

50th Anniversary Article

Organizational Behavior, Strategy, Performance,
and Design in *Management Science*

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This article provides a personal perspective on the themes and topics that have emerged in research published by the department of organizational behavior, in the first 50 years of *Management Science*. A review of articles accepted by the department suggests several themes that reflect broad objectives, such as “improving management science models,” or distinguishing points of view or assumptions, such as “treating organizations as decision-making entities.” The research is summarized through topics and subtopics that classify the subjects and findings of the research, identifying the relative popularity of the topics, and their contribution to each of the themes. The pattern suggests that as a “behavioral” department in a journal characterized by managerial practice, optimization, and the context of real work organizations, research is uniquely grounded in applications, solutions, and work consequences in ways that are less prevalent in typical outlets for behavioral research. The article concludes by suggesting that there are ample signs of convergence across departments in the journal. Scholars in organizational behavior increasingly recognize that the context provided by other management disciplines provides essential insights. Likewise, scholars in other management disciplines increasingly recognize the value of integrating behavioral theories and findings into their frameworks and models.

Key words: organization; behavior; strategy; organization design; learning; management science

1. Introduction

The department of organizational behavior, performance, strategy, and design (OBPSD) has a relatively recent history, compared to such venerable areas as operations management and optimization. Hopp (2004, Figure 1) showed that there were few publications formally identified in the area of organization behavior prior to the 1980s. Since the 1980s, however, there has been a steady rise in the number of papers in this domain, representing an increasing proportion of *Management Science*. The catalyst for this shift came in 1969, with the establishment of departments, including the department of management and behavioral science with former editor-in-chief C. West Churchman listed as the department editor. In 1978, Arie Y. Lewin published the first statements of objectives, setting what were to be consistent themes for the department, emphasizing that organization design was a continual and significant management activity, reflecting multiple constituents and measures of success, and involving diverse disciplines such as “anthropology, psychology, sociology, general systems, economics, political science, and information science” (p. x). In 1982 the departments’ name was changed to organization analysis, performance, and design. With this change, Lewin revised

the objectives to include a focus on decisions, units of analysis that did not isolate the individual from the larger system, and normative implications. This approach was in contrast to many journals of human behavior, which emphasized individual behaviors or attitudes, often out of context, and a descriptive perspective. It provided the department with a unique position for advancing the understanding of organization and behavioral issues, as we shall see. In 1990, Richard Burton changed the name to organization performance, strategy, and design, incorporating an emphasis on organizational effectiveness and strategy processes, in addition to the design and decision emphasis of prior years. This title continued until 2003, when the name was changed to organization behavior, performance strategy, and design, to recognize research with behavioral results that inform management science models, decisions, organization design, and organization performance.

The objective of this article is to provide a personal perspective on the themes and topics that have emerged in research published by the department. First, we identify several characteristic “themes” that span many topics and have pervaded the research. These themes reflect broad objectives, such as “improving management science models,” or they

reflect distinguishing points of view or assumptions, such as “treating organizations as decision-making entities.” Then, we present the method we used to identify articles fitting the department. We follow this with a summary of the topics and subtopics taken up by the research, that we used to classify the published articles. This topical taxonomy is by no means the only possible one, but it accommodates virtually all of the articles, offers a relatively independent set of categories, and serves as a guide to the most popular research topics. Subsequent sections describe the research within each topic. The article concludes by revisiting the themes with an eye toward the future.

2. Characteristic Themes

Several themes distinguish research in the department, and span both time periods and topic areas. These themes, which reflect the department’s statement of objectives and distinguish it from other outlets for similar research, can be summarized as follows:

Organizations as Decision-Making Entities. Articles in the department typically regard organizations as decision-making entities, striving for optimal decisions through information gathering and processing. This is explicitly stated in several articles dealing with the nature of organizations, and it implicitly permeates department research. Issues such as information sharing, learning, and group processes are typically discussed or investigated from the perspective of their effects on information, uncertainty, or enhancing the efficiency or quality of organizational decisions.

Searching for a Solution. A common theme in *Management Science* is to recommend solutions. Most articles aim for optimization, solutions, and decision aids. The history of optimization in the journal created a legacy for the department, and fertile ground for a normative perspective. This is in distinct contrast to many other outlets for organizational and behavioral work, which focus more on descriptions and hypothesis testing. The terms “solution” and “optimization” appear far more frequently in department publications than in other organizational behavior outlets.

Improving Management Science Models. Department articles frequently identify an assumption from traditional management science models that might be violated in actual organizations, or could be made more precise with organizational knowledge. For example, if management science decision support systems assume that decision behavior follows an expected utility model, organizational behavior research showing systematic deviations from such a model can illuminate potential problems and improvements in those systems. In several areas, one can

trace patterns showing an early proposal challenging a management science assumption, followed by research defining the phenomenon, verifying it with data, and then incorporating the implications into the original management science paradigms. While no research stream follows this pattern perfectly, the most vivid examples are studies that actually estimate management science model parameters through behavioral observation, and then incorporate their findings into existing operations research or management science models. As Hopp (2004, p. 5) noted, “understanding a manufacturing plant does not just require a theory of human motivation and a theory of material flow; it also requires a means for describing the interaction between the two.”

Applying Management Science Methods. Management science has a long tradition of linear programming, simulation, and mathematical modeling that emanate from a concern with optimization and prescription. The department has favored research that uses such methods, which engender an “engineering” approach, in contrast to the more common observation and descriptive statistical analysis approach of other organizational behavior journals. The department has certainly published many narrative case studies, survey research, laboratory experiments, and statistical analyses of field data, but is distinguished by the frequent use of engineering-inspired methods.

