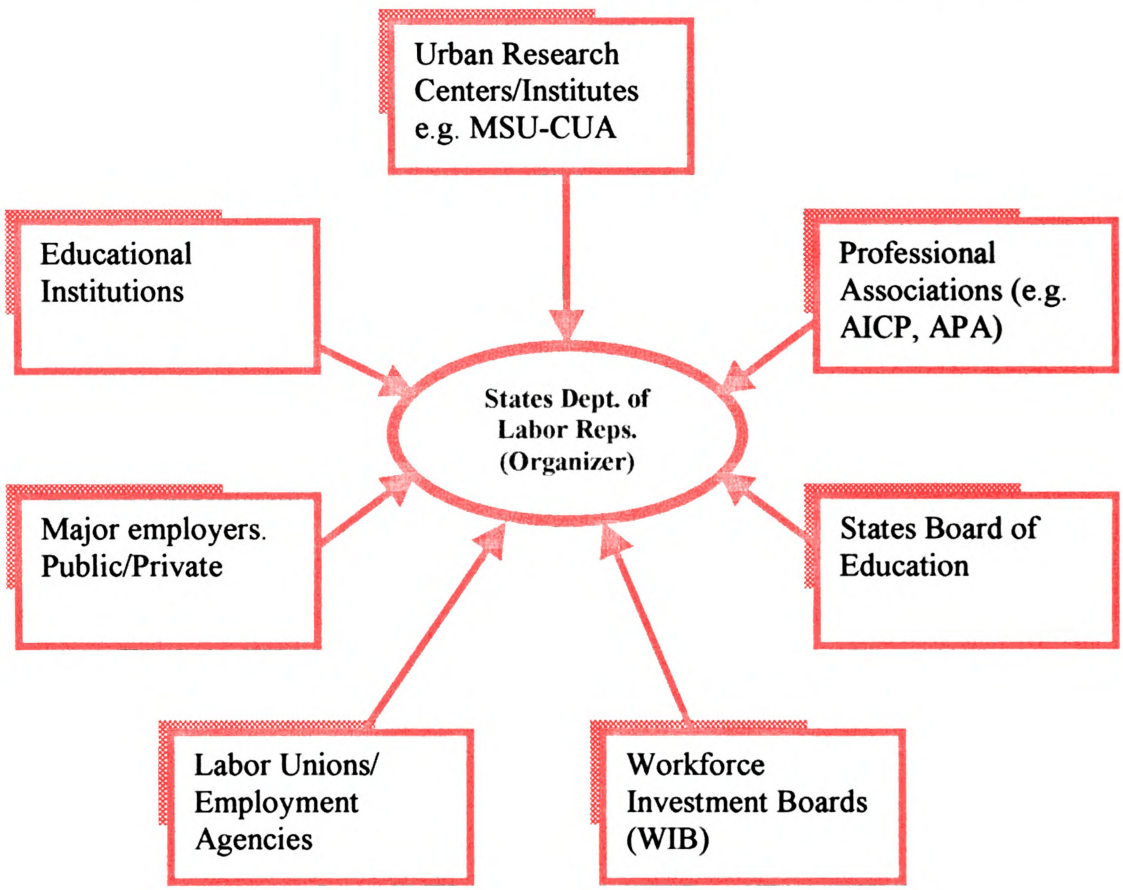
- Standardizing the educational and intellectual requirements for such job positions. To achieve this goal, the state must provide equal funding opportunities for the achievement of qualitative and cognitive education for all people irrespective of their professions, or geographical locations (urban, suburban or rural locations).
- Broadening training decision-making stakeholders.

Without any anti-labor sentiments, it will be ideal to bring to a round-table representatives of labor unions, employers, Michigan Department of Labor, important educational institutions, and other valued stakeholders in the state to work as a team and develop a consensus plan on the requirements and recommendations for a workable training and retraining program in Michigan. In this way, all parties will have a share, stake, and responsibilities in the future success of any collective program reached for workforce improvement

in Michigan. This is an important quality and contribution of the WRTP mentioned in the Atkinson recommendation.

