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CAPITAL INVESTMENT AS INVESTING IN ORGANIZATIONAL CAPABILITIES: AN EMPIRICALLY GROUNDED PROCESS MODEL

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This article describes a field study in which insights from the resource-based view of the firm were combined with models of capital investment decision making to investigate the decision processes used to make capital investments in capabilities. The study shows that different decision processes are used to invest in existing and new capabilities and that current models in the literature need to be adapted to capture the differences, which relate primarily to information requirements and management roles. The results suggest adopting a contingency approach to managing capital investment in capabilities.

Capital investment decisions rank among the most critical types of managerial decisions made in a firm. Funds and other resources, such as people and know-how, are committed to projects in anticipation of a future expected return that exceeds the cost of making that commitment. These investments can have major long-term implications, both positive and negative, for the success of a firm. As Barwise, Marsh, and Wensley pointed out, "Almost everything about a firm—its physical assets, and how they are used; its people, reputation, and skills; its products and services; its customers, channels of distribution, and brands; its financial performance—can be traced back to particular [investment decisions that were made] years or even decades ago" (1987: 2). So, to understand a capital investment decision, it is important to understand how the physical asset in which a firm is investing will interact with existing assets, both tangible ones, such as equipment, and intangible ones, such as skills and know-how.

When a manufacturing firm makes a capital investment in a piece of production equipment, in what is it really investing? The firm could be simply investing in new capacity to meet demand for its product. But the intent may not be so straightforward. The firm could be investing in the capability to achieve lower production costs from the economies of scale that result from the increased capacity. Alternatively, it could be investing in the capability to become flexible enough to change its product mix on short notice and thus increase its responsiveness to customer needs. It could be investing in a new technological capability to enable it to produce a new product. Or it could be investing in the capability to use capacity as a competitive weapon to deter entry or expansion by competitors. In other words, there can be an investment in an organizational *capability* embedded in a capital investment in a physical asset (Baldwin & Clark, 1992). To grasp the true nature of a capital investment and the process of making the decision to invest, any capabilities associated with the physical assets need to be identified and understood.

This article describes a field research project, in a manufacturing setting, that investigated the process of making capital investments that were associated with investing in capabilities. I drew on the resource-based view of the firm to better understand how capital investment decisions are made. The results comprise a set of propositions that extend the conventionally accepted view of the capital investment process and provide insights into how companies use capital investment as a mechanism for developing operating-level organizational capabilities. Managers used different decision processes for investments in existing and new capabilities. The generally accepted process model of capital investment in the literature adequately describes investing to maintain or further develop existing capabilities, but it does not capture the information flow or the senior management role in investments made to develop new capabilities.

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This finding—different processes used for investing in different types of capabilities—suggests taking a contingency approach to managing the development of organizational capabilities. If there is a "fit" between investment type and process features such as information requirements, power, and responsibility, then a poor match is unlikely to serve an organization well. Furthermore, different firms could have differing ability to identify and make a required match, so a superior ability to select investment processes itself could be developed as a higher-order corporate-level organizational capability.

The next section briefly reviews the organizational capabilities and capital investment literature to provide the background and context for this study. Then the conceptual lens used to conduct the fieldwork is developed. The remainder of the article describes my research and inductively develops propositions based on field observations. An empirically derived conceptual model of the organizational process of investing in capabilities is presented, and suggestions for future research are provided.

BACKGROUND

Organizational Capabilities

The notion of organizational capabilities has been developed within the resource-based view of the firm (e.g., Barney, 1991; Dierickx & Cool, 1989; Peteraf, 1993; Teece, Pisano, & Shuen, 1997). According to this view, competitive advantage is derived in large part from internal, firm-specific resources and capabilities. How a firm's resources and capabilities are acquired, developed, and deployed by its managers defines the firm's relative competitive position, and the sustainability of that position depends on the ease with which competitors can imitate or replicate the firm's acquisition, development, and deployment of those resources and capabilities.

A *capability* is defined as a firm's capacity to deploy its assets, tangible or intangible, to perform a task or activity to improve performance (Amit & Schoemaker, 1993; Grant, 1991; Teece et al., 1997). Important characteristics of capabilities are that they are knowledge-based, firm-specific, and socially complex, and they generally cannot be simply acquired in factor markets. They are developed within the firm. Some empirical work has examined various aspects of capabilities development (e.g., Henderson & Cockburn, 1994; McGrath, MacMillan, & Venkataraman, 1995); however, little research has focused on investment, despite conceptual discussions clearly identifying it as a mechanism for building capabilities. Haspeslaugh and Jemison (1991) used a capabilities framework to evaluate the potential of acquisition targets, but they saw the capabilities as already existing in target firms. Helfat (1994, 1997) considered investing in capabilities, but her focus was on research and development, not on capital investment. Baldwin and Clark (1992) did directly address capital investment in capabilities; however, given their practitioner audience, their focus was on prescriptive measures rather than on understanding the link between investment and capabilities development.

Capital Investment

Most research on capital investment has been conducted by financial economists who have developed project evaluation techniques. However, there is a management literature that takes a process approach to the subject and places financial evaluation in the context of a complex organizational decision process. The work of the Carnegie School (e.g., Cyert & March, 1963) made an early contribution and laid the groundwork for subsequent research that studied investment decisions.

These studies specifically examining the process of capital investment decision making provide the reference point for the field study reported here. Beginning with Bower's (1970) well-known study, this work has developed descriptive models of the capital investment process based on analyses of actual capital project proposals, typically in large multidivisional firms.

Investment is portrayed as a complex, bottom-up, multistage process in which managers at multiple levels of a firm play different but interrelated roles (Bower, 1970; Carter, 1971; King, 1975). Initiation of projects occurs within and is constrained by the context of existing strategic objectives (Carter, 1971) and the organization structure and systems in place (Bower, 1970). Senior management's role in the process is indirect, consisting primarily of setting this context. Although Marsh, Barwise, Thomas, and Wensley found evidence of some direct senior management intervention, they were unable to determine the "extent to which these interventions were part of a coherent and systematic approach" (1988: 128). A question explored here thus arises: What is the nature of senior management's role in different types of investment projects?

Researchers have recognized that some aspects of the investment process may vary with firm characteristics, such as whether a firm is vertically integrated or diversified (Ackerman, 1970). However,

most existing work, with the exception of Butler, Davies, Pike, and Sharp (1993), has not investigated how the process might vary with investment characteristics. In most of the process studies, multiple investment decisions were examined, but the resulting models were based on commonalities across investments. The research did not examine the degree of variation of capital investment decision processes within a given firm and developed the investment decision process as a firm-level construct. In the study described here, I used the concept of organizational capabilities to characterize individual investments and investigated the capital investment decision process as an investment-level rather than a firm-level construct. This approach accommodates the possibility that the same firm simultaneously follows different processes for different investments and potentially develops a higher-order capability to manage these different processes.

There are also concepts from the more general literature on organizational decision making that are relevant to understanding capital investment decisions. Procedural rationality and politicality are two particularly relevant characteristics of decision-making processes. The concept of rationality has been central to organizational decision making research. Simon (1976) distinguished between two views of rational behavior: "Substantive rationality" is concerned with the product of behavior or action; the conventional economists' definition of rational behavior as utility maximization demonstrates substantive rationality. In contrast, "procedural rationality" is concerned with the process of behavior and the choice of actions. It addresses whether the outcome of an action is a product of "appropriate deliberation" (Simon, 1976: 131), given human cognitive limitations. Investment decision making research has raised the issue of procedural rationality but has not systematically measured it. Are all investment decision processes equally rational (or irrational)?

