

USING CLUSTER-BASED ECONOMIC DEVELOPMENT TO ENHANCE THE ECONOMIC COMPETITIVENESS OF NORTHWEST OHIO'S GREENHOUSE NURSERY INDUSTRY¹

Neil Reid
Department of Geography and Planning
The Urban Affairs Center
The University of Toledo
Toledo, Ohio 43606

Michael C. Carroll
Department of Economics
Center for Regional Development
Bowling Green State University
Bowling Green, Ohio 43403

1. INTRODUCTION

In recent years a large number of communities around the world have adopted cluster-based economic development as a strategy to propel their economies to new levels of economic competitiveness (for example see Lundquist and Power, 2002; Solvell et al, 2003). Despite concerns, in some quarters, over the ability of a cluster-based development strategy to deliver its promised economic benefits (Martin and Sunley, 2003) the greenhouse nursery industry in northwest Ohio has adopted this particular approach to retain its competitive edge in an increasingly competitive industry. Like many northwest Ohio industries, the greenhouse nursery industry is facing increasing international competition. In particular, competition from southern Ontario is threatening the future viability of many northwest Ohio greenhouse nursery operations. The northwest Ohio greenhouse cluster is in its formative stages of development. The cluster is being supported by university researchers who function as the Cluster Strategy Team (CST)². The purpose of this paper is to report on the genesis, evolution, and current status of the cluster. As such this paper is exploratory and descriptive. While the authors believe that the initiative described in this paper has the potential to have a significant and positive impact on the competitiveness of the northwest Ohio greenhouse industry it is too early to make any such impact assessment.

2. CLUSTER-BASED ECONOMIC DEVELOPMENT

Cluster-based economic development is premised on the idea that a geographic region, and the businesses that it contains, can compete more effectively when everyone in the region works together to the common benefit of all the stakeholders. A cluster can be defined as "geographic concentrations of interconnected companies and institutions in a particular field" (Porter, 1998). Clusters, by definition include not only business entities such as companies, but also universities, trade associations, financial institutions, vocational training providers, economic development agencies, and any other entity that can be considered "important to competition" (Porter, 1998, 78). Participation in a cluster enables firms to operate more productively. It does so because cluster participants have better access to resources such as information, ideas, technology, suppliers, and markets than they would have if they were operating in isolation. A cluster is much more than just a geographic concentration of interrelated firms. Clustering is really a process whereby competitor firms work together to solve problems and address challenges that, due to the lack of resources, they are unable to

¹ This research is funded by USDA grants CSREES 2003-06230 and CSREES 2004-06222. The research team comprises faculty and staff from Bowling Green State University, Indiana State University, The Ohio State University, The University of Toledo, and Toledo Botanical Gardens.

² Dr. Michael Carroll and Dr. Neil Reid were chosen to function as the Cluster Strategy Team.

address and solve as individual business entities. As noted by Porter (1998, 88) “the mere co-location of companies, suppliers, and institutions creates the potential for economic value; it does not necessarily ensure its realization”. Economic value is created through what Schmitz and Nadvi (1999) call *collective efficiency*. Collective efficiency is the competitive advantage that can be attained through the combination of external economies of scale **and** joint action. While external economies of scale are *passive* (and often fall into the producer’s lap) joint action is *active* and can only be derived through conscious collaboration (Schmitz and Nadvi, 1999). Collective efficiency is powerful and is the essence and lifeblood of successful cluster-based economic development initiatives. The central focus of any cluster strategy should be getting firms to work together to identify collaborative solutions to commonly shared problems (Diez 2001). Successful clusters promote collective learning that tends to be bottom-up and interactive in nature (Landabaso, 1995). Empowering the business owners and decision makers to identify a collective pathway to higher levels of competitiveness is critical to cluster success. One of the biggest challenges facing cluster-based economic development initiatives is that of getting competitors to trust each other and to agree to make a conscious effort to work together on joint initiatives. Trust is embedded within the concept of what economists term *social capital*. Social capital is those “features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions” (Putnam et al, 1993, 67). Social capital plays a critical role in the development of a successful cluster initiative (Hospers and Beugelsdijk, 2003).

