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Strategic Orientation And Customer Dependency In Discontinuously Changing Environments: A Study Of The Defense Industry

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With the ever increasing intensity of competition in the marketplace, the body of literature on organizational response to discontinuously changing environments is expanding rapidly (Romanelli and Tushman, 1994). While responses to discontinuous environmental changes often are studied as reactions to a single event (Kelly and Amburgey, 1991; Smith and Grimm, 1987), multiple organizational domains influence and are influenced by these responses. To capture these interrelationships, viewing the organizations in an industry undergoing discontinuous changes from multiple domains is both helpful and necessary (Dess et al., 1993).

This study uses a configuration approach to extend research on discontinuous environmental change in four areas. First, most studies on discontinuous change have focused on

internal structural responses to turbulent environments (Miller and Friesen, 1980a, 1982b; Romanelli and Tushman, 1994; Virany et al., 1992). However, attention to industry level responses has been comparatively limited and has lacked in generalizability across industries (Ginsberg, 1988; Meyer et al., 1990). Determining the content of organizational response strategies along with the process by which they are developed is important because these discontinuities will affect each organization differently (Gersick, 1991). Second, while there has been theoretical work on discontinuously contracting markets (Zammuto and Cameron, 1985) and empirical work on technologically driven discontinuous downturns (Tushman and Anderson, 1986), there has been limited work on environmental declines driven by political discontinuities. This study extends

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that work by focusing on a sample of firms doing business with the U.S. Department of Defense (DOD). Third, by using a theoretically grounded approach to measure the content of an organization's strategy and a heterogeneous sample in terms of industry classification, this article attempts to determine strategies that are associated with strong performance within discontinuously changing environments. Fourth, existing studies of firms undergoing discontinuous change have focused on firms totally dependent on one industry for their livelihood (Meyer et al., 1990; Smith and Grimm, 1987; Zajac and Shortell, 1989). This study extends this research by examining whether differing levels of dependence on an industry is a possible explanatory factor behind differences in strategy response and performance in these settings.

Specifically, this research seeks to answer two questions: (1) What types of strategies do companies use to respond to discontinuously changing environments, and (2) Which strategies are associated with the strongest performance within those environments? To address these questions, the remainder of the article is presented in four sections. First, the literatures on discontinuous environmental change and customer dependency are reviewed to develop the theoretical base for the study. Second, the operationalizations of variables and the data collection process are described in the methodology section. Third, the results section describes the strategic orientations and performance levels of each cluster. Lastly, the discussion section summarizes the findings and provides implications for theory, future research, and managerial practice.

LITERATURE REVIEW

Discontinuous Environmental Change

A long-standing debate in organization theory and strategic management literature is whether a selection-based or adaptation-based theory of change is most appropriate for determining behavior in the midst of environmental change (Carroll, 1993; Ginsberg and Buchholtz, 1990). While the selection perspective allows for some successful organizational change, it contends that it is unachievable for most organizations due to either organizational inertia within older organizations or a "liability of newness" within younger ones (Hannan and Freeman, 1984; Stinchcombe, 1965).

Adherents of the adaptation perspective suggest that successful response to environmental discontinuity is possible through implementing changes in strategy, personnel, and external coalitions to meet the challenges of the new environment (Ginsberg, 1988; Miller and Friesen, 1984; Tushman and Romanelli, 1985). However, recent research suggests that this debate is irrelevant since both adaptive and selective forces influence subsequent performance (Ginsberg and Buchholtz, 1990; Haveman, 1992; Zajac and Kraatz, 1993).

Discontinuous environmental change can be categorized as a single event that dramatically reshapes activity within an industry (Dewar and Dutton, 1986; Zammuto and Cameron, 1985). Prior research has determined that some of the causes of industry level discontinuous change are sudden changes in the social, legal, political, competitive, or technological conditions within an industry (An-

derson and Tushman, 1990; Meyer et al., 1990; Tushman and Anderson, 1986; Zajac and Kraatz, 1993). These causes dramatically alter the traditional rules of competing in the industry, and organizations must change their strategies, structures, and operating procedures accordingly if they are to be successful (D'Aveni, 1994; Miller and Friesen, 1980a; Smith and Grimm, 1987; Zajac and Shortell, 1989).

The study of events that produce discontinuous change at the industry level has recently increased for at least two reasons. First, the strategic management paradigm suggests that an organization will achieve its best performance if there is the right fit between strategy and environment (Miller, 1992; Venkatraman, 1989b). This implies that if environmental conditions within an industry change discontinuously, then industry competitors also must change their strategies to maintain fit and performance. Second, isolating a single event helps to reduce the difficulties in operationalizing the phenomenon. By focusing on a single event, such as regulatory changes in an industry (Haveman, 1992; Kelly and Amburgey, 1991; Smith and Grimm, 1987), researchers can more easily establish a reference point to assess the nature of strategic responses to discontinuous environmental changes. These settings provide a ready-made discontinuity and reduce the need for generalizable operational definitions.

The likelihood of generalizable conclusions on responses to discontinuous environmental changes may be enhanced by studying more heterogeneous organizational contexts. For example, previous studies have not examined the ability of firms to service a heterogeneous customer

base. Such a sample may include some firms for whom the environmental discontinuity has no effect, and therefore will not experience any adverse impact. The ramifications of these differences are discussed in the next section.

