DOES LOCATING IN A METROPOLITAN AREA IMPROVE THE BUSINESS PERFORMANCE OF MANUFACTURING ESTABLISHMENTS?

THE LINK BETWEEN BUSINESS AND REGION

Wael H. Ramadan, PhD, PMP, LSSBB.
Sheridan Institute of Technology and Advanced learning
Oakville, Ontario, Canada

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ABSTRACT: This research provides empirical evidence on the link between the location of manufacturing business establishments in metropolitan areas and business performance compared to rural locations, for manufacturing establishments located in Wisconsin. The primary research question explores the influence of metropolitan area agglomeration effects on a business establishment's performance. Proportional odds ordered logistic regression models are used to test hypotheses on the influence of the location of a business establishment in a metropolitan area on a business establishment's competitive advantage. The major statistical finding is the existence of a relationship between revenues generated from new product introductions and establishment locations in a metropolitan area.

Introduction

Agglomeration economies arise when a business's performance is improved due to external economies of scale including labor pooling, customer supplier interactions and localized externalities and shared infrastructure, resulting in unit cost savings that accrue to individual firms when large numbers locate in one metropolitan area (Hill, 2000). Understanding the connection between business establishments and their regional economies is important because Ledebur & Barnes (1998) describe the economic region as the basic building block of the national economy and a building block of the three-tiered economic systems including: regional, national and global systems, where a metropolitan area is the center of a local economic region and the center of new ideas, technologies and innovation.

The objective of this research is to fill existing gaps in the economic development and business literature by providing an analysis of the relationship between a region and objective operational practices of business establishments by testing the existence of systematic differences in these operational practices due to the region in which they are located.

This research develops a conceptual framework that associates systematic differences in the objective operational practices of businesses with their locations in sub-state regions. The cross-sectional Wisconsin Next Generation Manufacturing Study survey, that was developed and administered by the Manufacturing Performance Institute (MPI) in Wisconsin during 2008, is used and the hypotheses are tested with proportional odds logistic regression models.

Operational practices are the subject of the analysis rather than firm profit for several reasons. First, the observations are manufacturing business establishments and not businesses. These establishments may be part of multi-establishment businesses, and establishments do not have their own data on profit. Second, many of the smaller independent businesses are owner-managed. Under this type of business ownership the financial affairs of the owner and that of the business are inter-mingled, rendering reported profit data meaningless for research purposes. Third, all businesses manage their books to minimize the effect of taxation on both the company and stock holders. Finally, reported accounting profits for companies do not account for the opportunity cost of capital, the result is that the reported profits of the business establishment are likely to not be the same as economic profit.

Based on the above, three operational variables serve as the dependent variables in this work. They proxy different aspects of the competitive position of a business establishment. The first is measured by the percent improvement in productivity over the past three years. The second is measured by the percent reduction in the total value of inventory throughout the supply chain for the primary product over the last three years. And, the third is measured by the percent of annual sales derived from new products introduced in the past three years. These three dependent variables are used because it is assumed that businesses with improved productivity, reduced inventory levels, and sales from new products will also be businesses with higher profits and improved probabilities of survival over time.

This research begins with an introduction where the objectives and contribution of the research are described. A description of relevant studies, theoretical models, research variables, and three hypotheses are then described. The data source and method, the research question and statistical models that test the hypothesized relationships between a region and a firm's sustainable competitive advantage are then described. The research ends with a discussion of the results followed by the conclusions.

Theoretical Model and Hypotheses

Agglomeration

Agglomeration improves a firm's performance by reducing the costs of transactions and by increasing the revenue (Appold, 1995). Zander (1994) suggests that location and proximity are critical in the innovation process. Pavitt (1984) suggests that innovative ideas in manufacturing work frequently originates outside the firm that carries out the work. Geographically concentrated industrial configurations have a great advantage due the exchange of tacit knowledge by face-to-face contact (Enright, 1991).

Glaeser et al. (2007) builds on Hoover (1948) and Marshall (1890/1916) in describing the reasons why agglomeration affects business locations. These are transport cost savings, supply-chain cost savings, and labor pooling cost savings. Transport costs could be for: buying or selling goods from suppliers or to customers, accessing large pools of potential labor force, and accessing new ideas and innovation. Proximity to customers and suppliers enables the use of just-in-time inventory systems where inventory is minimized to very low levels, creates tighter supply chains with faster deliveries, and therefore, improves the efficiency of business supply chains. Labor market pooling creates risk-sharing in labor markets, increases the advantage of scale economies associated with large labor pools, enables access to better trained labor, and therefore, maximizes productivity. New ideas and technology spillovers: enables higher speeds of information flow in agglomeration economies where businesses benchmark and learn from each other, enables access to density of ideas and creates innovation, and therefore, increases the rate of new products introduction.

