A STATISTICAL ANALYSIS OF ORGANIZATIONAL EFFECTIVENESS

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ABSTRACT

The structural foundation of organizations has undergone major changes in recent years due to compelling re-structuring of organizational purposes and functions in the marketplace.
Changes in manufacturing practices as well as changes in the internal culture of organizations created doubts about the inherent strengths of U.S. manufacturing businesses. Various decision makers, agencies, and researchers are not confident anymore that the manufacturing sector is in a position to meet and compete with other global manufacturing businesses. The American manufacturing sector has lost its luster and backbone to other countries in the world that could get the job done faster and cheaper. The present investigation tries to get some answers to the cardinal questions: What went wrong? What did cause the U.S. manufacturing sector to lose its luster and its global edge?

INTRODUCTION

The current state of U.S. manufacturing has been a major concern to manufacturing companies. In a recent study, the Council of Manufacturing Associations (CMA) contended that while manufacturing has been the engine for healthy economic growth and good jobs in the U.S., intense global competition and rising costs of doing business threaten manufacturing's ability to maintain the nation's economic strength and standard of living (CMA 2008). In order to sustain strong economic growth, U.S. manufacturers must improve their business practices so that higher productivity, profitability, innovation and other major aspects of business will become globally competitive. Studies have shown (Fawcett and Myers 2001; Black et. Al. 2001; Gunasekaran et. Al. 2006 and 2007; Kanji 2006; Lee et. Al. 2007) that organizational performance is directly influenced by organizational strategy and the structure of the organization. Businesses are adjusting tjeir operating processes by incorporating advanced technologies, implementing TQM, forming partnerships, and developing other mechanisms. The main purpose of this paper is to present an overview of the business practices, environment, culture, and strategies practiced by manufacturing companies in the U.S. This investigation will answer such questions as: (1) Is there a significant relationship between process management practices and product quality?, (2) Is there a significant relationship between organizational culture and financial performance?, (3) Is there a significant relationship between technology management practices and financial performance?, and (4) Is there a significant relationship between company strategy and innovation performance?

LITERATURE REVIEW

Business practice and business performance are two different things (Ketokivi and Schroeder 2004). Logically, the best practices should produce the best performance. Researchers have devoted considerable efforts into classifying and categorizing various facets of manufacturing practices and hypothesizing about their impacts on organizational performance (laugen et. Al. 2005). Ungan (2005)

classified the best practice context into three broad elements: best practice factors, organizational factors, and environmental factors. Through multiple regression analysis, he established a significant positive association between management support and organizational resource availability, external pressures, perceived operational benefits, and compatibility. Nahm, et al. (2004) proposed that organizational cultural factors affect manufacturing practices and performance. They developed a framework that relates culture and manufacturing practices to performance. Their findings indicate that higher levels of customer orientation in the organization lead to higher levels of advanced manufacturing practices, which lead to better performance. Fawcett and Myers (2001) proposed a conceptual framework of advanced manufacturing practices which tie the product and employee development practices to the manufacturing process practices of JIT production and manufacturing automation.

METHODOLOGY

Empirical data was collected through a survey of U.S. manufacturing companies. The six-part survey included questions about organizational profile, organizational practices, organizational performance, business environment, organizational strategy, and organizational culture. The organizational practices part was designed to capture detailed input in the areas of leadership, strategy and planning process, customer focus, information and analysis, people management, process management, supplier relationships, technology management, R & D management, knowledge management, and creativity and idea generation. The organizational performance part asked for detailed input into the areas of product quality, product innovation, process innovation, and financial performance. Two rounds of mail surveys were conducted. In the first round, 800 letters were posted requesting CEOs to respond to the survey. In the second round, 1200 companies (including many of those approached in the first round) were approached. Altogether, 108 responses were received. The data was analyzed using the SPSS software. Out of 108 companies in the sample, more than half (about 62%) of the companies employed between 101 and 500 workers. The average annual revenue was $314 million. About 83% of the companies were ISO 9000 certified and about 80% had established TQM programs.

