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The Influence of Organizational Culture on Sustainable Competitive Advantage of Small and Medium Sized Establishments, Best Business Practices for Achieving World-Class Status, the Link Between Business & Region

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THE INFLUENCE OF ORGANIZATIONAL CULTURE ON SUSTAINABLE COMPETITIVE ADVANTAGE OF SMES, BEST BUSINESS PRACTICES FOR ACHIEVING WORLD-CLASS STATUS, THE LINK BETWEEN BUSINESS & REGION

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DEDICATION

To my parents, my wife, and my four children: my son Laith and my three daughters Lorene, Danya and Natalie for their continuous and never ending love and inspiration.

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ABSTRACT

This is a three-essay dissertation that examines the effects of objective aspects of business organizational culture and the region on objective measures of the outcomes of sustainable competitive advantage. The first essay examines the association of objective aspects of business organizational culture on objective measures of sustainable competitive advantage. The first essay recommends that firms increase the number of training hours devoted annually to each employee and increase the percentage of production employees participating in empowered work teams. The second essay describes a conceptual model and provides recommendations for best business practices for manufacturing firms that realize the ultimate ability to generate competitive advantage when their resources are exposed to global market processes. The third essay explores the link between the firm and the region. This essay recommends economic development policy makers and business leaders to consider new business models that take advantage of regional economies in order to stay competitive.

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LIST OF ABREVIATIONS

Abbreviation	Interpretation
AIC	Akaike Information Criterion
CA	Competitive Advantage
CEO	Chief Executive Officer
MSA	Metropolitan Statistical Area
NAICS	National American Industry Classification System
RBV	Resource Based View
RH	Research Hypothesis
RQ	Research Question
SCA	Sustainable Competitive Advantage
SMEs	Small and Medium Sized Establishments
VOC	Voice of the Customer

CHAPTER I

THE ROLE OF ORGANIZATIONAL CULTURE IN INCREASING THE SUSTAINABLE COMPETITIVE ADVANTAGE OF SMES

1.1 Introduction

Three types of capital resources can be identified as the sources of a business competitive advantage: organizational resources, human resources and physical resources. Organizational planning and control and a firm's organizational structure are examples of a firm's organizational capital resources. The knowledge of a firm's employees coupled with their judgment and skills, intellectual property and tacit knowledge are examples of a firm's human capital (Barney & Wright, 1998). And a firm's buildings, plants, equipment and finances are examples of a firm's physical capital resources. The organizational culture of a firm is composed of both organizational resources and human resources (Barney & Wright, 1998). Organizational culture can be thought of as an asset that money cannot buy and it is a factor that can make or break a business. This research contains an empirical analysis of the link between observable aspects of organizational culture and a business establishment's sustainable competitive advantage.

The objective of this research is to fill existing gaps in the business literature by providing an analysis of the relationship between the objective aspects of a business's organizational culture and objective measures of the outcomes of sustainable competitive advantage. The outcomes are measured by the percentage improvement in productivity over the past three years, the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years, and the percentage 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, which are the ultimate measures of competitive advantage.

The three objective aspects of a business organization's culture are employee training hours, employee participation and talent management. These three independent variables are used because it is assumed that businesses with high levels of employee training, participation and talent management will also be businesses with higher levels of involvement, sense of ownership and responsibility. Involvement and ownership are key measures of organizational culture. Ownership creates a greater organizational commitment, a lesser overt control system and therefore improves business effectiveness (Denison, 1990).

These three aspects of a business organization's culture capture two sources of competitive advantage, human resources and organizational resources. The links between the three observed dependent variables and profitability and firm survival provide the logic for the model of competitive advantage that is used in this research. This conceptual

framework includes three independent variables and three dependent variables, forming nine potential hypotheses that establish the potential association of objective aspects of organizational culture with objective measures of the outcomes of a firm's sustainable competitive advantage.

Competitive advantage is at the heart of a firm's performance in competitive markets (Porter, 1985) yet, maintaining existing advantage is difficult (Stalk, 1988), because its sources may be imitated by new industry entrants who intentionally imitate the distinctive competencies of industry leaders. SMEs in particular have difficulty in distinguishing their core competencies and in sustaining their sources of competitive advantage (Van Gils, 2000). The ability to imitate the distinctive competencies of successful firms presents a threat to established SMEs, pushing them to rethink their business models, strategies and relationships. This, in turn, may change or reinvigorate their competitive advantage.

Barney (2008) defines competitive advantage as being sustainable if competitors are unable to imitate the source of advantage or if no one conceives of a better offering. For example, Toyota has become the largest car manufacturer in the world, in recent years by differentiating itself from competitors in quality and customer service, while automobile manufacturers in the United States have had operational problems with improving efficiency and quality and reducing inventory costs (Palmer, 2007). Competing firms such as Ford, Chrysler and General Motors should be able to imitate particular system capabilities of Toyota or Honda, and probably these firms are trying to do that. However, it seems that these firms are unable to imitate the root source of advantage of the Toyota or Honda business model.

The theory of competitive advantage is used to examine the influence of organizational culture on an establishment's performance. This research develops a conceptual framework that associates three objective aspects of organizational culture with three objective measures of the outcomes of a firm's sustainable competitive advantage. 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

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, a value chain model and a suggested framework that illustrates the interactions between the dependent and the independent variables follow in the next section. The research question and three hypotheses are then described. The statistical models in this section test the hypothesized relationships between organizational culture and the outcomes of a firm's sustainable competitive advantage. The variables are also defined and operationalized in this section. The research ends with a discussion of the results followed by the conclusions.

1.2 Theoretical Model

1.2.1 Organizational Culture

Denison (1990) defines organizational culture as:

> The underlying values, beliefs, and principles that serve as a foundation for an organization's management system as well as the set of management practices and behaviors that both exemplify and reinforce those basic principles (Denison, 1990, p. 2).

Four hypotheses about organizational culture were then derived from Denison (1990): 1) the consistency hypothesis, 2) the mission hypothesis, 3) the involvement/participation hypothesis and 4) the adaptability hypothesis. Baker (2002) interprets these four hypotheses as:

> The consistency hypothesis – the idea that a common perspective, shared beliefs and communal values among the organizational participants will enhance internal coordination and promote meaning and a sense of identification on the part of its members. The mission hypothesis – the idea that a shared sense of purpose, direction, and strategy can coordinate and galvanize organizational members toward collective goals. The involvement/participation hypothesis – the idea that involvement and participation will contribute to a sense of responsibility and ownership and, hence, organizational commitment and loyalty. The adaptability hypothesis – the idea that norms and beliefs that enhance an organization's ability to receive, interpret, and translate signals from the environment into internal organizational and behavioral changes will promote its survival, growth, and development (Baker, K.A. 2002).

These hypotheses address the relationship between a business organization and its internal and external environments. These hypotheses address and encourage stability and control on one hand and change and adaptation on another. For example, the participation and involvement hypotheses encourages change and flexibility and addresses the relationship of the organization with its internal environment. This research is interested in two of these four hypotheses; this is due to the fact that the MPI survey has data on two of the hypotheses: the involvement/participation hypothesis and the consistency hypothesis.

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. Schein (1990) defined organizational culture as:

> A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein, 92).

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

1.2.2 Competitive Advantage

This section defines competitive advantage. Three basic types of capital resources provide the firm with competitive advantage: physical resources, human resources and organizational resources. Physical resources include the firm’s plant, equipment and finances. Human resources include intellectual property, knowledge of business processes and tacit knowledge, skills, judgment and intelligence of the firm’s employees; and organizational resources include the firm’s structure, planning, controlling and coordination (Barney & Wright, 1998). Both the human and the organizational resources are contributors to the organizational culture of a business.

Competitive advantage is a term given to the source of a firm's ability to win business and out-perform competitors at a point in time. Maintaining competitive advantage is a constantly moving target and the source of competitive advantage will shift over time (Stalk, 1988). Rivals can quickly copy any changes in market position or strategies, therefore companies must be flexible in order to respond rapidly to competitive and market changes (Porter, 1996). Stevenson (2009) defines competitive advantage as a firm's effectiveness in using organizational resources to satisfy customers' demand when compared to competitors.

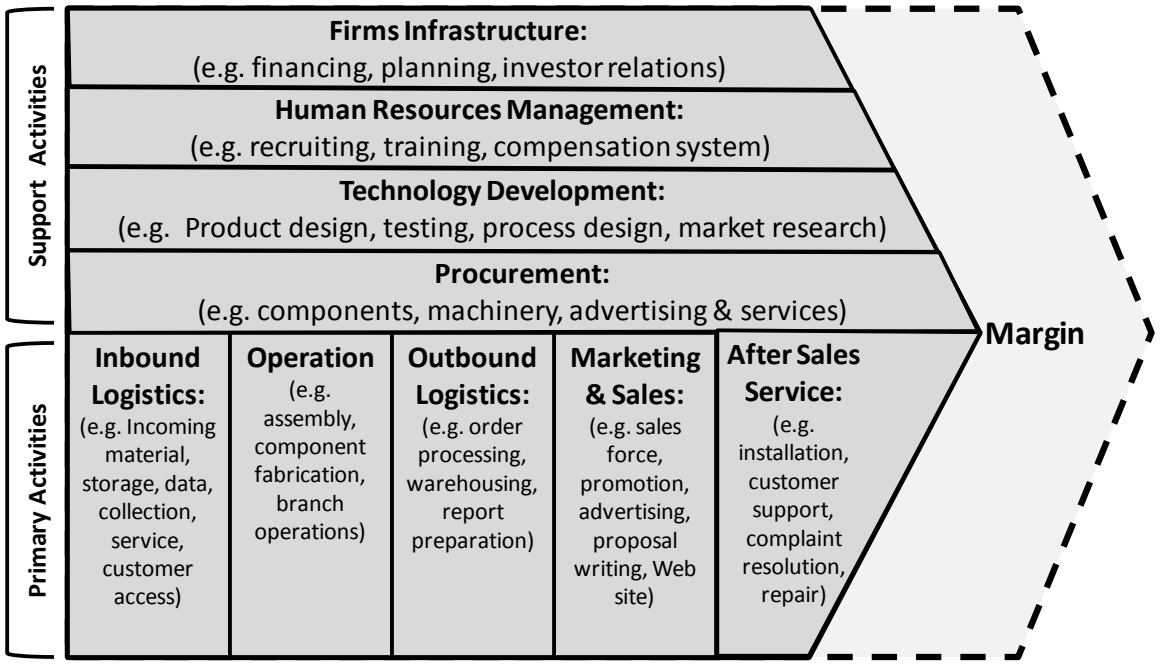
Barney (2008) defines competitive advantage as the ability to create more economic value than competitors (Barney, 2008). Barney distinguishes between two types of competitive advantage: temporary and sustainable competitive advantage. Competitive advantage typically results in high profits, but these profits attract competition, and competition limits the duration of competitive advantage in most cases, therefore most competitive advantage is temporary (Barney, 2008). On the other hand, some competitive advantages are sustainable if competitors are unable to imitate the source of advantage or if no one conceives of a better offering (Barney, 2008).