Customer Dependency

Support for heterogeneous customer bases is similar to a firm transitioning from a single product or business to a diversified business portfolio. Like diversification, broader customer bases provide opportunities for future growth and serve as a buffer against declines in sales to one customer. Miller and Camp (1985) found that a broadly defined customer base was associated with success amongst new corporate ventures. This conclusion was extended through subsequent findings that broad customer bases combined with rapid industry growth rates were associated with strongest performance amongst startups (McDougall et al., 1994).

While the roles of customer heterogeneity and strategic orientations in determining organizational response to discontinuously changing environments have not been examined, these literatures can be integrated to provide some insights on how these variables may affect organizational response. First, because of differences in the scope and magnitude of the effect of the discontinuity, organizations employ different strategies to respond to them (Gersick, 1991; Smith and Grimm, 1987; Zajac and Kraatz, 1993). Second, a diverse customer base implies that organizations will be impacted differently by environmental discontinuities. If an organization competes in an industry

undergoing discontinuous change, it can use sales to customers outside that industry to reduce the impact of the change. In effect, the greater the diversity of the customer base, the lower the impact of the environmental discontinuity on the firm. In fact, if sales to outsiders are robust, the firm may exit the industry (Harrigan, 1986; Zammuto and Cameron, 1985).

RESEARCH METHODOLOGY

Operationalizing Environmental Discontinuity

This study examined DOD suppliers for two reasons. First, the defense industry has undergone tumultuous changes during the 1990s. Second, DOD suppliers do business in a variety of industries, thereby increasing the generalizability of the study's findings (Gansler, 1993; Markusen and Yudken, 1992). Since abrupt, permanent change is associated with discontinuous environmental change (Anderson and Tushman, 1990), the Fiscal Year (FY) 1991 provides the best time frame for operationalizing the environmental discontinuity. This year was selected for two reasons: (1) a dramatic decline in procurement budgets began that year, and (2) the announcement of the dissolution of the Soviet Union. Prior to FY 1991, the budget authorizations for procurement appeared to be stabilizing at around \$80 billion annually after the peak of the Reagan buildup in FY 1985, but the procurement budget authorizations dropped about 25 percent from FY 1990 to FY 1991, from \$81.4 billion to \$64 billion. A retrospective analysis shows that actual outlays dropped 14% from FY 1990 to FY 1991, from \$81.4 billion to \$71.4 billion (Kosiak, 1993), but

that decline was the start of annual double-digit percentage cuts in procurement budgets which stabilized during FY 1994. Procurement budgets usually decline after a war, such as after the Vietnam War in the late 1970s. However, declines in the second half of the 20th century were always balanced with the need to counter the threat presented by the Soviet Union. However, the collapse beginning in August 1991 diminished this threat substantially. In fact, procurement budgets for FY 1992 and 1993 were reduced to \$63.0 billion and \$53.6 billion in response to the collapse.

Data Collection

To ensure that the population consisted of procurement contractors rather than R & D, construction, or manpower and personnel contractors (DOD procurement has remained fairly constant for these line items) and to control for temporary sales bursts due to the Persian Gulf War, the entire population of Ohio defense firms was screened by SIC code. Ohio is among the top 10 states in the number of "subcontractor" type DOD firms (Gansler, 1989; Markusen et al., 1991). Nearly 36,000 defense industry jobs in Ohio have been eliminated since 1991, making it the seventh most affected state in terms of jobs lost (Logistics Management Institute, 1993). The SIC codes used in this study included manufacturing firms (SIC 24-38), transportation and logistics firms (SIC 42-48), and wholesaling and services firms (SIC 50, 73, and 87).

The data were collected in a five step process explained below. There is no DOD requirement to keep records on all defense firms (Gansler,

1989). Therefore, longitudinal historical records were not available for this population of firms, which in turn required the use of a modified cross-sectional design. First, a list of all firms winning DOD contracts in the state of Ohio in FY 1990 was obtained from the Greater Cleveland Government Business Office. The Defense Logistics Agency's Mid-Atlantic Defense Contract Management District suggested that firms receiving total contracts of less than \$100,000 should be dropped because defense work generally does not represent a substantial portion of their business. Second, the remaining firms were contacted by phone to determine if they were still in business and that they were located in Ohio. Third, a letter soliciting participation in the study was sent to the CEO or person in charge of DOD business of all 411 Ohio firms that met the previously discussed criteria. Fourth, those executives who responded to the letter were interviewed over the telephone. Finally, firms that did not respond to the letter were contacted by phone and given the option of responding to the study by a fax survey. This process resulted in 135 usable responses, for a 33 percent response rate. A comparison of dollar value of FY 1990 DOD contracts and distribution by SIC code revealed no significant differences between respondents and nonrespondents.

Measuring Strategic Orientation

A modified version of Venkatraman's (1989a) Strategic Orientation of Business Enterprises (STROBE) instrument was used to measure the firms' strategic orientation during FY 1990-1993. The STROBE offers the advantages of being a theoretically

grounded measure of realized business unit strategy that has been tested for unidimensionality, reliability, and convergent, discriminant, and predictive validity (Venkatraman and Grant, 1986).

Customer Dependency

Customer dependency was measured by the percentage of the firm's FY 1990 sales that went to DOD. Based on the divergence of these values along extreme positions of dependency, the sample was divided into three groups for further analysis. The first group contained firms with 1990 DOD sales at 20 percent or less of total sales, the second group with 1990 DOD sales between 20 and 80 percent of total sales, and the third group with 1990 DOD sales at 80 percent or greater of total sales.