With over five hundred cluster-based economic development initiatives worldwide (Solvell et al, 2003) there is, not surprisingly, a wide array of organizational and morphological forms that clusters take on. Indeed, every cluster-based economic development initiative should be unique and should be designed to reflect the cultural, political, and economic context of the geographic region within which it functions (Diez, 2001; Porter 1998). It is extremely difficult to create successful clusters from scratch and building upon the existing industrial strengths of a geographic region is the foundation of most successful cluster initiatives (Castells and Hall, 1994; Schmidt and Nadvi, 1999; Hospers and Beugelsdijk, 2002).

While each cluster initiative should be unique and designed to accommodate the specific cultural, political, and economic realities of the region it is possible to learn from successful cluster projects in other geographic locations. To learn more about how a successful cluster-based economic development strategy works the Cluster Strategy Team (CST) spent four days in the West Midlands region of England in August 2004. The greenhouse cluster is only one of eight clusters being developed in the northwest Ohio region.³ The West Midlands was chosen for a site visit because the region has a similar economic history to NW Ohio, is developing a similar number of clusters (10 in the West Midlands case, 8 in the NW Ohio case), and there is some overlap in terms of the clusters being developed in each region (e.g. both regions are developing automotive, advanced engineering, transportation, and information technology clusters). Were we in the process of developing just the greenhouse cluster in NW Ohio then the West Midlands would, arguably, not have been the best destination for a site visit. However, the CST was interested in identifying generic best practices that we felt might be applicable to a wide range of clusters in NW Ohio. We felt that this could be best achieved by visiting a region that had a similar economic history and was developing a similar broad range of clusters. The West Midland’s cluster strategy is coordinated by the region’s development agency, Advantage West Midlands (www.advantagewm.co.uk). Major cities within the region include Birmingham and Wolverhampton. While there, the CST met with approximately twenty-five individuals involved in the region’s cluster-based economic development initiative. This included a day spent with Paul Butler, the Champion for the Advanced Engineering Cluster. Cluster Champions play a critical role in success of the West Midlands’ clusters. The primary tasks of the Champion are to spend time in the field, visiting firms, identifying opportunities for inter-firm collaboration, and organizing networking events. Identifying and helping to implement collaborative opportunities are central goals of the West Midlands’ cluster initiative. Knowledge and information gleaned from the CST’s visit to the West Midlands were used in the development of the northwest Ohio greenhouse cluster.

3. NORTHWEST OHIO’S GREENHOUSE NURSERY INDUSTRY

The greenhouse nursery industry⁴ has a significant presence in northwest Ohio⁵ (Figure 1). Lucas County, the region’s most heavily urbanized county, ranks 4th in the state and 94th in the nation in terms of the dollar

³ The other seven are clusters being developed in northwest Ohio are automotive, plastics, glass, information technology, alternative energy, transportation logistics, and advanced engineering.

⁴ The greenhouse nursery industry corresponds with the North American Classification System (NAICS) code 1114 and is defined as “establishments primarily engaged in growing crops of any kind under cover and/or growing nursery stock” (U.S. Census Bureau, 2002 NAICS Definitions).

value of nursery and greenhouse crops sold. These rankings place Lucas County in the top five percent of counties statewide and the top four percent of counties nationwide for sale of nursery and greenhouse crops. In 2002 Lucas County generated \$18.2 million in nursery and greenhouse sales, while sales in the five-county region were \$39.8 million (USDA 2005). The industry is responsible for generating over 750 jobs in northwest Ohio and has an economic impact of almost \$100 million in the local economy. The industry has a rich history in northwest Ohio and can be traced back to European immigrants who settled in the region during the 19th and 20th century.