Furthermore, policy recommendations to address this problem will have to include an across the board standardized life-long educational curriculum that can motivate all people, young and old, in the State of Michigan to improve on their existing level of education. For this training to be responsive to the immediate needs of its relevant groups, the training has to be organized at some focused, professional occupational levels. For example, organizing a training/retraining program for Community Economic Development Planners (CEDP) in Michigan, the curriculum would be best designed by including focused group that comprised of the institutions on the schematic plan below.

Map 26:Training/Retraining Curriculum Committee for CEDP's



The above schematic typology recommendation of mine will be organized, directed, and funded by the state's Department of Labor, and the money for training should be taken from the workforce development allocation approved by Congress. All other professional groups are expected to follow this schematic map to build their own standard.

The State of Michigan's present method of funding training/retraining is ambiguous in its specific terms. The process requires that employers willing to train/retrain their employees should apply for funds from the Economic Development Job Training Program (EDJT) from the state, and if found qualified funds will be directed to the cause. The standard for knowing who qualifies for training support is not so clear and the curriculums for organizing training are not so specific.

The above plan of mine provides efficient planning and organization that has built-in checks and balances, and the collaboration of important stakeholders from the profession. The Department of Labor (through the Workforce Investment Act) is expected to advise the committee and provide the funding for such training. Major employers in the group will list the expectations they want their workers to meet and the kind of knowledge they want them to acquire. Education institutions of learning and boards of education will come up with the required courses that will adequately provide present/future workforces with the required knowledge that they will need. Research institutes will update the group on the new trends in knowledge economy and how this might help the future in that profession. Professional associations will be the custodians of professional

ethics. Labor unions/employment agencies will ensure that the interests of the workers will be well protected and will work in accord with employers to control strikes and wage demands. Inputs from these groups will also matter during the training sessions for evaluation, monitoring, and reevaluation of the approved curriculum. One or two of these groups, or any number of groups chosen by the organizers, may also be saddled with the responsibility of leading the training session.

In light of the example given above, attendees to such training/retraining programs would be encouraged to discuss state, county, and township economic development planners, and any other interested private organizations or local divisions. The following are the advantages of this recommendation:

- This would instill confidence in the employer's willingness to recruit fresh graduates from Michigan's institutions. It will definitely improve the relationship and confidence in their quality demands and productivity of the workers. It will also build cordial relationships between the employers and the institutions. Any further retraining and skill acquisition can be developed on this basis and relationship.
- Michigan's higher institutions should endeavor to keep and make available to employers the list of their graduating students for prospective employment opportunities. This can even include the list of its alumni members. Such groups can be reasonably enticed or motivated in helping grow the economy that they once benefited from.

- According to findings made by Partnership for Economic Progress and University of Michigan (2001:4), "cold/bad weather push 7%" of Michigan's workforce out of the state. Since adverse cold weather is one factor pushing indigenous population workforces away from Michigan, it is possible that foreign-born skilled workers may be willing to fill these positions, if offered. Tolerance and accommodation for foreign culture, language/accent and ways of life may be required from Michiganians to make these changes work. This cultural diversity is a phenomenon of the globalization era that we must all live with now.
- The use of funds from the Workforce Reinvestment Act (WIA) apart from its primary purposes should also be broadened to include diversification into science and technology occupations. This can be arranged by offering scholarships and grants for workers and students willing to go back to school or those willing to change their specialization to these fields.
- Brain Drain in Michigan; wealth creation as a Measure.

