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RESEARCH NOTES AND COMMUNICATIONS

THE MODIFIED TICHY TPC FRAMEWORK FOR PATTERN MATCHING AND HYPOTHESIS DEVELOPMENT IN HISTORICAL CASE STUDY RESEARCH

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Scholars' calls for an integrating view of the technical, political, and cultural (TPC) aspects of management lead to examining Tichy's TPC framework as the basis of such a view. Tichy's framework is shown to require modification to include the TPC systems of a firm's customers and competitors, and a modified TPC framework is proposed. This framework's usefulness for pattern matching to identify causes of performance is demonstrated in historical case research into a strategic group marketing IBM-compatible mainframes. A result is four testable hypotheses suggesting how firms' success marketing to organizations depends on effective integration between marketing and general management, and a potential cause of variations in performance within strategic groups and during movement between strategic groups. In addition, a method for testing and developing hypotheses by pattern matching on a modified TPC framework is demonstrated.

INTRODUCTION

Management and strategy scholars such as Peters and Waterman (1982), Miles and Snow (1978, 1984 and 1994), Maidique (1983), Ansoff (1987), and Miller (1996) argue that a broader, more inclusive view of the technical, political and cultural aspects of management is needed. In related research, marketing scholars including Day and Wensley (1983), Robinson and Wind (1983), and Horovitz (1984) posit that success selling to organizations depends on effective integration between marketing and general management. Finally, researchers including McGee and Thomas (1986) and Cool and Schendel (1988) observe that understanding performance within strategic groups and success moving between strategic groups requires a high-resolution understanding of management effectiveness. Ansoff (1987) and Chaffee (1985) call for a framework encompassing technical, political, and cultural matters, as a step toward an integrative view. One such framework is offered by Tichy's (Tichy, 1983; Tichy and Devanna, 1986; Tichy and Sherman, 1993) technical–political–cultural framework (TPC framework).

The objectives of this paper are to assess the TPC framework's usefulness in developing an integrative view of management and illustrate its

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use to develop testable hypotheses from historical case study analysis. First, we describe Tichy's TCP framework; then we evaluate the appropriateness of the framework for pattern matching using a sample of research findings relating to the determinants of firms' performance. Finally, we demonstrate by means of case analysis how a modified version of the framework can be used for pattern matching and the development of testable hypotheses.

THE TICHY TPC FRAMEWORK

Tichy's (1983) view of the scope of a firm's context is set out in Table 1, which encompasses three aspects of management systems: technical core systems address the subject matter of competitive advantage, including analysis and implementation issues; political core systems describe the systems of authority to make policy and allocate resources, and cultural core systems concern core values and shared beliefs which constrain and inspire a firm's actions and reactions to customers and competitors. The TPC framework is animated by loose coupling between the technical, political, and cultural core systems, caused by linkages between these systems. A metaphor for the effect of these linkages is that they intertwine the systems of the TPC framework like the strands of a rope, which is stronger than the sum of the strengths of its individual strands.

Tichy calls the source of this greater strength alignment and observes its effects with contrasting cases. First, when a business makes a propitious start, the resulting alignment of the TPC systems can carry the business to sustained success. Conversely, should a shock to one of the firm's technical, political, or cultural systems cause a loss of alignment, the resulting strains can reverberate through the whole TCP framework. The tendencies for alignment to reinforce itself and for loss of alignment to reverberate demonstrate what Tichy calls the loosely coupled characteristics of the TPC framework. Tichy defines alignment as a condition of the TPC framework in which the systems reinforce each other, and its loss as a condition in which linkages across the systems weaken the effects of management or cause perverse effects. Tichy describes linkages as relationships that cause alignment or the loss of alignment by acting across boundaries between a firm's technical, political, and cultural systems.

However, in common with other organizational effectiveness frameworks, Tichy's treats customers and competitors as components of an environment that produces turbulence to which a firm's responses determine its effectiveness. In effect, two important marketplace actors are regarded as exogenous challenge generators. The extent to which this potential shortcoming limits the potential of Tichy's framework as an integrative device for understanding organizational performance and pattern matching is discussed in the next section.