Despite the national prominence of northwest Ohio as a greenhouse nursery-producing region there is very little systematic knowledge about the nature and structure of the industry. This lack of knowledge has become particularly evident in recent years, as the industry has come under pressure from competing regions that have been able to use technology, investment, and policy levers to bolster their industry. It has become increasingly apparent that understanding the economics of northwest Ohio's greenhouse nursery industry is necessary if the industry is to remain competitive. The starting point for increasing understanding of the challenges facing northwest Ohio's greenhouse industry was to conduct a census of greenhouse nursery operations in northwest Ohio.

FIGURE 1
NORTHWEST OHIO



4. INDUSTRY SURVEY

To better understand the nature and structure of northwest Ohio's greenhouse nursery industry a questionnaire survey was administered by mail. The survey was sent to 82 growers in the five-county northwest Ohio region (Figure 1). These 82 growers represented the entire population of growers in the region. The survey was administered by mail using the Dillman method (Dillman, 1978)⁶. A total of 27 responses were obtained, giving a response rate of 32.9 percent. The survey was conducted during the months of March, April, and May of 2004.

The survey comprised seventy-five questions. The questions asked were broad ranging and covered a wide variety of topics including size of current operations, modernization and expansion plans, continuing education interests, use of technology, perception of competition, competitive strategies employed, and thoughts about the future health of the industry in northwest Ohio.

⁵ Northwest Ohio is defined as a five-county region – Erie, Fulton, Lucas, Ottawa, and Wood counties (Figure 1)

⁶ Over the survey period greenhouse growers received an initial survey by mail. Non-respondents received up to two follow-up surveys plus a visit from a member of the research team to encourage them to complete the questionnaire.

5. INDUSTRY PROFILE

As noted above, the greenhouse nursery industry has a long history in the northwest Ohio. This longevity is represented in the current greenhouses located in the region. Based on survey results, over half (52 percent) have been operating at their current location for over forty years. The industry is also highly seasonal with less than half (46 percent) of the greenhouse nurseries operating year round. This high level of seasonality is reflected in the employment patterns, with 62 percent of employees hired on a seasonal basis. The industry has a strong family orientation, with 63 percent of full-time employees being members of the owner's family. Labor (along with fuel costs) represents the most significant incurred by growers. Northwest Ohio's greenhouse industry is dominated by floriculture production. Floriculture products comprise over ninety percent of the sales of surveyed growers.⁷ The markets for these sales are very local in nature with 71 percent being sold on-site and 78 percent being sold within the state of Ohio. The average size of northwest Ohio greenhouses is 45,000 square feet. The northwest Ohio greenhouse industry remains very labor intensive with less than ten percent of essential functions (e.g. fertilizer application, irrigation, media mixing, ventilation, etc) being fully automated.

6. INDUSTRY FORECASTS AND SOURCES OF COMPETITION

The survey asked a number of questions about the challenges, both current and future, facing the greenhouse nursery industry in northwest Ohio. For this paper we are particularly concerned with how northwest Ohio growers perceive the short-term (five-year) health of their industry and from where they perceive the main competition emanating. The survey revealed that many of the growers in northwest Ohio are concerned about the industry's short-term health. Forty percent of those surveyed feel that the region's greenhouse industry is going to be less profitable over the next five years. As a result, 15 percent of those surveyed are planning to either downsize or close their greenhouse operations during the next five years. This pessimistic forecast is not surprising given the increasingly competitive environment within which the growers are operating. The northwest Ohio greenhouse growers are particularly concerned with competition from Canada. When asked to rank the extent of competition from various geographic regions the highest level of perceived competition was identified as coming from Canada. Half of the growers surveyed ranked competition from Canada as being high (Figure 2).