Therefore, competitive advantage must reside in a firm's value chain. The value chain is composed of primary business activities and support business activities and is displayed in Figure 1. Primary business activities include: inbound logistics, operations, outbound logistics, marketing and sales and after sales service. Support business activities include: firm infrastructure, human resources management, technology development and procurement. The value chain is entrenched in a firm's value system which includes: suppliers, buyers, and distribution channels. Competitive advantage also

depends on how well a firm coordinates the entire value system. The activities inside the value chain are interlinked and this linkage creates interdependencies between the firm and its external environment.

Competencies that reside in the culture of the firm help sustain competitive advantage, therefore, the phenomena of firm's culture and its social complexity plays a very important role in defining competitive advantage and the survival of many firms (King, Zeithaml, 2001). However, SMEs with limited market power are most vulnerable. Based on my review of the existing literature, Figure 2 illustrates the proposed model of the interactions between organizational culture variables and competitive advantage outcomes that is tested in this chapter.

Figure 1 The Value Chain

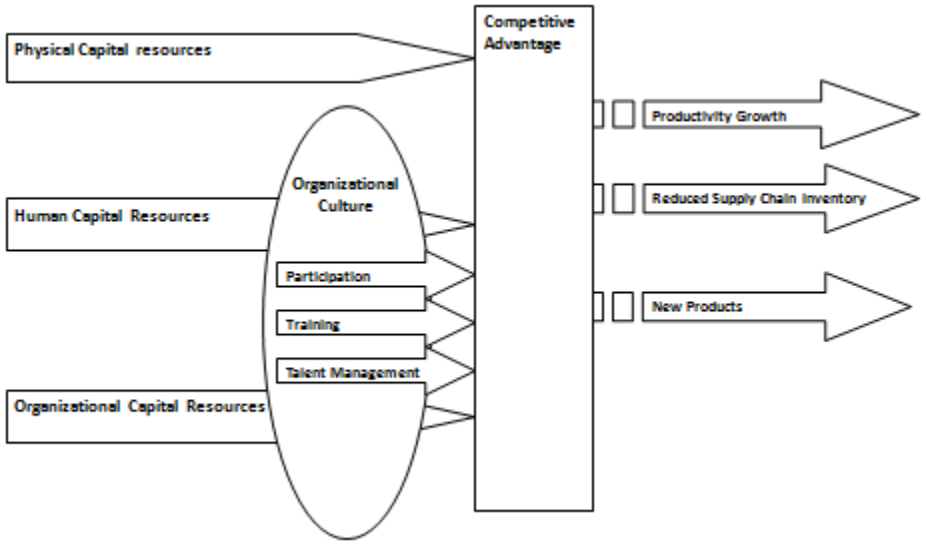


(Source: Porter, 2006).

This research uses three objective measures of the hypothesized outcomes produced by sustainable competitive advantage as dependent variables. These are: 1)

productivity growth: measured by the percentage improvement in productivity over the previous three years, 2) supply chain efficiency: measured by the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the previous three years, and 3) new products: measured by the percentage of annual sales derived from new products introduced in the previous three years. It is assumed that higher margins are associated with new products.

Figure 2 The Interactions Between Organizational Culture Variables & Sustainable Competitive Advantage Outcomes



1.2.3 Control Variables

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. The size of establishment 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 as identified in the MPI survey. The age of the establishment is measured by the number of years the

establishment has been in operation. 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.

Porter (2006) maps the relationship between a firm's operations in Figure 1 with emissions and waste, therefore, the establishment's environmental awareness, or green, is used as a control variable. This is measured by the percentage of the workforce dedicated to reducing energy, or emissions in operations.

The theoretical model, dependent variables, independent variables and control variables have been defined in this section. The hypothesized relationships between the objective aspects of organizational culture and the objective measures of the outcomes from competitive advantage are also discussed in this section. The next section provides the research question that explores this relationship and research hypotheses. The definitions of research variables and their ordinal scales are provided in Table I.

1.3 Research Question and Hypotheses

1.3.1 Research Question

The primary research question in this study explores the influence of organizational culture on sustainable competitive advantage (SCA). As described in previous sections three resources are sources of competitive advantage: organizational resources, human resources, and physical resources (see Figure 2 above). The research

Table I 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%.
Organizational Culture Independent Variables	$PARTICIPATION_i$: Independent 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%.
	$TRAINING_i$: Independent 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.
	$TALENTMGMT_i$: Independent 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%.
Control Variables	$\log(SIZE_i)$: Control variable, defined as the log of the number of full time employees.
	$log(\text{AGE}_i)$: 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.
	$NAICS_i$: Control variable, defined as the North American Industry Classification System (NAICS).
	ε_i: Statistical Error.

question (RQ) addressed in this chapter is: Does organizational culture affect the competitive advantage of an SME?

1.3.2 Hypotheses

Panico (2004) argues that culture is the most critical component in moving a company from being good to great. Di Stifano (2007) also argues that a prerequisite for achieving competitive advantage is having the right corporate culture in place. Panico (2004) also argues that the only asset that firms cannot buy is their organization's culture. As noted above, Denison (1990) identified four basic components of organizational culture that are translated into four hypotheses about the connection between culture and performance: 1) the consistency hypothesis, 2) the mission hypothesis, 3) the involvement/participation hypothesis and 4) the adaptability hypothesis. The involvement and consistency hypotheses test the associations between employee participation, training and talent management with the organization's performance.

This research uses employee training, participation and talent management as proxy for organizational culture. These variables are defined as: 1) participation: measured by the percentage of employees regularly participating in empowered work teams, 2) training: measured by the number of formal training hours devoted annually to each employee and 3) talent management: measured by the percentage of employees dedicated to assessing and upgrading the organization's talent pool. These three independent variables are used because it is assumed that businesses with high levels of employee training, participation and talent management will also be businesses with

higher levels of involvement, sense of ownership and responsibility. Involvement and ownership are key measures of organizational culture. Ownership creates a greater organizational commitment, a lesser overt control system and therefore improves business effectiveness (Denison, 1990).

Three objective measures of the outcomes from an establishment's competitive advantage are used as this study's dependent variables: 1) productivity growth: measured by the percentage improvement in productivity over the past three years , 2) supply chain efficiency: measured by the percentage 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: measured by the percentage 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 proportionately large sales from new products will also be businesses with higher profits and improved probabilities of survival over time, these are assumed to be the ultimate measures of the success of competitive advantage.

Based on the hypotheses developed by Denison about the connection between organizational culture and performance it is reasonable to propose three sets of hypotheses that explore the effect of objective aspects of organizational culture on objective measures of the outcomes from sustainable competitive advantage. This research defines three dependent variables and three independent variables.

The research hypotheses are organized into three sets of questions that are given in Table II, Table III and Table IV. The dependent variables are defined in Table I. The first set of hypotheses in Table II include Research Hypotheses RH1, RH2 and RH3.

These three hypotheses explore the effect of employee participation on the three dependent variables: productivity growth, supply chain efficiency and new products. The second set of hypotheses is given in Table III and includes Research Hypotheses RH4, RH5 and RH6. These three hypotheses explore the effect of employee training on the three dependent variables mentioned above.

Table II Hypotheses Sets For The Independent Variable Participation

Independent Variables (Participation)	RH1	H_0	*The percentage of production employees participating in empowered or self-directed work teams has no effect on the percentage improvement in productivity over the past three years.*
		H_1	*The percentage of production employees participating in empowered or self-directed work teams does affect the percentage improvement in productivity over the past three years.*
	RH2	H_0	*The percentage of production employees participating in empowered or self-directed work teams has no effect on the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years.*
		H_1	*The percentage of production employees participating in empowered or self-directed work teams does affect the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years.*
	RH3	H_0	*The percentage of production employees participating in empowered or self-directed work teams has no effect on the percentage of annual sales derived from new products introduced in the past three years.*
		H_1	*The percentage of production employees participating in empowered or self-directed work teams does affect the percentage of annual sales derived from new products introduced in the past three years.*

Table III Hypotheses Sets For The Independent Variable Training

Independent Variable (Training)	RH4	H_0	*The number of training hours devoted annually to each employee has no effect on the percentage improvement in productivity over the past three years.*
		H_1	*The number of training hours devoted annually to each employee does affect the percentage improvement in productivity over the past three years.*
	RH5	H_0	*The number of training hours devoted annually to each employee has no effect on the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years.*
		H_1	*The number of training hours devoted annually to each employee does affect the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years.*
	RH6	H_0	*The number of training hours devoted annually to each employee has no effect on the percentage of annual sales derived from new products introduced in the past three years.*
		H_1	*The number of training hours devoted annually to each employee does affect the percentage of annual sales derived from new products introduced in the past three years.*

The third set of hypotheses is given in Table IV and includes Research Hypotheses RH7, RH8 and RH9. These three hypotheses explore the effect of the independent variable talent management on the three dependent variables.