Previous researchers (e.g., Bower, 1970) have found investment decision making to be a sociopolitical process affected by organizational politics. In the political model of the firm, individuals or groups within an organization have some competing interests (March, 1962). Although it has been suggested that political behavior and procedural rationality are two ends of a continuum describing a single dimension of decision making (Pettigrew, 1973) and provide competing explanations for decision-making behavior (Allison, 1971), Dean and Sharfman (1993) empirically demonstrated that they are two distinct dimensions. This position is also supported by Eisenhardt and Zbaracki's conclusion that "strategic decision-making is best described by an interweaving of both boundedly rational and political processes" (1992:35). Does the political aspect of investment decision making vary by investment? How is politicality related to the procedural rationality of investment decision making?

RESEARCH FRAMEWORK: INVESTING IN CAPABILITIES

A capital investment can be viewed as a resource flow, and the cumulative result of the flow, as a resource or capability stock (Dierickx & Cool, 1989). Since these stocks can deteriorate, in addition to the investment required to initially build them, further investment is required to replenish them (Dierickx & Cool, 1989; Grant, 1991). Following this logic, one can define three types of flows or investments in capabilities: There are (1) investments to *maintain* the stock of an existing capability, (2) investments to *add* to the stock of an existing capability, and (3) investments to build a *new* capability. I labeled these types of flows "maintain," "add," and "new," respectively. *Maintain* and *add* investments require no qualitative change to a firm's capability stock. They are investments decision makers make to preserve or to increase the "quantity" of a capability, with the intent of leveraging existing capabilities and competencies. In contrast, *new* investments represent a qualitative change to the firm's capability stock, and decision makers enact this change with the intent of broadening the opportunity set available to the firm (Grant, 1991; Sanchez & Heene, 1997). Related to these quantitative and qualitative changes in capability stocks are differences in uncertainty.

There is uncertainty associated with both acquiring a capability and using it. It is important to note that, in capability acquisition, the uncertainty concerns a firm's production function and not its external environment. In the management literature, the term "uncertainty" typically refers to environmental uncertainty (e.g., Jauch & Kraft, 1986; Milliken, 1987). Although uncertainty about future environmental conditions is clearly a large component of the uncertainty associated with an investment project, it is not the only component. Uncertainty concerning the production function is separate from environmental uncertainty (e.g., Dixit & Pindyck, 1994; Hickson, Hinings, Lee, Schneck, & Pennings, 1971; Tushman & Nadler, 1978), and it is this uncertainty about processing throughputs, or technical uncertainty, that varies by investment type.

A decision related to maintaining a capability stock would usually involve the least uncertainty, since it is a decision to preserve an existing condition. A decision related to adding to an existing capability stock typically involves more uncertainty. The firm involved has familiarity and experience with both accumulating and using the capability, but there is some uncertainty about whether the firm will achieve the desired ends with the increased quantity. A decision about creating a new capability involves the highest degree of uncertainty. The firm does not have experience either accumulating or using the capability, so there is uncertainty about both the means of acquiring it and the end result of using it. Because of these underlying differences in the level and type of uncertainty, differences in the organizational process used to make the three types of investment decisions are likely to exist.

So that the processes followed to make *maintain, add,* and *new* investments could be compared, I used a composite model drawn from the existing literature. As the literature review above described, the capital investment decision process has been portrayed as an essentially decentralized, multistage, bottom-up, sociopolitical process. Although various researchers have applied various labels, the stages of the investment process are, in substance, proposal initiation, proposal development, proposal management, and project approval. An investment proposal is initiated in response to identification of a need or a problem. The development of the proposal includes estimation of the costs and benefits, and evaluation of alternatives. Proposal management is the guiding of the investment proposal through the organization, culminating in project approval. These stages have been found to occur essentially sequentially, in a bottom-up manner, with some iteration between adjacent stages. Proposals are initiated and developed by the division specialists thought to be closest to the relevant product market or operation and thus to have the best information with which to identify needs and opportunities. Division managers conduct proposal management. The participation of corporate management is indirect, consisting primarily of setting the organizational structural context. For convenience, in the remainder of this article, I label this generalized model as the "standard process model."

METHODS

The process of making decisions to invest in capabilities was investigated with multiple cases. An individual investment decision was the unit of analysis and constituted a case. For each of 29 investments in a large U.S. pulp and paper firm, the process used to make the investment decision was retrospectively reconstructed through document analysis and semistructured interviews of managers. The research design followed a replication logic in which each case served to confirm or disconfirm inferences drawn from the others (Yin, 1994).

Research Site

The study was carried out in a *Fortune* 500 pulp and paper company, identified here as Integrated Paper or simply, Integrated. The terms of a confidentiality agreement required that the firm and its businesses be assigned descriptive code names. The choice of research site was largely based on the firm's interest in and willingness to participate in the research, but several industry- and firm-related factors made Integrated Paper a particularly suitable research site for this study.

Industry. Integrated operates in a number of segments in the paper industry. The paper industry consists of five broad segments, as defined by the Standard Industrial Classification (SIC): pulp mills (SIC code 261), paper mills (SIC code 262), paperboard mills (SIC code 263), paperboard containers and boxes (SIC code 265), and miscellaneous converted paper products (SIC code 267). Paper is among the most capital intensive manufacturing industries. According to the 1992 U.S. Department of Commerce Census of Manufactures, the paper industry ranked sixth in terms of dollars spent and first in terms of the ratio of capital expenditures to the value of shipments. The high capital spending in the industry is a result of the high cost of the basic equipment required, namely paper machines, fiber preparation equipment, and converting equipment, as well as of the cost of compliance with safety and environmental standards (Jaffe, 1997). This level of capital spending contributes to the paper industry's being a good context for studying capital investment practices. In addition, individual investments in this industry tend to be large and difficult to reverse, making effectively managed investment decisions important to a firm's competitiveness. Therefore, firms in this industry are likely to have well-developed investment procedures and processes.

The nature of the investments made by paper companies is also important to this research. A review of the annual reports of large U.S. paper companies and discussions with industry experts revealed that, although a large proportion of the capital investment in the industry represents

straightforward repair and replacement expenditures, many technology- or skill-related investments in equipment also appear to be made. These technology- or skill-related investments are most likely to be associated with the development of capabilities. For example, in recent years, technological innovations in the paper industry have resulted in equipment investments related to improving paper quality as measured by strength and printability, to increasing flexibility for handling pulp with different characteristics, and to achieving significant cost efficiencies. Quality, flexibility, and cost efficiency are all examples of manufacturing capabilities (e.g., Ferdows & DeMeyer, 1990). The paper industry presents an environment in which there are likely to be examples of capital equipment investments that are associated with capabilities.

Firm. The standard process model describes investment in a large, complex, multidivisional firm. The divisions are decentralized profit centers staffed with their own multifunctional management teams that have a high degree of strategic and operating control. To ensure that meaningful comparisons and extensions to the standard process model could be made, it was important that this study be set in the same type of firm. Integrated Paper satisfied this requirement. Integrated is a *Fortune* 500 company with several decentralized divisions reporting to a corporate office having ultimate authority over allocation of capital to specific investment projects. Average annual capital expenditures total more than $200 million.

A study of this nature requires access to highly confidential firm data. I was acquainted with a senior corporate executive of Integrated and negotiated using the firm as a research site. I was granted permission to review any relevant company documents and speak with any company employee. Six divisions participated in the study. They were selectively chosen to include both small and large units and to represent a range of industry segments. Two of the divisions produced paper, two produced paperboard, and two produced value-added converted products manufactured from paper or paperboard. These divisions accounted for approximately 60 percent of total company revenues and over 80 percent of total capital expenditures during the period studied.