Brain drain is the outward migration of an areas highly educated workforce to another area of opportunity and best condition of life. This problem can best be addressed in Michigan by introducing empowerment programs that ensure that its citizens will have a stake in the wealth being produced in the state. In this way, people living in the state will see themselves as participants in the economic prosperity of their community. This stake will ensure their stay and dedication to its future progress and prosperity. Young

graduates willing to setup small entrepreneurial businesses, or incubator companies should be encouraged financially. Making venture capital sources of funds available to investors is becoming a major problem today. Michigan can help secure investors trust in companies that raise funds for development by serving as their guarantor against default. Introducing R&D tax credit similar to that in U.K will help stimulate economic growth in the state. Providing

- Providing the needed bandwidth to all areas of Michigan is the only way to include everybody, improve its citizen's quality of life and to promote aggregate community growth that leaves no one behind. The availability of these facilities will provide the needed jobs and reduce the present brain drain affecting the state.
- An area's quality of life will be essential in the knowledge economy. Areas with good quality of life will be able to attract and retain workers with new economy skills than their counterparts (Ivey, 2002).

Proving that Michigan is a state producing knowledge workers in abundance is an easy task to fulfill, but proving that it is losing these workers to adjacent states in its region and other 'sun belt states' may be a difficult task to achieve because of the lack of data to this effect.

Michigan's wealth of well-developed historical institutions grounded in outstanding research in science and engineering and other high-tech industrial jobs is largely supported by the large numbers of qualified graduate students they produce, but facts about why they are leaving right after graduation have not

been well established by data from scientific researchers. University of Michigan, Michigan State University (notable Big Ten universities), and Northwestern Michigan University whose contribution to medical research, biomedical experiments, chemistry, nano technology, fuel cell technology, biotechnology, agro-allied researches, advance manufacturing and ICT development are well known in the nation. These areas of new scientific knowledge contribute greatly to today's knowledge economy evolution and Michigan's leading universities and less influential ones are at the forefront of producing qualified students in these disciplines.

According to the National Center for Education Statistics (NCES 2002), there are about 116 unevenly distributed higher-level institutions in Michigan (see map 27). MEDC's 1999 and 2002 reports show that Michigan's institutions of higher learning continue to increase the numbers of engineering graduates being turned out annually from 5,866 graduates in 1999 to 6,517 graduates in 2002 (see table 12), this high turnout is incomparable to the number of engineering graduates retained so far.

According to the American Association of Engineering Societies, this level of professional workforce turnout placed Michigan 4th in 1999 and 3rd in 2002 in its American engineering graduates state ranking. But there is a disconnect in Michigan's rate of fresh graduate absorption/retention into available job opportunities. According to the Michigan State Licensure Department statistics on licensed professional engineers, the employment rate of licensed professional engineers only increased by 10% between1993 and 2002.