Grower perception that Canada is a significant competitor region is supported by trade data. During the period 1995-2004 a growing trade gap between the U.S. and Canada in floriculture products emerged (Figure 3). In 1995 the U.S. floriculture trade deficit with Canada was \$11.2 million. In 2004 it stood at \$35.3 million. The primary source region for U.S. floriculture imports from Canada is Ontario. Ontario accounts for nearly half (44.9 percent) of the value of Canadian floriculture exports to the United States. The most important single destination region for Ontario floriculture exports to the United States are the Great Lakes states (Illinois, Indiana, Michigan, Ohio, and Wisconsin). Great Lakes states receive 39.2 percent of Ontario's floriculture exports to the United States. Ontario has a positive and growing balance of trade with Ohio in floriculture products. In 1995 the trade gap between Ontario and Ohio was \$531,186. By 2004, this trade gap had increased to \$2,014,171 (Figure 4). It is against this competitive backdrop, and the knowledge that Ontario had formed its own greenhouse cluster (The Ontario Greenhouse Alliance, 2005) in 2003, that the decision was made to establish the northwest Ohio greenhouse nursery cluster.

FIGURE 2
PERCEIVED SOURCES OF COMPETITION FOR NORTHWEST OHIO'S
GREENHOUSE NURSERY INDUSTRY

⁷ Floriculture production corresponds with the North American Classification System (NAICS) code 111422 and is defined as "establishments primarily engaged in growing and/or producing floriculture products (e.g. cut flowers and roses, cut cultivated greens, potted flowering, and foliage plants, and flower seeds) under cover and in open fields" (U.S. Census Bureau, 2002 NAICS Definitions).

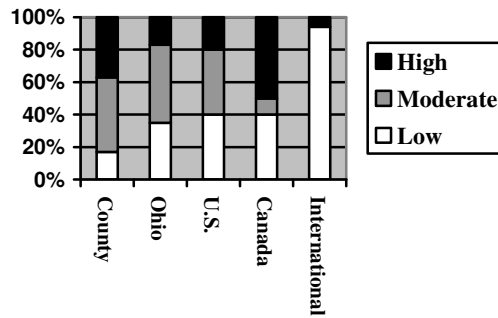
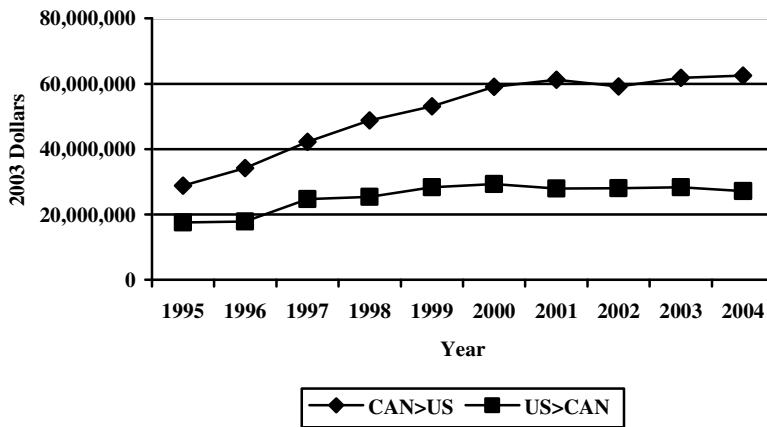


FIGURE 3
CANADA-U.S. FLORICULTURE TRADE, 1995-2004

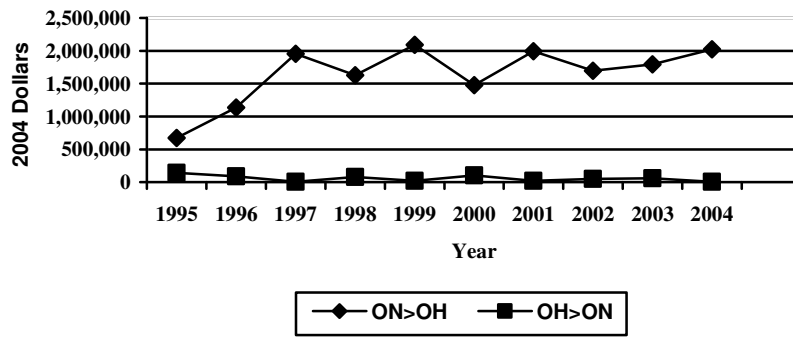


Source: (Compiled from data available at www.strategis.gc.ca)