DEVELOPING AN INTEGRATIVE FRAMEWORK

To evaluate Tichy's TPC framework for integration and pattern matching, we displayed a sample of research findings about determinants of firms' performances. The sample consisted of 58 journal articles located in index searches carried out between July 1990 and July 1992 using 15 combinations of key words related to performance, and reviews of six journals suggested by MacMillan (1991) and two journals that contained many articles found in our index searches. Also included in the sample were 93 observations from six management books referred to frequently in journal articles sampled: Miles and Snow (1978), Porter (1980, 1985), Peters and Waterman (1982), Kanter (1984) and Bartlett and Ghoshal (1989). We used this sample of research findings to extend Tichy's TPC framework for use in the fieldwork reported in this paper. After 1992, we reviewed articles published in journals represented in our sample and in Hamel and Prahalad (1994), but found no observations that suggested further modification of the framework.

Taken together, the articles and books in our sample yielded 131 causes of performance that could be plotted onto specific rows in Tichy's TPC framework. However, Figure 1 (in which each dot represents a researched cause of performance) would accommodate our sample only if we added columns representing customers' and competitors' technical, political, and cultural systems to Tichy's TPC framework. To be confident that we had validly located causes on Figure 1, we reviewed a random sample of 20 causes

Table 1. Management system components

Core systems	Mission and strategy	Tasks	Prescribed network	People	Processes	Emergent networks
Technical system	Assessing environmental threats and opportunities. Assessing organizational strengths and weaknesses. Defining mission and fitting resources to accomplish it	Environmental scanning activities. Strategic planning activities	Differentiation: organization of work into roles (production, marketing, etc.) Integration: recombining roles into departments, divisions, regions, etc. Aligning structure to strategy	Selecting or developing technical skills and abilities. Matching management style with technical tasks	Fitting people to roles. Specifying performance criteria for roles. Measuring performance. Staffing and development to fill roles (present and future). Developing information and planning systems to support strategy and tasks	Fostering the development of information returns which facilitate task accomplishment
Political system	Who influences the mission and strategy. Managing coalitional behavior around strategic decisions	Lobbying and influencing external constituencies. Internal governance structure. Coalitional activities to influence decisions	Distribution of power across the role structure. Balancing power across groups of roles (e.g., sales vs. marketing, production vs. R&D, etc.)	Utilizing political skills. Matching political needs and operating with organizational opportunities	Managing succession politics (who gets ahead, how they get ahead). Decision and administration of reward system (who gets what and how). Managing the politics of appraisal (who is appraised by whom and how). Managing the politics of information control and the planning process	Management of emergent influence networks, coalitions, and cliques
Cultural System	Managing influence of values and philosophy on mission and strategy. Developing culture aligned with mission and strategy	Use of symbolic events to reinforce culture. Role modeling by key people. Clarifying and defining values	Developing managerial style aligned with technical and political structure. Development of subcultures to support roles (production culture, R&D culture, etc.). Integration of subcultures to create company culture	Utilizing cultural leadership skills. Matching values of people with organization culture	Selection of people to build or reinforce culture. Development (socialization) to mold organization culture. Management of rewards to shape and reinforce the culture. Management of information and planning systems to shape and reinforce the culture	Fostering friendship and affective networks, coalitions and cliques to shape and reinforce the culture

