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Manufacturing Practices of West Michigan Organizations

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Introduction

A dominant theme in manufacturing strategy literature is the linkage between the differential emphasis placed on a firm's competitive priorities of cost, quality, flexibility, and dependability and the manufacturing strategies adopted. The manufacturing strategies include emphasis on total lead time, quality, cost, customer service, advanced technology and innovation, human resources, and operations flexibility. Previous research indicates that it is difficult to offer superior performance across all competitive priorities simultaneously. For example, pursuit of the cost priority through the use of low-cost labor may entail sacrifices in delivery, reliability, and quality. The extent to which the firm's strategies are contingent on a particular competitive priority relate to what is termed "order-winning" criteria.

This study was initiated to develop insights into the strategic directions and operational priorities West Michigan manufacturing organizations are setting for themselves. Specifically, this study addresses two issues: (1) To what extent are each of these strategies and priorities adopted by West Michigan organizations, and (2) Is there a relationship between the demographic and background characteristics of the organization and the manufacturing strategy implemented?

Based on the literature, the researchers reasoned that the type of operations strategy selected and adopted by West Michigan organizations may differ among organizational focus, organization size, and labor status. Therefore, for example, instead of measuring sales or market share of a company based on the type of strategy used, the researchers preferred to examine if a type of strategy used by a company is dependent on the size of the company. In this study, sales, market share, labor status, and other variables were treated as independent rather than dependent variables contrary to what one would expect.

Methodology Participants

For the study, a potential sample representing all manufacturers in the West Michigan region was identified. Using the *Directory of Manufacturers* published by various chambers of commerce, 250 firms were selected by a systematic stratified random sample. The questionnaire was then mailed to the President/CEO or manufacturing managers of the firms identified in the sample.

Procedure

Based on an extensive literature review, a listing of variables representing possible strategies for competing in today's manufacturing environment was developed by the researchers. A

questionnaire was constructed around these items. A Likert scale of 1 to 5, where 1 was not true and 5 very true, was selected to record the respondents' opinions of the importance of each degree of practice within each operational strategy. Additionally, demographic questions were devised and included. The questionnaire was then reviewed and pre-tested by other researchers, who are familiar with the literature and practices, and modifications were made prior to distribution.

For the purpose of data analysis, given the large number of variables identified, the researchers wanted to determine if the items/individual questions related to the concepts being studied. Factor analysis was used to identify underlining patterns among the possible operational strategies. All the hypotheses were tested using multivariate and one-way analysis of variance. A significance level of 0.05 was used.

Results

Eighty-five questionnaires were returned, completed by individuals that identified themselves as being in position of plant manager or higher. Out of these, 18 were considered unusable as major portions of the survey were incomplete. This resulted in a 27% response rate.

Table 1 summarizes the characteristics of the respondents' firms. The strategic priorities adopted by the organizations are shown in Table 2. More than 68% of the firms ranked quality as the highest strategic priority followed by on-time delivery (27.3%), cost (18.2%), and variety of products produced (12.1%). Table 3 provides summary statistics for the operational priorities for these firms. The arithmetic mean responses show that customer service was ranked the highest operational priority followed by technology, operational flexibility, human resources, total lead time, quality, and cost.

A principal component analysis and the varimax rotation of the factor analysis procedure were used to identify those items that collectively explain each factor better. A loading criteria of 0.50 was used as a cutoff point. The factor analysis results show that, for operational variables total lead time, quality, cost, human resources, and operational flexibility, all original statements were necessary in the explanation of that variable. However, for customer service, only statements 2-6 had a factor rating of 0.50 or greater and were considered suitable. For advanced technology and innovation, the factor analysis grouped the statements into two separate factors. The first grouping consisted of statements 1-4 and 7 while the second grouping included statements 15, 17, 18, 22, and 23.

To examine the relationship between each operational priority and firm characteristics, six independent MANOVAs were conducted. For the dependent variables, only items having a factor loading of 0.50 or greater were used for MANOVA. The results are shown in Table 4. Sales, number of employees, labor status, and global orientation were significantly related to the operational priorities at the 0.05 level. Since type of product manufactured and market share did not show significance, these relationships were not further examined using ANOVA.