Map 27: Distribution of Michigan's Higher Level Institutions, 2002

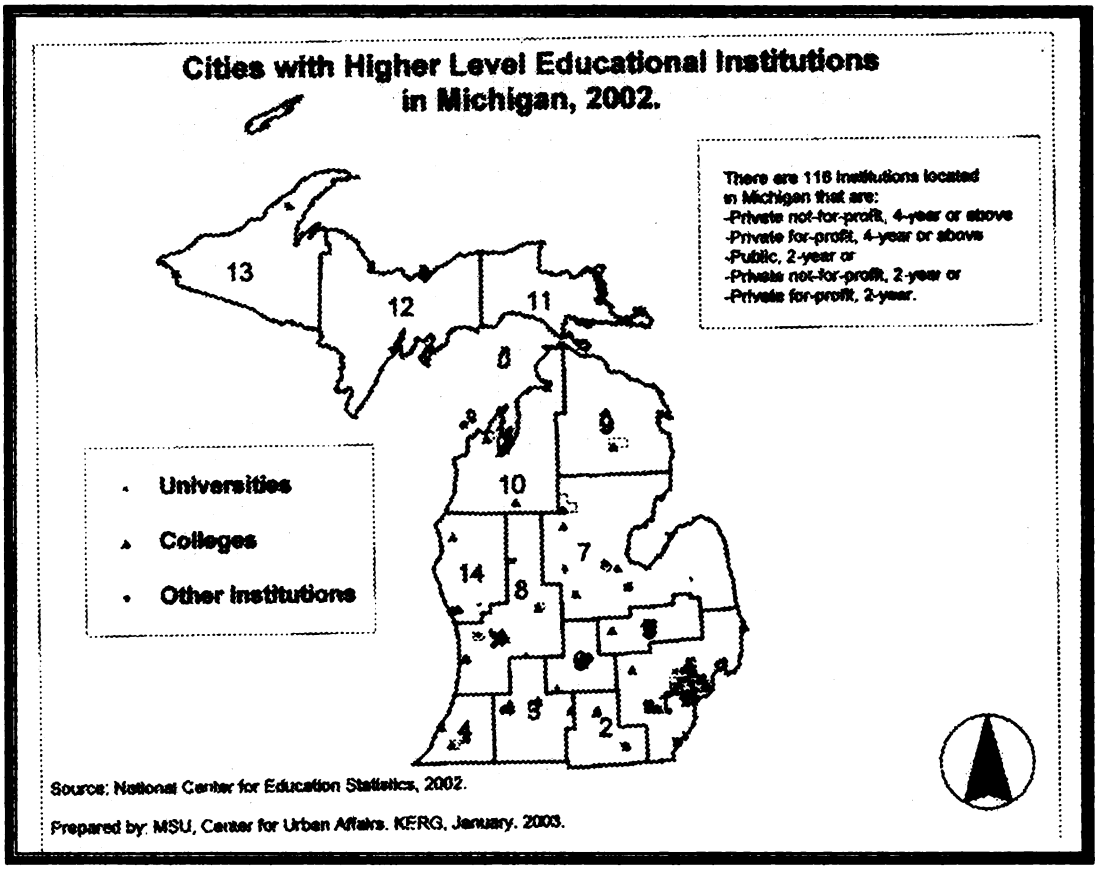


Table 12: Michigan's Engineering Graduates

	B.Sc	M.Sc	Ph.D	TOTAL
Year 1999	3,705	1884	277	5,866
Year 2002	4,156	2,075	286	6,517
TOTAL	7,861	3959	563	12,383

Source: MEDC, 2002 (Education and Research)

The average number of engineers employed on a yearly basis stood at a conservative number of 105 for in-state engineers, and 15 for foreign engineers. Comparing 1999 and 2002 graduation rates to retention rate figures, only 2% in 1999 and 3% in 2002 of licensed engineering graduates were retained in the state. This retention rate percentage shows a disconnect between their staying

and living in Michigan and therefore buttresses the fact that engineers groomed by Michigan's vital educational investments are servicing other states.