Table IV Hypotheses Sets For The Independent Variable Talent Management

Independent Variable (Talent Management)	RH7	H_0	*The percentage of employees dedicated to assessing and upgrading the organization's talent pool has no effect on the percentage improvement in productivity over the past three years.*
		H_1	*The percentage of employees dedicated to assessing and upgrading the organization's talent pool does affect the percentage improvement in productivity over the past three years.*
	RH8	H_0	*The percentage of employees dedicated to assessing and upgrading the organization's talent pool has no effect on the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years.*
		H_1	*The percentage of employees dedicated to assessing and upgrading the organization's talent pool does affect the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years.*
	RH9	H_0	*The percentage of employees dedicated to assessing and upgrading the organization's talent pool has no effect on the percentage of annual sales derived from new products introduced in the past three years.*
		H_1	*The percentage of employees dedicated to assessing and upgrading the organization's talent pool does affect the percentage of annual sales derived from new products introduced in the past three years.*

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

1.4 Research Model and Data

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:

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

Model 2:

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

Model 3:

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

The first model explores the association between organizational culture and percentage improvement in productivity over the past three years. The second model explores the association between organizational culture and percentage reduction in the total value of inventory throughout the supply chain for the primary product over the last three years. The third model explores the association between organizational culture and percentage of annual sales derived from new products introduced in the past three years.

The dependent variables in these models are three measures of outputs of sustainable competitive advantage. The productivity growth dependent variable is measured by the percentage improvement in productivity over the last three years. The supply chain ordered dependent variable is measured by the percentage reduction in the total value of inventory throughout the supply chain for the primary product over the last three years. The new products ordered dependent variable is measured by the percentage of annual sales derived from new products introduced in the past three years.

The organizational culture variables that are used as independent variables are: participation, training and talent management. The participation variable is measured by the percentage of employees regularly participating in empowered teams. The

participation variable is measured by the number of formal training hours devoted annually to each employee. The talent management variable is measured by the percentage of employees that are dedicated to assessing and upgrading the organization's talent pool.

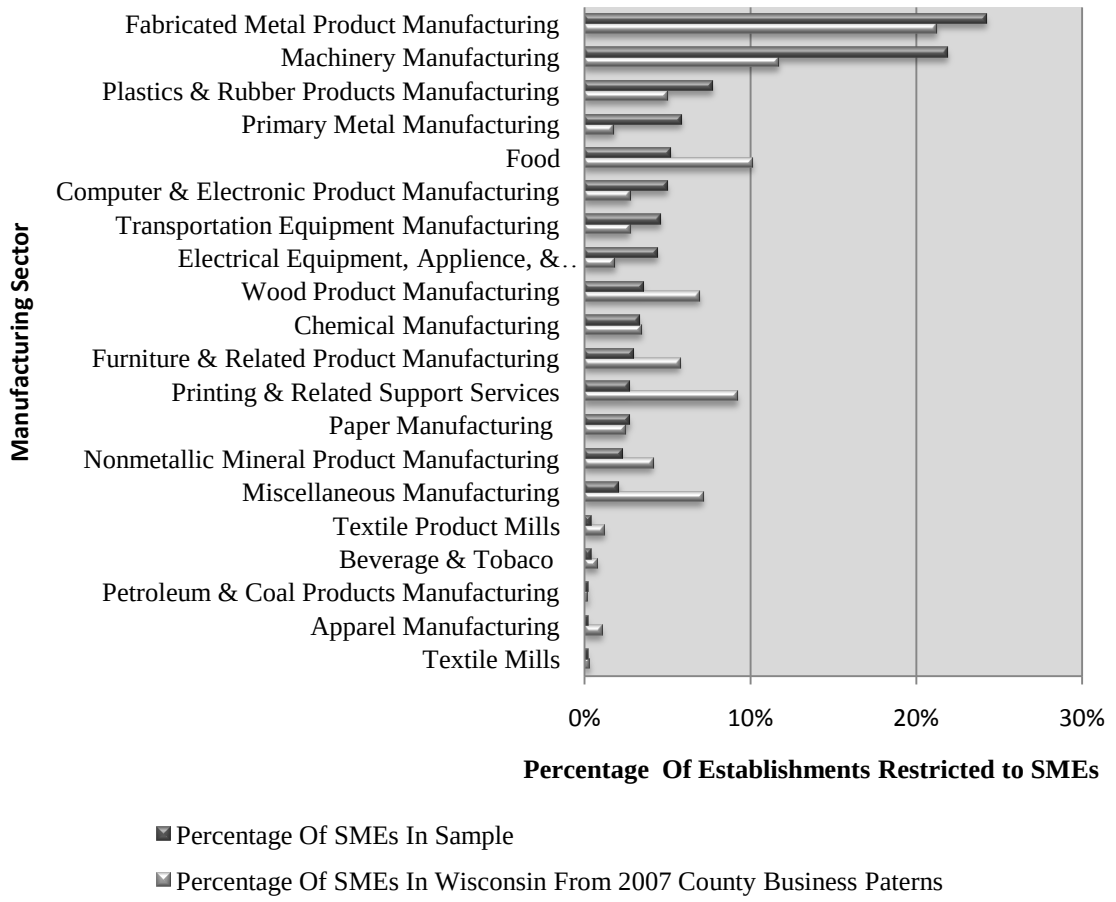
Each of the three statistical models is tested under different conditions. Each model is tested using the North American Industry Classification System (NAICS) code under different fixed effects assumptions. The variables used in these statistical models are defined in Table I. The distribution of the sample by manufacturing sector is provided in Figure 3.

MPI reports that the research sample is approximately 6% of Wisconsin's manufacturing establishments. There are twenty manufacturing sectors represented in the MPI survey responses, where sector are defined according to NAICS 2007. Establishments in the Fabricated Metal Product Manufacturing sector constitute 24.2% of the sample, and establishments in the Machinery Manufacturing sector constitute 21.9% of the sample. These two manufacturing sectors represent 46% of the sample; the remaining 18 sectors represent 56%. These two sectors are also the largest two in the 2007 County Business Patterns data. The 2007 County Business Patterns (Census, 2007) reports that 21% of Wisconsin manufacturing establishments are in the Fabricated Metal Products sector; the corresponding figure for the Machinery Manufacturing sector is 12%.

Comparing the industry distribution of SMEs in the sample versus the County Business Patterns data shows that the sample is noticeably different from the County Business Patterns data. In particular, the sample over represents durable manufacturers and under represents non-durable manufacturers. This is one of the reasons industry fixed effects are included in all of the regression models. If the population coefficients for the explanatory variables are similar across industries but industries have different intercepts, the industry fixed effects will make the results

generalizable to all Wisconsin manufacturers. If this untestable assumption is false, then the results are less generalizable. This limitation is common to research using similar survey data.

Figure 3 The Generalization Of the Research Sample By Manufacturing Sector To Wisconsin



1.5 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 survey instrument was administered 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 was all manufacturing establishments in Wisconsin. The sample size is 492 establishments representing a 6% of the universe.

Proportional odds logistic regression models are used for the statistical analysis because the dependent variables are ordinal variables. OLS is not appropriate to use because it is restricted to continuous dependent variables. Since the dependent variables in this research are discrete, ordered and not continuous, and since they are scaled on either a four or a five-level ordinal scale proportional odds logistic regression models are used to test the hypothesized relationships. Descriptive statistics of the ordinal scaled variables is provided in Table V. 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 model errors are logistically distributed, as compared to ordered probit models where 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

Table V Descriptive Statistics

	Percentage improvement in productivity over the past three years			Percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years			Percentage of annual sales derived from new products introduced in the past three years		
Dependent Variables	**Scale**	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**
	<25%	230	48%	<10%	285	59%	<5%	132	27%
	26-50%	155	32%	10-25%	138	29%	5-25%	224	46%
	51-75%	64	13%	26-50%	46	10%	26-50%	93	19%
	76-99%	26	5%	>50%	10	2%	>50%	36	7%
	>100%	5	1%						
		480	100%		479	100%		485	100%
	Percentage of employees regularly participating in empowered work teams (i.e., make decisions without supervisor approval)			**Number of training hours devoted annually to each employee**			**Percentage of employees dedicated to assessing and upgrading the organization's talent pool**		
Independent Variables	Scale	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**
	<25%	194	40%	≤8	141	29%	<1%	133	27%
	25-50%	148	30%	9-20	215	44%	1-5%	240	49%
	51-75%	72	15%	21-40	85	17%	6-10%	74	15%
	76-90%	50	10%	>40	48	10%	>10%	43	9%
	>90%	26	5%						
		490	100%		489	100%		490	100%

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 PseudoR^2. The PseudoR^2 is calculated using the following formula:

$$\text{PseudoR}^2 = 1 - (\ln L_{(\text{Multinomial})} / \ln L_{(\text{Ordered})})$$

Where: $\ln L_{(\text{Multinomial})}$ is the loglikelihood value of the multinomial regression model and $\ln L_{(\text{Ordered})}$ is the loglikelihood value of the ordered logistic regression model. The 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 fits the data almost perfectly (Vani, 2001).

1.6 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 results for the small and medium sized establishments (SMEs) models are generally superior to the results for the models that include observations on establishments of all sizes. The superior results for the SME models are identified by the low AIC values and the high association statistics are displayed in Table VI and Table VII.

The lowest AIC result is for Model 2 where the AIC = 869. This means that the goodness of fit is best for the statistical model testing the regression of the ordered

dependent variable supply chain that include the 4-digit NAICS fixed effects variables and where the sample is restricted to SMEs.

This research is exploratory. The research question explores whether organizational culture affects sustainable competitive advantage. F-tests for each model 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. This is true for two reasons: first, research is exploratory and sample is biased, second, the joint effect of three independent variables is of interest. Therefore, this research focuses on F-tests rather than coefficient tests. Table VI and Table VII, summarize the statistical results. The F-tests show significant results, as displayed in Table VII.