Table 1: Company Profile

Number of Employees	Frequency	Percent	Average Annual Revenue	ISO 9000 Certification	TQM Program
< 100	4	3.7	$314 million	Certified	Has TQM
101 – 500	62	57.4		= 89 companies	program = 86
501 – 1000	34	31.5			
> 1000	8	7.4		Not Certified	No TQM
Total	108	100.00		= 16 companies	program = 19

PROCESS MANAGEMENT PRACTICES, PRODUCT QUALITY, AND FINANCIAL PERFORMANCE

The perception of product quality of the manufacturing companies responding is above average in their industry. All four quality attributes (performance, conformance, reliability, and durability) ranked higher than 4 on a 5-point Likert scale where 1 indicates worst in the industry and 5 indicates best in the industry.

Table 2: Product quality related performance

Organizational Performance: **Product Quality** (relative to major competitors in industry)	(1= worst in industry; 5= best in industry) Mean Score
Performance of products	4.43
Conformance to specifications	4.31
Reliability of products	4.41
Durability of products	4.42

The strongest relationships between process management practices and the dimensions of product quality were observed for design process, and clear and standardized instructions. It should be noted that extensive use of statistical techniques for process improvement and reduction of variation was not significantly related to any of the dimensions of product quality.

Table 3: Correlation coefficients between quality practices and quality attributes

	Performance of products	Conformance to specificatn of products	Reliability of products	Durability of products
The concept of 'internal customer' is well understood		0.192 *		
Design processes in our organization is "fool-proof" (preventive-oriented)	0.271 **	0.302 **	0.173 *	0.177 *
Clear, standardized and documented instructions which are well understood by employees	0.242 **	0.274 **	0.177 *	0.183 *
Making extensive use of statistical techniques to improve production processes and reduce variation				

* weak relationship, correlation is significant at the 0.05 level (2-tailed)
** strong relationship, correlation is significant at the 0.01 level (2-tailed)

The perception of financial performance of the manufacturing companies responding to the survey was above average in their industries, but not as high as the perception of product quality.

Table 4: Levels of Financial Performance

Organizational Performance: **Financial Performance** (relative to major competitors in industry)	(1=worst in industry; 5=best in industry) Mean score
Sales Growth	3.66
Market share	3.83
Profitability	3.81

Overall, the relationships between technology and financial performance were rather strong. It appears that the respondents considered technological leadership an important way to maintain and improve financial performance.

ORGANIZATIONAL STRATEGY VERSUS PRODUCT AND PROCESS INNOVATION

The perception of product innovation performance and process innovation performance of the manufacturing companies responding to the survey was above average in their respective industries.

Table 5: Correlation Coefficients between Organizational Strategies and Product Innovation Considerations of the Company Relative to Major Competitors in the Industry

	Level of Novelty of Company's New Product	Use of Latest Technological Innovations in New Product Development	Speed of New Product Introduction	Number of New Products Introduced	Number of New Products First-to-Market
Development and Introduction of Major and Frequent Product Innovations is Primary Strategy	0.489**	0.404**	0.352**	0.445**	0.394**
Attempts to be Ahead of Competitions in Product Novelty or Speed of Innovation	0.560**	0.472**	0.437**	0.604**	0.592**
Company is Growth-, Innovation-, and Development-Oriented rather than Favoring Tried and True Market	0.524**	0.412**	0.367**	0.494**	0.444**
Pursue a Tough 'Undo the Competitors' Philosophy rather than Trying to Cooperate and Coexist with Competitors	0.309**	0.221**	0.234**	0.312**	0.170*
Company has a Strong Inclination for High-Risk Projects with Chances of Very High Returns rather than Low-Risk Projects with Normal and Certain Rates of Return	0.303**	0.272**	0.170*	0.334**	0.332**
Price Cutting and Minimization of Expenditures is very Important Strategy	-0.198*		-0.169*		-0,183*
Cost Centers and Fixing Standard Costs by Analyzing Variances for Cost Control is Used Frequently throughout the Firm instead of only Rarely or for a Small Part of Operations					

Prefer to Explore and Make Decisions on the Basis of Gradual and Incremental Change					