Sample

Because the focus of this research was how firms make decisions to invest in capabilities, it was necessary to identify capital investments that decision makers made with the clear intent of developing capabilities that would improve performance and contribute to creating competitive advantage. Given the concept of a capability as the capacity to deploy assets, all of a firm's assets can theoretically be viewed as being associated with organizational capabilities. Therefore, a more helpful distinction had to be developed.

Viewing capital investment in a physical asset in terms of the capabilities associated with that asset raises the issue of what is generating the return to the investment. Is it the physical asset? Or is it the firm-specific way in which the asset is used? Robins (1992) argued that the answer is both. The return to a capital project has two components: (1) the market-determined return to the asset, which could be realized by any firm employing that asset, and (2) additional rents earned by the firm-specific way in which the asset is employed—that is, the differential capability that the firm has developed. In addition, for an investing firm to be able to appropriate those rents, the capability must be imperfectly imitable and imperfectly substitutable so that competitors cannot copy the capability that the firm has developed or substitute another capability to achieve the same result (Peteraf, 1993).

To illustrate this point, consider the simple example of an investment in a jackhammer. A jackhammer is a pneumatic percussion tool typically used to break apart materials such as pavement or concrete or to drill into rock. The uses are well known, and it is unlikely that one trained user of the tool would be able to perform a task differently than another trained user. Therefore, the likelihood of earning rents from the firm-specific employment of a jackhammer is close to zero. In contrast, consider an investment in custom-designed calendering machinery that is used to achieve a particular surface texture on paper. This machinery is based on a new method of calendering, is designed to operate on a particular paper machine using a specific feed stock, and requires considerable skill to operate and master. Furthermore, the equipment can be used to develop paper surface properties that create new opportunities in the product market. Potential rents may accrue to the firm that develops and uses such a piece of machinery, over and above the returns to other firms that might purchase a similar piece of machinery in the market. For this to be possible, competitors must not be able to copy the way in which the calendering equipment is used in the rent-generating firm or achieve the same result using another means of treating the paper surface. Since an investment in any asset could technically be thought of as an investment in some capability, it was more helpful here to concentrate on those investments that have

a higher probability of generating a rent that the investing firm can appropriate, because these investments are more likely to contribute to competitive advantage.

Identification of investments. Before specific investments could be identified for study, a list of industry-specific capabilities in which Integrated could have invested had to be developed. From extensive discussions with industry consultants, reading back issues of the industry trade publication *Pulp and Paper,* and reviews of the annual reports and 10K filings of paper firms, I compiled a list of capabilities that correspond to important dimensions of competition in the paper industry. This set of items, which is reported in Table 1, served as a master list and guided the identification of specific investments for study.

The population of projects considered was the 164 capital investment proposals for amounts exceeding $400,000 submitted for approval between January 1993 and August 1996. The minimum size was based on Integrated's internal approval procedures to ensure that all investments studied would have been subject to the same formal documentation and approval requirements. The August 1996 cutoff corresponded to the commencement of data collection. The 42-month time period was selected to reduce the potential unreliability of retrospective reports while maintaining a large enough sample to permit meaningful comparisons to be made. Importantly, Integrated's structure and management were stable during this period. Funding had been approved for all projects in the population. There was no comprehensive documentation of declined projects; therefore, it was not possible to systematically identify and analyze them.

TABLE 1
Classification of Paper Industry Operating-Level Capabilities

General Category	Specific Capabilities
Forestry	Silviculture Woodlands management
Papermaking	"Wet-end" chemistry Substrate preparation Sheet forming Printing-paper interaction
Fiber technology	Pulping Bleaching Recycled use Deinking
Finishing	Drying Calendering Converting
Coating	Formulations Application
Packaging science	Design Glue technology Printing
Information technology	Process control Logistics Ordering, inventory, shipping practices
Manufacturing	Machinery design Process modeling Maintenance practices

The written capital budgeting proposals and supporting documents for all 164 projects were reviewed. The texts were analyzed for the presence of key words that related to the master list of capabilities. In all cases, the proposed investment was primarily framed in terms of its effects on capacity, products, and markets, not capabilities. However, because the proposals were required to include a section relating the investment to the division's strategy and provide a great deal of detail about the anticipated benefits of making the investment, it was possible to determine if the intent of the investment was to develop operating-level capabilities.

The reviews were conducted on-site at each division office so that it was possible to request additional documentation and/or discussions with Integrated managers to help with interpretation of the proposals. Once I had compiled the set of capabilities investments for a division, I discussed it with a senior division manager who was responsible for signing off on all investment proposals and therefore was very familiar with the division's investment projects. I presented the concept of a capability to the manager and explained how a capability investment could be embedded in an equipment investment. The manager was then shown the list and asked if he could recall any proposals not on the list that were investments in capabilities. Several managers identified capabilities investments that I had not identified, but in all cases except one, the proposal had been submitted prior to 1993 and was therefore not in the population of proposals considered.

These document analyses and discussions identified 29 capital investments that managers proposed with the intent of investing in capabilities. Examples of these investments are (1) a pulp-handling system intended to improve product quality by increasing paper strength, (2) converting equipment replacing a two-step process with a one-step process to increase efficiency and reduce costs, (3) a reconfiguration and expansion of product-shipping facilities to improve delivery times, and (4) a paper machine for making a grade of paper previously unavailable in the market. A confidentiality agreement prohibits disclosure of the com-

plete sample. At this point, no consideration was given to whether the projects would fall in the maintain, add, or new categories. The remaining 135 investments were either straightforward equipment repair investments or incremental capacity investments with no identifiable knowledge- or skill-related element. The excluded investments could not clearly be described as having the potential to generate rents for Integrated.

Given the capital intensity of the paper industry and the associated need to simply repair physical plant, it is not surprising that only 18 percent of investment proposals (29 out of 164) clearly related to investments in capabilities.

Classification of investments. I classified the 29 sample investments as maintain, add, or new on the basis of a second analysis of the investment proposal texts. When the investments were originally identified, each was coded according to the primary operating-level capability in which the firm was investing. I later analyzed the justification arguments in the proposals for references to staying current with, improving, or acquiring that capability. If the investment involved staying current with a technology or skill base that the firm already possessed, the project was classified as maintain. It is important to recognize that these investments were to maintain a capability and not to simply maintain a piece of equipment. Recall that routine equipment maintenance investments were excluded from the sample. One maintain investment was for equipment for applying a coating to the paper surface. Although the particular equipment proposed for purchase was a new, state-of-the-art machine, it was an updated version of what the firm was already using and based on technology with which the firm was very familiar. There was little uncertainty about Integrated's ability to achieve the desired results. The investment was being made to maintain the firm's paper-coating capability.

In contrast, another investment in coating equipment was classified as add because it was based on a technology with which Integrated had limited familiarity. The particular piece of equipment was of a new design, creating some uncertainty, but the firm was familiar with the basic principles of operation and had been using a machine to accomplish the same task. The investment was being proposed to improve or add to Integrated's paper coating capability. A third proposal to invest in coating was classified as new. This investment proposal involved using a coating formulation that was different from what Integrated had used before and applying this new material in a new manner. The proposed process was highly proprietary, and the firm had no experience with several aspects of the project. Uncertainty about both technical and market outcomes was high. All three examples fall under the broad category of coating capability, but they differ markedly in the uncertainty associated with making the investments.