Organizational Performance

Since most smaller defense firms are privately held and must comply with DOD security requirements (Gansler, 1989), obtaining traditional performance figures such as ROI for the entire sample would have been extremely difficult or impossible (Dess and Robinson, 1984). Therefore, performance was measured by asking the respondents to provide the firm's total increase in sales and profits from 1990 to 1993. Change in sales has been used previously to measure performance in studies of new, small, privately held firms (Brush and VanderWerf, 1990; McDougall et al., 1994). Descriptive statistics are shown in Table 1.

To control for industry effects (Dess et al., 1990), the percentage change in sales and profits from 1990-1993 were compared across SIC codes

TABLE 1
Descriptive Statistics for the Entire Sample

(n=135)	<u>No. Percentage</u>	
	Still Doing Business with DOD	127
Developing Commercial Applications From Defense-Based Technologies	81	60.0
Dollar Value of FY 1990 Contracts (in Millions)	<u>Mean</u>	<u>Standard Deviation</u>
	4.02	8.63
DOD Sales as a Percentage of 1990 Total Sales	53.61	39.21
DOD Sales as a Percentage of 1993 Total Sales	44.87	39.56
Percentage Change in Total Sales Since 1990	18.10	61.01
Percentage Change in Total Profits Since 1990	28.67	123.14

using Kruskal-Wallis one-way ANOVAs. There were no significant differences between SIC codes for percentage changes in sales ($F=1.17$, df 17,117, $p>.15$; Chi-Square 21.74, $p>.19$). However, there was evidence that Stone, Clay and Glass product firms (SIC 32) and Air Transportation firms (SIC 45) significantly outperformed the rest of the sample in percentage change in profits, while Communications firms (SIC 48) performed significantly poorer on this dimension ($F=0.85$, df 17,117, $p>.32$; Chi-Square 29.41 $p<.04$). Since only one firm from each of these SICs was in the sample, their overall impact on the analysis was expected to be minimal.

Principal components analysis was used to reduce the strategic orienta-

tion items for further analysis. The correlation matrix for these items is provided in Table 2. The matrix shows moderate to strong correlations between variables within the aggressiveness, analysis, defensiveness, futurity, and riskiness dimensions, which suggests the appropriateness of principal components analysis.

Two criteria were used to determine the appropriate number of components: components with eigenvalues greater than 1 and Cattell's Scree Test. Both measures recommended that seven components be retained for subsequent analysis. In light of the sample size for this study, only factor loadings greater than 0.5 were included. Four of the components loaded as prescribed by Venkatraman (1989a) and were given the