7. NORTHWEST OHIO'S GREENHOUSE NURSERY CLUSTER: FROM CONCEPT TO IMPLEMENTATION

The northwest Ohio greenhouse cluster has its genesis in the office of U.S. Congresswoman Marcy Kaptur. Ms. Kaptur is one of the longest serving members of Congress, currently serving her twelfth term. For many years Ms. Kaptur has maintained a keen interest in the economic welfare of northwest Ohio's greenhouse industry. In 2003, as the ranking member of the Congressional Appropriations Agriculture Subcommittee, she was able to secure funds for an economic study of northwest Ohio's greenhouse industry. As part of the economic study a survey of northwest Ohio growers was conducted (see above). An analysis of the survey findings indicated that northwest Ohio's greenhouse industry was facing an uncertain economic future. Competition, particularly from southern Ontario, was threatening the economic viability of the region's greenhouse growers. In response to this threat the research team decided that a cluster-based approach was the best response to the industry's competitive challenges. The authors were chosen to lead the development of the northwest Ohio greenhouse cluster. An additional year of funding was secured through the efforts of Congresswoman Kaptur and the Cluster Strategy Team (comprising Drs. Reid and Carroll) began the process of establishing the northwest Ohio greenhouse cluster.

FIGURE 4
ONTARIO-OHIO FLORICULTURE TRADE, 1995-2004



Source: (Compiled from data available at www.strategis.gc.ca)

If a cluster-based approach was going to be successful in northwest Ohio it was critical that the Cluster Strategy Team recognized that the growers themselves accept and take ownership of the strategy. In October 2004, to begin the process of obtaining grower buy-in the Cluster Strategy Team made a presentation on cluster-based economic development to a small group of eight growers. The Cluster Strategy Team utilized the knowledge and expertise of the local agricultural extension agent in identifying growers who should attend this presentation. The growers attending were carefully chosen as they were recognized as being among the region's most open-minded and innovative. Care was also taken to ensure that this group represented both the economic and geographic structure of the industry. This initial group, therefore, included both retailers and wholesalers of greenhouse products. Growers from inside the city of Toledo, from suburban communities, and from communities outside the urban area were also represented. This was a critical presentation and discussion. Rejection of the cluster concept by these growers at this early stage would have probably signaled the death-knell for the initiative. Fortunately, the growers present recognized the utility of the concept and decided that they would like to further explore the possibility of developing a greenhouse cluster in northwest Ohio. A subsequent meeting (December 2004) between the CST and the same small group of growers was used to further explore the cluster concept and, more importantly, to continue the process of developing mutual trust and respect. In January 2005 the cluster concept was presented to a larger number of northwest Ohio growers at the annual winter conference of the Toledo Area Flower and Vegetable Growers Association (Carroll and Reid 2005). Approximately twenty-five growers attended this presentation. The presentation described the economic realities facing the northwest Ohio greenhouse industry, presented the premises underlying cluster-based economic development, and outlined how the development of a greenhouse cluster might be a vehicle to higher levels of economic competitiveness for northwest Ohio growers. This presentation brought additional grower support for the cluster initiative. This support manifested itself in higher levels of grower attendance at meetings of the cluster advisory board.

Having presented the cluster concept to many of the region's growers the next step was to establish the infrastructure necessary to operationalize the strategy. Successful implementation of the strategy would require establishment of an Advisory Board and appointment of both a Project Manager and a cluster Champion. The Project Manager identified, Mr. Joe Perlaky, had experience working in both the public and private sectors. His private sector experience had been as owner of a small business (a dry cleaning service). He, therefore, understood the challenges of running a business of a size similar to many of the greenhouse nursery operations. His public sector experience comprised of holding the position of Commissioner of Economic Development for the City of Toledo, Ohio, as well as being Executive Director of a non-profit development foundation for the city of Oregon, Ohio. Mr. Perlaky is also a graduate of The University of Oklahoma's Economic Development Council. The role of the Project Manager is to provide administrative and strategic visioning support to both the cluster Advisory Board and cluster Champion. A 14-member Advisory Board was established. The board comprised seven growers and representatives from academia, the Regional Growth Partnership (northwest Ohio's primary economic development agency), the U.S. Department of Agriculture, the Ohio Florists Association, Ohio State University Extension Service, and Congresswoman Kaptur's Office. The Advisory Board, officially established in January 2005, agreed to hold 9 to 10 meetings per year⁸. Its main function is to work with the Project Manager and the Champion to identify and implement solutions to challenges facing the greenhouse nursery industry in northwest Ohio.