A tentative classification based on the text analysis identified 11 maintain, 6 add, and 12 new projects. The categorization was reviewed with an Integrated executive who had been a management consultant and was familiar with both the concept of capabilities and the classification scheme used in this research. As a result of this review, 4 of the projects were reclassified, with the final breakdown being 8 maintain, 8 add, and 13 new projects.

Nonparametric statistical tests confirmed that the project classification did not reflect other project characteristics. Kruskal-Wallis tests indicated that there were no significant differences in median project size ($p = .414$) or median forecasted internal rate of return ($p = .725$) across the three investment types. "Pairwise" Wilcoxon rank-sum tests produced the same result. Fisher exact probability tests confirmed that the project categories did not map onto particular divisions or onto Integrated's internally defined categories of investment. Table 2 shows the distribution of projects and gives descriptive statistics.

Data Collection

For each of the 29 investments, I identified two key informants through examination of the names on the investment proposal and supporting documents and through discussions with senior divi-

TABLE 2
Distribution of Investment Projects by Type and Division[a]

Division	Investment Type			
	Maintain	Add	New	Total
Paper unit number 1	2	1	3	6
Paper unit number 2	3	2	1	6
Paperboard number 1	2	0	3	5
Paperboard number 2	1	1	1	3
Value-added number 1	0	3	2	5
Value-added number 2	0	1	3	4
Total	8	8	13	29
Median project size	4.5	2.1	5.3	4.8
Median projected internal rate of return	25.7	33.1	20.8	26.3

[a] Project size is in millions of dollars. Internal rate of return is given as a percentage.

sion managers. The informants had been extensively involved in the project. One informant was from the operating level of the division involved, and the other was from division management. The functional area of the operating-level manager depended on the nature of the investment. All of the identified key informants agreed to participate.

The informants were interviewed in detail about the process that was used to make each decision to invest. Because the involvement of individuals in investment projects was a function of their job responsibilities, most of the managers interviewed were identified as key informants for more than one project. Ideally, to ensure that the independence of observations assumption for statistical testing was not violated, I would have interviewed different informants for each project. However, doing this would have meant not interviewing the people most involved in the projects, that is, the key informants. To help assess the potential bias, I tested within-rater response variance for the variables quantitatively measured with scales. For some respondents, there was significant variance, and for others there was not. This result should be interpreted with caution because the consistency might reflect similarities between projects rather than bias.

A total of 58 formal interviews (2 per project) were conducted with 27 operating-level and senior division-level managers. Forty-nine interviews were conducted in person at the divisional offices, and the other 9 were conducted by telephone with interviewees whom I had met previously. Each formal interview lasted between 45 and 90 minutes. The interviews were conducted between October 1996 and January 1997. The time elapsed between an investment decision and the interview ranged from 2 to 45 months, with a mean of 17.6 and a median of 16. For 24 of the 29 projects, the time elapsed was 24 months or less. The participating managers declined my request to audiotape the interviews; therefore, I recorded all interviews by hand on forms based on an interview guide. The detailed interview data were supplemented with data from more general, semistructured discussions with senior corporate managers. This multilevel data collection ensured that managers from the three organizational levels identified by Bower (1970) and included in his model were represented. In total, over 80 hours of interviews were conducted, resulting in over 350 pages of interview notes.

Although most of the data were collected with open-ended questions, procedural rationality and politicality were measured with scales previously developed and validated by Dean and Sharfman (1993, 1996). Where scales were used, I averaged responses to obtain a single measure for each project. James, Demaree, and Wolf's (1984) measure of interrater reliability was calculated for each scale item. The reliabilities range from 0.43 to 1.00, averaging 0.90.

The nature of the data required in this study necessitated the use of retrospective reports. Use of such reports is often the only way to obtain certain types of information about past events (Seidler, 1974), such as the origination of investment ideas and the participation of individuals in an investment process, because these phenomena are not recorded in documents. Even when archival sources exist, retrospective accounts may be required to interpret the data (Golden, 1992; Schwenk, 1985). Retrospective reports may suffer from inaccuracies and biases because the data are perceptual and concern past events; therefore, I took several steps suggested in the literature to improve their reliability. The sample was chosen to reduce, as much as was practical, the time between the investment decision and the interview (Huber & Power, 1985). This desire to minimize the elapsed time had to be traded off against the requirement of having sufficient investments in the sample to analyze. Multiple informants were interviewed to permit comparing the responses for consistency (Phillips, 1981; Seidler, 1974). Where possible, information collected from informants was cross-checked for consistency against documentary evidence (Golden, 1992). As Huber and Power (1985) suggested, confidentiality was ensured, and the major disincentive to responding, namely, the use of a tape recorder, was removed. The data collection instrument was also designed for high validity. Most of the data were collected using a pretested, structured interview guide (Huber & Power, 1985) and, to the extent possible, I asked respondents about simple facts or concrete events (Glick, Huber, Miller, Doty, & Sutcliffe, 1990) and allowed "I don't recall" responses (Miller, Cardinal, & Glick, 1997).

Data Analysis

My intent in this analysis was to look for structure that might exist in the data rather than to test for specific hypothesized relationships. Most of the data are qualitative, and most of the analysis is descriptive. However, where it was possible, I used statistical procedures to supplement the description and test for structure in the data.

Integrated Paper has a standard, formal capital investment procedure outlined in company documents. A guidelines manual specifies the format of investment proposals and the dollar approval lim-

its for divisional and corporate management. The corporate treasurer's office sets "hurdle rates" for the division's portfolio of projects centrally. Although this procedure does not spell out an organizational process, certain elements of a process are implied. The introduction to the manual even includes the following statement: "Implicit in the [procedure] described below is the requirement that the [business unit and corporate staff] people assigned to the project planning, management, execution or start-up phases work as a team to achieve project objectives." Several people must sign off on a project proposal, including its writer, the managers who oversee the functional areas affected by the potential investment, senior division managers, and, for most projects as large as those considered in this research, corporate managers. Although the involvement of these individuals is implied by the standard procedure, the particular roles that they play in the process is not.

Importantly, Integrated's managers perceive that a single, standard investment process is associated with the documented standard procedure. When asked to describe how capital investment proposals are generated and evaluated in their company, 25 of the 27 managers interviewed outlined a decentralized, bottom-up process that mirrored the standard process model. (The other two said that they were not sure if there was a typical process, but neither could describe any process other than a bottom-up one.) Despite this perception of a single process, these same managers described significant deviations from this standard process when they recounted the stories of particular investments. The process differences were not intended but emergent.

CHARACTERISTICS OF THE INVESTMENT PROCESS

The dimensions of the investment process discussed below are a combination of characteristics that were specifically investigated so as to permit comparisons with previous research and characteristics that emerged as being important to either distinguishing between investment types or better understanding the processes followed.

Information, Managerial Roles, and Process Sequence

Proposal initiation. A key component of the standard process model is that investment ideas originate and proposals are developed at the lower levels of firms because division specialists who are close to the operations and the market have the best information with which to identify and evaluate investment opportunities. The process is decentralized because the information is decentralized. But if an investment is viewed in terms of the organizational capability being developed rather than in product-market terms, this assumption of decentralized information may not hold. Would division specialists necessarily possess the best information about what organizational capabilities a company should develop?