It is possible to test three hypotheses that explore the link between an establishment's location (in a metropolitan area or not) and that business establishment's performance. The research hypotheses are organized into three questions that are given in Table I. These three hypotheses explore the effect of locating in a metropolitan area on the three dependent variables: productivity growth, supply chain efficiency and revenue from new products.

Table I: Hypotheses Sets For The Independent Variable Metropolitan Area.

Prod uctivi ty Grow	H_0	*The percentage improvement in productivity over the past three years does not depend on the business establishment locating in a metropolitan area.*

	H_1	*The percentage improvement in productivity over the past three years depends on the business establishment locating in a metropolitan area.*
Supply Chain RH2	H_0	*The percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years does not depend on the business establishment locating in a metropolitan area.*
	H_1	*The percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years depends on the business establishment locating in a metropolitan area.*
New Products RH3	H_0	*The percentage of annual sales derived from new products introduced in the past three years does not depend on the business establishment locating in a metropolitan area.*
	H_1	*The percentage of annual sales derived from new products introduced in the past three years depends on the business establishment locating in a metropolitan area.*

These three sets of hypotheses are tested statistically using proportional odds ordered logistic regression model as explained in the next section.

Based on the above, three dependent variables that proxy different aspects of competitive position of a business establishment are used: 1) productivity growth, measured by the percent improvement in productivity over the past three years, 2) supply chain efficiency, measured by the percent of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years, and 3) new products introduction, measured by the percent of annual sales derived from new products introduced in the past three years. These three dependent variables are used because it is assumed that businesses with improved productivity, reduced inventory levels, and sales from new products will also be businesses with higher profits and improved probabilities of survival over time.

Metropolitan Area

Ledebur & Barnes (1998) describe metropolitan areas as the center of local economic regions and the center of new ideas, technologies and innovation. They define an economic region as:

> Economic regions are centered around metropolitan areas. The fulcrum of the local economic region is the metropolitan area, not “the city” or any governmental jurisdiction. These metropolitan centers are the sources of new ideas, new technologies, and innovations that drive economic growth and development within the region and throughout the national system of economic regions (Ledebur & Barnes, 1998).

In this work economic regions are defined as metropolitan statistical areas (MSAs). A metropolitan statistical area as defined by Census 2007, contains a core urban area of 50,000 or more population, consists of one or more counties, and includes the counties that contain the core urban area, as well as any adjacent counties that have a high degree of social and economic integration with the urban core (Census, 2007).

Thirteen dummy variables are used to capture the region in Wisconsin in which the establishments are located. The regional dummy variables include the state's twelve metropolitan areas and the rural balance of the state. The twelve metropolitan areas are: Appleton, Eau Claire, Fond Du, Green Bay, Janesville, La Crosse, Madison, Milwaukee-Waukesha-West Allis, Oshkosh-Neenah, Racine, Sheboygan and Wausau. A non-metropolitan business location is signified by the thirteenth regional dummy variable.

Control Variables

Denison (1990) addresses the relationship between a business organization and its internal and external environments using four hypotheses about organizational culture: the consistency hypothesis, the mission hypothesis, the involvement/participation hypothesis, and the adaptability hypothesis. For example, the involvement/participation hypotheses encourages change and flexibility and addresses the relationship of the organization with its internal environment. Denison (1990) provided empirical support for the participation/involvement hypothesis. He found that an increase in employee participation is correlated with an increase in organizational performance. Schein (1990) also argued that formal and informal training, coaching, mentoring and role modeling are critical mechanisms for changing and managing culture.

This research uses three aspects of organizational culture as control variables to proxy for organizational culture. These three are: 1) participation as measured by the percentage of employees regularly participating in empowered work teams, 2) training which is measured by the number of formal training hours devoted annually per employee and 3) talent management, captured with the percentage of employees dedicated to assessing and upgrading the organization's talent pool.

Storey (1994) shows that firm characteristics such as size, age, and sector are important factors that influence SMEs' success. Based on Storey (1994), the size of the business establishment is used as a control variable, and is measured by the number of full time employees. A small and medium sized establishment is defined as one that employs 500 or fewer employees in the MPI survey. The age of the establishment is measured by the number of years the establishment has been in operation in that location. The industry that the firm is a part of is also entered into the equation to control for industry-specific fixed effects. This is done with the establishment's North American Industry Classification System (NAICS) assignment.