Translating Behavioral Ideas into Management Concepts. The transfer of frameworks and methods is not only in one direction, bringing traditional management science paradigms to the behavioral domain. Some research streams take core behavioral concepts and inform management science approaches. For example, learning, traditionally viewed as an individual phenomenon, has been adapted to reflect “organizational learning” or learning curves measured with traditional management indexes such as cumulative production over time. This is different from improving existing management science models, in that it entails taking established behavioral ideas and approaching them as management issues.

History Defines the Research Topics. As with any social science, social trends are reflected in the department’s research. Certain topics emerge not only for their scientific interest and merit, but also because they are prominent in society, in part because the journal emphasizes relevance to managers. For example, organizational flexibility became more prominent in the 1980s and 1990s, as U.S. and Western managers found themselves competing with more aggressive Japanese companies.

3. Method

The breadth of the areas covered by the department means that articles accepted by many different departments might be reasonably included here. However, because other commemorative articles will cover research in other departments, we have elected to include articles based on their acceptance by the department editor. This provides an objective criterion, and an empirical demonstration of the multidisciplinary nature of the department's domain. This approach can only categorize articles during the era after the journal evolved to a department structure (i.e., after 1968), and only after articles were listed as accepted by the department editor (i.e., after 1973). Fortunately, as Hopp (2004, Figure 1) shows, this is less limiting for this department than for others. Figure 1 shows little activity in "organization behavior" until the 1980s, and our search uncovered articles dating back only to 1973. A list of the 299 articles identified is given in the online supplement at <http://mansci.pubs.informs.org/ecompanion.html>.¹ Even with this rather strict approach, many of the articles accepted by the department could be categorized into departments such as decision analysis, optimization, and business strategy. This is a testament to the disciplinary diversity and integration of the journal.

Because the domain of *Management Science* has always encompassed worker behavior, organizational effectiveness, and organizational strategy, there are some notable articles prior to the 1970s that clearly fit the mission of the department. It is useful to note a few of these early defining articles before delving into the later articles accepted by the department. These earlier articles are often on the most-cited list, featured on the *Management Science* website in the 50th anniversary section, and thus familiar to a wide array of readers.

Articles about the risks of management information systems and the role of emotionality (e.g., Ackoff 1967, Argyris 1971), and the relationships between research and management (Churchman and Schainblatt 1965, Doktor and Hamilton 1973, Little 1970) provided early inklings of the behavioral and organizational questions underlying traditional management science. The inaugural year of the journal saw Guetzkow and Simon (1955) explore the effects of communication nets on group performance, a harbinger of future research on group, organizational, and individual learning. The same year saw an article by Charnes et al. (1955) applying optimization methods to executive compensation, a human resource question with obvious significance today. Winkler (1968), Fishburn (1968), Bellman and Zadeh (1970),

and Keeney (1972) anticipated behavioral questions in probability distributions, utility functions, and fuzzy decision environments. With these foundations in place, let us explore the articles accepted by the department.

4. Research Classification Topics

Table 1 contains a summary of the topics and subtopics. The first four topics listed in Table 1 represent broad underpinnings. Topic 1 reflects basic questions about how management science should be conducted, and specific research methods and designs. Topic 2 reflects the design of management information systems, extended to include more general questions

Table 1 Topics and Subtopics in Articles Accepted by the Organizational Behavior Department

1.	Research methods and design
a.	Approaches to management science
b.	Analysis methods and designs
2.	Information technology and information systems
a.	Determinants of system success, implementation, resistance
b.	Behavioral reactions to information systems, individual involvement, individual characteristics
3.	National culture
4.	Decision processes, utility functions, and preferences
a.	Utility functions and risky choice
b.	Decision processes and prospect theory
5.	Organizations as decision-making and information-processing entities
a.	Organization classification and definition
b.	Information processing and decisions
c.	State-owned enterprises
6.	Organization effectiveness
a.	Planning processes and methods
b.	Program evaluation and policy making
c.	Effectiveness definitions and measures
d.	Data envelopment analysis
e.	Risk-return relationships
7.	Organization evolution and strategy processes
a.	Life cycle, strategic groups and diversification
b.	Resource-based strategy and factor markets
c.	Strategy processes
8.	Organization design, structures, coordination, and flexibility
a.	Group and team interactions
b.	Structure, configuration, process integration, and diffusion
c.	Coordination, resource allocation, control
d.	Structural flexibility, innovation
9.	The role of the manager
a.	Defining management and researcher-manager cooperation
b.	Manager decision processes and manager effects
c.	Individual manager and management team characteristics
d.	Principal-agent relationships and incentives
10.	Individual and organizational learning and knowledge management
a.	Diffusion of practices across units
b.	Communication and transfer between individuals and groups
c.	Innovation and research & development
d.	Learning curves and learning through experience
11.	Human resource management systems
a.	Rewards and incentives
b.	Job design and worker allocation
c.	Workforce planning and forecasting

¹ I am grateful to Sunghoon Kim of Cornell University for assistance in compiling the articles used in this review.