⁸ During months that were particularly busy for the growers (e.g. May) advisory board meetings will not be held.

The first task facing the Advisory Board was to identify a Champion for the cluster. The choice of cluster Champion was decided upon not by the whole Advisory Board, but by those members who were growers. If the cluster is going to be successful it is necessary that the growers take ownership of the cluster (Landabaso 1995). They are, therefore, given the privilege of making certain key decisions, such as choosing the cluster Champion. The CST did provide the growers guidance in choosing the Champion, however. Based upon the CST's visit to the West Midlands, and knowledge of other cluster initiatives, the growers were given some key characteristics that a Champion should possess. The cluster Champion needed to have significant knowledge of and experience working in the greenhouse industry. He/she had to be respected and trusted by local growers. Finally, the Champion had to be a visionary and capable of thinking in innovative and creative ways (Wisconsin Department of Commerce 2002, Yorkshire Forward 2004, Council on Competitiveness 2005).

In choosing a Champion and defining his/her role the Advisory Board were conscious that they had to avoid overlap between the duties of the Champion and the local agricultural extension agent who was already in the field. The role of the extension agent, who was also a member of the Cluster Advisory Board, was quite clearly defined. The local agricultural extension program, headquartered at The Ohio State University, has an educational mission (www.ag.ohio-state.edu/~extension). The role of the cluster Champion is quite distinct from that of the extension agent. Consistent with the role played by cluster Champions in other locations (e.g. Solvell, Lindqvist, and Ketels 2003, Yorkshire Forward 2004, and Advantage West Midlands 2005) the northwest Ohio greenhouse cluster Champion's primary responsibilities are identifying opportunities for collaboration among growers, acting as a liaison between the cluster and non-cluster actors (e.g. university researchers), and to organize networking activities that can facilitate information exchange and trust building.

The growers' first choice for Champion was a retired Ohio State University extension agent. The position of Champion is a half-time position (20 hours per week) and seemed suited to an individual who was retired. Having a retired extension agent function as Champion also fit the profile of the position. He was known and respected by all the growers in the region. Furthermore, he had an in-depth knowledge of the industry. The individual identified was initially enthusiastic about the opportunity that this position potentially afforded him. However, as he learned more about the nature of the position he decided, in February 2005, to decline the offer. The Advisory Board was keen to get the Champion in place and to have him/her get into the field and to start visiting and networking with growers. The growers were asked to identify another individual to fill the role of Champion. Their next candidate identified by the growers was an interesting one and presented both challenges and opportunities for the northwest Ohio greenhouse nursery cluster. Dean Krauskopf is a Michigan State University (MSU) agricultural extension agent who has over 20 years of experience in working with the greenhouse industry in southeastern Michigan. He also holds a Ph.D. in horticulture from North Carolina State University. Before Dr. Krauskopf could commit to the position of Champion, however, he had to obtain the necessary permission from MSU extension. Would they be willing to let one of their extension agents spend twenty hours per week assisting the greenhouse industry in another state? Would they view this activity as a conflict of interest? Or would they (as some northwest Ohio growers had) view this as a window of opportunity that had the potential to blossom into potential future collaborative relationships between southeast Michigan growers and northwest Ohio growers? After all, many southeastern Michigan growers were facing the same competitive challenges as their counterparts in northwest Ohio. Certainly, the potential for developing a greenhouse cluster that extended across state boundaries was intriguing. As it turned out, permission was granted and Dr. Krauskopf assumed the duties of the northwest Ohio greenhouse cluster Champion on May 1, 2005.