The research results highlight a strong positive association between training and the supply chain, and between talent management and productivity growth, both at the 1% critical level. This means that the number of formal training hours devoted annually to each employee are strongly associated with the percentage of reduction in the total value of inventory throughout the supply chain for the primary product over the last three years, and the percentage of employees dedicated to assessing and upgrading the organization's talent pool is strongly associated with the percentage improvement in productivity over the past three years.

The first model explores the association of organizational culture with the percentage improvement in productivity over the past three years. The model shows strong and statistically significant association between talent management and productivity growth, and weak associations between training and talent management and productivity growth. These are only significant at the 10% critical level.

The dummy variable talent management at level four, with more than 10% of the establishment's employees dedicated to assessing and upgrading the organization's talent pool, is positive and statistically significant at the 1% critical level. The association of talent management with productivity growth at the 1% critical level is interpreted as holding all else constant when more than ten percent of employees are dedicated to assessing and upgrading their organization's talent pool, then the odds of improving productivity are multiplied by 3.853 times what they are when less than one percent of employees are dedicated to assessing and upgrading their organization's talent pool. This is a very strong indicator of the importance of talent management in its effects on increasing productivity growth.

As the percentage dedicated to improving the organization's talent pool gets larger, the difference from the omitted dummy variable talent management 1 in the regression model, as provided in Table V, also gets larger, where the independent variables are scaled on a four or five-level ordinal scale. This provides additional evidence of the strong link between the increase in the percentage of employees dedicated to improving the talent pool and between productivity growth.

The second model explores the association of organizational culture with the percentage reduction in the total value of inventory throughout the supply chain for the primary product over the last three years. The model shows strong and statistically significant association between training and supply chain at the 1% critical level.

Model three explores the association of organizational culture with the percent of annual sales derived from new products introduced in the past three years. The model shows only weak association of training with new products at the 10% critical level.

The dependent variables in these models are three measures of outputs from sustainable competitive advantage. The productivity growth dependent variable is measured by the percentage improvement in productivity over the last three years. The supply chain ordered dependent variable is measured by the percentage reduction in the total value of inventory throughout the supply chain for the primary product over the last three years. The new products ordered dependent variable is measured by the percentage of annual sales derived from new products introduced in the past three years.

There is evidence of a relationship between the organizational culture variables and the competitive advantage outcomes. There are two strong relationships that are significant at the 1% critical level, and three relationships that are significant at the 10% critical level. The results show that the percentage of employees dedicated to assessing and upgrading the organization's talent pool is only associated with the productivity growth variable, however, this is a strong association that is significant at the 1% critical level. The percent of employees regularly participating in empowered work teams is positively associated with the percent improvement in productivity over the past three years at the 10% critical level. The number of training hours devoted annually to each employee is positively associated with all the objective measures of the outcomes of competitive advantage.

The consistency of the results is evident when the statistical models tested are examined. The models were tested with different NAICS code fixed effects using three-digit, four-digit and five-digit NAICS fixed effects. The model restricted to SME size and four-digit NAICS defined industry dummy variables to capture industry fixed effects proved to be the superior model, having the lowest AIC value of 869. The SME models

show higher t-values and larger odd ratios compared to the other models that included the full sample of all manufacturing establishments; manufacturing establishments of all sizes.

Talent management has a strong association with productivity growth and employee training has strong association with supply chain efficiencies. The economic and practical interpretation of the statistical analysis discussed above highlights the importance of organizational culture as a source of competitive advantage. Therefore, business establishments and top managers are advised to invest in empowering their employees, providing sufficient annual training in addition to managing their organizational talent pool.

Furthermore, it is also evident that the relationship between the objective aspects of organizational culture and the objective measures of the outcomes of sustainable competitive advantage is stronger when the sample is restricted to SMEs. This is an empirical result. As noted above, there are differences between SMEs and establishments of all sizes. However, there is no information to explain why.

The association of organizational culture outcomes with new products is very weak, almost non-existent. It is possible that the structure of an establishment's organizational culture will change at different stages of a product's life cycle. Therefore, the stage of a product's life cycle can be considered for analysis in future research.

Supply chain efficiency improves as inventory levels are decreased throughout the supply chain (Stevenson, 2009). A supply chain includes all the internal and external activities and facilities that are related to the production and distribution of a product. Participation and talent management can only be applied to the internal portions of a

Table VI Summary of the Results of the N4digSME Models

Variable Name	Model 1 Dependent Variable (PRODUCTIVITYGROWTH)		Model 2 Dependent Variable (SUPPLYCHAIN)		Model 3 Dependent Variable (NEWPRODUCTS)	
	Value	EXP(Coef)	Value	EXP(Coef)	Value	EXP(Coef)
	Std. Error	t value	Std. Error	t value	Std. Error	t value
PARTICIPATION2	0.676	1.965	0.502	1.651	-0.109	0.897
	0.281	2.400**	0.291	1.720*	0.267	-0.409
PARTICIPATION3	0.208	1.231	0.510	1.665	-0.060	0.942
	0.347	0.599	0.361	1.410	0.341	-0.176
PARTICIPATION4	1.041	2.833	0.338	1.402	-0.419	0.658
	0.428	2.440**	0.459	0.737	0.407	-1.030
PARTICIPATION5	0.529	1.697	-0.770	0.463	-0.054	0.947
	0.600	0.881	0.682	-1.130	0.578	-0.094
TRAINING2	0.642	1.901	0.953	2.594	0.059	1.061
	0.292	2.200**	0.316	3.020***	0.277	0.213
TRAINING3	0.714	2.041	1.300	3.671	0.491	1.633
	0.361	1.977*	0.385	3.380***	0.347	1.410
TRAINING4	0.881	2.413	1.035	2.816	0.987	2.683
	0.428	2.060**	0.477	2.170**	0.413	2.390**
TALENTMGMT2	0.530	1.699	-0.081	0.922	0.335	1.397
	0.302	1.750*	0.310	-0.262	0.288	1.160
TALENTMGMT3	1.283	3.606	0.281	1.325	0.674	1.962
	0.394	3.260***	0.406	0.692	0.377	1.790*
TALENTMGMT4	1.349	3.853	-0.744	0.475	0.113	1.119
	0.473	2.850***	0.604	-1.230	0.482	0.234

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

Table VII Summary of the Proportional Odds Logistic Regressions Results

		p-value		
		Model 1	Model 2	Model 3
		Dependent Variable		
		PRODUCTIVITYGROWTH	SUPPLYCHAIN	NEWPRODUCTS
Independent Variable	PARTICIPATION	0.0539 *		
	TRAINING	0.0825 *	0.0031 ***	0.0573 *
	TALENTMGMT	0.0028 ***		
df		108	107	107
AIC		1069	869	1119
Pseudo R^2		0.2717	0.2280	0.2609
Proportional Odds Test "*Pchisq"*		0.9997	0.9973	0.8644

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

supply chain and, therefore, may not have a strong association with a supply chain that extends to include external activities and facilities.

Employee training is strongly associated with supply chain. Employee training leads to new processes and decreases the level of waste in production activities and increases the quality of production and therefore, decreases the value of waste and inventory throughout the supply chain.

Unused human skill and knowledge within an establishment is a competitive disadvantage. Organizational culture management is a long-term strategy, and a difficult asset to cultivate (Denison, 1990) however, this research shows that it is well worth the effort.

1.7 Conclusion

Organizational culture forms a basis for creating a framework for understanding and, more importantly for investing in a firm's sustainable competitive advantage. Distinct attributes of a firm's organizational culture influence the sources of and outcomes from competitive advantage.

This study provides empirical evidence about the links between the objective aspects of organizational culture and objective measures of the outcomes from sustainable competitive advantage. This study shows that employee training is the objective aspect of organizational culture that is most strongly associated with the objective outcomes from sustainable competitive advantage. The statistical results show that employee training within SMEs has a strong association with the positive outcomes that are associated with sustainable competitive advantage.

Talent management has a strong association with productivity growth. Employee participation in empowered work teams shows a strong association with productivity growth and with the percentage of reduction in the total value of inventory throughout the supply chain for the primary product.

This research leads to recommendations that managers increase the percentage of employees who regularly participate in empowered work teams, to increase the number of formal training hours devoted annually to each employee and to increase the percentage of employees dedicated to assessing and upgrading the organization's talent pool.

CHAPTER II

BEST BUSINESS PRACTICES FOR ACHIEVING WORLD-CLASS STATUS

2.1 Introduction

Intense global competition and rapid changes in technology have enticed many manufacturers into adopting business practices that are said to help them achieve world-class status. The twin forces of globalization and technology continue to transform the world of work and as organizations become more virtual than physical, workers become more closely linked to customers across a country than to co-workers across a hall while products' shelve-lives become ever-shorter (Schwandt and Marquardt, 2000).

Firms need new strategies to overcome the challenges to their industries (Hill, 2008). Innovations in manufacturing will continue to pour forth. Amid all of this commotion firms need a guiding path that will move them forward confidently; step by step (Schonberger, 1996).

The objective of this research is to fill existing gaps in the business literature by providing an analysis of the relationship between objective aspects of a business's organizational culture and subjective measures of its world-class status in specific aspects of its operations. World-class status is defined as the self-reported assessment of a firm measured by the rate of organizational progress toward world-class customer-focused innovation; the rate of organizational progress toward world-class human-capital acquisition, development and retention; and the rate of organizational progress toward world-class supply-chain management and collaboration. These three dependent variables are used because it is assumed that businesses with world-class customer-focused innovation, world-class human-capital acquisition, development and retention and world-class supply-chain management and collaboration will be among the most competitive, and, therefore, among the most successful.

The three objective aspects of a business organization's culture considered are employee training hours, employee participation and talent management. These three independent variables are used because it is assumed that businesses with high levels of employee training, participation and talent management will also be businesses with higher levels of involvement, sense of ownership and responsibility. Involvement and ownership are key measures of organizational culture. Ownership creates a greater organizational commitment, a lesser overt control system and therefore improves business effectiveness (Denison, 1990).