Table 2 Frequency of Articles Within Each Topic

Topic	Count	Percent (%)
Research methods and design	14	5
Information technology and information systems	22	7
National culture	7	2
Decision processes, utility functions, and preferences	27	9
Organizations as decision-making and information-processing entities	15	5
Organization effectiveness	47	16
Organization evolution and strategy processes	34	11
Organization design, structures, coordination, and flexibility	61	20
The role of the manager	20	7
Individual and organizational learning and knowledge management	34	11
Human resource management systems	18	6
Total	299	100

about systems design. Topic 3 deals with cross-national culture. Topic 4 deals with individual decision behavior. The remaining topics proceed generally from the level of the organization, to questions of its effectiveness and competitiveness, to its design and coordination, to learning and human resource management systems.

Table 2 shows the relative frequency of articles within each topic. Certain topics are dominant, with organizational planning and organization design most frequent. Decision processes and learning and knowledge management are also prominent. We will note the relative prominence of the different topics as we proceed through the article.

Table 3 shows the dates of the earliest and latest articles appearing in each topic. Many topics span a wide range of publication dates. The articles specifically devoted to “national culture” were concentrated in one special issue in 1994. The topics of “information technology and information systems,” “decision processes, utility functions and preferences,” and

Table 3 Earliest and Latest Appearance of Articles Within Each Topic

Topic	Earliest	Latest
Research methods and design	1973	2000
Information technology and information systems	1974	1990
National culture	1994	1994
Decision processes, utility functions, and preferences	1975	1998
Organizations as decision-making and information-processing entities	1978	1997
Organization effectiveness	1974	2003
Organization evolution and strategy processes	1980	2002
Organization design, structures, coordination, and flexibility	1974	2003
The role of the manager	1974	2001
Individual and organizational learning and knowledge management	1984	2003
Human resource management systems	1976	2001

“organizations as decision-making and information-processing entities” seem to have had little activity in the department since the 1990s, and the topics of “organization evolution and strategy processes” and “individual and organizational learning and knowledge management” seem to have emerged during the 1980s. Yet, recent work has often built upon the work of earlier contributors in several topics, even those not seeing a great deal of recent specific publications.

The articles have used a variety of methods. Conceptual articles, which offered a new theoretical framework or developed a mathematical argument, comprised 117, or 39%, of the articles. Empirical field studies, in which data from field settings was analyzed statistically, comprised 104, or 35%, of the articles. Qualitative descriptions or case studies comprised 11% of the articles, while simulations and laboratory experiments each accounted for approximately 8% of the articles. As noted earlier, these statistics reinforce the unique character of organization behavior articles in *Management Science*, which much more frequently aim to provide a mathematical or conceptual solution, compared with research appearing in other journals, where laboratory experiments and field studies would have more emphasis.

4.1. Research Methods and Design

These articles represent about 5% of the historical total, and they cover topics as fundamental as the meaning of a “problem” in scientific research, the connections that define theory and simulation, and the cycle of theory development. Cameron (1986a) made the case for studying managers, with evidence that managerial strategies affect organizational performance. Several authors suggested the elements of a useful theory, and the importance of good theory to systems design and information use. Armstrong (1979) noted the predominance of “advocacy” research in *Management Science* and suggested that it limited objectivity in comparison to induction and hypothesis testing methods. Mackenzie (2000) argued for a “process approach” to research that reflects outcomes, elements and linking relationships, in contrast to the typical “variable approach” that specifies variables and their statistical associations.

Other articles have described specific scientific methods or research designs, such as simulations, longitudinal analysis (Miller and Friesen 1982), ordinal time series (Ruefli and Wilson 1987), Boolean policy analysis, and mathematical programming and regression analysis (Byrnes et al. 1988). Some have made direct comparisons between competing methods, such as using behavioral experiments to verify the predictions of simulation models (Sterman 1987).

These studies illustrate clearly the theme of “applying management science methods” where they had

not been applied before. A good example is Charnes et al. (1988), who examined whether AT&T was a natural monopoly, finding that goal programming and constrained regression (typically used in management science but rarely in other disciplines) reversed the main findings of the econometric studies that informed the decision.

4.2. Information Technology and Information Systems

Information technology and information systems enjoy a long history of research in *Management Science*, and created a fertile platform for departmental research, with system implementations and designer-client relationships as a frequent setting. They represent about 7% of the total articles accepted by the department. Contributions have included specifying predictors of system performance and risk factors (e.g., Anderson and Narasimhan 1979, Ein-Dor and Segev 1978). This research often incorporated behavioral predictions about system users into models of information system performance and success. This is a vivid illustration of the theme “improving management science models.” In this case, the human elements included the danger of unrealistic user expectations (Ginzberg 1981), the effects of human decisions about message routing, message summarizing, message delay, and message modification (Huber 1982), user resistance (Davis et al. 1989), user involvement (De Brabander and Edstrom 1977, Swanson 1974), and transfer pricing as a means to motivate end users (Westland 1992).

The line of research drew heavily on psychological and social-psychological theories as diverse as Piaget’s cognitive development and styles (based in part on child development), Alutto and Belasco’s (1972) theories of participation, theories of involvement and satisfaction, and sociotechnical theories that combine considerations of system performance with the system’s adequacy for expressive, emotional, or personal communication (Hiltz and Johnson 1990). This became so prevalent that Huber (1983) cautioned against relying too heavily on assessments of cognitive style in systems design, while Culnan (1986) suggested that MIS research was not grounded enough in organization theory. This reflects the theme of “searching for a solution,” because it grounded the debate in a specific practical issue—whether behavioral understanding would actually improve systems design.