To further examine the relationships between the significant independent variables and each operational priority, separate ANOVA analyses were conducted. Detailed results are available from the author. Sales was significantly related to all operational priorities except operational flexibility. The number of employees was significantly related to total lead time, quality, cost, technology 2, and human resources. Labor status was significantly related to all variables. Global presence was significantly related to technology 2, quality, and human resources.

Conclusions

Based on the arithmetic mean scores, it can be concluded that the most important strategic priority of West Michigan organizations was quality, followed by on-time delivery, cost, and variety of products produced. On the other hand, customer service was ranked the highest operational priority followed by technology, operational flexibility, human resources, total lead time, quality, and cost.

There appears to be a conflict in the strategic and operational strategies. For example, quality considered to be strategically most important was ranked second to last as an operational priority. The explanation for this could be that since the strategic priority of quality encompasses the component of customer satisfaction, the respondents felt that they were satisfied with their customer satisfaction programs but felt that their firms were not placing enough emphasis on the other aspects of quality.

The results of the hypotheses testing indicated that there existed a significant relationship between sales, number of employees, labor status, and global orientation and the operational priorities at the 0.05 level. Organizations with sales over \$150 million place a greater emphasis on all operational strategies except operations flexibility than organizations with sales of less than \$150 million. Organizations with 250 or more employees place a greater emphasis on all operational strategies except customer service, technology 1 (computer-aided practices), and operations flexibility than organizations with less than 250 employees. Non-unionized organizations place a greater emphasis on all operational strategies than unionized organizations. Organizations with a global presence place a greater emphasis on quality, technology 2 (communications and innovations), and human resources than organizations without a global presence.

Table 1: Profile of the 67 Organizations Surveyed Frequency Percent Type of Products Manufactured Industrial 42 62.7 Consumer 17 25.4 Both 8 11.9 Annual Sales (in millions) Under 10 10 15.2 10 - 5020 30.3 51 - 15017 25.8 151 - 35010 15.2 351 - 500 2 3.0 7 Over 500 10.6 Market Share Less than 10% 24 35.8 11 - 20% 9 13.4 21 - 40% 12 17.9 More than 40% 12 17.9 Unknown 10 14.9 Current Number of Employees 9 Under 100 13.6 100 - 24914 21.2 250 - 49910 15.2 500 - 999 12 18.2 Over 1000 21 31.8 Labor Status Unionized 26 41.4 Non-Unionized 37 58.6 Competitive in the Global Market 49 Yes 73.1 No 8 26.9

Table 2: Strategic/Competitive Priorities

Note. Highest rank/maximum emphasis = 1.

Priority	Rank	Mean	
Variety of Products	4	3.21	
Consistent of Quality	1	1.51	
Low Cost/Prices	3	2.51	
On-Time Delivery	2	2.12	

Table 3: Operational Priorities for Manufacturers

Priority	Mean	
Total Lead Time	3.30	
Quality	3.14	
Cost	2.87	
Customer Service	3.90	
Technology	3.44	
Human Resources	3.37	
Operations Flexibility	3.38	
Note. Maximum score = 5.		

Table 4: Multivariate Analysis of Variance for Organization Characteristics

Independent Variable	F-Value	P-Value
Type of Products Manufactured	0.60	0.88
Annual Sales (in millions)	3.17	0.01*
Market Share	1.47	0.19
Current Number of Employees	3.55	0.00*
Labor Status	2.49	0.02*
Competitive in the Global Market	2.11	0.05*

Note. Values denote Wilks' Lambda

* indicates significance at 0.05 level

West Michigan Stock Returns

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The stocks of West Michigan-based firms continued to generate good returns during the first half of 1996. After gaining an average of nine percent by the middle of June, the index fell back to an average gain of about six percent by July 1. This pattern was not unique to West Michigan stocks. Most other major stock indexes peaked early in June and then began to fall back. (See graph on page 27).

The six percent gain comes on the heels of a 22 percent gain during 1995. For the entire 18-month period, the stock prices of West Michigan-based companies have increased an average of 29 percent. Dividend payments by these firms add about another 1 percent to the annual returns earned by investors.

Continuing a trend begun last year, however, the returns from West Michigan stocks trailed that of the major indexes. The accompanying table shows that the NASDAQ Composite Index continues to out-perform other major indexes. It is heavily weighted by high-tech stocks -- a sector whose returns have been spectacular recently.