Martin (2008) argues that developing global strategic relationships is a key to a firm's global effectiveness. The concept of globalization is measured by the establishment's self-assessment of its progress toward becoming a world-class global player. Porter (2006) maps the relationship between a firm's operations with its emissions and waste containment, therefore, the establishment's environmental awareness, termed "green" in the statistical analysis, is used as a control variable and is measured by the percent of the workforce dedicated to reducing energy, or emissions in its operations. The next section provides the research question and research hypotheses. The definitions of variables used in the statistical models, along with their ordinal scales, are provided in Table II.

Data Source and Method

The data are from the Wisconsin Next Generation Manufacturing Survey of manufacturing establishments in Wisconsin conducted by the MPI for the Wisconsin Manufacturing Extension Partnership (WMEP) during 2008. The purpose of the MPI survey was to identify best management practices in the state's manufacturing establishments. The universe of the study is all manufacturing establishments in Wisconsin. The sample size is 492 establishments representing a 6% of the universe.

There are twenty manufacturing sectors represented in the MPI survey responses, based on the NAICS 2007 classification of the manufacturing sector. The number of establishments representing the Fabricated Metal Product Manufacturing sector in the sample constitutes 24.2% of the sample, and the number of establishments representing the Machinery Manufacturing sector in the sample constitutes 21.9% of the sample. These two manufacturing sectors represent 46% of the sample and the remaining eighteen sectors represent 54% of the sample. MPI reports that the research sample accounts for about 6% of Wisconsin's manufacturing establishments. Census 2007 manufacturing data reports that Wisconsin has 12% of its manufacturing establishments in the Machinery Manufacturing sector and 21% of its manufacturing establishments in the Fabricated Metal Product.

The distribution of SMEs in the sample is roughly parallel to the distribution of SMEs in Wisconsin but it is slightly skewed in some sectors. However, the NAICS fixed effects variables correct for biases introduced by the skewed distributions of establishments by industry in the sample. Therefore, the sample is concluded to be roughly parallel to the universe, assuming that the relationship between dependent and independent variables is constant across industries.

Since the dependent variables in this research are discrete, ordered and not continuous, and since they are scaled on either four-level or five-level ordinal scales proportional odds logistic regression models are used in this research. Descriptive statistics of the ordinal scaled variables are provided in Table III. The highest two levels of the scales for three of the variables, supply-chain, productivity growth, and global, had small numbers of observations, so the levels were collapsed into one tier (see table III).

Validation of the appropriateness of the proportional odds ordered logistic regression model is required (Vani, 2001). The proportional odds assumption is statistically tested using a Chi Square test. The ordered logistic model assumes that the model errors are logistically distributed, as contrasted with ordered probit models where the model errors are assumed to be normally distributed. Either model can be used for our tests. However, the ordered logistic model was selected because its results are easier to interpret than ordered probit models.

The goodness of fit of the estimated statistical models is measured using the Akaike Information Criterion (AIC) statistic where AIC = 2k – 2 ln(L), where: L is the maximized value of the likelihood function of the estimated model and k is the number of parameters in the statistical models (Vani, 2001). AIC is a model selection tool where the model with the lowest AIC value is determined to be the best. A low AIC value is interpreted as identifying the model with the lowest level of information inaccuracy.

Although ordered logistic regression models do not have an R^2 value as an overall gauge of the model's goodness of fit, they do have an analogous measure, the $\mathrm{PseudoR}^2$. The $\mathrm{PseudoR}^2$ is calculated using the following formula:

$$\mathrm{PseudoR}^2 = 1 - (\,\mathrm{lnL}_{(\mathrm{Multinomial})} \,/\, \mathrm{lnL}_{(\mathrm{Ordered})}\,)$$

Where: $\mathrm{lnL}_{(\mathrm{Multinomial})}$ is the loglikelihood value of the multinomial regression model and $\mathrm{lnL}_{(\mathrm{Ordered})}$ is the loglikelihood value of the ordered logistic regression model. The $\mathrm{PseudoR}^2$ is a rough indicator of the goodness of fit, where a value equal to zero means that all coefficients are zero and a value equal or close to 1 means that the model is very good (Vani, 2001).

Research Question

The primary research question in this study explores the influence of metropolitan area agglomeration effects on business establishment's performance. As described in previous sections agglomeration economies are caused by proximity between customers and suppliers, labor market pooling and technology and idea spillovers. The research question (RQ) addressed in this essay is: Does locating in a metropolitan area affect the performance of small and midsized manufacturing establishments in Wisconsin?