TABLE 2
CORRELATION MATRIX FOR STRATEGIC ORIENTATION VARIABLES

	AGGRESSIVENESS										ANALYSIS									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1. SACRIFICE PROFITS FOR CONTRACTS	1.0000																			
2. CUT PRICES TO RAISE HIT RATE	0.6181	1.0000																		
3. SET PRICE BELOW COMPETITION	0.4325	0.5330	1.0000																	
4. SEEK POSITION OVER CASH FLOW	0.6417	0.5063	0.4507	1.0000																
5. STRESS FUNCTIONAL COORDINATION	-0.0102	0.0485	0.0260	-0.0894	1.0000															
6. INFO. SYSTEMS FOR DECISIONS	0.0349	-0.0376	0.0062	-0.1680	0.4344	1.0000														
7. DEVELOP THOROUGH ANALYSIS	-0.0160	0.0198	-0.1301	-0.0747	0.2875	0.3293	1.0000													
8. USE PLANNING TECHNIQUES	-0.0489	-0.0140	-0.1859	-0.1832	0.3919	0.4390	0.6168	1.0000												
9. USE MANAGEMENT INFO. SYSTEMS	0.0205	-0.0628	-0.1486	-0.0598	0.2955	0.6319	0.4098	0.5590	1.0000											
10. APPRAISAL OF SR. MANAGERS	-0.1286	-0.0998	-0.0368	-0.2076	0.2216	0.3373	0.2105	0.4776	0.4215	1.0000										
11. MODIFY MANUFACTURING TECHNOLOGY	-0.0010	0.0507	-0.0200	-0.0009	0.2040	0.2091	0.0798	0.2860	0.1972	0.2560	1.0000									
12. USE COST CONTROL SYSTEMS	-0.0689	-0.1290	-0.0738	-0.1818	0.2363	0.3521	0.3080	0.3158	0.3762	0.3453	0.1330	1.0000								
13. USE PRODUCTION TECHNIQUES	-0.1094	-0.1195	-0.1379	-0.1630	0.1330	0.3380	0.1946	0.2814	0.3488	0.2573	0.3229	0.2707	1.0000							
14. EMPLOYEE INPUT ON QUALITY	-0.0633	-0.0025	-0.0908	-0.1026	-0.0266	0.1089	0.2639	0.2940	0.2385	0.1643	-0.0266	0.1089	0.2639	1.0000						
15. EMPHASIZE BASIC RESEARCH	0.0818	0.1374	-0.0039	-0.0244	0.1903	0.2646	0.2406	0.4653	0.3177	0.4078	0.2439	0.3148	0.2242	0.3997	1.0000					
16. FORECAST KEY INDICATOR	-0.0622	-0.0008	-0.0463	-0.1079	0.2439	0.3148	0.2242	0.3997	0.2512	0.3546	0.3493	0.2991	0.3577	0.4975	0.3715	1.0000				
17. TRACK SIGNIFICANT TRENDS	-0.0079	-0.0016	-0.0328	-0.0666	0.3493	0.2991	0.3577	0.4975	0.3715	0.3685	0.0143	0.0181	0.0073	0.0355	0.3715	0.3685	1.0000			
18. WHAT-IF ANALYSIS	0.0143	0.0181	0.0073	0.0355	0.2481	0.1841	0.3317	0.2701	0.1319	0.1802	0.0751	0.0995	0.0610	-0.1380	0.2701	0.1319	0.1802	1.0000		
19. SEEK NEW OPPORTUNITIES	0.0751	0.0995	0.0610	-0.1380	0.0200	0.0806	0.0116	0.1668	0.1376	0.1586	0.0019	-0.0389	-0.1184	-0.1029	0.0200	0.0806	0.0116	0.1668	1.0000	
20. FIRST TO INTRODUCE NEW PRODUCTS	0.0019	-0.0389	-0.1184	-0.1029	0.0437	0.1867	0.1270	0.2177	0.2308	0.1325	-0.1246	-0.1145	-0.1353	-0.2855	0.0437	0.1867	0.1270	0.2177	0.2308	1.0000
21. LOOK FOR ACQUISITIONS	-0.1246	-0.1145	-0.1353	-0.2855	0.2025	0.1725	0.0661	0.1474	0.1540	0.1687	-0.0909	0.0134	0.0178	-0.0510	0.2025	0.1725	0.0661	0.1474	0.1540	0.1687
22. ELIMINATE OLD OPERATIONS	-0.0909	0.0134	0.0178	-0.0510	-0.2748	-0.2064	-0.0880	-0.2253	-0.1028	-0.0149	-0.0560	-0.0717	-0.0200	-0.0579	-0.2748	-0.2064	-0.0880	-0.2253	-0.1028	-0.0149
23. HIGH-RISK OPERATIONS	-0.0560	-0.0717	-0.0200	-0.0579	0.2214	-0.0303	-0.0828	-0.2955	-0.1489	-0.1392	0.0987	0.0882	0.0948	0.0866	0.2214	-0.0303	-0.0828	-0.2955	-0.1489	-0.1392
24. STAGE-BY-STAGE APPROVAL	0.0987	0.0882	0.0948	0.0866	-0.2209	-0.2087	-0.1121	-0.1172	-0.2113	-0.0516	0.0916	0.0805	-0.0036	0.1630	-0.2209	-0.2087	-0.1121	-0.1172	-0.2113	-0.0516
25. SUPPORT CERTAIN RETURNS	0.0916	0.0805	-0.0036	0.1630	-0.0170	-0.0951	-0.1247	-0.1168	-0.0996	0.0219	-0.0274	-0.0074	-0.0347	0.0272	-0.0170	-0.0951	-0.1247	-0.1168	-0.0996	0.0219
26. TRIED AND TRUE OPERATIONS	-0.0274	-0.0074	-0.0347	0.0272																



TABLE 2 (CONT.)
CORRELATION MATRIX FOR STRATEGIC ORIENTATION VARIABLES

	DEFENSIVENESS					FUTURITY					PROACTIVENESS					RISKINESS				
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
12.	0.3633																			
13.	0.4184	0.5673																		
14.	0.1812	0.3887	0.3436																	
15.	0.0313	0.0860	0.1678	0.0634																
16.	0.2406	0.3352	0.3299	0.2067	0.3414															
17.	0.3152	0.3865	0.4013	0.2811	0.2373	0.6621														
18.	0.1618	0.2678	0.2422	0.3653	0.3066	0.5363	0.5184													
19.	0.0358	0.2350	0.0413	0.3525	0.3233	0.1886	0.1881	0.2968												
20.	0.2064	0.0604	0.2687	0.0793	0.3191	0.2168	0.3141	0.1783	0.0864											
21.	0.0782	0.0675	0.1280	0.1701	0.3053	0.1848	0.1185	0.1363	0.2082	0.1602										
22.	0.2664	0.3031	0.3450	0.2729	0.2462	0.2095	0.3325	0.3300	0.1343	0.2589	0.2064									
23.	0.0742	-0.0586	-0.0079	-0.1880	-0.0519	-0.1280	-0.0996	-0.3104	-0.3046	0.0297	0.0093	-0.0837								
24.	-0.0071	-0.0486	-0.0233	-0.1713	-0.0637	-0.0811	-0.0681	-0.2433	-0.2222	0.0619	-0.1727	-0.1871	0.3416							
25.	0.0637	-0.1610	-0.1640	-0.2566	-0.0596	-0.0554	-0.0588	-0.1666	-0.1891	0.0449	-0.1257	-0.2455	0.3022	0.2390						
26.	0.1923	-0.1053	-0.0392	-0.1808	-0.1705	-0.0661	0.0185	-0.1380	-0.2272	0.1455	-0.0035	-0.0969	0.4144	0.3017	0.4305					

same names: Defensiveness, Aggressiveness, Futurity, and Riskiness. Three other components loaded slightly differently than prescribed and are described below.

