THE INFLUENCE OF ORGANIZATIONAL CULTURE ON SUSTAINABLE COMPETITIVE ADVANTAGE OF SMALL & MEDIUM SIZED ESTABLISHMENTS

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The researcher wishes to acknowledge the Manufacturing Performance Institute (MPI) and Wisconsin Manufacturing Extension Partnership (WMEP) for the creation, administration, and analysis of the WMEP study. The researcher wishes also to acknowledge and thank John Brandt and George Taninecz at MPI for their assistance in providing the WMEP study and the data for this research.

ABSTRACT: This research provides empirical evidence on the links between organizational culture and competitive advantage. Organizational culture is an asset that money cannot buy and it is a factor that can make or break a business. The evidence presented in this research recommends that firms consider business models that invest in the number of training hours devoted annually to each employee and increase the percentage of production employees participating in empowered work teams. Proportional odds ordered logistic regression models are used to test hypotheses on the influence of objective aspects of organizational culture on objective measures of the outcomes of a firm's sustainable competitive advantage. The results are both strong and statistically significant.

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.

Theoretical Model

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.

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.

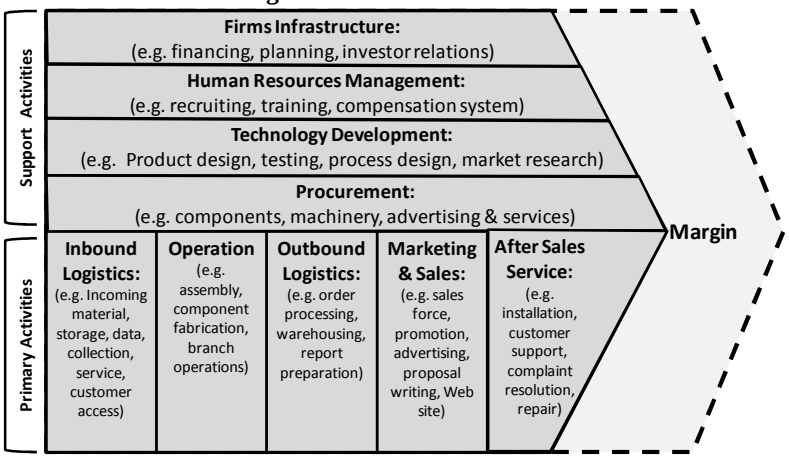
Competitive advantage is a term given to the source of a firm's ability to win business and out-perform competitors at a point in time. Maintaining competitive advantage is a constantly moving target and the source of competitive advantage will shift over time (Stalk, 1988). Rivals can quickly copy any 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.

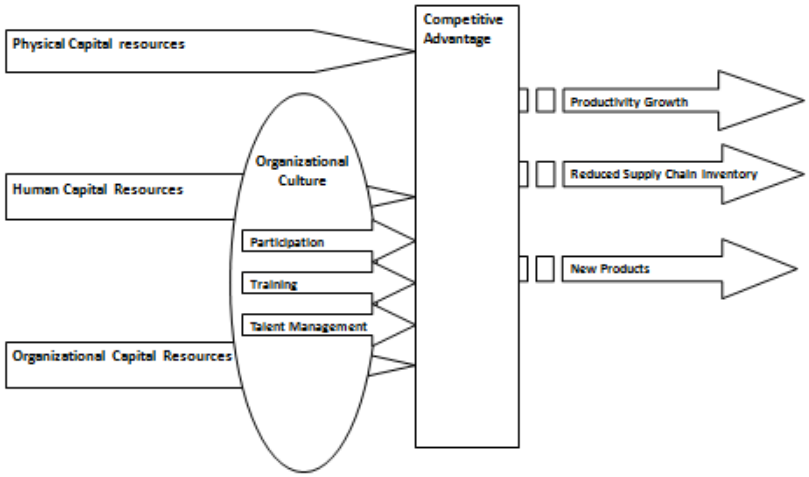
Figure 1: The Value Chain.



(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



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.

Research Question and Hypotheses

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

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

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.
	$log\,(AGE_i)$: 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.

Table II: Hypotheses Sets For The Independent Variable Participation.

Independent	RH1	H	*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	*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	*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	*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	*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	*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.*

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 III: Hypotheses Sets For The Independent Variable Training.

Independent Variable (Training)	RH4	H_1	*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_2	*The number of training hours devoted annually to each employee does affect the percentage improvement in productivity over the past three years.*
	RH5	H_1	*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_2	*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_1	*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_2	*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	RH7	H_1	*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_2	*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_1	*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_2	*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_1	*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_2	*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.

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.

There are twenty manufacturing sectors represented in the sample, based on the NAICS 2007 classification of the manufacturing sector. The number of establishments representing the Fabricated Metal Product Manufacturing sector in the sample constitutes 24.2% of the sample, and the number of establishments representing the Machinery Manufacturing sector in the sample constitutes 21.9% of the sample. These two manufacturing sectors represent 46% of the sample and the remaining eighteen sectors represent 54% of the sample. MPI reports that the research

sample accounts for about 6% of Wisconsin's manufacturing establishments. Census 2007 manufacturing data reports that Wisconsin has 12% of its manufacturing establishments in the Machinery Manufacturing sector and 21% of its manufacturing establishments in the Fabricated Metal Product.

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

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 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 $Pseudo\ R^2$. The $Pseudo\ R^2$ is calculated using the following formula:

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

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

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 VI.

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 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.

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 and with the percentage of annual sales derived from new products. 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.

Table VI: 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

Table VII: Summary of the Results of the N4digSME Models.

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

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

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