At Integrated Paper, some investment decisions were initiated by division specialists, but others were initiated by more senior managers. All eight maintain investments were initiated by specialists at lower levels in the division, and all but one of the 13 new investments were initiated at the senior division or corporate level. Initiation of the eight add investments was equally divided between division specialist and more senior managerial levels. A Kruskal-Wallis test of this relationship between investment type and level of initiation was significant ($p < .000$). These differences in level of initiation can be explained by the nature of the information that resides at different levels of the company. Information about opportunities to invest in maintaining an existing capability is likely to reside in the division making the investment because, by definition, similar investments have been made previously and the division is likely to have the experience and expertise required. Furthermore, the investment is consistent with an already approved and established strategy. In contrast, the decision to invest in a new capability involves more uncertainty about both developing and using that capability. The idea of making this type of investment may represent a change from existing strategy or development of missing or underdeveloped components of an existing strategy. It is less likely to be initiated by a division specialist because it is outside his experience base. Add investments represent an intermediate case in terms of previous experience and, not surprisingly, are initiated at both lower and more senior levels. In general, the hierarchical level at which Integrated's projects were initiated was found to differ with the newness of the capability.

The differences in the type of information found at different organizational levels might be explained by differences in the search routines of the managers (Cyert & March, 1963). Lower-level managers may conduct local searches for satisfactory investment opportunities as they manage the stock of existing capabilities. However, local search may not be sufficient to identify opportunities to invest in new capabilities that are by definition outside current experience. Senior managers may be conducting broader searches, thereby identifying addi-

tional investment opportunities not based on the existing capability stock. Consider the following quote from an engineering manager about a new project to manufacture a particular grade of paper:

> [The project] came out of nowhere. It was a corporate proposal. It was risky. You had to believe that the market would go for [a product with these specifications]. We hadn't thought of it. Once corporate proposed it, we were willing to take the risk.

Even once a project had been proposed, the division specialist managers sometimes saw a project only in terms of their current experience. Consider the following quotes from senior division managers about two new investments:

> The operating people saw this [project] as an equipment replacement, but it was part of a larger strategy to change what we could do for our customers. They had trouble seeing this as part of a bigger, longer-term initiative that would change how we serve our customers.

> Operations just couldn't see it. Neither could the division marketing people. They thought we needed the [equipment] to upgrade the plant because [a competitor] was doing something like it—a me-too investment. But that wasn't it. Building a high quality [technical] capability is key for us, and this project initiated that program. The logic is not [making] the same product for current customers, but with higher quality. It is using our new skills to get new business and higher value business—so new products and new customers.

Proposal development and management. Although different types of investments were initiated at different hierarchical levels of the firm, division specialists led the development of all investment project proposals. This is consistent with the standard process model. In 26 of the 29 cases, the specialists were engineering managers, reflecting the fact that the projects were investments in production equipment. In the other three cases, all customer service– or marketing-driven, the specialists were marketing managers. So, in all cases, individuals who possessed the specialist information required to provide project details and articulate specific costs and benefits developed the proposals.

However, even though division specialists led proposal development for all investment types, the participation of other levels of management differed by investment type. For new investments only, senior divisional and corporate managers were directly involved, along with the division specialists, in proposal development. In fact, all three levels of management participated in the development of all 13 proposals for new investments. As the quotes in the preceding section illustrate, for some projects, the operating-level perspective of division specialists sometimes bounded their view of a project. They framed the project and its benefits in terms of current experience and not in the broader terms that senior managers applied. It was therefore necessary for senior management to play a more active role and provide information that the operating-level managers lacked.

The senior management involvement took several forms, such as participating in discussions about how the investment would change future division and firm strategies, providing input about how the investment would affect other divisions and their strategies, participating in discussions of alternatives, reviewing preliminary analyses, questioning forecasts and assumptions, and providing an ongoing indication of what the proposal would have to look like to ultimately be formally approved. They were in effect shaping the context of the investment. But rather than doing it in a general systemic way, the shaping was investment-specific. This finding is similar to what Marsh and colleagues (1988) reported about senior management involvement. However, Marsh and colleagues were unable to discern why there was direct involvement in some investments and not in others; in the research reported here, a systematic relationship with investment type can be seen.

In the standard process model of investment, every project is managed up through the organizational hierarchy by a manager who provides impetus for, or champions, the project. Integrated's investment projects were all championed; however, the hierarchical level of the champion differed significantly with investment type ($p < .002$). Although maintain and add investments were championed by either division specialists or senior division managers, new investments were championed exclusively by senior division managers. In 7 of the 13 cases, this manager was the division's general manager. The more uncertain the costs and benefits associated with an investment, the more judgment is required. More senior managers are in a position to make those judgments by virtue of their arguably more strategic perspective and their level of responsibility. Both division- and operating-level managers framed championing new investments in terms of risk taking. Because the outcomes of making the investments are uncertain, supporting these investments is perceived to be personally risky. There was evidence that Integrated's senior managers were willing to undertake more uncertain investments even when the division specialist managers were reluctant. This finding is consistent with MacCrimmon and Wehrung's

(1986) finding that managers at the top of an organization and those with greater authority were more willing to take risks than lower-level managers and those with less authority.

The willingness to take risks appeared to also be influenced by the compensation and incentive system in place at Integrated. Consider this quote from a senior division manager:

> Any time you're doing a high-risk project, you have to give some leeway to the production unit. This project would negatively affect productivity and yield. So, to get them on board, we had to cut some slack on the performance measurement.

The division specialist managers were evaluated on the basis of productivity and other operating-level performance measures. Consequently, there was a tendency for them to concentrate on the incremental adverse effect that an individual investment could have on operating performance. As Shapira (1994) found in his study of managerial risk taking, the consequences of anticipated failure are more prominent in a manager's mind than the consequences of expected success. In contrast, an explicit part of the senior division managers' performance appraisal was the division's return on total capital. These managers were expected to manage portfolios of capital investments to achieve an acceptable return as specified by the corporate office. The purpose of this incentive scheme was to reduce both Type I (investing in bad projects) and Type II (not investing in good projects) errors (Shapira, 1994). The division managers therefore looked at capital investment opportunities in the context of the portfolio rather than on a stand-alone basis. This contextual focus encouraged more risk-taking behavior than a project-by-project approach would have.

The direct involvement of senior management in new projects is also consistent with Maidique's (1980) finding that a "business innovator" who has political clout is important to the success of an innovation. A similar observation was made by Day (1994), who found that innovations that represented a new strategic direction and did not draw heavily on existing operating assets tended to be driven by corporate managers. Investments in new capabilities may similarly represent changes to existing strategy. Unlike maintain or add investments, new investments do not signal previous commitment to developing the capabilities involved.

Project approval. The final stage of the standard process model is formal approval, and each of the investment projects studied did receive formal approval at the end of the process. However, receiving formal approval, in the form of a sign-off by the highest management level required by Integrated's formal procedure, was not the same as receiving effective approval. In many cases, effective approval of a project, generally verbal approval from the most senior managers required to ultimately sign off, preceded formal approval. This effective approval was found to come at one of four stages in the life of a project proposal: (1) at its inception, (2) early, but after some analysis was completed, (3) after the entire analysis was completed, or (4) when the project was formally submitted to corporate management for sign-off.

The stage at which a project was approved was inversely related to the uncertainty associated with the investment, with effective approval coming earliest for new and latest for maintain investments; add investments represented an intermediate case, with some early but primarily later approvals. Division-level approval was even coincident with inception for 8 out of the 13 new projects, not surprising given that 12 of the 13 were initiated by senior division or corporate managers, and all had senior champions. Corporate approval was also provided prior to formal submission for 11 of the 12 new projects that required it. As senior managers initiate and participate in the development of proposals for new investments, the stages of the investment process become blurred, and the decision-making process becomes "quasi decision making"—that is, a formal procedure enacted when the decision has in effect already been made (Hickson, Butler, Cray, Mallory, & Wilson, 1986).