These three objective aspects of a business organization's culture capture two sources of competitive advantage: human resources and organizational resources. The links between the three observed dependent variables and organizational effectiveness are

the basis of the model of Denison(1990) used in his research. Denison (1990) argued that business effectiveness is a function of policies and practices used by the organization. His theory of organizational culture and effectiveness is used in this work to link the influence of organizational culture to an establishment's performance. This research develops a conceptual framework that associates three objective aspects of organizational culture with three self-reported subjective measures of a firm's world-class status in three operational areas. 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. The hypotheses about the relationships between organizational culture and world-class performance are tested with proportional odds logistic regression models.

Toyota has become the largest car manufacturer in the world, in recent years by differentiating itself as world-class leader in quality and customer service, while automobile manufacturers headquartered in the United States have had operational problems with improving efficiency and quality and in reducing their inventory costs (Palmer, 2007). It should be relatively easy for firms such as Ford, Chrysler and General Motors to imitate particular system capabilities of Toyota or Honda and probably these firms are trying to do so. However, it seems that these firms are unable to imitate the root source of advantage of the Honda-Toyota business model.

This research begins with an introduction where the objectives and contribution of the research are described. A description of relevant studies, theoretical model, research variables, Denison's model of organizational culture and effectiveness and a suggested framework that illustrates the interactions between the dependent and the independent

variables follow in the next section. The research question and three hypotheses are then described. The statistical models follow. They test the hypothesized relationships between organizational culture and the self-reported assessment of the establishments progress toward world-class status in three operational areas. The variables are also defined and operationalized in this section. The final section contains a discussion of the results followed by conclusions.

2.2 Theoretical Model

2.2.1 Organizational Culture

Denison (1990) defines organizational culture as:

> The underlying values, beliefs, and principles that serve as a foundation for an organizational management system as well as the set of management practices and behaviors that both exemplify and reinforce those basic principles (Denison, 1990, p. 2).

Four hypotheses about organizational culture were then derived from Denison (1990): 1) the consistency hypothesis, 2) the mission hypothesis, 3) the involvement/participation hypothesis and 4) the adaptability hypothesis. Baker (2002) interprets these four hypotheses as:

> The consistency hypothesis – the idea that a common perspective, shared beliefs and communal values among the organizational participants will enhance internal coordination and promote meaning and a sense of identification on the part of its members. The mission hypothesis – the idea that a shared sense of purpose, direction, and strategy can coordinate and galvanize organizational members toward collective goals. The involvement/participation hypothesis – the idea that involvement and participation will contribute to a sense of responsibility and ownership and, hence, organizational commitment and loyalty. The adaptability

> hypothesis – the idea that norms and beliefs that enhance an organizational ability to receive, interpret, and translate signals from the environment into internal organizational and behavioral changes will promote its survival, growth, and development (Baker, K.A. 2002).

These hypotheses address the relationship between a business organization and its internal and external environments. These hypotheses address and encourage stability and control on one hand and change and adaptation on another. For example, the participation and involvement hypotheses encourages change and flexibility and addresses the relationship of the organization with its internal environment. This research is interested in two of these four hypotheses due to the structure of the MPI survey. The involvement/participation hypothesis and the consistency hypothesis are tested.

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. Schein (1990) defined organizational culture as:

> A pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein, 92).

This research uses three objective aspects of organizational culture as independent variables: 1) participation: measured by the percentage of employees regularly participating in empowered work teams, 2) training: measured by the number of formal training hours devoted annually to each employee and 3) talent management: measured by the percentage of employees dedicated to assessing and upgrading the organization's talent pool.

2.2.2 Best Business Practices And World-Class Status

Best business practices are defined both quantitatively and qualitatively, and definitions of what is really meant by a best practice vary widely. Best practices and business success can be defined as the best ways for doing anything from generating new products to providing after sales service. For example, Schonberger (1996) defined business success as: sustained bottom-line success follows when 1) customers are well served 2) employees are fully involved, and 3) actions are based on systematic data about processes, customers, competitors, and best practices.

The purpose of this research is to test the association between objective actions that are commonly associated with best business practices and the business establishments' self-assessment of their practices. In other words, if a business establishment states that they are world-class in a specific business practice are they correct?

This research uses three subjective measures of a firm's world-class status as dependent variables. These are: 1) world-class customer-focused: measured by the rate of organizational progress toward world-class customer-focused innovation, 2) world-class human-capital: measured by the rate of organizational progress toward world-class human-capital acquisition, development and retention, and 3) world-class supply-chain: measured by the rate of organizational progress toward world-class supply-chain management and collaboration. Figure 4 illustrates the proposed model of the interactions between organizational culture and world-class variables that is tested in this chapter.

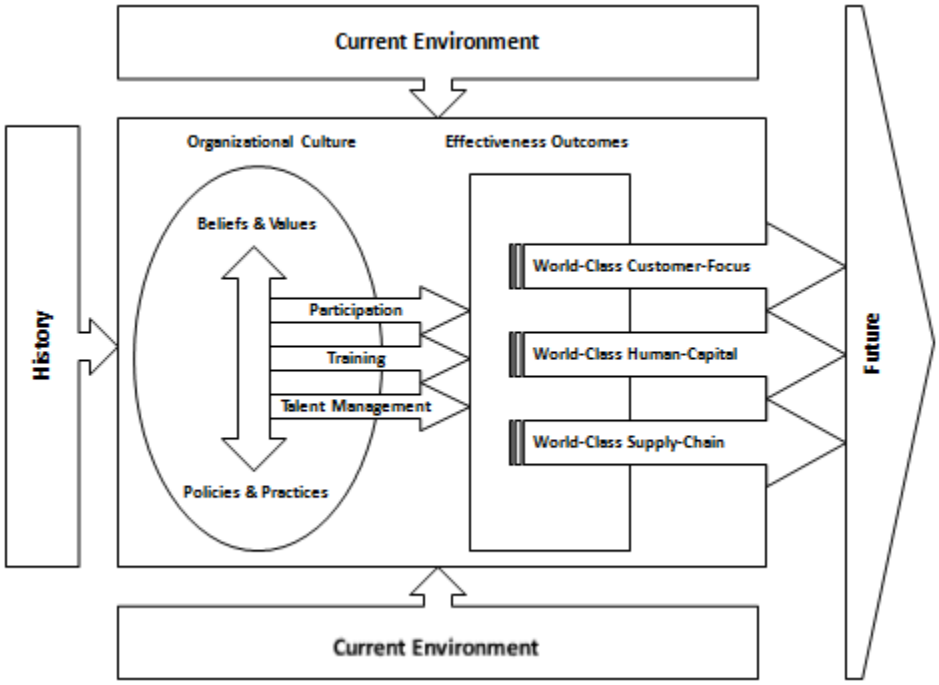
2.2.3 Control Variables

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. 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 therefore, global is used as a control variable and 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 in Figure 1 with emissions and waste containment, therefore, the establishment's environmental awareness, or green, is used as a control variable and is measured by the percentage of the workforce dedicated to reducing energy, or emissions in operations.

The theoretical model, dependent variables, independent variables and control variables were defined in this section. The association between the objective aspects of organizational culture and the self-assessment of an establishment's world-class were also provided in this section. The next section provides the research questions. The definitions of variables used in the statistical models ordinal scales are provided in Table VIII.

Figure 4 The Interactions Between Organizational Culture Variables & World-Class Status Variables



(Developed & Modified by the Researcher Based on Denison (1990)).

2.3 Research Question and Hypotheses

2.3.1 Research Question

The primary research question in this study explores the association between objective actions that are commonly associated with best business practices and the business establishments' self-assessment of their practices. As described in previous sections three subjective measures of world-class status are used: customer-focused, human-capital, and supply-chain (see Figure 4 above). The research question (RQ) addressed in this chapter is: Do management practices foreshadow world-class status?

Table VIII Definitions Of Variables & Ordinal Scales

World-Class Dependent Variables	$WORLDCLASScustomerfocused_i$: Ordered dependent variable, defined as the self reported image by an SME as world-class status in customer-focused innovation, measured by the rate of organizational progress toward becoming a world-class player in developing, making, and marketing new products and services that meet customers' needs at a pace faster than the competition, and is scaled on a five level ordinal scale: level one being no progress, level two being 2, level three being 3, level four being 4, and level five being world-class.
	$WORLDCLASShumancapital_i$: Ordered dependent variable, defined as the self reported image by an SME as world-class status in engaged people, human-capital acquisition, development and retention, measured by the rate of organizational progress toward becoming a world-class player in securing a competitive performance advantage by having superior systems in place to recruit, hire, develop, and retain talent, and is scaled on a five level ordinal scale: level one being no progress, level two being 2, level three being 3, level four being 4, and level five being world-class.
	$WORLDCLASSsupplychain_i$: Ordered dependent variable, defined as the self reported image by an SME as world-class status in supply-chain management and collaboration, measured by the rate of organizational progress toward becoming a world-class player in developing and managing supply chains and partnerships that provide flexibility, response time, and delivery performance that exceeds the competition, and is scaled on a five level ordinal scale: level one being no progress, level two being 2, level three being 3, level four being 4, and level five being world-class.
Organizational Culture Independent Variables	$PARTICIPATION_i$: Independent 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%.
	$TRAINING_i$: Independent 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.
	$TALENTMGMT_i$: Independent 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%.
Control Variables	$\log(SIZE_i)$: 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.
	$NAICS_i$: Control variable, defined as the North American Industry Classification System (NAICS).
	$GLOBAL_i$: Control variable, measured by the rate of organization's progress toward becoming a world-class global player.
	ε_i: Statistical Error.

2.3.2 Hypotheses

Schonberger (1996) defines business success as that which follows when customers are well served, employees are fully involved, and actions are based on systematic data about processes, customers, competitors, and best practices (Schonberger, 1996). Panico (2004) argues that culture is the most critical component in moving a company from being good to great. Panico (2004) also argues that the only asset that firms cannot buy is their organizational culture.