Automated Planning. This component reflects the automated and quantitative aspects of Venkatraman's (1989a) analysis dimension. Four variables loaded on this component: 1) information systems provide support for decision making, 2) when confronted with a major decision, we usually try to develop a thorough analysis of the situation, 3) use of planning techniques, and 4) use of the outputs of management information and control systems. The "soft" factors of the analysis dimension, manpower planning and functional coordination, were absent from this component and therefore it was given a new name.

Opportunity Identification. Four variables loaded on this component: 1) emphasize basic research to provide future competitive edge, from the futurity dimension, 2) constantly seek new opportunities related to present operations, 3) usually the first to introduce new brands or products in the market, and 4) constantly on the lookout for businesses that can be acquired, from the proactiveness dimension. These variables imply a commitment to future growth through creating new products or pursuing new markets, even if other firms have to be acquired to do so.

Incremental Coordination. Three variables loaded on this component. One variable was from the analysis dimension: emphasize effective coordination among different functional areas. Two variables were from the riskiness dimension: we adopt a rather conservative view when making major decisions, and new projects

are approved on a "stage-by-stage" basis rather than with blanket approval. This component reflects several characteristics of DOD weapons procurement, which occurred as a four-step process: (1) concept exploration, (2) demonstration and validation, (3) full-scale development, and (4) operations and support. At the end of each step it is decided whether to continue the program. Also, several DOD divisions and separate agencies must agree before a contract is awarded or a contractor can receive payment for services rendered (Gansler, 1980; 1989). Therefore, it is likely that highly DOD-dependent firms will have high scores on this component.

RESULTS

The observations were then clustered within each level of customer dependency by the seven strategic orientation principal components using SAS's CLUSTER procedure. This approach is consistent with Hambrick's (1984) multitiered taxonomy framework, which suggests building taxonomies first by categorizing an environmental context, then isolating some fixed short-run positions (i.e., DOD dependency), and then identifying strategic choices within those contexts. Based on an examination of the dendrogram and changes in squared Euclidean distances of the cluster solutions, Ward's method produced the tightest and most easily interpretable clusters. The uniqueness of the six clusters was verified through discriminant analysis and Duncan's multiple range tests across the seven components. The discriminant functions properly classified 59.1 percent of the observations. While this figure appears to be

relatively low, it compares favorably to the 17 percent classification that would have been achieved by chance. The *tau* statistic showed the discriminant function to produce a 44 percent improvement over random classification. *Tau* statistics of 25 percent or higher are considered to be significant, so the clusters are considered to be valid (Hair et al., 1992). Strategic orientation scores, performance and demographic variables, and the results of Duncan multiple range tests are presented in Table 3. Duncan's multiple range tests were performed to identify significant differences between the clusters (Hambrick, 1983b). The six clusters were named as follows: (1) Entrepreneurial Cost Leaders, (2) Commercial-Based Niche Holders, (3) Future-Oriented Cost Leaders, (4) *Status Quo* Firms, (5) Defense-Based *Status Quo* Firms, and (6) Defense-Based Prospectors. The next section describes the relationships to existing theory (Miller, 1996) and the differences in strategic orientation, customer dependency, and performance for each of the clusters.

Analysis and Interpretation of Clusters

Low DOD Dependency, Cluster 1: Entrepreneurial Cost Leaders. This group of firms resembles Miles and Snow's (1978) "analyzers" and the "going for growth" taxonomy identified by Galbraith and Schendel (1983) in its strategy, demographic characteristics, and performance. The cluster demonstrates both prospecting and defensive behavior, which suggests that they have developed a way to simultaneously pursue strategies of cost leadership and differentiation (Murray, 1988). Of the six strategy types, this group scored

highest in defensiveness; however, only Cluster 6 scored significantly lower in this area. This group scored significantly higher in opportunity identification than all types but Cluster 6. This group also scored highest in automated planning and riskiness, but it was only significantly higher than Cluster 2 on both components. These characteristics make this cluster look similar to the "entrepreneurial revitalization" organizational change archetype developed by Miller and Friesen (1980b). This strategy type is dominated by heavy manufacturing firms, with 23 of the 34 firms having SIC codes in the 30-39 categories. This combination of strategic orientation and demographic characteristics suggests a group of firms that may be trying to use cost-based competitive advantages to enter new markets. This cluster had significantly higher changes in sales than Cluster 4.

Low DOD Dependency, Cluster 2: Commercial-Based Niche Holders. With its comparatively high performance and comparatively low to moderate scores on aggressiveness and defensiveness, this cluster is similar to Hambrick's (1983b) "high-quality gendarme" taxonomy. This strategy type scored lowest on aggressiveness, automated planning, riskiness, and incremental coordination. It scored significantly lower than Cluster 1 on each of these components, and significantly lower than all the clusters on incremental coordination, which is to be expected given the DOD-dependent orientation predicted for this component. Conversely, this strategy type scored highest in futurity, significantly higher on the component than all the types but Clusters 3 and 5. This group's scores on these dimensions suggest that these firms may believe they compete in some-

TABLE 3
Cluster Means on the Dimensions of Business-Level
Strategic Orientation and Other Demographic Variables

