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IMPLEMENTATION STRATEGY AND PERFORMANCE OUTCOMES IN RELATED DIVERSIFICATION

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Strategy research has a long-standing interest in the performance consequences of corporate diversification. In theory, resource sharing should yield economic benefits in related multi-business firms, but the extensive empirical research remains equivocal. To explore this paradox, this paper examines the process of implementing a related diversification strategy. Working from existing theory, a formal model is constructed that describes the process and performance implications of a related diversification move. The model is analyzed using computer simulation, and the analysis suggests that successful diversification strategies require managerial policies that maintain organization slack. In the absence of such policies, related diversification can negatively impact firm performance even when substantial synergy opportunities exist. The analysis also demonstrates, contrary to existing theory, that diversification strategies based on a very high degree of relatedness can lead to lower performance than less related strategies in some circumstances. Counter-intuitively, extracting potential synergies may require additional investment in shared resources. Copyright © 2005 John Wiley & Sons, Ltd.

INTRODUCTION

The potential for firms to create competitive advantages through related diversification has long been a central research topic in strategic management. Economic theory suggests that when the costs of producing separate outputs exceed the costs of joint production firms can achieve economies of scope (Panzar and Willig, 1981). These synergies can potentially result when a firm shares input factors of production across multiple products or lines of business, giving rise to the hypothesis that product and resource-related diversification generates greater economic value than single-business focus and unrelated diversified strategies (Bettis, 1981; Rumelt, 1974, 1982).

This logic is attractive, but the empirical data have not complied. The evidence from a substantial body of empirical research does not conclusively find the related strategy superior to unrelated diversified firms, and this remains an unexplained paradox. On one hand, there are numerous studies that find support for the superiority of related over unrelated diversification (Bettis, 1981; Markides and Williamson, 1994, 1996; Rumelt, 1974, 1982). On the other hand, there are many studies which have found no significant relationship between diversification strategy and performance after controlling for industry effects, prior performance, or measuring relatedness differently (Christensen and Montgomery, 1981; Grant, Jammine, and Thomas, 1988; Hill, 1983; Hill, Hitt, and Hoskisson, 1992; Montgomery, 1985).

Keywords: diversification; synergy; implementation; decision policies; simulation; system dynamics
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In trying to account for the mixed empirical findings over the last four decades, scholars have primarily sought to define and measure relatedness differently. Much of the empirical work has examined 3- to 5-year time spans to test cross-sectional differences across diversification categories. However, we know that it can take up to 12 years before the full performance impact of a single diversification move can be assessed (Biggadike, 1979). We also know that firm diversification profiles can and do change quite dramatically over relatively short time periods due to acquisitions, divestments, and other forms of restructuring. Under such conditions, it has proven very difficult to untangle the effects of the diversification–performance relationship in cross-sectional comparative studies, and some scholars have suggested that this line of inquiry has been exhausted. 'The prospect for gaining new empirical insights by examining cross-sectional relationships between alternative measures of diversity and performance seems to be slim' (Ramanujam and Varadarajan, 1989: 543).

In addition, existing theory suggests that success or failure in diversification is determined by a complex interaction among multiple variables (Hoskisson and Hitt, 1990; Ramanujam and Varadarajan, 1989). Some scholars have highlighted the need for new research approaches to further our understanding of the relationship between diversification and performance. 'We now need a more revolutionary approach, integrating the various perspectives to build a more realistic and effective theory of diversification' (Hoskisson and Hitt, 1990: 499).

In developing a richer theory of diversification, a growing stream of research suggests that implementation strategy and process mechanisms are crucial for the success of strategies motivated by potential synergy benefits. Increasingly, the evidence from mergers and acquisitions research suggests that realizing potential synergy benefits requires appropriate implementation processes (Datta, 1991; Larsson and Finkelstein, 1999; Pablo, 1994). It seems that value creation in mergers and acquisitions stems not from relatedness, but primarily on how the interdependencies that contribute to the benefits are managed (Haspeslagh and Jemison, 1987). A similar theme has emerged from diversification research, with mounting evidence that implementation difficulties may offset the potential benefits of relatedness (Nayyar, 1992; Reed and Luffman, 1986). Findings on the crucial role of SBU decision making and managerial policies as determinants of performance in diversified firms provide additional support for the importance of implementation strategy (Stimpert and Duhaime, 1997). As in mergers and acquisitions, it seems the realization of potential synergy benefits depends on how effectively linkages between SBUs are managed (Gupta and Govindarajan, 1986).