4.3. National Culture

The majority of department research did not explicitly address cultural or national differences, though research on diversification and organizational learning are exceptions. Many phenomena are the subjects

of mathematical or simulation modeling, or reflect relationships believed unlikely to differ across nations or cultures. Yet, the department may benefit from cross-cultural research, appropriately connected to its core mission. Some cultural differences have proved interesting.

In 1994, Volume 40, Issue 1 was a special issue on “Is Management Science International: In Search of Universal Rules,” and contained seven articles on the role of national culture in management science. Issues included cultural differences in business problem solving in negotiations (Graham et al. 1994), whether national buying patterns reflect nationally different responses to price and advertising (Farley and Lehman 1994), and a contingency framework for integrating new practices depending on how values such as social control affect organizational structure, process and behavior (Lachman et al. 1994). Farley and Lehman (1994) concluded that international differences may be accommodated by adjusting parameters of existing models, rather than requiring new models. Shenkar and von Glinow (1994) concluded that some theories might not apply to Chinese organizations, and most would require significant adjustment. The theme of “improving management science models” is apparent, as this work goes beyond describing cultural differences, or simply applying models in other nations, to address the impact of national differences on the application of management science models.

4.4. Decision Processes, Utility Functions, and Preferences

Decision analysis has a long history in the journal, in all departments. The articles on decisions accepted by this department include some of the most widely cited examples of cross-fertilization between departments. Articles on this topic represent about 9% of the total.

One group of studies focused on utility functions including how to combine individual preferences into group preferences, and how risk-aversion and risk-seeking affect them. The theme of “searching for a solution” was evident here, as studies sought to identify algorithms, programs, or rules of thumb that would more parsimoniously or accurately capture the decision weights of individuals or groups. The theme of “applying management science methods” was also apparent in the use of techniques such as linear programming or Markov analysis, nonlinear and linear models. Several studies specifically examined methods to elicit preferences, noting that preferences vary with the methods used to elicit them, and suggesting that preferences under uncertainty might exhibit serious incompatibilities with traditional expected utility theory (e.g., Hershey et al. 1982). Payne et al. (1980,

1981) found that preference reversals were caused by changing the reference point of a risky decision, even without altering the decision problem.

Research in this topic provides a vivid example of the theme, “improving management science models.” If decisions made under uncertainty exhibit systematic incompatibilities with expected utility theory, then management science models based on that theory might be incorrect. This prompted the question, “What human processes might explain these behaviors?” and led to the emergence of Prospect Theory (Kahneman and Tversky 1979). Specific department papers reflecting this perspective have addressed questions such as how do problem solvers recognize a problem (Taylor 1975)? How does the amount and communication of information, or the interaction among team members affect decisions (Boland 1978)? Are team-derived decisions more or less accurate than simple pooled individual estimates or normative decision rules (Boje and Murnighan 1982)? Do decision makers use resource-saving strategies to simplify their task, and do strategies harm decision quality (Johnson and Payne 1985)?

The theme of “improving management science models” has been illustrated by studies that integrate individual differences into models and methods. Henderson and Nutt (1980) found that when faced with the same project choices, those with sensation-thinking decision styles saw the highest risk and were reluctant to adopt, while sensation-feeling styles were risk tolerant and more likely to adopt. Bouwman (1983) showed how decision processes observed through protocols could be incorporated directly into computer programs. Johnson and Payne (1985) developed strategies for choosing decision approaches that take less effort but approach the accuracy of more demanding normative procedures.

4.5. Organizations as Decision-Making and Information-Processing Entities

In a department with the name “organization,” it is not surprising to find research devoted to defining the term and its implications. This and the next several sections describe research on organizations. In fact the department devoted a special issue to organization design in 1986 (Volume 32, Issue 5). Research in this topic clearly highlights the theme “organizations as decision-making entities,” because virtually all research on this topic addresses organizations from this perspective. This topic represents about 5% of the historical total for the department. For example, Huber and McDaniel (1986) proposed that organizations should be designed primarily to facilitate organizational decisions. Daft and Lengel (1986) investigated the reasons organizations process information, noting that a major problem was lack of clarity, not

lack of data, which nicely anticipated an age of information overload.

The theme of “organizations as decision-making entities” has also been reflected in the context of information processes, including a computer model of how a police force senses, learns about, and solves crimes (Simms and Petersen 1991), how U.S. and Japanese automotive organizations create relationships (Bensaou and Venkatraman 1995), and the emergence of “super organizations” that connect according to logical orders of decision rules and transactions (Baligh 1986).

An interesting subset of articles dealt with state-owned enterprises (SOEs). Again, the “organizations as decision-making entities” theme dominated, with a call for more research on why such enterprises operate as they do (Aharoni 1981). The theme of “improving management science models” was also prominent. Research issues included how internal and external orientation of SOE managers affects organizational goals, and the effectiveness of ministerial control through financial ground rules, direct investment review and corporate planning (Lioukas 1985). Ramamurti (1987) showed that despite the government’s expectation that SOEs would promote the public interest, Indian SOE managers’ subjective evaluations showed that commercial profitability was their most important criterion.

4.6. Organizational Effectiveness

A large number of articles has addressed questions of how to define and measure organization effectiveness. In fact, this topic contains 16% of the historical total, second only to organizational design. Much of this research appeared in the late-1970s and early-1980s, and may have been motivated by questions about the long-term competitiveness and productivity of U.S. companies relative to the emerging success of companies in Japan and Asia. Thus, the theme of “history defines the research topics” is apparent in this research. For example, Cameron (1986a) noted that attention to organizational effectiveness had increased because popular management books extolled management excellence, almost two million jobs were lost due to poor U.S. competitiveness, and economic conditions put pressure on organizations to become more accountable.