Cluster/DOD Dependence Level	1/Low	2/Low	3/Medium	4/Medium
Cluster Size	34	11	26	11
Clustering Variables:				
Defensiveness	.2860 (.8410)	-.0104 (.9977)	.2640 (.9654)	-.3768 (1.4807)
Aggressiveness	-.0687 (1.0273)	-.3966 (1.0739)	.0811 (.8231)	-.0527 (1.0455)
Automated Planning	.2964 (.9165)	-.4824 (.9898)	-.1194 (.9132)	-.2111 (1.1405)
Futurity	.0739 (.7263)	.6487 (.6763)	.5068 (.9394)	-1.4770 (.7694)
Riskiness	.3622 (1.1027)	-.6667 (.8501)	-.0926 (.8656)	.2494 (1.1141)
Opportunity Identification	.5386 (.9020)	-.4397 (.7994)	.0656 (.9085)	-.4844 (.9930)
Incremental Coordination	.1247 (.7043)	-1.4973 (.5785)	.1473 (1.0677)	-.4296 (.6277)
Demographic/Performance Variables:				
Dollar Value of 1990 DOD Contracts (thousands)	2942.38 (8838.00)	914.73 (2596.98)	3725.92 (9715.67)	2364.73 (4565.87)
Percentage Change in Sales Since 1990	21.35 (39.81)	43.72 (60.10)	15.88 (45.33)	-25.00 (25.24)
Percentage Change in Profits Since 1990	32.88 (139.08)	77.36 (127.49)	65.42 (163.21)	-10.73 (102.37)

(Standard deviations are in parentheses)

what secure markets with synergies between certain groups of customers, which suggests a "focused differentiator" strategy (Murray, 1988; Porter, 1980).

The dominant demographic characteristic of this cluster is that its members sell commercially developed products to DOD. In spite of their low DOD dependence, only one

TABLE 3 (Cont.)
Cluster Means on the Dimensions of Business-Level
Strategic Orientation and Other Demographic Variables

Cluster/Dependence Level	5/High	6/High	Results of Duncan Tests*
Cluster Size	28	23	
Clustering Variables:			
Defensiveness	.0976 (.5988)	-.6549 (1.180)	1>4,6; 3>6; 5>6
Aggressiveness	.4485 (.9829)	-.3213 (.9903)	5>1,2,6
Automated Planning	.0536 (.8486)	-.0368 (1.2250)	1>2
Futurity	.3515 (.7539)	-.7140 (.8528)	2>1,4,6; 3>1,4,6; 5>4,6; 1>4,6; 6>4
Riskiness	-.0037 (1.0319)	-.2266 (.7777)	1>2,6; 4>2
Opportunity Identification	-.5943 (1.1347)	.2952 (.5604)	1>2,3,4,5; 6>2,4,5; 3>5;
Incremental Coordination	.5167 (.6663)	-.0583 (1.2157)	5>2,4,6; 1,3,4,6>2;
Demographic/Performance Variables:			
Dollar Value of 1990 DOD Contracts (thousands)	6877.25 (10897.07)	3989.39 (6664.77)	
Percentage Increase in Sales Since 1990	25.18 (89.86)	16.17 (69.00)	1,2,3,5,6>4
Percentage Increase in Profits Since 1990	8.64 (108.63)	3.78 (40.34)	3>4,5,6; 2>4

* $p < .05$

(Standard deviations in parentheses)

of the eleven firms develops commercial applications from their defense-based technologies. And in spite of their comparatively risk-averse, non-aggressive strategic orientation, their

financial performance was the strongest of the six clusters, which suggests that any adverse effects from the defense industry were offset by increased commercial sales.

Medium DOD Dependency, Cluster 3: Future-Oriented Cost Leaders.

This strategy type is very similar to Cluster 1, with the major difference being significantly differing scores in opportunity identification. While both types are future-oriented, these firms place more emphasis on insuring their future success in their present operations than on identifying new markets to pursue. This suggests that these firms know their desired direction and aren't looking to deviate from it (Andrews, 1971; Venkatraman, 1989b). Nearly half (12 of 26) of the firms in this strategy type are heavy manufacturing firms (SIC 30-39), closely followed by ten business and engineering service firms (SICs 73 and 87). This combination of strategic and demographic characteristics cause this cluster to resemble the "maintenance" taxonomy derived by Galbraith and Schendel (1983). This emphasis resulted in strong profitability for these firms, significantly outperforming Clusters 4-6. The combination of higher increases in profits and lower increases in sales than Cluster 1 suggest that they are seeking to increase profits through selling to existing customers instead of identifying new markets.

Medium DOD Dependency, Cluster 4: Status Quo Firms. This strategy type is distinguished by low to very low scores on nearly all strategic orientation components. These firms are significantly less defensive than Cluster 1, significantly less opportunistic than Clusters 1 and 6, and significantly less future oriented than all the strategy types. This orientation is very similar to the "toward stagnation" organizational change archetype developed by Miller and Friesen (1980b). Ten of the eleven firms are heavy manufacturers (SIC 30-39),

which combined with their low strategic orientation scores make them resemble Galbraith and Schendel's (1983) "harvest" typology. The data do not allow us to determine whether this organizational drifting is due to intentional abandonment or poor strategy formulation and/or implementation.

These firms were the poorest performers on both the growth and profitability dimensions, with significantly poorer sales performance than all other clusters and significantly poorer profit performance than Clusters 2 and 3. There are at least two plausible explanations for the poor performance of this Cluster. First, the poor present performance has forced these firms to abandon future development and to focus on turning around present operations (Galbraith and Schendel, 1983; Hambrick and Schecter, 1983). Second, their low defensiveness score may indicate that these firms are trying to compete in industries where cost is the primary selection criterion, and their poor performance reflects their comparative lack of cost consciousness. These firms resemble Porter's (1980) "stuck-in-the-middle" firms and Miles and Snow's (1978) reactors, and face a perilous future if they do not correct their situation.