*Weak relationship, correlation is significant at the 0.05 level (2=tailed)
**Strong relationship, correlation is significant at the 0.01 level (2=tailed)

Table 6: Correlation Coefficients between Organizational Strategies and Process Innovation Considerations of the Company Relative to Major Competitors in the Industry

	Technological Competitiveness	Speed in Adoption of Latest Technologies in Processes	Currency of Technology Used in Processes	Rate of Change in Processes, Techniques &Technology
Development and Introduction of Major and Frequent Product Innovations is Primary Strategy	0.393**	0.447**	0.431**	0.397**
Attempts to be Ahead of Competition in Product Novelty or Speed of Innovation	0.476**	0.461**	0.422**	0.474**
Company is Growth-, Innovation-, and Development-Oriented Rather than Favoring Tried and True Market	0.444**	0.484**	0.449**	0.474**
Pursue a Tough 'Undo the Competitors' Philosophy Rather than Trying to Cooperate and Coexist with Competitors	0.234**		0.173*	0.219**
Company has a Strong Inclination for High-Risk Projects with Chances of Very High Returns Rather than Low-Risk Projects with Normal and Certain Rates of Return	0.269**	0.312**	0.251**	0.298**
Price Cutting and Minimization of Expenditures is Very Important Strategy	-0.261**			0.225**
Cost Centers and Fixing Standard Costs by Analyzing Variances for Cost Control is Used Frequently throughout the Firm Instead of only Rarely or for a Small Part of Operations				
Prefer to Explore and Make Decisions on the Basis of Gradual and Incremental Change				

*Weak relationship, correlation is significant at the 0.05 level (2=tailed)
**Strong relationship, correlation is significant at the 0.01 level (2=tailed)

DISCUSSION

The main result of this study reveals that the characteristics of practices and the culture of manufacturing organizations are strongly related to their financial performance, the quality of their products and the degree of product and process innovation that they exhibit. There are also some relationships, or lack of relationships, that are surprising.

In the area of product quality, much of what was found was expected. 'Fool-proof' processes and (its close relative) clear, standardized, and documented instructions, are important in achieving high product quality. The concept of internal customer was not rated as an important determinant of product quality. The lack of relationship between the use of statistical techniques and any dimension of product quality was surprising. It is hypothesized that the use of statistical process control tools is now so ingrained into manufacturing processes that the survey respondents did not consider the use of those 'routine' tools to be exceptional.

The elements of organized culture are in many cases strongly related to financial performance as measured by sales growth, market share and profitability. Teamwork, a philosophy of growth and expansion, and a strong focus on goals are all strongly related to financial performance. On the other hand, centralization or decentralization and a focus on efficiency were not as strongly related to financial performance. A belief in reutilization, formalization and structure is unrelated to financial performance indicating a relaxation of traditional hierarchical structures in manufacturing organizations. U.S. manufacturers also indicate that technology management practices are directly related to financial performance.

The most interesting results show up in the relationships between organizational strategy and innovation. As expected, innovation is inversely related to price and cost cutting. The inverse relationships are particularly strong in the areas of technological competitiveness and rate of change in processes. Conversely, organizations that attempt to be leaders in innovation achieve strong relationships with speed of new product and process introduction and with the number of new products introduced. A notable lack of relationship is between firms that use gradual or incremental change and product or process innovation. It has been widely understood that U.S. manufacturers tend to "play for the home run" rather that use the incremental approach of many Asian companies. The present study reinforces this notion.

It is interesting to note that U.S. manufacturers rated their product quality much higher in their industries than they did their financial performance or their degree of innovation (product or process). These ratings raise some interesting questions that remain unanswered by the present study. Is there a time lag between achieving high product quality and seeing the results in the 'bottom line'? Is product quality really a differentiating factor for the competitiveness of U.S. manufacturing? Is the U.S. still the world leader in innovation? In future research endeavors, the results of this study could be combined with the results of similar studies but for other countries (Prajogo and Sobal 2004 and 2005) in order to shed some additional light on how U.S. manufacturing differs in its processes from manufacturing in other countries.

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