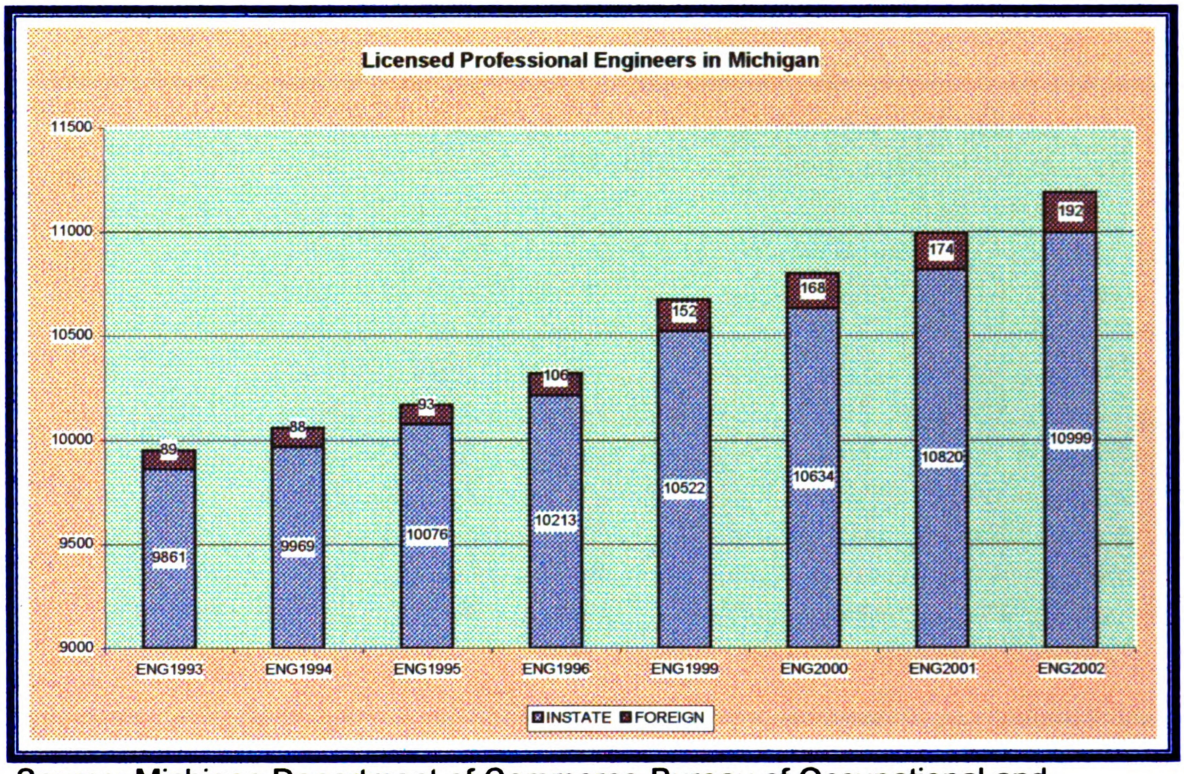
The table 13 below show the growth patterns of Michigan's licensed professionals from 1993 to 2002. The original data, which is on a county level, show large concentrations of these professionals in Michigan's metropolitan areas. This supports the fact that major industries are located in the big cities while rural areas tend to have fewer professional engineers in them. For example, about 30 counties in the state have, at some time, less than 25 licensed engineers in their jurisdiction. Lake County and Oscoda County have had less than eight professional engineers in the last ten-year period (see table 14).

According to U.S Census Bureau estimates, emigration losses to other states have been relatively cushioned by the net international migration into the country. In the year 2000, 6,418 international migrants from abroad replaced the 2,577 people that moved out of Michigan. Likewise in 2001, over 20,000 people were reported to have moved out of Michigan while 25,000 international migrants replaced their movement (see table15). But in 2002 only 25, 678 international substitutes could replace the 26,728 people that moved into other states, leaving Michigan with a population deficit of about 1,050 people.

According to a recent joint report by the Partnership for Economic Progress and University of Michigan (2001:4), "graduates that choose to accept an out-of-state job do so primarily because of better job opportunities and better salaries – 53% left because of a 'better job or better opportunity.' 11% moved

out-of-state to be closer to friends and family, 7% left to get away from the cold/bad weather and 4% cited the lack of social/cultural life."

Table 13: Growth Patterns of Michigan's Licensed Engineers, 1993 – 2002.