These observations about the location of information, the hierarchical level of the managers involved, and the sequencing of process stages lead to the following propositions:

Proposition 1. The location of relevant information about an investment project will differ with the uncertainty associated with the investment project, and the involvement of managers at different hierarchical levels will reflect the location of this information.

Proposition 2. The higher the level of uncertainty associated with an investment project, the more extensive the direct involvement of senior divisional and corporate managers in the investment process. Involvement will be more extensive for new investments than for maintain or add investments.

Proposition 3. The higher the level of uncertainty associated with an investment project, the more likely there is quasi decision making. Maintain and add investments will follow a

process in which approval is subsequent to other stages, but new investments will follow a process in which approval is coincident with other stages and that exhibits quasi decision making.

Analysis and Evaluation of Investment Projects

In addition to differences in managerial involvement and sequencing of process stages, there were also differences in how projects of different types were analyzed and evaluated.

Procedural rationality of investment decision making. The degree of procedural rationality associated with a decision process is defined as the extent to which decision makers collect, analyze, and rely upon relevant information (Dean & Sharfman, 1993, 1996). Two competing arguments can be made for how the uncertainty associated with an investment affects procedural rationality. Under conditions of uncertainty, information about future events is lacking, so outcomes are not known. If information does not exist, managers cannot acquire and analyze it; therefore, knowing this to be the case, they will not even attempt to acquire and analyze, so procedural rationality is low (Dean & Sharfman, 1993). Alternatively, a lack of information about certain future events could lead managers to try to increase collection and analysis of information that does exist, in an attempt to reduce the uncertainty; thereby, the degree of procedural rationality increases (Eisenhardt, 1989).

Evidence from the investment decisions at Integrated supports the first of these arguments. The mean values of the procedural rationality scale decreased with the uncertainty associated with the investment, being highest for maintain (5.86 on a 7-point scale), lower for add (5.73), and lowest for new (5.00). The evidence of quasi decision making for new investments discussed above is consistent with lower procedural rationality. An analysis of variance (ANOVA) showed only the difference between maintain and new investments to be significant ($p < .10$). Despite the small sample size, the data followed a normal distribution, so conducting an ANOVA was possible.

Proposition 4. Procedural rationality will decrease with the uncertainty associated with an investment project. Procedural rationality will be highest for maintain investments and lowest for new investments.

Politicality of decision making. For the investments analyzed, the mean values on the politicality scale increased with the uncertainty associated with an investment, being lowest for maintain (1.47), higher for add (2.31), and highest for new (2.63) investments. Overall, the reported level of politicality at Integrated was low for all types of investments, averaging 2.22 on a 7-point scale. Underlying the low values were responses to questions about personal goals and hidden agendas. Almost every response was a 1 or 2 out of 7. The uniformity of responses suggests that an institutional detail, such as Integrated's culture, could be responsible for the result. When I probed this issue during the interviews, typical comments received were these: "[Integrated's] culture is to put the organization first. That's how you get ahead," "In this division, we don't hide our positions on issues," and "At [Integrated], playing games doesn't pay off." Because there was little variance among responses to these two questions about personal goals and hidden agendas, the politicality measure was driven almost entirely by responses to questions about the use of power and the extent of negotiation. For this reason, the relationship between investment type and politicality should be viewed with some caution.

Although the absolute responses were low, an ANOVA indicated that the differences between maintain and add ($p < .05$) and maintain and new ($p < .001$) are statistically significant. Several factors could contribute to these differences. The higher the level of uncertainty associated with a capability, the less clear the outcome of an associated investment decision. For a new investment, there is a higher probability of managers having differing preferences about the means of developing the capability and differing views about the anticipated result of investing, increasing the chance of conflict among decision makers and thereby also increasing the politicality. A second factor is that new investments, which by definition are innovative, may pose a threat to existing patterns of resource sharing within a firm (Pettigrew, 1973), thereby increasing political behavior. A third factor could simply be the more extensive involvement of senior management in the process for new investments. Pettigrew described decision making as "a political process that balances various power vectors" (1973: 265) and found that senior managers, by virtue of their positions of authority, had the most influence over decision outcomes, particularly in the formative early stage and in the conclusive stage of decision making. The interviews with Integrated's managers provided evidence consistent with all three of these factors.

Proposition 5. The politicality of behavior will increase with the uncertainty associated with an investment project. It will be lowest for

maintain investments and highest for new investments.

Justification of investment projects. The investment proposals included both quantitative and qualitative justifications for the projects. Managers use qualitative arguments because the benefits of capabilities can be difficult to quantify. For example, the benefits of improving product quality by adding to the capability of applying coating to a paper surface, or the benefits of developing a new capability to use recycled material in a product line, include an option value. What opportunities will being able to produce a higher-quality paper or being able to incorporate recycled content create? Quantitative justifications were used to calculate returns for the projects. These quantitative justifications were typically based on improved productivity, cost savings, or increased volume, regardless of the actual reason for making the investments. When asked about this in the interviews, managers spoke about "finding tons to make the numbers work," "telling a productivity story," and "spinning a cost-based argument." What is particularly interesting is that when extra tons of production were "found" or a cost-based argument was "spun," it did not appear to be a case of manipulating the forecasts or financial calculations. Additional production volume or cost-savings measures were literally worked into the project specifications. For example, a paper machine was sped up in conjunction with a modification to the machine intended to improve the printing surface of the paper. Although the benefits of offering customers higher-quality paper could not be quantified, the benefits of producing additional volume of paper could be and were used to justify the investment. This behavior is consistent with Dougherty and Heller's (1994) argument that substantive and not just ceremonial reframing is required to legitimize a project. Integrated's current evaluation practices required quantitative justification of projects, and managers found a way to provide this.

Even when probed, managers reported that there was no widespread practice of manipulating cash flow estimates to facilitate project approval. As a division manager explained, "It's not [Integrated] culture to lie about a project just to get it approved. Besides, we would have to live with the consequences." It is impossible to know if manipulation or exaggeration of cash flows was in fact practiced in addition to the substantive modification to projects, or if the culture and/or evaluation and incentive system minimized such a practice.

Project Success and Satisfaction with the Decision-Making Process

I examined two types of project outcomes: project success as objectives attainment—or task outcomes—and satisfaction with the decision-making process, or psychosocial outcomes (Butler et al., 1993; Pinto, Pinto, & Prescott, 1993). Task outcomes were measured both by the perceived degree to which the project objectives had been attained to date (rated on a seven-point scale) and by whether the informant perceived that the right decision had been made (rated as a binary variable). The use of general objectives attainment measures was necessary because the sample included projects at various stages of completion, ranging from having been completed for 12 months to having just had funding approved. Although Integrated performs formal postaudits on many of its capital projects, none had yet been performed on the investments in the sample. Therefore, financial return data were not available.

In only 2 of the 29 cases did informants see the decisions to invest as wrong. (For all projects, the two informants were in agreement.) Both of these projects were investments in new capabilities to enable Integrated to produce new products. Although the projects were technically successful, in both instances, the size of the new market had been grossly overestimated. Preliminary market estimates triggered the development of technical designs and cost estimates, but as one manager commented, "[The project was unsuccessful because] we didn't revisit the marketplace once we knew what it would cost." This failure to gather additional information is consistent with the lower procedural rationality exhibited in new investments.