Research Model

The statistical models used for testing these three sets of hypotheses are structured according to the following equations, where $f(\,)$ is used to signify the proportional odds logistic regression function:

Model 1:

$$PRODUCTIVITYGROWTH_i = f(\alpha + \beta_1 METRO_i + \beta_2 PARTICIPATION_i + \beta_3 TRAINING_i + \beta_4 TALENTMGMT_i + \beta_5 \log(SIZE_i) + \beta_6 log(AGE_i) + \beta_7 GREEN_i + \beta_8 GLOBAL_i + \beta_9 NAICS_i + \varepsilon_i)$$

Model 2:

$$SUPPLYCHAIN_i = f(\alpha + \beta_1 METRO_i + \beta_2 PARTICIPATION_i + \beta_3 TRAINING_i + \beta_4 TALENTMGMT_i + \beta_5 \log(SIZE_i) + \beta_6 log(AGE_i) + \beta_7 GREEN_i + \beta_8 GLOBAL_i + \beta_9 NAICS_i + \varepsilon_i)$$

Model 3:

$$NEWPRODUCTS_i = f(\alpha + \beta_1 METRO_i + \beta_2 PARTICIPATION_i + \beta_3 TRAINING_i + \beta_4 TALENTMGMT_i + \beta_5 \log(SIZE_i) + \beta_6 log(AGE_i) + \beta_7 GREEN_i + \beta_8 GLOBAL_i + \beta_9 NAICS_i + \varepsilon_i)$$

The first model explores the association between the location of a business establishment in a metropolitan area and its percentage improvement in productivity over the past three years. The second model explores the association between the location of a business establishment in a metropolitan area and the percent reduction in the total value of inventory throughout the supply chain for its primary product over the last three years. The third model explores the association between the location of a business establishment in a metropolitan area and the percentage of annual sales derived from new products introduced in the past three years.

Each of the three statistical models was tested under different conditions. Each model was tested using the North American Industry Classification System (NAICS) code under different levels of the NAICS structure. The industry specification was entered using the three, four and five-digit levels of industry identification. The variables used in these statistical models are defined in Table II. The distribution of the sample by manufacturing sector is provided in Figure 1.

Table II: Definitions Of Variables & Ordinal Scales.

Competitive Advantage Dependent Variables	$PRODUCTIVITYGROWTH_i$: Ordered dependent variable, defined as the percentage improvement in productivity over the past three years, and is scaled on a five level ordinal scale: level one being 0-25%, level two 26-50%, level three 51-75%, level four 76-99%, and level five >100%.
	$SUPPLYCHAIN_i$: Ordered dependent variable, defined as the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years, and is scaled on a four level ordinal scale: level one being <10%, level two 10-25%, level three 26-50%, and level four >50%.
	$NEWPRODUCTS_i$: Ordered dependent variable, defined as the percentage of annual sales derived from new products introduced in the past three years, and is scaled on a four level ordinal scale: level one being <5%, level two 5-25%, level three 26-50%, and level four >50%.
Independent Variable	$METRO_i$: Independent variable, defined as the metropolitan statistical area (MSA) as defined by Census 2007, and contains a core urban area of 50,000 or more population, and consists of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core.
Control Variables	$PARTICIPATION_i$: Control variable, defined as the percentage of employees regularly participating in empowered work teams (i.e., make decisions without supervisor approval), and is scaled on a five level ordinal scale: level one being <25%, level two 25-50%, level three 51-75%, level four 76-90%, and level five >90%.
	$TRAINING_i$: Control variable, defined as the number of training hours devoted annually to each employee, and is scaled on a four level ordinal scale: level one being ≤8 hours, level two 9-20, level three 21-40, and level four >40 hours.
	$TALENTMGMT_i$: Control variable, defined as the percentage of employees dedicated to assessing and upgrading the organization's talent pool, and is scaled on a four level ordinal scale: level one being <1%, level two 1-5%, level three 6-10%, and level four >10%.
	$\log(SIZE_i)$: Control variable, defined as the log of the number of full time employees.
	$log(\mathrm{AGE}_i)$: Control variable, defined as the log of the number of years the organization has been in operation.
	$GREEN_i$: Control variable, defined as the percentage of workforce dedicated to reducing energy, or emissions in operations.
	$GLOBAL_i$: Control variable, measured by percentage of total workforce located overseas and/or located domestically and responsible for global business activities.
	$NAICS_i$: Control variable, defined as the North American Industry Classification System (NAICS).
	ε_i: Statistical Error.