High DOD Dependency, Cluster 5: Defense-Based Status Quo Firms. This cluster is distinguished by its conservative nature, and appears to be committed to staying primarily in the defense business. These firms scored lowest in opportunity identification and were significantly lower than all but Clusters 2 and 4. This group also scored significantly higher in incremental coordination than all but Clusters 1 and 3. They scored the highest on aggressiveness which, with

their moderate level of defensiveness, implies that they are feeling the pinch of the shrinking pot of DOD procurement dollars and are reducing their margins in order to win contracts and hold or expand their share of the market. The moderate level of defensiveness may also reflect the inability to cut costs because of the cost structure imposed on defense firms to meet DOD requirements (Gansler, 1980; Markusen et al., 1991). This combination of attributes is similar to the "trouble shooting" organizational change archetype developed by Miller and Friesen (1980b), which suggests that they may be slowly developing their response to the changes in a centralized manner. Heavy manufacturers and engineering/business service firms make up the majority of firms in this cluster.

The four Business Service Firms (SIC 73) outperformed the other industries within this cluster in terms of growth (mean=146.25; $F=1.941$; $p<.06$) and profitability (mean=146.25; $F=2.488$; $p<.03$). Controlling for this influence results in a 5 percent increase in sales and a 14 percent decline in profits for the cluster, which results in Clusters 2 and 3 significantly outperforming this cluster in profitability. Although their percentage of sales to DOD declined during the study, this cluster's strategic orientation suggests that the decline reflects reduced DOD sales rather than increased commercial sales.

High DOD Dependency, Cluster 6: Defense-Based Prospectors. With the lowest score on the defensiveness component and the second highest score on opportunity identification, this cluster most closely represents Miles and Snow's (1978) prospector typology. This cluster's behavior suggests that these firms are trying to move away from their dependency on

defense business, but have yet to see the fruits of their efforts. This cluster scored significantly higher on futurity than Cluster 4 and significantly lower on that dimension than the rest of the clusters. Since these firms scored significantly lower on the aggressiveness dimension than all types but Cluster 2, it is possible that they also have secured niches in the defense markets in which they compete. A high emphasis on opportunity identification and a low emphasis on futurity may indicate that these firms are actively seeking new nondefense business but aren't exactly sure how to develop them, thereby "muddling through" the process (Lindblom, 1959). This combination of low incremental coordination and planning and defensiveness with high emphasis on opportunity identification closely reflects Miller and Friesen's (1980b) "initiation by fire" change archetype, which suggests that while they may be trying to change, they may not have the desire or experience to successfully do so.

Like Cluster 5, nearly half the firms in this strategy type are business and engineering service firms. The firms in this cluster have been more successful in reducing their dependence on DOD sales than the defense based *status quo* firms, although their growth and profitability performance is similar. This lack of difference in performance will be addressed in the managerial implications portion of the Discussion section.

DISCUSSION

This study sought to identify strategies that firms use to respond to discontinuously changing environments and to determine whether any of these strategies were associated with

stronger performance. The study extends existing work on discontinuous change by identifying response types to a single phenomenon in a multiple industry context. While previous studies examined the impact of technological discontinuities in multiple industries over differing time periods (Anderson and Tushman, 1990), this is one of the first studies to examine the responses of firms in multiple industries.

The primary contribution of the study is that it suggests that differing levels of dependence on a discontinuously changing context evoke significantly different responses to the phenomenon. Firms with a minimal presence, such as the Commercial Based Niche Holders, seem to operate as if nothing has changed, whereas the Defense Based *Status Quo* Firms and the Defense Based Prospectors find it difficult to move because they have shaped their organizations to cater almost exclusively to the needs of the defense industry. This suggests that despite the turbulence often associated with this type of environmental change, perceived and objective environmental heterogeneity may still be present, providing new opportunities for growth and change (Hambrick, 1983a; Kim and Lim, 1988). Since five of the six clusters experienced stronger performance after the discontinuity, the findings provide some support for the adaptation perspective of strategic change in discontinuous environments (Haveman, 1992; Smith and Grimm, 1987), but the fact that divergent strategies within the most defense dependent firms did not produce significantly different performance results suggests that this is a tentative conclusion.

Another significant finding of the study is that while the context in which the discontinuous change took place was unique, the responses to the phenomena were not. Nearly all the response types closely replicated strategies found in previous studies. This could explain why the performance differences were not more pronounced. While organizations will attempt to adapt to discontinuously changing environments, their attempts will generally reflect the momentum of the organization (Boeker, 1989; Miller and Friesen, 1980a, 1982b). This suggests that while radical departures in strategy may be risky, they may also be necessary to see significantly enhanced performance in these environments. It also suggests that firms in uncertain environments may be better off to abandon their old approaches and that they must acquire the resources to develop and implement these new strategies if they are to be effective (Bourgeois and Eisenhardt, 1988; Miller, 1992; Miller and Chen, 1996).