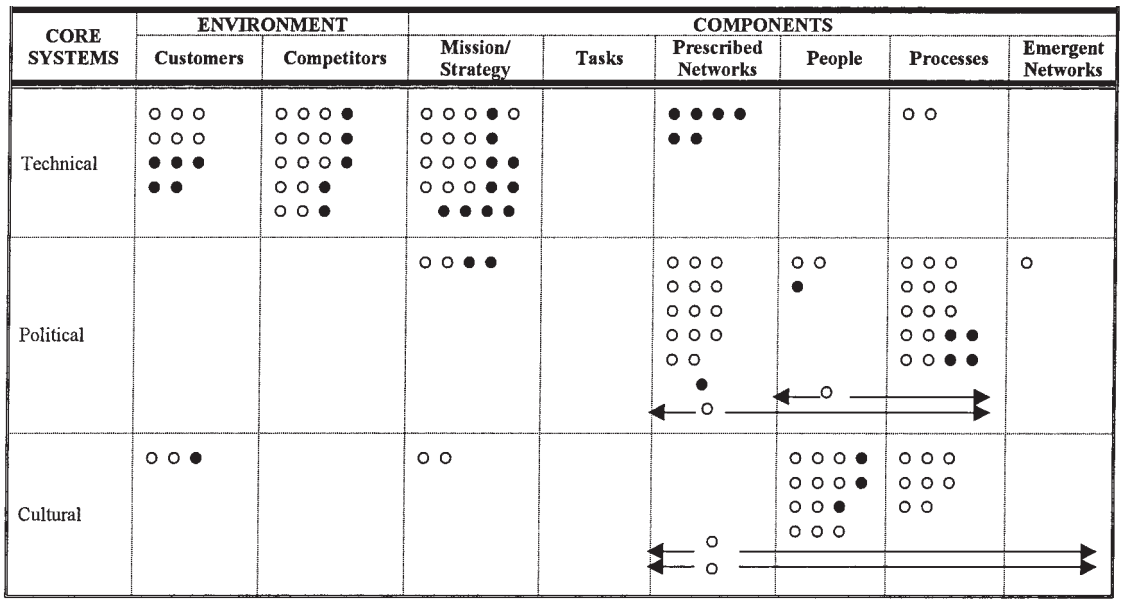

Figure 1. Management knowledge and observations on the modified TPC framework

with two business scholars, who agreed with 17 (or 85%) of our locations of causes in Figure 1. We called the resulting framework the modified TPC framework, on which a dot represents a cause from a journal article (represented by a shaded dot) or a management book (represented by an unshaded dot) and the horizontal arrows indicate the possible locations of causes whose locations are unclear.

Next, we focused on observations from the articles and books in our sample that could not be mapped into rows of a firm's TPC framework. These observations crossed boundaries, either between the technical, political, or cultural rows of the framework, or between the firm's columns and those of its customers or competitors. This group of observations highlighted contrasting views of management theory. For example, while Miles and Snow (1978) feel that strategy dictates political and cultural solutions, Peters and Waterman (1982) explicitly reject Miles and Snow's suggestion, observing instead that values shared by a firm's customers and its managers create interactions between the cultural row of customers (E1), and people with influence in a firm's prescribed network (E2). Two-headed arrows represent the interaction of these values with strategy (E3) and the skills of a firm's people (E4).

The corners of the arrows in Figure 2 represent Peters and Waterman's contradiction of Miles and Snow's observation that a firm's history will tend to determine its technical, political, and cultural attributes. Where Miles and Snow observe a sequence of events (strategic choices called entrepreneurial solutions lead to decisions called engineering solutions which are followed by administrative solutions), Peters and Waterman observe an interaction whose outcomes are not obvious, giving the interaction an essential feature of a system according to Ackoff (1994). Peters and Waterman's interactions encompass not only the technical, political, and cultural aspects of the firm, but also those of its customers. While the TPC framework has served Tichy's (Tichy, 1983, 1993; Tichy and Devanna, 1986; Tichy and Sherman, 1993) work for over a decade, we found it necessary to extend it to encompass the firm's competitors and customers. The resulting modified TPC framework is shown by the examples of Figures 1 and 2 to be more useful than Tichy's original framework for integrating different views of management. Figures 1 and 2 also suggest that the modified TPC framework can be used to visualize management theories.