Table III: Descriptive Statistics

Dependent Variable		
Percentage improvement in productivity over the past three years		
Scale	**Number of Establishments**	**Percentage of Establishments**
<25%	230	48%
26-50%	155	32%
51-75%	64	13%
76-99%	26	5%
>100%	5	1%
	480	100%
Percentage of annual sales derived from new products introduced in the past three years		
<5%	132	27%
5-25%	224	46%
26-50%	93	19%
>50%	36	7%
	485	100%
Percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years		
<10%	285	59%
10-25%	138	29%
26-50%	46	10%
>50%	10	2%
	479	100%

Independent Variable		
Metropolitan statistical area (MSA), contains a core urban area of 50,000 or more population, and consists of one or more counties.		
MSA	**Number of Establishments**	**Percentage of Establishments**
Appleton	18	4%
Eau Claire	5	1%
Fond Du	9	2%
Green Bay	34	7%
Janesville	15	3%
La Crosse	4	1%
Madison	50	10%
Milwaukee-Waukesha-West Allis	150	31%
Oshkosh-Neenah	12	2%
Racine	35	7%
Sheboygan	13	3%
Wausau	10	2%
No MSA; rural	136	28%
	491	100%

Results and Discussion

Before the results are discussed in this section, validation of the appropriateness of the proportional odds ordered logistic regression model is required (Vani, 2001). The proportional odds assumption holds for all the models tested.

The consistency of the results is evident when the various forms of the statistical models tested are examined. Eighteen models for the entire sample were tested with different NAICS code fixed effects: at the three-digit, four-digit and five-digit NAICS levels. The SME models show higher t-values and larger odd ratios when compared to models that included all manufacturing establishments including large establishments. The superior results for the SME models are identified by the low AIC values and the high association statistics are displayed in Table IV and Table V.

Table IV reports the AIC results for the final models estimated for each of the three dependent variables. The lowest AIC result was for the second model, where supply chain efficiency is the dependent variable. This means that the model used best fits the supply chain results and the fit for productivity growth and new product introductions are about equivalent.

The proportional odds assumption test holds for all three models. Model 1 has a value of 0.284, model 2 has the highest value of 0.946, and model 3 has the lowest value of 0.123. These results indicate that the proportional odds ordered logistic regression assumption holds for all models.

F-tests are similar to maximum likelihood tests and are more effective and appropriate to address the research question than are individual t-tests of the coefficient. The F-test tests the hypothesis that the metropolitan area dummy variables, when taken together or taken jointly, have a statistically significant influence on the three establishment operational outcomes. The results of the F-tests for the joint independent variable metro are provided in Table IV.

By dropping the rural locational dummy all results are expressed as being relative to a rural location, both jointly with F-tests and individually with t-tests as shown in Table V. There are 136 business establishments in the sample located in rural, non-metropolitan, areas in Wisconsin out of the 492 in the sample; this is 28% of the sample (Table III).

Table IV: Summary of the Proportional Odds Logistic Regressions Results.

	p-value		
	Model 1	Model 2	Model 3
	Dependent Variable		
	PRODUCTIVITYGROWTH	SUPPLYCHAIN	NEWPRODUCTS
F-test for the Joint Independent Variable METRO	**0.3941**	**0.6546**	**0.0033*** **
df	121	120	121
AIC	1062	890	1155
Pseudo R^2	0.3023	0.1452	0.2864
Proportional Odds Test "*Pchisq*"	0.2842	0.9462	0.1233

*significant at the 0.10 confidence level **significant at the 0.05 confidence level ***significant at the 0.01 confidence level. N=492

The F-test results for the first model in Table IV explores the association between a business location in a metropolitan area with the percent improvement in productivity over the past three years. The model shows no statistically significant association between the metropolitan area variables with productivity growth. This means that locating in a metropolitan area does not offer a locational advantage over a rural location in terms of productivity growth for manufacturing establishments in Wisconsin.

The second model explores the association between the metropolitan area locational variables with the business establishment's percent reduction in the total value of inventory throughout the supply chain for the primary product over the last three years (supply chain efficiency). Again, the model shows no association between a location in a metropolitan area with improved supply chain efficiency when compared to a rural location for manufacturing establishments in Wisconsin.

The third model tests the association between location in a metropolitan area with the percent of annual sales derived from products introduced in the past three years (these are considered to be new products). The F-test for the joint independent locational variable, as shown in Table IV, shows that the association is significant at the 1% critical level which is consistent with the hypothesis that agglomeration economies found in metropolitan areas affect new product development and deployment for manufacturing establishments in Wisconsin.

The results of the coefficient tests are provided in Table V. The table shows: coefficient value, standard error, t-statistic, and exponential function of the coefficient value. The proportional odds logistic regression requires the use of the exponential value of the coefficient which is represented by exp(coef) in Table V. The exponential function or form is used so that no value will be negative. The results of the coefficient tests provided in Table V show that a location in the La Crosse metropolitan area is associated with productivity growth at the 5% critical level when compared to a location in a rural area. However, the La Crosse metropolitan area contains 4 business establishments in the sample, making up just only 1% of the sample (Table III).