As noted above, Denison (1990) identified four basic components of organizational culture that are translated into four hypotheses about the connection between culture and performance: 1) the consistency hypothesis, 2) the mission hypothesis, 3) the involvement/participation hypothesis and 4) the adaptability hypothesis. The involvement and consistency hypotheses test the association of employee participation, training and talent management with organizational performance. This research uses objective measurements of participation, employee training, and talent management to capture these critical aspects of organizational culture.

1) Employee participation is measured by the percentage of employees regularly participating in empowered work teams. 2) Training is measured by the number of formal training hours devoted annually per employee. 3) Talent management is measured by the percentage of employees dedicated to assessing and upgrading the organization's talent pool. These three independent variables are used because it is assumed that businesses with high levels of employee training, participation and talent management are businesses with higher levels of employee involvement, sense of ownership and responsibility.

Involvement and ownership are key measures of an employee-involved organizational culture. Ownership creates a greater organizational commitment, a less overt control system which is expected to improve business effectiveness (Denison, 1990).

Three self-assessments of a firm's world-class status are the study's dependent variables: 1) world-class customer-focus: measured by the rate of organizational progress toward developing, making, and marketing new products and services that meet customer's needs at a pace faster that the competition, 2) world-class human-capital: measured by the rate of organizational progress toward securing a competitive performance advantage by having superior systems in place to recruit, hire, develop, and retain talent, and 3) world-class supply-chain: measured by the rate of organizational progress toward developing and managing supply chains and partnerships that provide flexibility, response time, and delivery performance that exceeds the competition. These three dependent variables are used because it is assumed that businesses with world-class customer-focused innovation, world-class human-capital acquisition, development and retention and world-class supply-chain management and collaboration are best at meeting Schonberger's definition of business success.

Based on the hypotheses developed by Denison about the connection between organizational culture and business effectiveness it is reasonable to propose three sets of hypotheses that explore the effects of objective aspects of organizational culture on subjective measures of a firm's world-class status. This research defines three dependent variables and three independent variables, therefore nine hypotheses are defined to explore the link between organizational culture and world-class status.

The research hypotheses are organized into three sets as provided in Table IX, Table X and Table XI respectively. The dependent variables are defined in Table VIII. The first set of hypotheses is given in Table IX; these are Research Hypotheses RH1, RH2 and RH3.

Table IX Hypotheses Sets For The Independent Variable Participation

Independent Variables (Participation)	RH1	H_0	*The percentage of production employees participating in empowered or self-directed work teams has no effect on the rate of organizational progress toward world-class customer-focused innovation of an SME.*
		H_1	*The percentage of production employees participating in empowered or self-directed work teams does affect the rate of organizational progress toward world-class customer-focused innovation of an SME.*
	RH2	H_0	*The percentage of production employees participating in empowered or self-directed work teams has no effect on the rate of organizational progress toward world-class human-capital acquisition, development and retention of an SME.*
		H_1	*The percentage of production employees participating in empowered or self-directed work teams does affect the rate of organizational progress toward world-class human-capital acquisition, development and retention of an SME.*
	RH3	H_0	*The percentage of production employees participating in empowered or self-directed work teams has no effect on the rate of organizational progress toward world-class supply-chain management and collaboration of an SME.*
		H_1	*The percentage of production employees participating in empowered or self-directed work teams does affect the rate of organizational progress toward world-class supply-chain management and collaboration of an SME.*

Table X Hypotheses Sets For The Independent Variable Training

Independent Variable (Training)	RH4	H_0	*The number of training hours devoted annually to each employee has no effect on the rate of organizational progress toward world-class customer-focused innovation of an SME.*
		H_1	*The number of training hours devoted annually to each employee does affect the rate of organizational progress toward world-class customer-focused innovation of an SME.*
	RH5	H_0	*The number of training hours devoted annually to each employee has no effect on the rate of organizational progress toward world-class human-capital acquisition, development and retention of an SME.*
		H_1	*The number of training hours devoted annually to each employee does affect the rate of organizational progress toward world-class human-capital acquisition, development and retention of an SME.*
	RH6	H_0	*The number of training hours devoted annually to each employee has no effect on the rate of organizational progress toward world-class supply-chain management and collaboration of an SME.*
		H_1	*The number of training hours devoted annually to each employee does affect the rate of organizational progress toward world-class supply-chain management and collaboration of an SME.*

These three hypotheses explore the effect of employee participation on the three dependent variables: world-class customer-focus, world-class human-capital, and world-class supply-chain.

Table XI Hypotheses Sets For The Independent Variable Talent Management

Independent Variable (Talent Management)	RH7	H_0	*The percentage of employees dedicated to assessing and upgrading the organizational talent pool has no effect on the rate of organizational progress toward world-class customer-focused innovation of an SME.*
		H_1	*The percentage of employees dedicated to assessing and upgrading the organizational talent pool does affect the rate of organizational progress toward world-class customer-focused innovation of an SME.*
	RH8	H_0	*The percentage of employees dedicated to assessing and upgrading the organizational talent pool has no effect on the rate of organizational progress toward world-class human-capital acquisition, development and retention of an SME.*
		H_1	*The percentage of employees dedicated to assessing and upgrading the organizational talent pool does affect the rate of organizational progress toward world-class human-capital acquisition, development and retention of an SME.*
	RH9	H_0	*The percentage of employees dedicated to assessing and upgrading the organizational talent pool has no effect on the rate of organizational progress toward world-class supply-chain management and collaboration of an SME.*
		H_1	*The percentage of employees dedicated to assessing and upgrading the organizational talent pool does affect the rate of organizational progress toward world-class supply-chain management and collaboration of an SME.*

The second set of hypotheses is provided in Table X and it includes Research Hypotheses RH4, RH5 and RH6. These three hypotheses explore the effect of the independent variable training on the three dependent variables mentioned above.

The third set of hypotheses is provided in Table XI and include Research Hypotheses RH7, RH8 and RH9. These three hypotheses explore the effect of the independent variable talent management on the three dependent variables.

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

2.4 Research Model and Data

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:

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

Model 2:

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

Model 3:

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

The first model explores the association between organizational culture and the establishment's self-assessment of its customer-focused innovation. The second model explores the association between organizational culture and the establishment's self-assessment of its progress toward human-capital acquisition, development and retention. The third model explores the association between organizational culture and the

establishment's self-assessment of its progress toward world-class supply-chain management and collaboration.

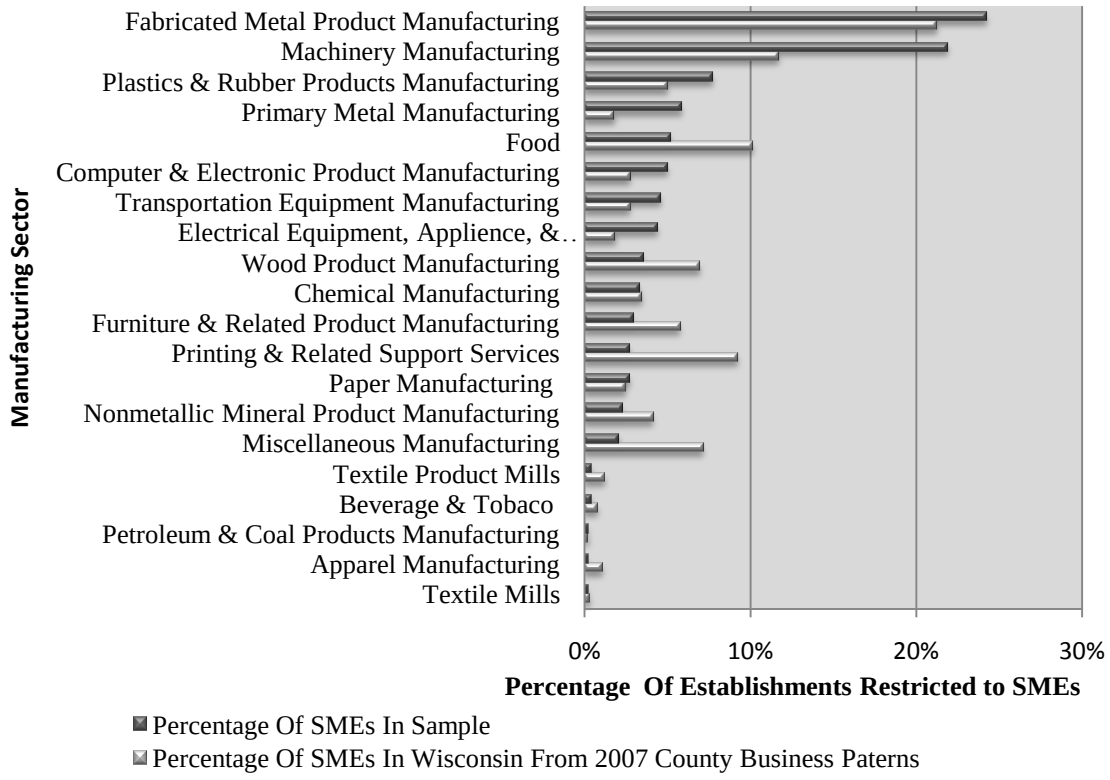
The organizational culture variables that are used are: participation, training and talent management. The participation variable is measured by the percentage of employees regularly participating in empowered teams. The participation variable is measured by the number of formal training hours devoted annually to each employee. The talent management variable is measured by the percentage of employees that are dedicated to assessing and upgrading the organization's talent pool.

Each of the three statistical models is tested under different conditions. Each model is tested using the North American Industry Classification System (NAICS) code under different fixed effects at the three, four and five-digit levels of industry identification. The variables used in these statistical models are defined in Table VIII. The distribution of the sample by manufacturing sector is provided in Figure 5.