Having established the infrastructure (Project Manager, Champion, and Advisory Board) for the northwest Ohio greenhouse cluster the next phase of the project was to move towards implementation. The Advisory Board discussed a number of different projects as the starting point for cluster activities. Two issues emerged, however, as priority for northwest Ohio's greenhouse industry. These were energy costs and the branding and marketing of the industry. The survey (see above) had identified natural gas costs as major factor that was contributing to lower profit margins. The growers on the Advisory Board confirmed this. The survey had also revealed that northwest Ohio growers had a significant lack of knowledge when it came to effectively marketing their product. Again, the growers on the Advisory Board confirmed the importance of this issue. After some discussion the Advisory Board chose branding/marketing as its first cluster project. There were a number of reasons why this issue was chosen to receive priority over that of high energy costs. First, branding is essential to the competitiveness of any cluster. A study by Lundquist and Power (2002) of 13 cluster initiatives in Sweden, ranging from wood products to pharmaceuticals, showed branding to be a critical component of cluster success. Second, the survey of northwest Ohio growers had identified the lack of knowledge with respect to marketing as a critical competitive challenge facing the industry. Third, the Advisory Board felt that branding would be an initiative that growers would be willing to collaborate on. Developing an identifiable brand and marketing strategy for the northwest Ohio greenhouse industry has the potential to allow growers to increase market share, charge higher prices, and secure larger profit margins (Lindsay, 2000). Fourth, the Advisory Board felt that developing a brand and marketing strategy for the

cluster would be a much easier issue to tackle than that of high energy costs. The potential for success was greater with the branding/marketing project. Having a successful first project was considered critical to the future of the cluster.

The development of a brand and marketing strategy for the cluster is under way. A contract has been signed with a local branding consultant (Thread 2005). The consulting firm has started meeting with growers to begin the process of establishing an identifiable brand for the cluster and developing a comprehensive marketing plan.

8. CONCLUSION

This paper has described the genesis, evolution, and current status of the cluster of the northwest Ohio greenhouse cluster. The decision to utilize a cluster-based approach to secure the economic future of the industry is a response to a number of stark realities facing greenhouse growers in northwest Ohio. First, competition is increasingly international in nature. Second, many of these international competitors (e.g. southern Ontario) are becoming increasingly sophisticated in terms of their competitive strategies. Coming together, forming a cluster, and facing the future together seemed to be a promising way forward for the industry. The cluster is in its formative stages. A Project Manager and Champion have been hired, and an Advisory Board has been established. The first cluster project, branding and marketing, is underway. The Champion is in the field meeting and talking with growers. As the Champion continues his interactions with growers other opportunities for collaboration between growers will be identified and explored.

Despite the progress made by the northwest Ohio greenhouse cluster to date there are numerous challenges ahead. At present, only a small number of growers are intimately involved in the initiative. Participation by larger number of growers is necessary if the cluster is going to be ultimately successful. However, as the Champion meets with more and more growers and educates them on the benefits of the cluster it is anticipated that more growers will come on board. Also, if the branding and marketing initiative is successful it is hoped that this will bring more growers to the table as they see the benefits (e.g. increased sales) of collaborative branding and marketing. There is also the challenge of identifying ongoing funding for the cluster. The cluster and its activities are currently funded by a grant by the U.S. Department of Agriculture (USDA). While USDA funds may be available to continue funding the cluster in the short-term there is a need to identify a mechanism to provide long-term sustainable funding for the cluster.

Many local growers increasingly view the success of the northwest Ohio greenhouse cluster as the key to a viable economic future. Even a preliminary assessment of its success is at least twelve months away, however. The impact of the branding and marketing strategy will not be felt until the 2006 sales season. The fact that the growers are now meeting to discuss their industry and its problems is significant progress. Interest in the cluster initiative is also growing. Attendance at Advisory Board meetings (which are open to all growers and other interested parties) has increased from around a dozen to twenty-five people. Competitors are engaging in discussion with each other and working together to craft a vision for a more competitive and sustainable greenhouse industry in northwest Ohio.