The results in Table V show no association between locating a business establishment in a metropolitan area with supply chain efficiency which is consistent with agglomeration theory. The results in Table V show that locations in both the Milwaukee and the Janesville metropolitan areas are associated with higher proportions of establishment annual sales coming from products introduced in the past three years than for manufacturing establishments located in rural Wisconsin. This is a stronger association for locations in the Milwaukee metropolitan area that is significant at the 1% critical level, than locations in the Janesville metropolitan area that is significant at the 5% critical level. The Milwaukee metropolitan area has 150 business establishments in the sample out of 492. The metro area is made up of Milwaukee, Waukesha, Ozaukee, and Washington Counties. It is Wisconsin's largest MSA, with 1.5 million residents in 2007. Traditionally a manufacturing hub, this sector has decreased in size over the past several decades. However, when measured by employment, manufacturing remains the third largest employment sector with 15.3% of total employment (Wisconsin Department of Revenue, 2009).

This research is exploratory and the findings are tentative for a number of reasons. First, only one state, Wisconsin, is included in the analysis. Second, the distribution of the business establishments is skewed, even though NAICS industry dummies help control for the impact of the skew on the results. Finally, data were collected at an early stage of a steep recession, however, despite these time limitations the results are suggestive and justify replication with other different data sets. There is evidence of a relationship between locating a business establishment in a metropolitan area and business behavior that is associated with competitive advantage, specifically higher revenues being generated by new products. There is a statistically strong relationship in the Milwaukee metropolitan area and a weaker, but significant, relationship in the Janesville metropolitan area.

Conclusion

Economic growth is driven by metropolitan areas that are: the geographical unit of economic development, the centers of economic regions, and the sources of innovation and new ideas (Ledebur & Barnes 1998). These metropolitan centers of innovation and new ideas form a basis for creating a framework for understanding and, more importantly for investing in a firm's sustainable competitive advantage. It enables the understanding of the factors that influence the sources and outcomes of competitive advantage and therefore it enables the understanding of the factors that influence increasing the sustainability of business establishments' competitive advantage.

This study provides empirical evidence on the link between locating a business establishment in a metropolitan statistical area and objective measures of the outcomes of sustainable competitive advantage. This study shows that location of a business establishment in the La Crosse metropolitan area is associated with supply chain efficiency. Locating a business establishment in the Milwaukee metropolitan area or the Janesville metropolitan area is associated with new products which is consistent with agglomeration theory that agglomeration economies affect new product development and deployment.

The research results indicate that integrating economic geography with firms' strategy, innovation processes and organization is important to both establishing and sustaining competitive advantage. The link between the region and the firm can be used for business retention and attraction purposes by economic development managers. It can also be used by site selection consultants for location selection decision making, and by firms that seek to increase the sustainability of the competitive advantage of their businesses.

Table V: Estimation Results For The Model That Uses 4-Digit NAICS Fixed-Effects For Small And Mid-Sized Business Establishments.