Tichy suggested that linkages, whose effects determine the degree of alignment within firms, connect his framework's core systems. Alignment

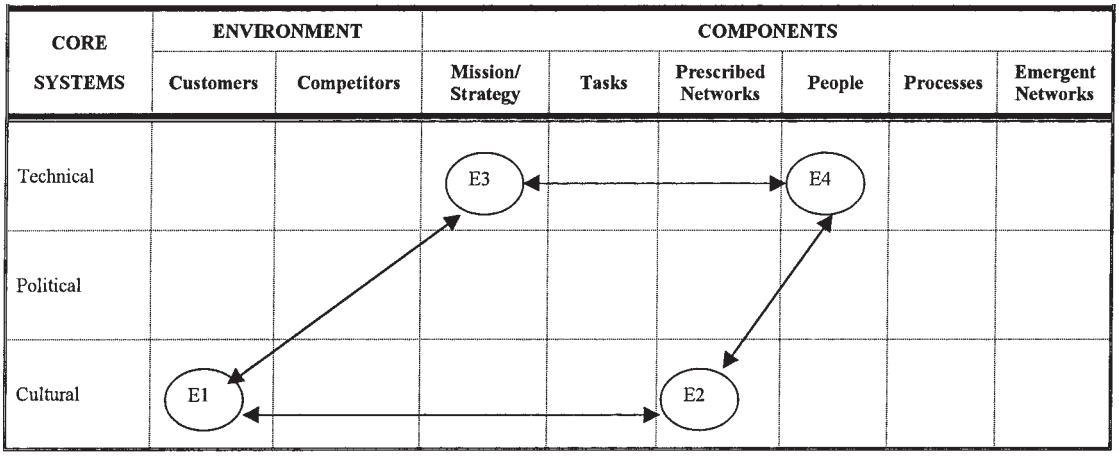

Figure 2. Relationships among elements of a system of management

in turn determines firms' abilities to innovate or imitate competitor's innovations. By extension, linkages may act across boundaries between a firm's management systems, or between a firm and its customers or competitors in the modified TPC framework. Thus, the linkages in Figure 2 represent Peters and Waterman's (1982) suggestion that values shared by a firm and its customers can reinforce the technical value of a firm's skilled people, potentiating the firm's strategy and sustaining its success.

Having demonstrated the integrating potential of the modified TPC framework we now present a case study to show how the framework can be applied for pattern matching and the generation of new testable hypotheses.

METHOD

The case study investigated the causes of IBM's loss of market share to Amdahl in the Canadian market for IBM-compatible mainframe computers between 1975 and 1985. This event was notable because Amdahl's penetration of IBM's base in Canada was 343 percent of its penetration in the United States. At the outset of our research, expert interviews indicated that Amdahl, IBM, and National Advanced Systems were conscious of selling similar products to the same customers within the protection of barriers to entry, qualifying these firms as a strategic group according to McGee and Thomas (1986). Therefore, the focus of our case research is referred to as the IBM-compatible mainframe strategic group (CMSG). The market share performance of these three companies is set out in Table 2.

After choosing qualitative research on the recommendation of Van Maanen (1979), we took the advice of Yin (1989), Miles and Huberman

Table 2. Quantitative validation of relative performance within the CMSG

	Canada		United States	
	1975 share of installed base	1985 share of installed base	1975 share of installed base	1985 share of installed base
Amdahl	None	24%	None	7%
IBM	100%	75%	100%	90%
NAS	None	1%	None	3%

Sources:
1 1975 shares of installed base in Canada and the United States, for IBM-compatible mainframes: Datamation (1976)
2 1985 share of installed base in Canada: Computer Intelligence (1986); Lucas (1986), A strategic marketing plan for national advanced systems, unpublished paper, Syracuse University; Amdahl Canada: sales presentation, apparently from 1980 or 1981, provided in the form of a photocopy by Warren McCarthy, shortly after 21 June 1993; Amdahl Canada: corporate overview presentation, original overhead transparencies, dated between October 1981 and June 1982, provided by FT White, 12 December 1991; Amdahl Canada: internal memorandum on sales territory assignments, setting out all CMSG installed computers known to Amdahl Canada on 6 July 1984, authored by Jim Poole, a marketing manager at Amdahl Canada, provided in the form of a photocopy of the memorandum by Warren McCarthy shortly after 21 June 1993
3 1985 share of installed base in the United States: Annex Research (1989), projected back to 1985 by linear interpolation

(1984), McCracken (1988), and Eisenhardt (1989) commending multiple sources of evidence for enhanced validity, by interviewing experts, participants, and customers from the CMSG, about causes of the result summarized in Table 2.