9. REFERENCES

- Advantage West Midlands. 2005. www.advantagewm.co.uk Last accessed 9 August 2005.
- Carroll, M. and N. Reid. 2005. Competing Successfully in a Global Marketplace. Paper Presented at Toledo Area Winter Greenhouse Conference. Monclova, Ohio, 13 January 2005.
- Castells, M. and P. Hall. 1994. Technopoles of the World: The Making of Twenty-first Century Industrial Complexes. London: Routledge.
- Council on Competitiveness. 2005. Regional Innovation. Council on Competitiveness. www.compete.org. Last accessed on 9 August 2005.
- Department of Trade and Industry. 2003. A Practical Guide to Cluster Development. www.dti.gov.uk Department of Trade and Industry. Last accessed on 9 August 2005.
- Diez, M.A. 2001. The Evaluation of Regional Innovation and Cluster Policies: Towards a Participatory Approach. European Planning Studies 9(7):907-923.
- Dillman, D. 1978. Mail and Telephone Surveys: The Total Design Method. New York: Wiley.

- Hospers, G. and S. Beugelsdijk. 2002. Regional Cluster Policies: Learning by Comparing? *Kylos* 55(3):381-402.
- Industry Canada. 2005. Strategis: Canada's Business and Consumer Site. <http://www.strategis.gc.ca>. Last accessed 17 May 2005
- Landabaso, M. 1995. The Promotion of Innovation in Regional Community Policy: Lessons and Proposals for a Regional Innovation Strategy. Paper Presented at the International Workshop on Regional Science and Technology Policy. Himeji, Japan, 13-16 February.
- Lindsay, M. 2000. The Brand Called Wisconsin: Can we Make it Relevant and Different for Competitive Advantage? Paper Presented at the Wisconsin Economic Summit. Milwaukee, Wisconsin, November 29-December 1.
- Lundquist, P., and D. Power. 2002. Putting Porter into Practice? Practices of Regional Cluster Building: Evidence from Sweden. *European Planning Studies* 10(6):685-704.
- Martin, R., and P. Sunley. 2003. Deconstructing Clusters: Chaotic Concept or Policy Panacea? *Journal of Economic Geography* 3:5-35.
- Ohio State University Extension. www.ag.ohio-state.edu/~extension. The Ohio State University Extension Program. Last accessed 9 August 2005.
- Porter, M. 1998. Clusters and the New Economics of Competition. *Harvard Business Review*, November-December 77-90.
- Putnam, R.D., R. Leonardi, and R.Y. Nanetti. 1993. Making Democracy Work. Princeton, NJ: Princeton University Press.
- Schmitz, H. and K. Nadvi. 1999. Clustering and Industrialization: Introduction. *World Development* 27(9):1503-1514.
- Solvell, O., G. Lindqvist, and C. Ketels. 2003. The Cluster Initiative Greenbook. Ivory Tower AB: Stockholm.
- Thread. 2005. www.experiencethread.com. Website of Thread Consulting Firm. Last accessed 9 August 2005.
- The Ontario Greenhouse Alliance. 2005. The Ontario Greenhouse Alliance. Grimsby, Ontario. www.theontariogreenhousealliance.com. Last accessed 12 May 2005.
- United States Bureau of the Census. 2005. North American Industry Classification System. www.census.gov/epcd/www/naics.html Last accessed 17 May 2005.
- United States Department of Agriculture. 2005. 2002 Census of Agriculture. Washington, D.C.: U.S. Government Printing Office.
- Wisconsin Department of Commerce. 2002. Cluster Organizing Guide. Wisconsin Department of Commerce. www.commerce.wi.gov. Last accessed 9 August 2005.
- Yorkshire Forward. 2004. Regional Strategic Cluster Champions. Yorkshire Forward. www.yorkshire-forward.com. Last accessed 9 August 2005.

Acknowledgements: The authors thank Tim Ault for his cartographical assistance.