	Model1Dependent Variable PRODUCTIVITYGROWTH		Model2 Dependent Variable SUPPLYCHAIN		Model3 Dependent Variable NEWPRODUCTS	
Independent Variable	Value (Std. Error)	EXP(Coef) (t value)	Value (Std. Error)	EXP(Coef) (t value)	Value (Std. Error)	EXP(Coef) (t value)
REGION2-Eau Claire	1.6612 (1.2143)	5.2656 (1.3681)	0.5623 (0.8591)	1.7547 (0.6545)	-0.6072 (0.9225)	0.5449 (-0.6582)
REGION3- Fond Du	-0.2785 (0.9594)	0.7569 (-0.2902)	-0.7574 (0.9609)	0.4689 (-0.7882)	0.5403 (0.8464)	1.7165 (0.6383)
REGION4-Green Bay	-0.3363 (0.5135)	0.7144 (-0.6549)	-0.7300 (0.5312)	0.4819 (-1.3743)	-0.4786 (0.5037)	0.6197 (-0.9502)
REGION5-Janesville	0.6913 (0.6130)	1.9962 (1.1276)	-0.5576 (0.6696)	0.5726 (-0.8327)	-1.3067 (0.6538)	0.2707 (-1.9986)**
REGION6-La Crosse	2.8057 (1.2291)	16.5378 (2.2827)**	-0.2570 (1.3568)	0.7734 (-0.1894)	-1.2742 (1.0769)	0.2797 (-1.1831)
REGION7-Madison	0.3628 (0.4247)	1.4373 (0.8541)	-0.3901 (0.4583)	0.6770 (-0.8512)	-0.5731 (0.4146)	0.5638 (-1.3822)
REGION8-Milwaukee	-0.1633 (0.3027)	0.8493 (-0.5395)	-0.2435 (0.3169)	0.7839 (-0.7682)	-1.2635 (0.2913)	0.2827 (-4.3366)***
REGION9-Oshkosh-Neenah	0.0165 (0.7860)	1.0166 (0.0210)	0.1424 (0.8385)	1.1531 (0.1699)	-0.4975 (0.7935)	0.6080 (-0.6269)
REGION10-Racine	0.3709 (0.5224)	1.4490 (0.7100)	0.3985 (0.5057)	1.4896 (0.7880)	0.0055 (0.4868)	1.0055 (0.0113)
REGION11-Sheboygan	0.1121 (0.6720)	1.1187 (0.1669)	-0.4108 (0.7968)	0.6631 (-0.5155)	0.3377 (0.6146)	1.4017 (0.5494)
REGION12-Wausau	0.5286 (0.8618)	1.6965 (0.6133)	1.0599 (0.8041)	2.8862 (1.3182)	0.7966 (0.8046)	2.2180 (0.9900)
REGION13-Appleton	0.7530 (0.6768)	2.1233 (1.1125)	-0.8583 (0.7221)	0.4239 (-1.1886)	-0.2752 (0.5911)	0.7595 (-0.4655)

*significant at the .10 confidence level **significant at the 0.05 confidence level ***significant at the 0.01 confidence level. N=492

Bibliography:

Appold, S. J. (1995), *Agglomeration, Interorganizational Networks, and Competitive Performance in the U.S. Metalworking Sector*, Economic Geography, 71: 27–54.

Barney. (2002). *Gaining and Sustaining Competitive Advantage,* 2nd Ed. Prentice Hall, NJ.

Barney, J. B. (1986). *Organizational Culture: Can it be a Source of Sustained Competitive Advantage?* Academy of Management Review, 11, 656-665.

Barney, J. B. (1991). *Firm Resources and Sustained Competitive Advantage.* Journal of Management, 17(1), 99-120.

Barney, J. B., & Wright, P. M. (1998). *On becoming a strategic partner: The role of human resources in gaining competitive advantage.* Human Resource Management, 37(1), 31-46.

Barney, J. B., & Hesterly, W.S. (2008). *Strategic Management and Competitive Advantage: Concepts and Cases*. Pearson Prentice Hall Inc.

Barnes, W. R., & Ledebur, L. C. (1998). *The New Regional Economies: The U. S. Common Market & the Global Economy.* Sage Publications.

Bennett R. & C. Smith, (2002). *Competitive conditions, competitive advantage and the location of SMEs,* Journal of Small Business and Enterprise Development.

Borstorff , P., Moran F. & Palmer D.(2007). *The Relationship between National Culture, Organizational Culture, Causal Ambiguity and Competitive Advantage in an International Setting: An Exploratory Analysis*, Jacksonville State University.

Brandt, J. (2007). *Ohio Auto Supplier Benchmark Study: Continuously Improving But facing Challenges,* Manufacturing Performance Institute (MPI).

Christensen, C. (2001). *The Past and Future of Competitive Advantage,* Sloan Management Review.

De-Castro, G. M., Lopez, J. E., Lopez, P.,& Salzar, A. E. (2006). *Organizational capital as competitive advantage of the firm*. Journal of Intellectual Capital, 7(3), 324-337.

Denison, D. R. (1990). *Corporate Culture And Organizational Effectiveness.* John Wiley & Sons.
De Wit, B. Meyer, R. (1999). *Strategy Synthesis: Resolving Strategy Paradox to Create Competitive Advantage,* ITP, UK.

Dicken, P. (2007). *Global Shift: Mapping the Changing Contours of the World Economy,* 5th Edition. New York: The Guilford Press.

Di Stefano, L. (2007). *Warning to SME's: Integrate Corporate Culture for Competitive Advantage or Risk Losing Market Share*, Mettle Group.

Enright, M. J. (1991), *Geographic Concentration and Industrial Organization, unpub. Ph.D. thesis*, Department of Economics and Graduate School of Business Administration, Harvard University, Cambridge, Mass.

Fahy, J. (2000). *The resource-based view of the firm: some stumbling-blocks on the road to understanding sustainable competitive advantage*. Journal of European Industrial Training.

Garmise, S. (2006). *People and the Competitive Advantage of Place: Building a Workforce for the 21st Century.* New York: M.E. Sharpe.