We obtained access for interviews in part because one of us had worked at information technology companies including IBM and NAS, though not in the decade being studied. We sought objectivity by probing for prior agreement, structuring interviews to avoid bias, submitting interim conclusions to respondents for verification, and having evidence from the interviews independently reviewed. As a result, we combined objectivity with detailed industry understanding as suggested by Cool and Schendel (1988), Fiegenbaum, Sudharshan, and Thomas (1990) and McGee and Thomas (1986) for qualitative research into causal relationships.

Our analytical method was pattern matching, visualizing the causes of performance within the CMSG identified by respondents. First, interviews were conducted as recommended by McCracken (1988), encouraging testimony nondirectively, so that interviews were nearly over before we asked directive questions. As a result, the transcripts of the interviews represent the respondent's undirected opinion about causes of relative performance within the CMSG.

Next, we located testimony from interviews on the modified TPC framework, using an instrument derived from instruments already proven by Sharma, Netermeyer, and Mahajan (1990), Kotabe *et al.* (1991), and Norburn *et al.* (1990). We assigned a unique location on the modified TPC framework to each element of the derived instrument, so the resulting scheme maps statements about causes of performance onto the framework.

To test the reliability of our mapping, we had two samples of interviews independently interpreted by two computer industry consultants. Their interpretations exhibited at least 80 percent agreement with ours, after we clarified the difference between political and cultural systems. In an added test of reliability, the business scholars who refereed our framework development agreed with 87 percent of a sample of 99 of our interpretations. We were satisfied with these results, because Krippendorf (1980) and Miles and Huberman suggest that 80 percent or more be regarded as good agreement.

With our visualization method established, we displayed causes of relative performance within the CMSG from interviews with 10 experts, 22 participants (front-line salespeople, sales managers and head office executives and staff from each of Amdahl, IBM, and NAS), and 12 customers of the CMSG. Since no new cause of performance was cited after the first 25 interviews, the sample of 44 interviews seemed large enough by Strauss and Corbin's (1990) criterion.

Although respondents gave reasons falling within cells of the modified TPC framework, the between-cell causes (linkages) threw new light on possible determinants of performance. Linkages appearing in our results were described spontaneously by 38–80 percent of respondents in each of three groups. In contrast to the attention paid to linkages, only three causes located in single cells of the modified TPC framework were identified in 38–41 percent of interviews. After five linkages had emerged from the testimony of the first 25 respondents, the remaining 19 respondents (participants and customers) were asked at the end of their interviews to comment on them. The five linkages were accepted after being supported by over 80 percent of respondents asked to comment on them.

The research method set out in Figure 3 summarizes the effort to correctly measure the concepts represented by the modified TPC framework and assess the relative strength of competing explanations for the results observed in the CMSG.

RESULTS AND HYPOTHESIS DEVELOPMENT

The causes of relative performance in the CMSG are set out in Figure 4. These causes are linkages among the CMSG participant's management systems and those of competitors or customers. There was perfect congruence between the patterns of linkages (NC1–NC5) identified by the participants and customers. The experts identified linkages NC1–NC4, but not NC5. Since all five linkages were identified as a cause of performance differences within the CMSG by at least two of the three groups, they were used for hypothesis development.