The perceived degree of success of the projects ranged from 2 to 7 on a 7-point scale, averaging 5.82, indicating a high level of success. The ratings of each pair of informants were averaged to yield one rating per investment. The interrater reliability (James et al., 1984) ranged from 0.5 to 1.0, with the average being 0.92. Four of the decisions were too recent for success to be rated; therefore, this analysis includes only 25 projects. No relationship was found between the perceived success of an investment project and whether the investment was classified as maintain, add, or new (the ANOVA was not significant at the 0.10 level). This is an important result, because we can conclude that the observed process differences between maintain, add, and new capabilities investments were not systematically associated with different degrees of success.

Proposition 6. The success of an investment project is not related to the project type—

that is, to whether the project is maintain, add, or new.

The other type of outcomes, psychosocial outcomes, relate to whether a decision process was satisfying and productive (Pinto et al., 1993). The informants were asked both about their satisfaction with the particular decision process and about whether useful learning resulted (Butler et al., 1993). The comments relating to satisfaction with the process were coded as satisfied, moderately satisfied, and not satisfied. Unlike project success, satisfaction with the process used to make the decision to invest was related to the project type. Integrated's managers were satisfied with the decision process for all but one maintain and one add project and, for those projects, they were moderately satisfied. However, the managers were satisfied with the process used for only 5 of 13 new investments, with the other 8 split evenly between "moderately satisfied" and "not satisfied." The following comments expressed this lack of satisfaction with the process used for new projects:

> We need a better model for project justification. It has to be based on value rather than on production. We need a strategic tie-in.
>
> The [capital budgeting] model didn't work, so, we went to a business case to articulate systems savings. It's a new strategy, not an equipment investment.
>
> We need to look at things in their totality instead of on a piece-by-piece basis.
>
> When we have projects that are more intuitive or gut, we don't have a good process for evaluating them because of their nonquantifiable nature.

The frustration and dissatisfaction appeared to be due the fact that most of the new investments deviated from the standard process that was perceived to exist. As discussed above, new investments followed a less procedurally rational, more political process. The decisions relied less on collecting and analyzing information and more on intuition. There was more use of power and influence and more negotiation. The benefits of these projects were difficult to quantify and/or had a large anticipated future option value, or both. Issues had to be revisited and reevaluated as the proposals took shape and the justification arguments were built. Managers expressed frustration that the process did not progress smoothly or in a straightforward manner.

Proposition 7. Managerial satisfaction with an investment process is not related to perceived project success. It is a function of the political-ity and procedural rationality of the decision-making process.

Butler and colleagues (1993) suggested that an investment decision process is productive if it results in useful learning. The assumption is that the learning will be used to improve the process in the future. In the interviews, the informants were asked to discuss what they learned from the process used to make the decisions to invest. Comments included these:

> This was one of the first cross-functional project task forces we've used. It has set the model.
>
> We learned the benefit of talking to [another division] who had done [a similar project] before.
>
> We now get [a downstream division] to sign off on certain proposals.
>
> We should have gotten the people at [a sister division] and corporate involved to get them to understand what was really going on in the marketplace.
>
> Production should push back at marketing to question the estimates.

Interestingly, the comments above relate to additional information that either was collected and used or should have been collected and used in the decision process. Useful learning was reported for 16 of the 29 projects, including 11 of the 13 new investments. This result is not surprising, since the decision processes for the new investments were less procedurally rational and did not follow the standard process that was perceived to exist. There was useful learning in all 4 cases where managers were not satisfied with the process, in 4 of the 6 cases where managers were moderately satisfied, and in only 8 of the 19 cases where managers were satisfied. This learning may be capturing some recognition that not all projects follow the same process.

A MODEL OF INVESTING IN CAPABILITIES

This field study provided evidence of multiple processes being used simultaneously in the same firm to make capital investments that were associated with capabilities. Different investment processes were followed for different investment projects. These multiple processes exist despite there being a single official firmwide formal procedure outlined in Integrated's company documents and despite the fact that the multiple processes are not even explicitly recognized by the vast majority of managers participating in them. This broad finding supports the notion that investment decision making is a decision-level and not a firm-level con-

struct. Furthermore, the multiple decision processes differed systematically with investment type.

The most striking differences exist between the processes followed for investments to maintain or add to existing capabilities (that is, the maintain or add investments) and the process followed for investments to build new capabilities (that is, the new investments). Although there were some differences in process characteristics between the maintain and add investments, these differences are less pronounced and less numerous than the other observed differences. The standard process model essentially captures the information flows and the relationships between elements of the process of investing in an existing capability, whether the investment maintains that capability or adds to it. However, this model captures neither the information flows nor the relationships between process elements for investing in a new capability. Therefore, for the purpose of understanding the investment decision process, the three original theoretically defined categories can be collapsed to two, "existing," which combines maintain and add investments, and "new," which constitutes a separate type.

The results of this research suggest that the standard process model requires revision to accommodate investments in new capabilities. Figure 1 contrasts the two patterns of investment process elements that correspond to investments in existing and new capabilities, respectively labeled the "existing capability submodel" and the "new capability submodel." The grids lay out the elements of the investment process and the organizational level of the managers involved in the process. The arrows map the sequence of process elements and the hierarchical levels of the managers involved in each element for each of the 29 investment projects in the sample. Patterns are evident in these mappings. The shaded blocks indicate the hierarchical levels of management that play a primary role in each process element. There are, of course, some deviations, but overall, the investments within each type, existing and new, follow very similar patterns. Additional characteristics of the submodels not captured by the process mapping are listed next to each grid.

The existing capability submodel corresponds to the standard process model of capital investment; however, the new capability submodel differs considerably from the standard process model. One key difference is that new projects originate at a more senior level of an organization, specifically, at the senior division level rather than at the operating level. Senior managers conduct broader, less local information searches than operating-level managers and are therefore better able to identify opportunities to invest in new capabilities that are outside current experience. Another difference is the direct intervention in the development of the investment proposal by both senior division and corporate managers. This intervention results in a less procedurally rational and more political decision process. There is more extensive exercise of power and use of negotiation, resulting in quasi decision making, wherein decisions are effectively made by senior management well in advance of formal, final approval.