Glaeser, E. L., Ellison, G., & Kerr, W. (2007). *What Causes Industry Agglomeration? evidence From Co-Agglomeration Patterns*. National Bureau of Economic Research.

Gonzalez, A. & Nieto, A. M. (2005). *Protection and internal transfer of technological competencies: The role of causal ambiguity*. Industrial Management & Data Systems.

Hamel, G.& Prahalad, C. K. (1990). *Core Competence of the Corporation*, Harvard Business Review.

Hill, E. W., & Samuel F.S. (2008). *Driving Ohio's Prosperity: A Two-Job Strategy for Growing the Value of Automotive and Advanced Manufacturing"*. Compete Columbus.

Hill, E.W. (2009). *The Ohio Urban University Program UUP. National Perspective on State and Local Finance in an Economic Crisis*. Columbus, Ohio.

Hill, E.W. and Brenan, J. (2000). *A Methodology for Identifying the Drivers of Industrial Clusters: The Foundation of Regional Competitive Advantage*. Economic Development Quarterly, 14(1): 65-96.

Hill, E.W. and Brenan, J. (1999). *Measuring Metropolitan Manufacturing Competitiveness*. Economic Development Commentary, 23(2): 33-38

Hoover, E. M. (1948), *The Location of Economic Activity,* New York: McGraw-Hill.

King, A. W., & Zeithaml, C. P. (2001). *Competencies and Firm Performance: Examining the Causal Ambiguity Paradox*. Strategic Management Journal, 22, 75-99.

Kleindl, B. (2001). *Competitive Dynamics and New Business Models for SMEs in the Virtual Market,* Journal of Development Entrepreneurship, no.1.

Pavitt, K. (1984), *Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory,* Research Policy, 13: 343–73.

Peters, T. and Waterman, R. (1982). *In Search of Excellence: Lessons from America' Best Run Companies*. New York: Harper and Row.

Peteraf, M. (1993). *The cornerstones of competitive advantage: A resource-based view*. Strategic Management Journal, 14, 179-191.

Perterson, Albaum, & Kozwtsky. (1986). *The Public's Definition of Small Business*, Journal of Small Business Management.

Porter, M. & Kramer, M. (2006). *Strategy & Society: The Link Between Competitive Advantage and Corporate Social Responsibility*, Harvard Business Review.

Porter, M. (1996). *What is Strategy,* Harvard Business Review.

Porter, M. (1990). *The Competitive Advantage of Nations,* New York: Free Press.

Porter, M., & Stern. (1987). *From Competitive Advantage to Corporate Strategy*, Harvard Business Review.

Porter, M. (1985). *Competitive Advantage – Creating and Sustaining Superior Performance,* New York: Free Press.

Porter, M. (1980). *Competitive Strategy - Techniques for Analyzing Industries and Competitors,* New York: Free Press.

Schein, E. H.(1980). *Organizational Psychology*. Englewood Cliffs, NJ: Prentice Hall.

Schein, E. H. (1985). *Organizational Culture and Leadership: A Dynamic View*. San Francisco: Jossey-Bass Publishers.

Schein, E H. (1992) *Organizational Culture and Leadership*. San Francisco: Jossey-Bass Publishers.

Schein, E. H. (1995). *Kurt Lewin's Change Theory in the Field and in the Classroom: Notes Toward a Model of Managed Learning.* MIT Sloan School of Management.

Schein, E. H. (1999). *The Corporate Culture Survival Guide: Sense and Nonsense about Cultural Change.* San Francisco: Jossey-Bass Publishers.

Stalk, G. (1998). *Time-The Next Source of Competitive Advantage*, Harvard Business Review.

Steinhoff & Burgess. (1989). *Small Business Development*, McGraw Hill, Singapore.

Stevenson, W.J. (2009). *Operations Management*, 10^{th} Edition, McGraw Hill.

Storey, D.J. (1994). Understanding the Small Business Sector, ITP, London.

Van Gils, A. (2000). *Cooperative Behavior in Small and Medium-Sized Enterprises: The Role of Strategic Alliances*, Doctorate Dissertation, University of Gronongen.

Vani, K. B. (2001). *Logit and Probit: Ordered Multinomial Models*, Sage Publications, Inc., California.

Wisconsin Department of Revenue Division of Research & Policy. (2009). *Wisconsin Metropolitan Area Economic Outlook.*

Zander, I. (1994). *The Tortoise Evolution of the Multinational Corporation: Technological Activity in Swedish Multinational Firms 1890–1990*, pub. Doctoral diss. (Stockholm: Institute of International Business, Stockholm School of Economics).