The technical evaluation by customers of competing products is represented by NC1 in Figure 4. Amdahl delivered better price/performance than

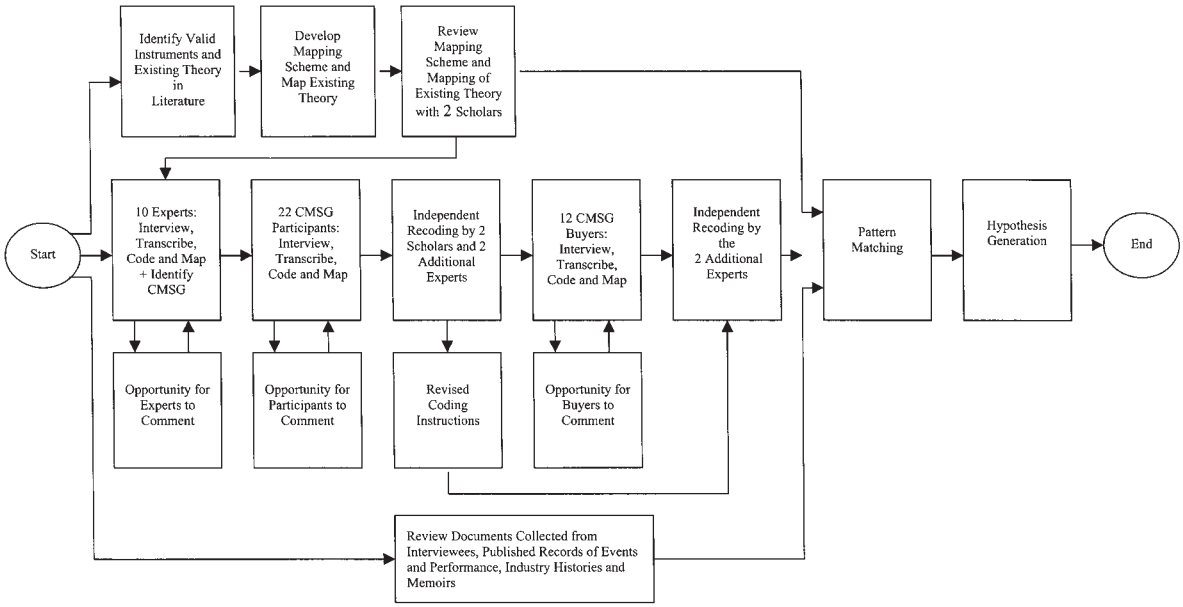

Figure 3. Flow chart of research method

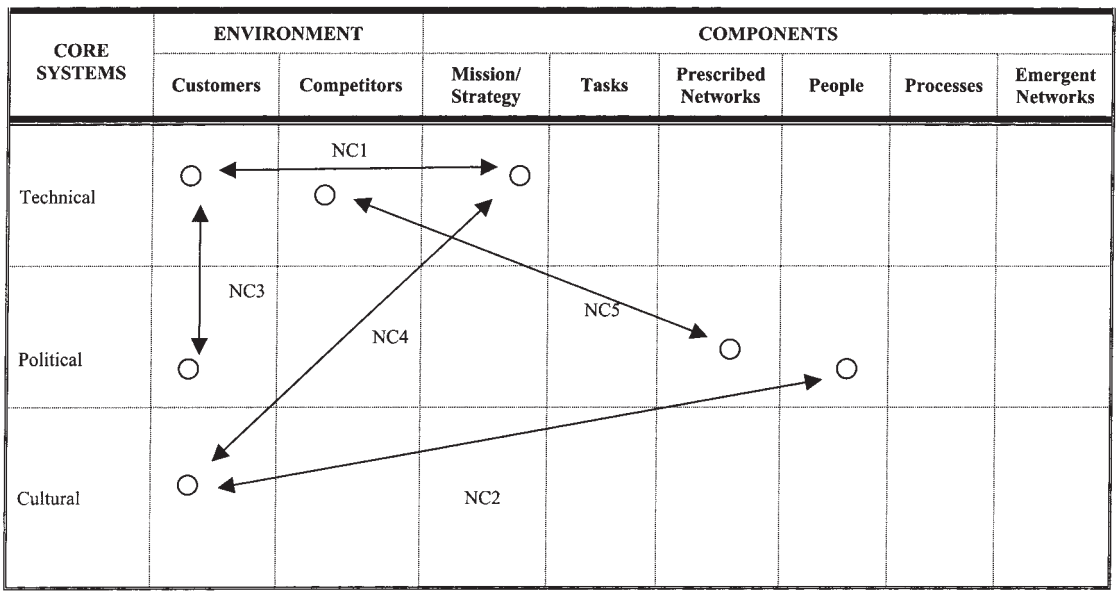

Figure 4. Linkages described without prompting

IBM while maintaining sufficient compatibility to permit users to run on Amdahl computers the same programs that ran on IBM computers. This attribute of Amdahl's offering represents one of Porter's (1985) conditions for profitable differentiation: that differentiation be a matter that customers will recognize in a value chain analysis. Therefore, NC1 links the technical (customer) and technical (strategy) cells of the modified TPC framework. As this basis for performance is already well established in the strategy literature no hypothesis is proposed. However, participants and customers stated that NC1 was not a sufficient condition for Amdahl's success in Canada. Because all the computers would run the same programs, NC1 did not deliver Porter's second

condition: that the basis of differentiation be difficult for competitors to imitate.

While linkage NC1 is conventional, linkage NC2 (between customers' values and beliefs and participants' people) represents Amdahl's and IBM's appointment of appropriate people in their Canadian businesses, while NAS failed to do so. Both Amdahl and IBM appointed managers and key professionals whose business values and beliefs were known and respected by CMSG customers. In contrast, NAS appointed individuals who were insufficiently respected by customers considering a change in mainframe computer vendor. Hence the following hypothesis is suggested by NC2:

Hypothesis 1: Customers choose between competing products on the basis not only of technical comparisons but also on the fit between their beliefs and values and those of the individuals who represent the firms offering those competing products.

Linkage NC3 reflected the fact that IBM had boardroom clout with many of its customers, meaning that a decisive reason (personal or business) was needed to buy from Amdahl or NAS because the decision could backfire politically. This linkage between the technical (customer) and technical (political) cells of the modified TPC framework favoured IBM, who exploited the political risk of change. Hence the following hypothesis is proposed:

Hypothesis 2: Customers choose between competing products on the basis not only of technical comparisons but also on differences in the influence (within the customers' political systems) of the firms offering the competing products.

Linkage NC4 reflected the need for Amdahl to weaken the established relationships between IBM and its customers. Amdahl needed more than innovative products, which were technically excellent but necessarily similar to those of IBM and NAS, to attract IBM 'defectors.' IBM provided Amdahl with an opportunity to tie its strategy to customers' values and beliefs by timing price/performance improvements to maximize the growth of IBM's share price (DeLamarter, 1986). Gene Amdahl was believed to have left IBM after failing to obtain approval for a more cost-effective mainframe, because it conflicted with IBM financial plans (DeLamarter, 1986; Ferguson and Morris, 1993). Hence, Amdahl's strategy seemed rooted in Gene Amdahl's reaction to IBM's pricing and product release strategy. Shared by some IBM customers, this belief linked the values and beliefs of some customers to Amdahl's business strategy. Hence, NC4, linking the cultural (customer) and the technical (strategy) cells of the modified TPC framework, supports the following hypothesis:

Hypothesis 3: Customers choose between competing products on the basis not only of technical comparisons but also the fit between their beliefs and values and those that are incorporated in the strategies of the firms offering the competing products.

While both Hypotheses 1 and 3 relate to customers' values and beliefs, they are distinct hypotheses. Hypothesis 1 contemplates the possibility that customers may choose between competing products on the basis of how well the people representing those products conform to the customers' values and beliefs. In contrast, Hypothesis 3 refers to the possibility that customers may choose on the basis of how well they perceive their values and beliefs are reflected in the strategy of the firms offering those products.