MPI reports that the research sample is approximately 6% of Wisconsin's manufacturing establishments. There are twenty manufacturing sectors represented in the MPI survey responses, where sector are defined according to NAICS 2007. Establishments in the Fabricated Metal Product Manufacturing sector constitute 24.2% of the sample, and establishments in the Machinery Manufacturing sector constitute 21.9% of the sample. These two manufacturing sectors represent 46% of the sample; the remaining 18 sectors represent 56%. These two sectors are also the largest two in the 2007 County Business Patterns data. The 2007 County Business Patterns (Census, 2007) reports that 21% of Wisconsin manufacturing establishments are in the Fabricated Metal

Products sector; the corresponding figure for the Machinery Manufacturing sector is 12%.

Figure 5 The Generalization Of the Research Sample By Manufacturing Sector To Wisconsin



Comparing the industry distribution of SMEs in the sample versus the County Business Patterns data shows that the sample is noticeably different from the County Business Patterns data. In particular, the sample over represents durable manufacturers and under represents non-durable manufacturers. This is one of the reasons industry fixed effects are included in all of the regression models. If the population coefficients for the explanatory variables are similar across industries but industries have different intercepts, the industry fixed effects will make the results generalizable to all Wisconsin manufacturers. If this untestable assumption is false, then the results are less generalizable. This limitation is common to research using similar survey data.

2.5 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 was all manufacturing establishments in Wisconsin. The sample size is 492 establishments which represents 6% of the universe.

Since the dependent variables in this research are discrete, ordered and not continuous, and since they are scaled on either four or five-level ordinal scales proportional odds logistic regression models are used in this research. Descriptive statistics of the ordinal scaled variables is provided in Table XII.

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 PseudoR^2. The PseudoR^2 is calculated using the following formula:

$$\text{PseudoR}^2 = 1 - (\ln L_{(\text{Multinomial})} / \ln L_{(\text{Ordered})})$$

Where: $\ln L_{(\text{Multinomial})}$ is the loglikelihood value of the multinomial regression model and $\ln L_{(\text{Ordered})}$ is the loglikelihood value of the ordered logistic regression model. The 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 fits the data almost perfectly (Vani, 2001).

2.6 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 results for the small and medium sized establishments (SMEs) models are generally superior to the results for the other models that include observations on establishments of all sizes. The superior results for the SME models are identified by the low AIC values and the high association statistics are displayed in Table XIII and Table XIV.

The lowest AIC result is for Model 3 where AIC = 1111. This means that the goodness of fit is best for the statistical model testing the regression of the ordered

Table XII Descriptive Statistics

	Rate of organization's progress toward world-class customer-focused innovation			Rate of organization's progress toward world-class human-capital acquisition, development and retention			Rate of organization's progress toward world-class supply-chain management and collaboration		
Dependent Variables	**Scale**	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**
	1=No progress	18	4%	1=No progress	40	8%	1=No progress	44	9%
	2	83	17%	2	114	23%	2	126	26%
	3	181	37%	3	198	41%	3	196	40%
	4	161	33%	4	111	23%	4	106	22%
	5=World-class	46	9%	5=World-class	24	5%	5=World-class	13	3%
		489	100%		487	100%		485	100%
	Percentage of employees regularly participating in empowered work teams (i.e., make decisions without supervisor approval)			**Number of training hours devoted annually to each employee**			**Percentage of employees dedicated to assessing and upgrading the organization's talent pool**		
Independent Variables	Scale	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**	**Scale**	**Number of Establishments**	**Percentage of Establishments**
	<25%	194	40%	≤8	141	29%	<1%	133	27%
	25-50%	148	30%	9-20	215	44%	1-5%	240	49%
	51-75%	72	15%	21-40	85	17%	6-10%	74	15%
	76-90%	50	10%	>40	48	10%	>10%	43	9%
	>90%	26	5%						
		490	100%		489	100%		490	100%

Table XIII Summary of the Results of the N4digSME Models

	Model 1 Dependent Variable (World-Class Customer-Focus)		Model 2 Dependent Variable (World-Class Human-Capital)		Model 3 Dependent Variable (World-Class Supply-Chain)	
Variable Name	Value	EXP(Coef)	Value	EXP(Coef)	Value	EXP(Coef)
	Std. Error	t value	Std. Error	t value	Std. Error	t value
PARTICIPATION2	0.54	1.71	0.37	1.44	0.01	1.01
	0.26	2.04**	0.26	1.41*	0.28	0.04
PARTICIPATION3	1.02	2.76	1.06	2.90	-0.39	0.68
	0.34	2.99***	0.33	3.23***	0.34	-1.12
PARTICIPATION4	1.02	2.78	1.61	4.98	-0.08	0.92
	0.35	2.91***	0.36	4.43***	0.38	-0.22
TRAINING2	0.73	2.07	0.80	2.22	-0.05	0.95
	0.27	2.68***	0.27	2.96***	0.28	-0.18
TRAINING3	0.09	1.09	0.42	1.53	-0.46	0.63
	0.30	0.29	0.30	1.42*	0.31	-1.48
TALENTMGMT2	0.31	1.36	0.31	1.37	0.10	1.10
	0.26	1.17	0.26	1.20	0.27	0.36
TALENTMGMT3	0.69	1.99	0.77	2.15	0.37	1.45
	0.31	2.20**	0.31	2.46***	0.32	1.15

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

Table XIV Summary of the Proportional Odds Logistic Regressions Results

		p-value		
		Model 1	Model 2	Model 3
		Dependent Variable		
		World-Class customer-focus	World-Class human-capital	World-Class supply-chain
Independent Variable	PARTICIPATION	0.0037***	1.5e-05***	0.6661
	TRAINING	0.0069***	0.0110**	0.2257
	TALENTMGMT	0.0862*	0.0447**	0.4800
Proportional Odds Test "*Pchisq"*		0.9174	0.9389	0.7337
Pseudo R^2		0.1883	0.2553	0.2304
AIC		1148	1265	1111
Df		105	106	112

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

dependent variable world-class supply-chain that includes 4-digit NAICS fixed effects variables and where the sample is restricted to SMEs.

This research is exploratory. F-tests for each model 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. This is true for two reasons: first, research is exploratory and sample is biased, second, the joint effect of three independent variables is of interest. Therefore, this research focuses on F-tests rather than coefficient tests. Table XIII and Table XIV, summarize the statistical results. The F-tests show significant results, as displayed in Table XIV.

The research results show a strong association between participation and training with an establishment's self-assessment of world-class customer-focus, and training with world-class human-capital at the 1% critical level. The association between participation and training with an establishment's self-assessment of world-class human-capital is significant at the 5% critical level.

The first model displayed in Table XIII explores the association of organizational culture with an establishment's self-assessment world-class customer-focus. The model shows strong and statistically significant association of participation and training with world-class customer-focus, and weak associations between talent management with world-class customer-focus. These associations are only significant at the 10% critical level.

The dummy variable participation at level four (where between 76% and 90% of employees regularly participate in empowered work teams) is positive and statistically significant at the 1% critical level. Holding all else constant, when between 76-90

percent of employees regularly participate as members of empowered work teams, then the odds of the establishment's envisioning itself as being world-class customer-focus are multiplied by 2.78 times what they are when less than twenty five percent of employees participate in empowered work teams. This is a very strong indicator of the connection between high levels of work-force participation and world-class customer-focus.

As the percentage of the workforce that is involved in employee participation gets larger, the difference from the omitted dummy variable participation 1 in the regression model, as provided in Table XIII, also gets larger. This indicates that the percentage of employees regularly participating as members of empowered work teams is strongly associated with an establishment's self-assessment of world-class customer focus.

The second model in Table XIII explores the association between organizational culture and the establishment's self-assessment as being world-class in recruiting, hiring, developing, and retaining talent. The model shows strong and statistically significant association between participation and world-class human-capital. This is at the 1% critical level.

Model three explores the association between the attributes of organizational culture with the establishment's self-assessment as being world-class in developing and managing supply chains and partnerships. These would be supply chains that are flexible and where response time and delivery performance exceed the competition. The model shows no significant associations between the organizational culture variables and world-class supply-chain. There is evidence of a relationship between the organizational culture variables and the establishment's self-assessment as being world-class measures

in two of the three models. These models are model 1 and model 2 that are provided in Table XIII.

There are three strong relationships that are significant at the 1% critical level, two that are significant at the 5% critical level, and one weaker relationship that is significant at the 10% critical level. The results show that the percentage of employees regularly participating in empowered work teams is positively associated with an establishment's self-assessment as world-class customer-focus and world-class human-capital at the 1% critical level. The average number of training hours devoted annually to each employee is positively associated with an establishment's self-assessment of world-class customer-focus at the 1% critical level, and with world-class human-capital at the 5% critical level. The percentage of employees dedicated to assessing and upgrading the organization’s talent pool is positively associated with an establishment's self-assessment as world-class human-capital at the 5% critical level.

The consistency of the results is evident when the statistical models tested are examined. The models were tested with different NAICS code fixed effects using three-digit, four-digit and five-digit NAICS fixed effects. The model restricted to SME size and four-digit NAICS defined industry dummy variables to capture industry fixed effects proved to be the superior model, having the lowest AIC value of 1111. The SME models show higher t-values and larger odd ratios compared to the other models that included the full sample of all manufacturing establishments; manufacturing establishments of all sizes.

Results show that there are strong associations between objective actions that are commonly associated with best business practices and the business establishments' self-

assessment of their practices. In other words, if a business establishment states that they are world-class in a specific business practice they are correct. Participation in empowered work teams and investing in training have strong associations with an establishment's self-assessment of world-class customer-focus and with world-class human-capital management. Talent management has strong associations with an establishment's self-assessment of world-class human-capital management.

Furthermore, it is also evident from our results that the relationship between the objective aspects of organizational culture and an establishment's self-assessment of world-class status is stronger when the sample is restricted to SMEs.

The association of organizational culture outcomes with an establishment's self-assessment of world-class supply-chain is very weak or almost non-existent. This can be attributed to the lack of a logical relationship between the organizational culture variables used and supply-chain management.