The theme of “improving management science models” is also apparent, as research questioned the premise that organizational effectiveness criteria are constant or unidimensional. Quinn and Cameron (1983) proposed that organizational effectiveness criteria changed with organization life-cycle stages. Quinn and Rohrbaugh (1983) obtained similarity judgments from organizational theorists

and researchers, concluding that three value dimensions (control-flexibility, internal-external, and means-ends) underlie conceptualizations of organizational effectiveness. Cameron (1986b) proposed perhaps the most unorthodox view, that the most effective organizations are those characterized by paradoxes, suggesting that confusion and disagreement about effectiveness criteria may be inherent in the concept itself, an important behavioral insight for management science models that assume one organizational objective function.

The research in this topic also vividly illustrates the theme of “applying management science methods” to organizational questions. Articles have addressed methods of defining and measuring technical efficiency, such as through piecewise parametric production modeling (Fare et al. 1988), and total factor productivity (Miller 1987). Several studies reflected the growing interest in environmental and social responsibility, including examinations of global environmental standards in multinational corporations (Dowell et al. 2000), and profitable pollution reduction (King and Lenox 2002). Researchers even tackled the question of defining and planning freedom (Van Gich 1976), and the different definitions inherent in different planning models (Singhal and Vyasulu 1978, Nowakowska 1979), thus taking a “soft” concept and making it more rigorous by applying management science paradigms.

Research on the relationship between risk and return seems to illustrate the heritage of decision science research and game theory, as well as the theme of “organizations as decision-making entities.” In addition, it reflects the theme of “improving management science models” as many of the findings called into question classic assumptions. March and Shapira (1987) noted that managers appear insensitive to the probabilities of outcomes, that their decisions are affected by the way their attention is focused on performance targets, and they make a sharp distinction between taking risks and gambling. The authors suggested that risk taking in organizations would thus be imperfectly understood within a classical conception of risk. Bowman (1980) similarly reported a finding of a negative relationship between risk and return, calling into question basic management science assumptions and prompting behavioral and organizational research to address the issue.

The topic of organizational effectiveness contains the only analysis method that attracted sufficient research to qualify as a subtopic, namely data envelopment analysis (DEA). DEA measures organizational effectiveness by cleverly reversing the traditional use of mathematical programming. It vividly illustrates the themes, “applying management science methods” and “improving management science models.” DEA

aims to estimate production functions and/or efficient production possibility surfaces of “decision-making units,” a term specifically chosen by Charnes et al. (1981) to extend attention to the public and/or not-for-profit sectors. Banker et al. (1984) noted that the DEA approach is distinctive because mathematical programming is typically used to evaluate alternative courses of action *before* selecting one, while DEA reverses this and employs mathematical programming to obtain ex post facto evaluations of the relative efficiency of management accomplishments. Highly cited articles in this area included Banker et al. (1986), who applied both econometric modeling and DEA to hospital performance, and Banker and Morey (1986), who added the use of categorical variables. Other articles extended the method to include ordinal relations among weights, convex production functions, application to two-person games, resource-allocation rules, sensitivity analysis through bootstrapping, and incorporating value judgments.

4.7. Organization Evolution and Strategy Processes

Research addressing how organizations evolve through a life cycle, how they form strategy groups, and how they create strategies represents a significant departmental topic, representing about 11% of the accepted articles.

Organization evolution reflects research on organization life-cycle stages, such as conception, commercialization, growth, renewal, stability, and decline, often drawing on the product life cycle. Studies found complementarities between environment, strategy, structure, and decision-making methods within each stage. In an example illustrating the theme of “improving management science models,” research suggested conditions where pure profit-maximizing behavior may reduce survival, and inefficient competitors may outlast more efficient ones (van Witteloostuijn 1998). Researchers have also studied organization decline and bankruptcy through agency theory and prospect theory (D’Aveni 1989). This illustrates the theme of “translating behavioral ideas into management concepts,” as prospect theory and agency theory were frequently applied to individual decision processes and interactions, but here are used to describe organization-level concepts.

A second subtopic also focused on classifying organizations by competitive strategies. Cool and Schendel (1987) tested the existence of strategic groups in the pharmaceutical industry, finding that such groups differed in market share but not profitability. Segev (1987) categorized kibbutz organizations by their strategic type (prospector, analyzer, defender, reactor) and their strategic approach (entrepreneurial, adaptive, planning), finding associations between the

two. David et al. (2002) tested for a contingency relationship among product strategies, purchasing design characteristics, and overall firm financial performance, finding that complimentary design and strategy did not always produce higher returns. Barney's (1986) observation that the economic performance of firms does not depend simply on its product market strategies, but also on the cost of implementing those strategies brought attention to competition in strategic factor markets. This topic also includes studies of diversification, an area where cross-national research has been common. The theme of "improving management science models" is apparent, as this research sought to extend models of firm performance to include variance that might be accounted for by strategic types or life-cycle stages.