A linkage that hampered IBM's responses to Amdahl is represented by NC5. Both participants and customers observed that the IBM sales organization's competitive responses were impeded by the influence of powerful staff groups including accountants, lawyers and business practices staff. This relationship softened IBM's technical responses to competitors through its political prescribed network. Examples include the presence of lawyers at account reviews, the removal of IBM salespeople who were too aggressive in defending their territories from Amdahl, and the allocation of scarce new computers by lottery, instead of according to the effect of deliveries on Amdahl's insurgence. Since political core systems in the modified TPC framework are the management systems which allocate resources and authority to approve or mandate activities, the power of staff groups to restrain IBM's sales organizations' responses to Amdahl represent

linkages between IBM's political (prescribed networks) and IBM's technical response to a competitor. The following hypothesis is proposed:

> *Hypothesis 4: Competitive responses can be blunted by firms' political systems, creating an opportunity for differentiation that is sustainable despite the technical availability of a mitigating response.*

DISCUSSION AND CONCLUSION

The worth of the Modified TPC framework was demonstrated first by the analysis of causes of performance identified in a sample of journal articles and management books, then by an analysis of linkages identified as causes of relative performance by experts, participants, and customers. In both cases, all the observations and explanations could be plotted onto the framework only if Tichy's original TPC framework were extended to encompass the technical, political, and cultural systems of a firm's customers and competitors. Therefore, the new modified TPC framework provides a view of the dimensions that may influence firms' performance, which is broad enough for the CMSG case.

It must be recognized that research into other cases may require changes to the dimensions of the modified TPC framework. Other cases may be influenced by many environmental factors, perhaps adding dimensions such as the management systems of suppliers or governments, or substituting such dimensions for those of customers or competitors. In other words, while our research warrants confidence in the validity of the modified TPC framework for the CMSG, the external validity of that framework is as subject to external verification as the hypotheses we have derived in the research reported here.

The modified TPC framework and our process to locate causes of performance on it provide visualization for pattern matching when conducting historical case research. An analysis of explanations given by experts, participants, and customers in the CMSG identified a common pattern of four linkages (NC1–NC4) across the modified TPC framework. Participants and customers (but not experts) identified an additional linkage (NC5) as an explanation of relative success. By establishing internal validity, our method recommends four hypotheses for testing to determine how often and in what circumstances the relationships they posit are observed.

If found to be valid beyond the CMSG case, the new hypotheses would indicate how the success of firms marketing to organizations depends on effective integration between marketing and general management. Hypothesis 1 suggests that differentiation can depend on management appointments, which are a general management responsibility. While Hypothesis 2 (differentiation through influence within customers' political systems) could be delegated to marketing managers, it could be a general management function, and may require their involvement in order to be effective. Hypothesis 3 (differentiation based on linkages between firms' strategies and customers' values and beliefs) cannot be made credible without integration between marketing and general management, if product and other decisions delegated to marketing are to embody general management's values and beliefs. Finally, Hypothesis 4 (the hazard of political systems' blunting competitive responses) may require that general managers adjust their decision-making authorities and processes, both to make marketing decisions effective, and to avoid granting a competitor an unnecessarily sustainable advantage.

In addition, our hypotheses may clarify other strategic management issues. For example, we introduced our research by observing long-standing and widely originating calls for an integrating framework and hypotheses, which advance an integrating view of management. If the four hypotheses we have developed are observed frequently or in significant circumstances, our research could improve researchers' understanding of determinants of firms' performance, including variations of results within strategic groups and the success of efforts to move between strategic groups. A firm moving between strategic groups may founder on subtle linkages among customer culture, strategy, and staffing decisions. Similar limitations of a firm's capacity to learn about its current strategic group may cause that firm to perform relatively poorly, without any objective or quantitative explanation.

The method we have used to study the CMSG may be useful in testing the external validity of our hypotheses. The modified TPC framework, and the four hypotheses it yielded in our case analysis, show the usefulness of the framework,

its application to specify relationships in a case, and the use of pattern matching to observe relationships among firm's management systems as well as those of their customers and competitors.

Finally, our hypotheses may be useful in understanding issues occupying managers. For example, software industry executives may usefully focus on our hypotheses, as they consider insurgency against Microsoft's Windows by Linux (an alternative operating system with important cultural dimensions). Similarly, plans to contest Cisco's dominant position among network managers may benefit from considering our hypotheses. As the growth of electronic commerce broadens decision making about organizations' networks to include business unit and marketing managers, the impact of Cisco's position with network managers may be more easily contested.

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