2.7 Conclusion

Organizational culture is associated with an establishment's self-assessment of its world-class and, more importantly status in world-class customer-focus and world-class human-capital. This study provides empirical evidence on the links between objective aspects of organizational culture and an establishment's self-assessment of world-class. This study shows that employee training, employee participation in empowered or self-directed work teams and talent management are objective aspects of organizational

culture that are strongly associated with the subjective measures of a firm's world-class customer-focus status, and world-class human-capital status.

The association of the objective aspects of organizational culture is strongest between employee training and employee participation in empowered or self-directed work teams and between an establishment's self-assessment of world-class customer-focus, and world-class human-capital.

This research highlights the importance of the objective actions that are commonly associated with best business practices and the business establishments' self-assessment of their practices. The results suggest that firms that have high levels of worker participation, training, and talent management perceive themselves as having made more progress toward world-class customer focus and world-class human capital. These perceptions appear to be consistent with their business practices. However, no relationship is found between the firms' self-evaluations of world-class supply chain management and these three measures of organizational culture.

This research leads to recommendations for firms to consider business models that emphasize worker involvement and investment in training. Business establishments and top managers are advised to invest in empowering their employees, providing sufficient annual training in addition to managing their organizational talent pool by their continuous dedication to assess and upgrade the organizational talent pool.

CHAPTER III

DOES LOCATING IN A METROPOLITAN AREA IMPROVE THE BUSINESS PERFORMANCE OF MANUFACTURING ESTABLISHMENTS? THE LINK BETWEEN BUSINESS AND REGION

3.1 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.

3.2 Theoretical Model And Hypotheses

3.2.1 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 XV. 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 XV Hypotheses Sets For The Independent Variable Metro

Productivity Growth RH1	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.

3.2.2 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 Lac, 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.

3.2.3 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 XVI.

3.3 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 which represents 6% of the universe.

MPI reports that the research sample is approximately 6% of Wisconsin’s manufacturing establishments. There are twenty manufacturing sectors represented in the

Table XVI 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.
	$log(\text{AGE}_i)$: 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.

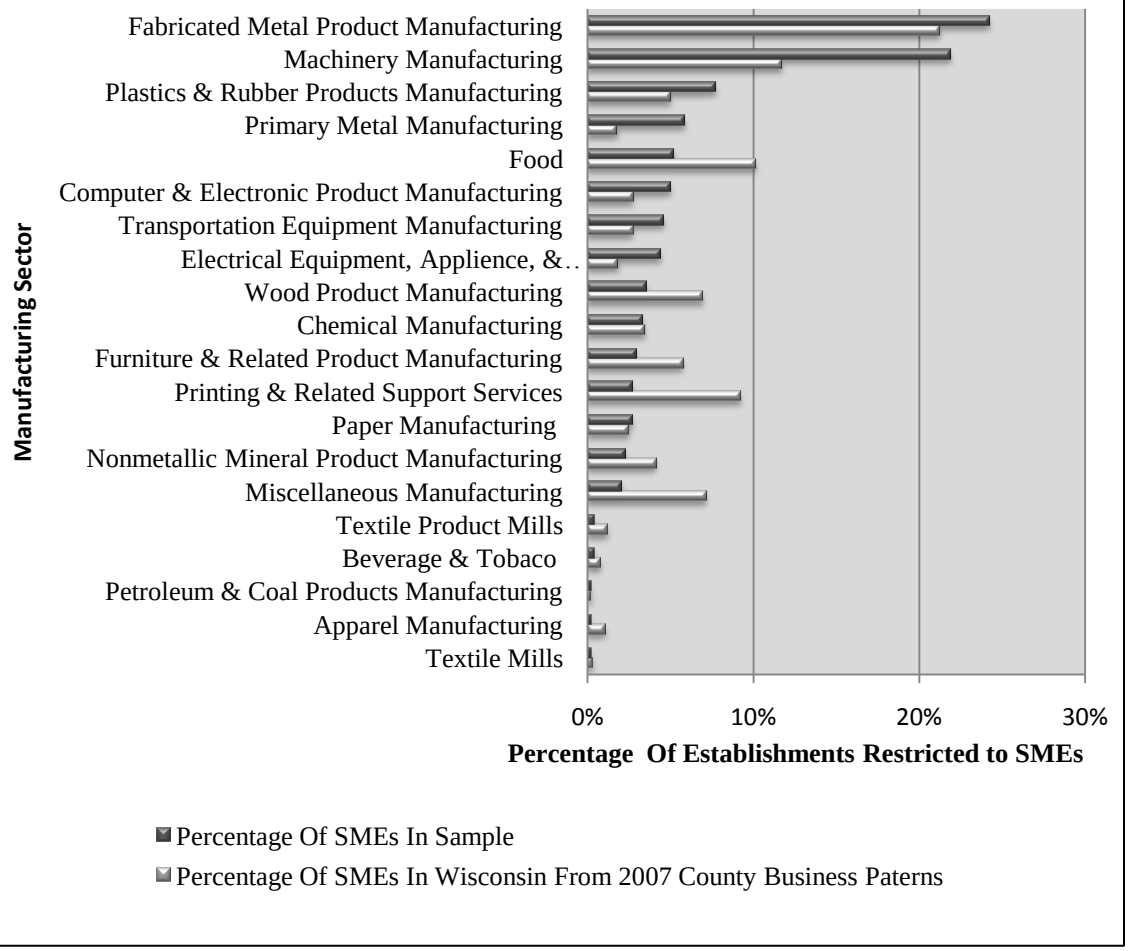
MPI survey responses, where sector are defined according to NAICS 2007. Establishments in the Fabricated Metal Product Manufacturing sector constitute 24.2% of the sample, and establishments in the Machinery Manufacturing sector constitute 21.9% of the sample. These two manufacturing sectors represent 46% of the sample; the remaining 18 sectors represent 56%. These two sectors are also the largest two in the 2007 County Business Patterns data. The 2007 County Business Patterns (Census, 2007) reports that 21% of Wisconsin manufacturing establishments are in the Fabricated Metal Products sector; the corresponding figure for the Machinery Manufacturing sector is 12%. Comparing the industry distribution of SMEs in the sample versus the County Business Patterns data shows that the sample is noticeably different from the County Business Patterns data. In particular, the sample over represents durable manufacturers and under represents non-durable manufacturers. This is one of the reasons industry fixed effects are included in all of the regression models. If the population coefficients for the explanatory variables are similar across industries but industries have different intercepts, the industry fixed effects will make the results generalizable to all Wisconsin manufacturers. If this untestable assumption is false, then the results are less generalizable. This limitation is common to research using similar survey data.

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 XVII. 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 XVII).

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. The ordered logistic model was selected because its results are easier to interpret than ordered probit models.

Figure 6 The Generalization Of the Research Sample By Manufacturing Sector To Wisconsin



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.

Table XVII Descriptive Statistics

Dependent Variable			**Independent Variable**		
Percentage improvement in productivity over the past three years			**Metropolitan statistical area (MSA), contains a core urban area of 50,000 or more population, and consists of one or more counties.**		
Scale	**Number of Establishments**	**Percentage of Establishments**	**MSA**	**Number of Establishments**	**Percentage of Establishments**
<25%	230	48%	Appleton	18	4%
26-50%	155	32%	Eau Claire	5	1%
51-75%	64	13%	Fond Du Lac	9	2%
76-99%	26	5%	Green Bay	34	7%
>100%	5	1%	Janesville	15	3%
	480	100%	La Crosse	4	1%
Percentage of annual sales derived from new products introduced in the past three years			Madison	50	10%
			Milwaukee-Waukesha-West Allis	150	31%
<5%	132	27%	Oshkosh-Neenah	12	2%
5-25%	224	46%	Racine	35	7%
26-50%	93	19%	Sheboygan	13	3%
>50%	36	7%	Wausau	10	2%
			No MSA; rural	136	28%
	485	100%		491	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%			

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 PseudoR^2. The PseudoR^2 is calculated using the following formula:

$$\text{PseudoR}^2 = 1 - (\ln L_{(\text{Multinomial })} / \ln L_{(\text{Ordered })})$$

Where: $\ln L_{(\text{Multinomial })}$ is the loglikelihood value of the multinomial regression model and $\ln L_{(\text{Ordered })}$ is the loglikelihood value of the ordered logistic regression model. The 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 fits the data almost perfectly (Vani, 2001).

3.4 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?

3.5 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, and Metro is a set of 12 region fixed effects:

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 XVI. The distribution of the sample by manufacturing sector is provided in Figure 6.

3.6 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 XVIII and Table XIX.

Table XVIII 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.

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 XVIII.

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 XIX. 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 XVII).

Table XVIII 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 XVIII 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 , when holding fixed organizational culture, industry, establishment size and age and the other controls, 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 XVIII, 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 XIX. 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

Table XIX 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 Lac	-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						

of the coefficient which is represented by exp(coef) in Table XIX. The exponential function gives the odds ratio for the coefficient.

The results of the coefficient tests provided in Table XIX 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 XVII). Overall, no relationship is found between MSA and productivity growth.

The results in Table XIX show no association between locating a business establishment in a metropolitan area with supply chain efficiency which is inconsistent with agglomeration theory.

The results in Table XIX show that locations in both the Milwaukee and the Janesville metropolitan areas are associated with lower proportions of establishment annual sales coming from products introduced in the past three years than for manufacturing establishments located in rural Wisconsin. This for the Milwaukee metropolitan area is significant at the 1% critical level, and for the Janesville metropolitan area 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 one business behavior that is associated with competitive advantage, specifically lower revenues being generated by new products. This results is driven primarily by the Milwaukee and Janesville MSAs and may not be representative of most MSAs.

3.7 The 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. However, overall no relationship is found between MSA and productivity growth and supply chain efficiency. Locating a business establishment in the Milwaukee metropolitan area or the Janesville metropolitan area is negatively associated with new products which is inconsistent with agglomeration theory that agglomeration economies affect new product development and deployment.

Further research is required to understand these differences between the results and agglomeration theory. Data covering a more representative set of metropolitan areas may be especially helpful for this.

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.

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