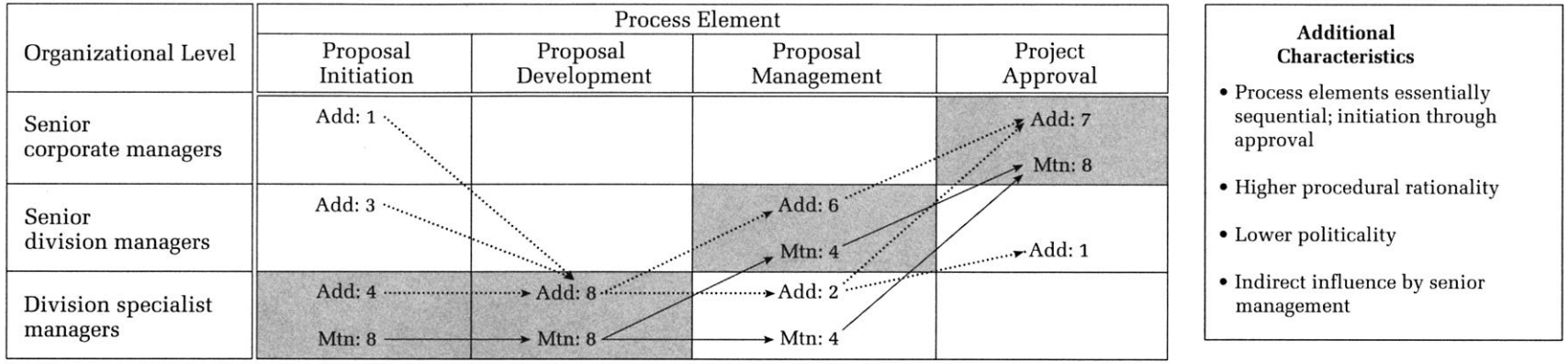
Implications

In this study, I found two capital investment processes that differed systematically according to whether the investment was being made in an existing or a new capability. At Integrated, the two observed investment routines were emergent. They were neither explicitly designed nor even recognized as existing. What if the two routines could be recognized and intentionally managed? This question suggests a contingency approach: match the investment process to investment type. Recall that there was no difference in the perceived success of the projects on the basis of investment type, indicating that the processes were equally successful. This is an important result. The observed deviations from the standard process model, the decision model that Integrated's managers thought was being used, were not associated with inferior performance in terms of task outcomes. Therefore, these deviations can be interpreted as differences to recognize and manage rather than as problems to correct. This recognition might also improve the psychosocial outcomes, since the deviations appear to be a source of dissatisfaction with the process. If potential investments in new and existing capabilities could be identified and classified a priori, a decision process could be matched to each investment. This explicit matching of process to investment type could itself be developed as an organizational capability.

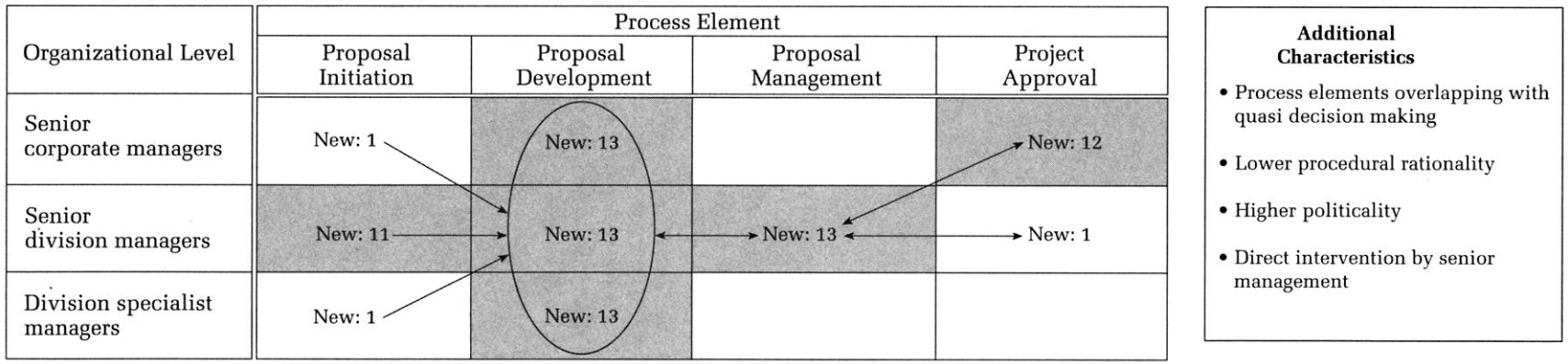
Organizational capabilities can be thought of as existing in a hierarchy (Collis, 1994; Grant, 1996). Lower-order, operating-level capabilities correspond to performing more specific activities, and higher-order capabilities correspond to performing more general activities that govern or integrate the lower-level activities. The capabilities in which Integrated invested, such as coating, process control, pulp handling, and so forth, are examples of lower-order, operating-level capabilities. In contrast, the capability to match investment decision process to

FIGURE 1
A Revised Process Model of Capital Investment[a]

Existing Capability Submodel



New Capability Submodel



[a] Arrows indicate information flows and process sequence. Numbers represent the number of investments following the path. Shading indicates involvement of a given managerial level in a process element.

investment type is an example of a higher-order capability, what is sometimes referred to as a dynamic capability (Teece et al., 1997). This higher-order capability provides the capacity to make changes to the lower-order ones, in this case, the capability to effectively manage decisions about investing in operating-level capabilities. If matching process to type leads to improved performance, a firm with a superior capability to make the required distinctions among investment types and match an investment to a decision-making process may develop an advantage over competitors.

Taking such a contingency approach to capital investment would require managers to adopt a "capability mentality," linking strategy development to capital investment by framing their capital plans and budgets in terms of organizational capabilities. Integrated did not use the term "capability," but it did recognize "core skills" that closely correspond to many of the operating-level capabilities in Table 1. The capital investment proposals studied provide evidence that the managers thought in terms of how an investment would contribute to the set of core skills, although that reasoning was generally not incorporated into the quantitative justification. Learning to explicitly characterize its capital investments in terms of the associated capabilities would be the first step toward developing the higher-order capability to match process to type for Integrated.

The study's findings also have implications for how firms allocate management of capabilities within their organizations. The distinction between new and existing capabilities is an important one. Lower-level managers within the divisions at Integrated appeared to have the experience and information, or at least the search routines, to manage the stock of existing capabilities with minimal involvement of more senior managers. This permitted senior division and corporate managers to devote attention to developing new capabilities. The direct involvement of senior management in proposal initiation and development for new investments also raises an interesting question. Had management instead relied on the structural context and strategic objectives they had established to identify good projects and screen out others, as the standard process model suggests, would fewer new investments have been made, thereby resulting in fewer qualitative changes to the firm's capability stock? At Integrated, there was evidence of only one new investment originating at the bottom of the organization. What opportunities are missed when senior management delegates the identification of all investment opportunities to specialists at lower levels of the organization?

Limitations and Future Research

Several limitations of the study constrain the interpretation and application of the findings. The first limitation is the single-firm setting, which by definition limits generalizability. Integrated was chosen as it was likely to exhibit the phenomena of interest in the research. A trade-off was made between having a rich source of detailed data about organizational process and a multifirm sample that would permit statistical inferences to be made but would not generate the level of detailed findings necessary to identify potentially important relationships. The next step in researching these relationships is to move to a multifirm context to test the propositions presented here and confirm that the existing/new distinction is important to understanding the processes used to invest in capabilities. A discriminant technique that defines the dependent variable as investment type and process characteristics as the explanatory variables would permit this test and could be used to empirically develop a contingency model. Key to the idea of a contingency approach is that the different processes themselves are not associated with different outcomes. The implication is that it is the matching and not a given set of investment characteristics that leads to superior results. At Integrated, the different processes led to equally successful outcomes, but this proposition needs to be tested. For the various reasons outlined earlier, only perceptual outcome measures were used in this study. Further investigations should include objective performance measures.

Another limitation concerns sample censoring. The 29 projects studied were all approved; therefore, it is impossible to compare projects that were accepted and those that were declined. In this setting, the absence of documentation for declined proposals prevented their systematic identification and analysis. However, to fully understand how the management of existing and new capabilities might be allocated in an organization, it is crucial to develop an understanding of what projects do not make it through the system and why.

Since the focus of the study was on investing in capabilities through capital investment, the sample was also limited to those capital investments that were clearly associated with capabilities. The results indicate that investing in new capabilities is different from investing in existing capabilities, but is breaking out new investments enough? Are there distinctions between capital investment in capabilities and the capital investments in routine equipment repair excluded from the study that are important to understanding the capital investment

process? It could be argued that since the standard process model satisfactorily captures the process of investing in existing capabilities, it should also capture the process of investing in routine repair investments that are associated with an even lower level of uncertainty. However, this proposition needs to be tested.

This research project has provided some insights into the process of making decisions about capital investments in capabilities. The recognition of distinct processes for investing in existing and new capabilities provides a promising starting point for further research that moves beyond identifying organizational capabilities and looks at how they are managed over time.

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