Several articles have proposed tools to enhance organizational planning, including simulations of planning processes, sense-making, strategy maps, and environmental scanning systems. A frequent subtopic has been ambiguity. For instance, Bourgeois and Eisenhardt (1988) examined how planning occurred in fast-changing industries with little information and high uncertainty. They concluded that successful organizations resolve a specific set of paradoxes, including making major decisions carefully but deciding quickly; having a decisive CEO and a simultaneously powerful top management team; and seeking risk and innovation, but executing a safe, incremental implementation. This research clearly illustrates the themes of "applying management science methods" and "organizations as decision-making entities." It also reflects the common pattern of challenging fundamental assumptions, such as the negative effect of paradoxes.

Research on strategy processes often focused on collective and organizational choice, and provides vivid examples of the theme "searching for a solution." Studies proposed algorithms to find points of disagreement and acceptance in group decisions and the proper use of adaptive planning processes (Neave and Petersen 1980). Abony (1983) illustrated the theme of "improving management science models" by challenging the assumption that group preferences are equivalent to optimizing a social preference function, and proposing filtering algorithms to minimize misinformation and gain consensus. Computerized decision technology has been frequently proposed as a means for improving group decisions, and one study examined how the public policy environment affected its use in the Federal Coal Management program (Gulley and Mei 1985). Significant attention has been devoted to budgeting tools and the trade-offs among financial goals, including total factor productivity, incrementalism in capital budgeting (Lioukas and Chambers 1981), and managing litigation costs using economics and learning theory (Levy 1985).

4.8. Organization Design, Structures, Coordination, and Flexibility

Previous topics took the organization as the unit of analysis. This section covers research that focused below the surface of the organization, examining how organizations are designed, their supporting structures, coordination, and how these enhance or reduce innovation and flexibility. This includes work on group and team interactions, as well as the structures, designs, and coordination, and control mechanisms that organize groups and teams. This is a significant defining topic for the department, containing 20% of the historical total—the highest of any topic.

This research has addressed interactions between individuals within groups, such as power, proximity, or expertise coordination. Many articles have dealt with the configuration of groups and processes. Examples include using workflow data to empirically estimate manufacturing group configurations, and methods for describing and estimating optimal hierarchies, spans of control, and organizational complexity based on objectives such as time savings, wage costs, service levels, decision quality, communication, technical efficiency (e.g., Beckmann 1982, Damanpour 1996, Faraj and Sproull 2000, Jehiel 1999, Keren and Levhari 1979). The theme of "searching for solutions" is apparent here, with a notable focus on not simply describing design issues, but optimizing them against more traditional management science performance measures. For example, Schultz and Juran (1999) directly observed individual reactions to simulated low-inventory production systems, incorporating behavioral implications of goal-setting, group cohesiveness, task norms, and peer pressure, also illustrating the theme of "improving management science methods."

Organization design research has also been prevalent and has illustrated these themes. For instance, Burton and Lauridsen (2002) used the multicontingency model proposed by Burton and Obel (1998) to develop a set of "if-then" rules. Several articles debated the adequacy of traditional organization designs, including whether typical pyramidal structures were optimum, and "virtual positions" (Mackenzie 1986) that form a structure largely outside the formal job structure. Researchers have developed normative models for coordinating decentralized operations (Nault 1998), collaboration in joint ventures (Zajac et al. 1991), and the optimality of pricing versus resource budgeting (Freeland and Moore 1977).

Illustrating the theme, "organizations as decision-making entities," research often approached organizational design as a coordination problem. For example, Kogut and Kulatilaka (1994) proposed that multinational corporations are networks to be coordinated.

Ouchi (1979) suggested that coordination occurs through “markets, bureaucracies, and clans,” where markets control through measuring and rewarding individual contributions, bureaucracies rely on close evaluation with a socialized set of common objectives, and clans use socialization to minimize goal incongruence. Mintzberg (1980) suggested that organizational units, coordination mechanisms, design parameters, and contingency elements combined to suggest five basic organizational configurations: simple structure, machine bureaucracy, professional bureaucracy, divisionalized form, and “adhocracy.”

This topic has attracted a substantial amount of research on one particular coordination mechanism, joint ventures. Examples include Hennart (1991), who used transaction costs to explain the degree of Japanese ownership of U.S. manufacturing subsidiaries, and Kogut (1991) who approached joint ventures as real options that are exercised if the JV is acquired. This research included the role of joint ventures in innovation, how industry type determines the use of joint ventures, and the role of justice. The earlier issue of cultural fit returns in this topic and thus provides a vivid example of the theme, “history defines the research topics” as the significant increase in Japanese competitiveness and economic visibility clearly motivated attention to Japanese ownership in the United States.

Finally, departmental research on this topic has dealt with flexibility, innovation, and diffusion of organization designs. Many of these articles appeared between 1992 and 2000, perhaps illustrating the theme “history defines research topics,” when one considers the emerging Internet and dot-com phenomena, and ideas of mass customization and hypercompetition. Burgelman (1983) noted the need to balance order and diversity, and the differing roles of top and middle management in that balance. Gerwin (1993) observed that organizations might respond to low-cost standardized items from abroad by offering wide varieties of technically superior products aimed at specific market niches. Research has examined flexibility in production time and range of outputs, vulnerability, and resilience to change, alertness, and managerial discretion. Within the theme of “searching for a solution,” computer models appeared to simulate innovation diffusion. Conner (1995) provided an example of “improving management science models” suggesting when *encouraging* clones of innovative products might minimize competition.

4.9. The Role of the Manager

In a journal called *Management Science*, it is appropriate that research define the role of a “manager.” This topic captured about 7% of all articles accepted.