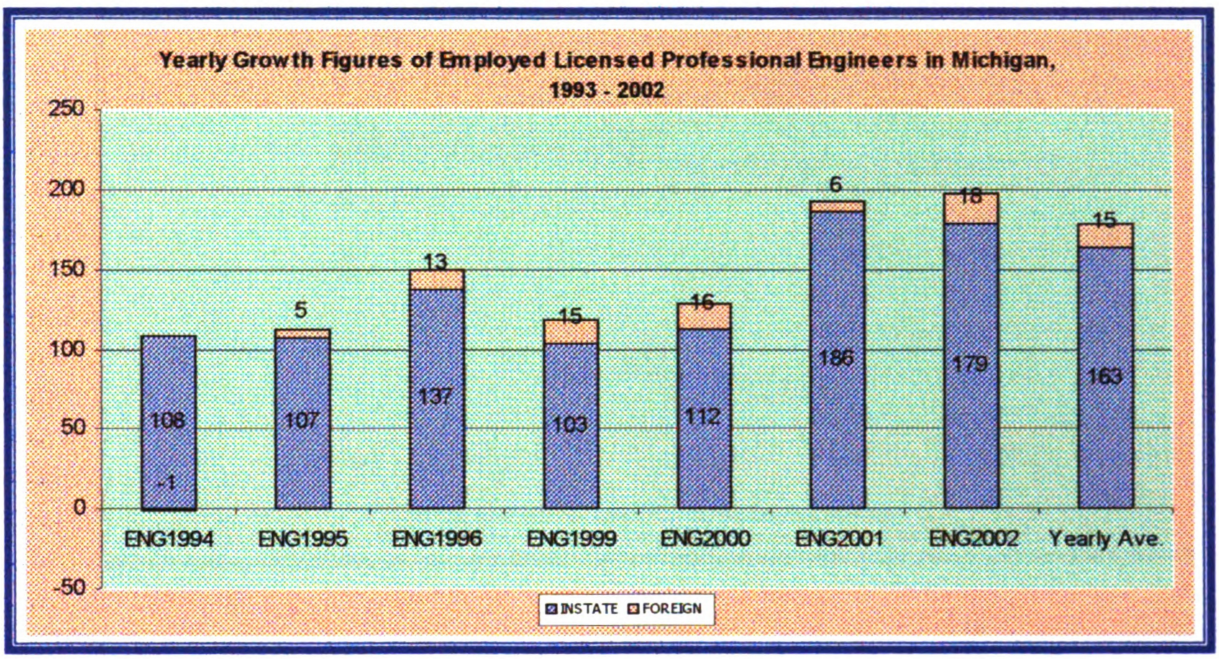
Source: Michigan Department of Commerce-Bureau of Occupational and Professional Regulation, 2002.

Though the report stated that Michigan might be retaining around 67%-84% of her technical graduates, the report also asserted, based on anecdotal evidence, that "there was some belief that technically skilled graduate out-migration might be higher in Michigan"(p.5) than the report predicted.

Since Michigan's birth rate has remained relatively constant for some period, this large emigration problem, which firms may read as a lack of enough labor force, may have a significant toll on business retention and attraction in the

manufacturing industries and likely on others that are considering settling in the state in the near future.

Table 14: Yearly Growth Rate of Licensed Engineers in Michigan, 1993 – 2002.