The most surprising performance finding is that in spite of the declines in the size of their primary market, sales and profitability actually increased for both defense-based clusters. This may be due to the fact that many firms are exiting the defense business (Gansler, 1993; Markusen and Yudken, 1992) and those remaining firms may be picking up a larger piece of a shrinking pie. The lack of more significant performance differences may be attributed in part to the economic recession that occurred during most of the time frame of the study. If general economic conditions had been better, firms with lower DOD dependence would have had an advantage over defense dependent

firms because their already established connections to commercial markets would have allowed them to increase sales and profits more easily. Therefore, it is likely that more significant sales performance differences between highly dependent DOD firms and less dependent DOD firms would have been found. Another possibility may be that a three year time period may not be a long enough time period to determine the results of change efforts. Since some studies have suggested that it may take as long as six years to fully implement organizational "revolutions" (Miller and Friesen, 1980a, 1982b), the full impact of the discontinuity may not be able to be measured yet.

The findings of the study must be interpreted in light of its limitations. First, respondents may have inflated company performance based on the subjective nature of the measures. However, these measures were seen as a tradeoff for gathering performance data on privately held firms, which made up the majority of the sample (Dess and Robinson, 1984). In fact, this collection method allowed for insights into the strategies and performance of firms most at risk in the defense drawdown, namely the small, independent contractor (Gansler, 1989; Markusen and Yudken, 1992). Second, the study's cross-sectional design did not allow for exact measurement of the firms prior to the environmental discontinuity. Therefore, it was not possible to measure levels of change in the strategic orientation. This limits the extent to which the study's findings can be compared to other studies on changes in strategy and subsequent organizational performance (Smith and Grimm, 1987; Zajac and Shortell, 1989). Since retrospective reports of

strategy may not have been completely accurate (Golden, 1992) and we desired to keep the instrument as brief as possible to increase participation, respondents were not asked to provide that information. Third, the number of variables used to build the configurations of strategic response was limited to increase the response rate. Had more attributes been measured, such as organization culture, structure, and resources, the resulting organizational types may have yielded more pronounced performance differences (Miller, 1996). Lastly, the use of cluster analysis to derive taxonomies is highly dependent upon researcher judgment to determine valid results (Ketchen and Shook, 1996). For instance, the clustering algorithm used in this study is greatly impacted by outliers. For this reason, two of the 135 respondents were eliminated from the analysis. Also, discriminant analysis and multiple range tests across customer dependency levels were used to reduce dependence on researcher judgment. While using multiple clustering methods may have produced stronger clusters, the consistency of the derived clusters with taxonomies in previous studies provides support for their validity.

Managerial Implications

In spite of the limitations, the study does provide several implications for practitioners. The clearest implication is that maintaining the *status quo* in discontinuously changing environments is not a viable option. Firms that had no clear strategic direction performed significantly worse than the rest of the sample. This suggests that even changing strategy for change's sake may be better than do-

ing nothing to respond to discontinuously changing environments (Haveman, 1992). Based on prior success, it is tempting not to make changes in hopes that the environment will return to its prior steady state. However, if markets become more hypercompetitive, as some researchers suggest (D'Aveni, 1994), waiting for a return to the "good old days" will most likely result in firm extinction.

A second implication addresses the lack of performance differences between the Defense-Based *Status Quo* Firms and the Defense-Based Prospectors. The firms appear to have many similar characteristics, which suggests that they have the same level of experience in transitioning to commercial production, which is little to none. Since strategic change in a firm is highly dependent on the characteristics of its founding and history (Boeker, 1989), it is not likely to achieve different outcomes with similar configurations of resources. This implies that the Defense-Based Prospectors must acquire different resources and arrange them differently if they are to make a successful transition into the production of commercial goods and services. This should be done by hiring people with commercial backgrounds who can help them identify a common theme around which they can compete (Miller and Chen, 1996), and then channel resources toward that theme accordingly. Since these firms would be competing against entrenched commercial firms, they may not have time to learn how to compete on their own. This would be quite an obstacle to overcome since tasks such as environmental analysis and marketing are foreign concepts to many defense firms (Gansler, 1989).

A third implication that emerges is that emphasizing efficiency may enhance performance in discontinuously changing contexts. This provides further support for the present discussion about Pentagon procurement reform. In spite of recessionary conditions, defense based firms had sales and profitability increases. However, less DOD dependent firms saw significantly higher increases in profitability. This suggests that while some distinctiveness must be maintained because of the uniqueness of some defense goods, greater efficiency could be achieved if procurement regulations for defense contractors are modified to resemble commercial practice. The increased similarity between the environments may actually accelerate conversion efforts by helping defense firms make the transition to commercial markets.

Lastly, the lack of differences in performance between the two types of defense firms suggests that while some defense firms are attempting conversion into commercial markets, the associated benefits will not be seen overnight. The regulatory environment facing defense firms has created a unique competitive environment for which the skills necessary for success are not directly transferrable to commercial markets (Gansler, 1989; Markusen et al., 1991). This implies that smaller defense firms have to make the same choices facing their larger counterparts without the luxury of their financial resources. Since many of these firms are lacking in the operational and financial capabilities to radically change their strategies and to quickly develop commercial operations, it may appear that they have no choice but to be swallowed or go out of business. However, this

may be one area where government assistance is appropriate. Through loans for retooling and other startup expenses, and arranging for consulting expertise to enter new markets, government agencies could play a vi-

tal role in helping those smaller defense firms that have demonstrated strong performance in the past and demonstrate the desire and creativity to navigate the challenges of their new environment.

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