Several studies observed actual managers, in the spirit of Mintzberg’s (1973) pioneering work. Researchers have offered taxonomies of managerial processes (e.g., planning, organizing, and staffing) and have embellished upon the basic taxonomy, incorporating concepts such as “muddling through” in a trial-and-error process, and how managers deal with interruptions. The value of managers was estimated, using performance losses when franchises lose managers and performance consequences of executive succession. For example, Hambrick and D’Aveni (1992) showed that firm performance decreases when top management teams deteriorate, and that deterioration and performance can become mutually reinforcing. There have also been several studies of leadership, including typologies and calls to look beyond leader traits or interactions with followers. For example, McCall and Lombardo (1982) described a method of observing leaders through management simulation. Miller and Toulouse (1986) and Miller (1991) examined the match between CEO personalities and organizational strategies and structures, finding it greater in smaller firms and with shorter-tenure CEOs.

Managers represent one example of the principal-agent relationship, in which an agent acts on behalf of an interested principal, and the agent has unique access to information or skills. This describes not only owner-executive relationships, but other relationships (corporate and division managers) and markets (investors and portfolio managers). Several studies addressed this, primarily by proposing or simulating incentive systems (such as profit sharing, transfer pricing, and performance management) to align agent behaviors with principal’s goals consistent with organizational success (Atkinson 1978, Harris et al. 1982). The themes of “applying management science methods” as well as “searching for a solution,” are apparent in studies aimed at identifying optimum levels of monitoring (e.g., observing specific outcomes of each task versus observing the aggregate production from all tasks, Gersbach 1998), using optimization methods from other areas.

4.10. Individual and Organizational Learning and Knowledge Management

Learning and knowledge have been a dominant topic in the department, representing about 11% of accepted articles, including a special issue in 2003 (Volume 49, Issue 4). The department’s research on learning is distinctive in its attention to “organizational learning” and to developing optimization algorithms, in contrast with other disciplines that typically address individual reactions and knowledge produced by training experiences. Social network theory and information-processing theories have informed much of this work, in addition to more traditional individual-learning theories.

Research has focused on the communication and information sharing between individuals and groups. For instance, Sproull and Keisler (1986) used questionnaires and e-mail records to examine effects of e-mail on self-absorption, status equalization, and uninhibited behavior, finding that e-mail had an unregulating effect on communication. Other research has developed heuristics for learning between team members, determinants of information seeking, how technical support problem-solving strategies are influenced by the formulation presented by the client, and how perceptions of coworkers affect group discussion and performance (social isolation, status, and unique knowledge, and whether knowledge from insiders or outsiders is valued as in Kim 2003 and Menon and Pfeffer 2003). Most research in this topic has emphasized “searching for solutions.”

A second subtopic is the diffusion of practices across organizational units and managerial influence on diffusion. Leonard-Barton and Deschamps (1988) found that sales employees who were lower in innovativeness, task importance, skills, and performance perceived greater management influence in their adoption decisions. Other studies have examined the effects of top management attitudes, interunit comparisons, organizational receptivity, and vertical integration on innovation diffusion in software development groups and financial services, pizza-preparation in franchises, and work-station manufacturers (Darr and Argote 1995, Zmud 1984, Mezias et al. 2002). Uzzi and Lancaster (2003) took this topic to the level of interfirm learning, to suggest that learning *markets* emerge through relationships and the knowledge transfer capabilities of social ties. This is an example of the theme, “translating behavioral ideas into management concepts,” because the concept of learning has typically been applied to individuals and studied through behavioral science, but, in this research topic, was adapted to apply to organizations and teams.

A third subtopic within learning and knowledge management is innovation, and the mechanisms through which innovations are transferred, such as among research and development organizations. van de Ven (1986) provided four conditions for innovation: (1) managing attention, (2) managing new ideas into good currency, (3) managing part-whole relationships, and (4) institutional leadership. Research has examined how innovation was affected by incentives and organization structure (sequential or team based), and the mobility of scientists, suggesting that mobility can be especially useful for knowledge that is distant from the core. Patent citation data analysis was a prominent feature of this research, as were data on technology licensing. Several studies examined how university research is licensed and incorporated into

patents, finding that university institutional prestige increases licensing rates (Sine et al. 2003), and that scientific ideas and patents seem to follow different selection processes and conflicting logics (Gittelman and Kogut 2003).

The final subtopic within learning and knowledge management has focused on learning curves (productivity increases with cumulative output), again in sharp contrast to more individual-focused research on training and learning. Argote et al. (1990) proposed that cumulative output may overstate the persistence of learning. Other studies have examined whether learning curves are affected by engineering changes, workforce training, production lines designed to create experimentation, and specialization. Schilling et al. (2003) and Lapre et al. (2000) found that diversity of tasks affects learning, noting that learning was significantly higher under conditions of related variation. This illustrates the theme of “improving management science models” by calling into question the premise that specialization always enhances learning from production experience. Mody (1989) noted that learning reflects conscious decisions, and is not merely a by-product of production, suggesting factors to explain faster learning in Japanese versus U.S. firms.

This topic presents several vivid examples of the theme “improving management science models” that directly incorporated observed behavior patterns into management science tools. For example, Bailey (1989) used a laboratory experiment simulating a production line to evaluate how individual patterns of forgetting after interruptions affected learning curves. Shafer et al. (2001) estimated a specific distribution of learning-forgetting on population of workers, and then directly incorporated it into existing learning curve and assembly line productivity estimation models, demonstrating that including only central tendency and the variations across workers tends to systematically underestimate overall productivity.