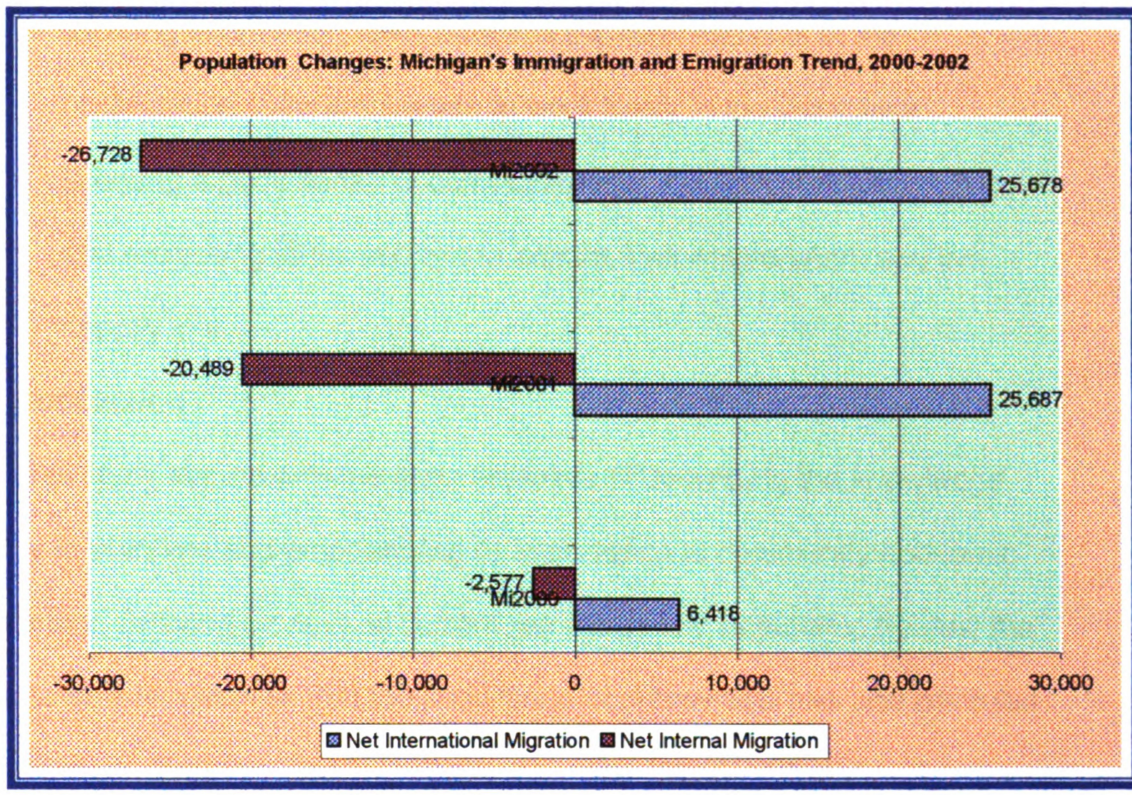


Source: Michigan Department of Commerce-Bureau of Occupational and Professional Regulation, 2002.

To retain engineers in Michigan the following recommendations are valuable:

- Employers should offer potentials in areas of revenue increases to their employees.
- Strategies in buying-up fresh graduates educational loans or debt and converting it to service year is becoming a common contract in human resources.

Table 15: Michigan's Migration Pattern, 2002



Source: U.S. Census Bureau, 2002.

- Offering strong support for work and family responsibilities of employees through the organization of activities for employees siblings, or allowing employees to pursue their educational careers is important.
- Employers should consider giving opportunities, encouragement, and support to the skills of all their employees.
- According to Miller, treating employees as business partners is a new workplace culture that propagate mutual honesty, respect, trust, openness, support for continuous growth, and regard for each other's best interests (Miller, 1998).

- Maintaining transparency in the content of contract agreement and allowing information flows between the rank and files of the organization allow employees to work freely in the workplace.
- Creating a good sense of community that is safe for working, living, and recreating allow workers to admire their environment and live happily in it.

4.5 Conclusion

This study started with the main objective of describing the knowledge economy to planners and emphasizing its importance to community economic development. Drawing on several current literatures and population figures, the study was able to establish that the knowledge economy was real and not a fad as some people thought. The knowledge economy has contributed to the nations Gross Domestic Product and will continue to do so in the near future. For how long the (knowledge economy) phenomena will last is not actually predictable, but certain is the fact that it embraces all the facets of the U.S economy, both old and new. Also basic is the fact that the knowledge economy has demanded from any spatial continuum three fundamentals that are imperative to initiating community growth, i.e., knowledgeable workforce, newer high-tech infrastructural facilities, and focus on research and development. Communities concerned and willing to maintain pro-growth policies must critically examine these indicators and objectively rate themselves. This objective rating will provide them the information they needed to initiate growth policies. The twenty-four indicators reviewed in this research showed that in the U.S Midwest

Economic Development Administration region Michigan's performance was in the third position. To meet-up with this competitive challenge from other states Michigan must improve its rating on the indicators.

Based on these fundamentals, this study has drawn significant conclusion on why Michigan's present workforce entrants needed to improve their employability skills through training/retraining programs, acquiring team working skills, being dependable and in improving their writing and oral communication skills. To build this mindpower resources the research recommended, amongst others, a broader scoped committee of stakeholders that includes the employers, researchers, labor unions, and educational institutions that will draw-up a useful curriculum for improving workforce employability skills. The research also recommended that all workers should see learning at work as a long-life issue and be willing to acquire newer skills that innovative technology will constantly bring in their ways.

Globalization and innovation in high-tech businesses has introduced new indicators for initiating community economic growth around the world. For community planners, whose goals are to encourage economic growth in their communities and provide/retain job opportunities, the indicators analyzed in this report can lead them to knowing what are their community's strengths and weaknesses. The indicators clearly show how they can build on their strengths and carve out a niche of advantage for themselves in the new knowledge influence economy. However, these indicators emphasize the importance and availability of venture capital funds, patents, and infrastructures for the success

and propagation of these small entrepreneurial businesses that must operate in this highly competitive global market.

As the analytical section of this research confirms, population emigration amounting to significant brain drain of Michigan's mindpower continues to diminish Michigan's chances of positive participation in the knowledge economy. Michigan's present investment in the Life Sciences corridor, Fuel Cells, and other biomedical fields are very important investments that can improve its participation provided the needed mindpower are available to chart its course. Thus, this present a great challenge to the planners who must have to develop a formula for the social needs of these groups. These groups cut-across the different age cohorts on our demographic and racial charts and may be requesting special needs. Encouraging small business formation and assisting them through Small businesses Administration services, providing secured funds for investment, broadening the scope of the Workforce Investment Act, and introducing R&D tax credit are some valuable recommendations offered to improve Michigan's economic growth. Also of importance is the need to correct the states indifference to people of colors drive towards economic self-sufficiency. All people should be given equal opportunity to survive in this already difficult globalizing economy. This equity approach will generate trust, confidence, and involvement, between the state and its citizens. Financial empowerment like the "$6,000 Solution" asset investment idea of Boshara can be a first step approach to leveling the playground for Michigan's working poor kids.

To offer equal growth opportunities to all Michigan communities this research emphasize equal distribution of broadband communications technology, and supports that further studies in regional finance sharing will offer Michigan ailing communities the opportunity to solve their financial and social amenity problems. In light of the above, pro-growth Michigan communities should ensure that their communities are well connected with high-tech information and communications technology, they have good roads, and efficient utilities like water, road, telephone, and source of sustainable power. Social amenities like good schools and other higher educational facilities, affordable office spaces, and recreational (indoor and outdoor) facilities will be very important facilities that will attract these groups of mindpower professionals. Communities or regions that have them in abundance will benefit most. Michigan's glory as the automobile state and arsenal of democracy grants it no exception from these new demands. Further studies on how homeland security will influence community economic development and the spatial distribution of businesses will be a very important planning study in the near future.

4.6 Further Research Areas

This era of change as produced by the knowledge economy has definitely impacted our economy. It has produced both positive and negative synergies that economic development planners cannot fail to pay particular attention to. Thus, further research into the following areas may bring greater understanding to future planners whose duties it will be to understand the problems and find lasting solutions to them.

Spatial Impact of Venture Capital Funds: Future economic development plan for Michigan communities will be impacted by the spatial distribution of venture capital funds in the state. This assertion was proven in the United Kingdom when Mason and Harrison (2002) observed that classic venture capitals- the capital used for investments in young entrepreneurial companies with high growth potential, facilitates job creation and economic growth. While its counterpart, merchant venture capital, the investments in large-scale management buy-outs and buy-ins, facilitate corporate restructuring through ownership change but often has adverse effects on employment. Planners and communities in Michigan need to further understand how these factors will impact developments in their neighborhoods.

Regional Finance Sharing: Fractionalized economic development planning has made large-scale coordination and cooperation difficult between communities in Michigan. This need as called for a timely formula for regional finance sharing that may secure the future of ailing and virile communities. Regional planners like Orfield (1998:10) have argued that regional cooperation would help to reduce the duplication of services that has amounted to enormous financial wastes in our communities. Studies in this area will help Michigan consolidate the advantages of globalization in its economy.

Spatial Infrastructure Divide: Notable difference is presently being observed in Michigan's infrastructure connectivity. Michigan communities are being divided along the income, class, rural and urban, central cities and suburban community lines. To control this, infrastructure divide studies will be needed in this area so

that Michigan's spatial continuum can have a positive uniform growth that it wants.

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