4.11. Human Resource Management Systems

Human resource management systems, such as rewards, training, staffing, and labor relations significantly affect the human capacity underlying management science systems. Other research outlets such as *Academy of Management Journal* and *Personnel Psychology* have been preferred by human resource management researchers, reflecting a disciplinary bias toward descriptive research, often rooted in psychology. Nonetheless, there are significant opportunities for fruitful research at the boundaries between the traditional topics of management science and human resource management, and many thorny issues in both fields can benefit from the integration (Boudreau et al. 2003). This topic contains articles accepted by the

department that deal with specific human resources systems, and represents about 6% of the historical total. Considering the prominence of incentives and workforce scheduling in other management science areas, it is not surprising that this topic reflects mostly incentive systems and workforce planning, with some additional work on the design of jobs and recruiting.

The departmental research on incentive systems is a good example of “applying management science models,” and “searching for solutions,” as it used methods and principles from decision theory or game theory and applied them to explain or derive normative compensation schemes. This is in contrast to much research in other outlets, which focused on describing individual reactions to compensation elements. Examples of departmental research include compensation design models that incorporate risky choice variables, multiattribute and probabilistic goals, the use of profit sharing or Groves scheme rewards to achieve equilibrium under conditions of moral hazard. Environmental uncertainty figured prominently. Eisenhardt (1985) tested economic and agency theory predictions, finding that task programmability, cost of measuring outcomes, and business uncertainty had significant effects on compensation system design. Other research has focused on incentives between *organizations*, such as compensation plans that allow for negotiations between advertising agencies and clients (Calantone and Drury 1979). Finally, a few studies have tested propositions of compensation models and used laboratory studies to examine effects different performance information on groups.

The second large group of studies has focused on job and work design, developing algorithms and systems for estimating the optimal mix of labor and automation, and specifying the value of job rotation as a means for organizations to learn employee capabilities in uncertain environments. For example, Oliva and Stermann (2001) explored service quality deterioration using econometric estimation, interviews, observations, and archival data. One study resembled typical research in psychology, examining how salesperson job satisfaction and performance related to job ambiguity and individuals’ locus of control and need for clarity (Behrman et al. 1981).

Several studies have examined workforce attrition and proposed methods to forecast and match worker supply and demand, illustrating the theme of “applying management science models” by using forecasting principles derived in other management science applications to better understand workforce issues. Examples have included enhancements to enable the use of cross-sectional data and calculation of hiring, promotion, separation, and retirement policies (Gaimon and Thompson 1984); the combination of

Markov and fuzzy predictive models to derive optimal education development programs in China (Ling 1987); and algorithms to estimate the proper allocation of advertising dollars versus personnel in military recruitment (Morey and McCann 1980), and the future oversupply of tenured professors (Vaupel 1981).

Conclusions . . . and a Prediction

The themes examined here, “organizations as decision-making entities,” “searching for a solution,” “improving management science models,” “applying management science methods,” “translating behavioral ideas into management concepts,” and “history defines the research topics” reflect the unique position of a behavioral department embedded within a journal so well known for excellence in mathematical optimization and “engineering” applied to management science. Perhaps there is one over-arching theme that pervades all of them—cross-pollination.

The department has and will likely continue to include elements of other *Management Science* departments and disciplines in its title and mission. Indeed, a fundamental distinction of the department from other organizational behavior research outlets has been its ability to build upon and inform the questions, methods, and models related to those other management science disciplines, and to inform issues that have practical importance in real management contexts. Being a “behavioral” department in a journal characterized by devotion to managerial implications, optimization, and the context of real work organizations has usefully grounded departmental research in practice, solutions, and managerial implications in ways that are far less prevalent in typical outlets for behavioral research. The themes developed here reflect this “creative tension” to achieve both rigorous application of theories and methods developed in the behavioral sciences, while being true to the insights, methods, and managerial contexts so clearly articulated by traditional management science research.

The term cross-pollination, however, also implies a two-way street. There is much to be learned and much practical improvement to be made in other management science domains by incorporating behavioral and organizational theories and results more deeply into traditional models and theories. A strength of the journal is that such potential is readily recognized through the interaction of various department editors as they work together to classify and appropriately review boundary-spanning manuscripts.

The journal has always provided a uniquely open forum for such boundary-spanning contributions, and it appears that this will be particularly true

for research in organization behavior, performance strategy, and design. For example, operations management represents a cornerstone of the journal, embodying the rich early tradition and a significant portion of the journal's identity. What is the position for behavioral and organizational work in operations management? In their 50th anniversary article, Chopra et al. (2004, p. 13) state, "No plant manager anywhere would ignore the role of good people management in running an efficient operation. Yet, the research in our discipline has remained largely disjoint from the social sciences literature on human resource management and organizational behavior (OB)... . Operations management models have historically invoked oversimplified models of motivation, learning, creativity, and other such aspects of human behavior that are vital to the success of management policies in practice... . High-quality descriptive and empirical work, including experimental analysis of behavior and decision making, often precedes prescriptive models."

Thus, the position of the department of organization behavior, performance, strategy, and design is firmly established and its future prospects are bright. When the history of the department is reviewed again on the 100th birthday of the journal it may well require a joint review spanning several departments, as the interfaces between our disciplines become ever stronger, and new integrative paradigms emerge.

An online supplement to this paper is available at <http://mansci.pubs.informs.org/ecompanion.html>.

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