There is clearly a need to build a richer theory about diversification encompassing multiple variables from existing theory, incorporating implementation strategies and managerial policies, and capturing the dynamic nature of diversification profiles. In this paper, the process through which a single-business firm diversifies into a related business is explored by combining the existing theory on related diversification with a set of hypothetical implementation strategies. A formal model is constructed of the process by drawing on established variables and relationships. Simulation experiments are employed to analyze the performance implications of a related diversification move, removing uncertainty about the implications of synthesizing established variables and relationships into a causal theory of diversification. The analysis generates new insights through this integration, and these insights can be tested in future empirical work.

This paper represents the first attempt to build a simulation model exploring the implementation process of a related diversification move. Diversification moves are fundamentally a disequilibrium phenomenon, and simulation is a research method well suited to analyzing dynamic issues. Simulation modeling has become increasingly popular in strategic management and organization theory to refine and test our progressively dynamic theories (Adner, 2002; Oliva and Sterman, 2001; Repenning, 2002; Sastry, 1997; Zott, 2003). Building a formal model forces us to be much more precise about our constructs and the associated causal relationships underpinning the diversification–performance relationship. This added precision is important in deepening our understanding of unresolved complex organizational issues such as diversification, where our theories need further development before empirical studies can help resolve the remaining questions and knowledge gaps.

MODELING RELATED DIVERSIFICATION

To explore the process of implementing a related diversification strategy, a formal model is developed in this section from existing theory. The benefits of translating verbal theory into mathematical form include an ability to evaluate the internal validity of the theory, and a mechanism for discovering new insights from existing theory. The model is constructed to examine the implementation process and performance implications of a single-business firm diversifying into a related business. Managers have considerable scope in shaping implementation strategy, and the implementation difficulties firms face in trying to realize potential synergy benefits are a crucial component in understanding the success or failure of a related diversification move. Computer simulation enables us to examine the performance consequences of a range of implementation strategies, and helps further our understanding of the role managerial decision making and policies play in related diversification. The analysis suggests that combining variables and relationships already present in the literature provides a persuasive explanation for the elusive nature of synergy in related diversification.

The model is developed incrementally by adding additional variables and relationships at each stage, and Table 1 provides an overview of the seven different managerial diversification strategies represented. We begin the analysis from the perspective of a single-business firm focused entirely on its core business. The Single Business Focus strategy establishes a benchmark for the value created by remaining a specialist, focused firm. The next step in the analysis is to explore the implications of diversifying beyond this core business into a related business. The Ideal Related Diversification strategy represents a related diversification move where the firm extracts all of the potential synergy benefits of sharing resources across the core and new businesses without any implementation costs. This establishes an unattainable standard for an idyllic related diversification. These first two strategies in Table 1 serve as benchmarks. From this point, we explore the performance consequences of five different diversification implementation strategies in which there are costs for poor implementation of sharing resources. Table 1 provides an overview of the diversification strategies that will be explored in the subsequent pages: the (3) No Investment, (4) Myopic Investment, (5) Myopic Investment Very Related Diversification, (6) Myopic Investment with Higher Initial Slack, and (7) Maintain Slack strategies. Each of these implementation strategies will be discussed as we progress through them sequentially.

Resource sharing

The established single-business firm starts with an existing set of resources—including tangibles such as plant and equipment or skilled employees and intangibles such as manufacturing and marketing capabilities—to perform the tasks required for the

Table 1. Overview of seven managerial diversification strategies represented in the formal model and explored using simulation experiments

Strategy	Core business activities and resources	Initial organization slack (%)	Diversify into new business	Potential economies of scope synergy	Implementation costs	Investment in shared resources	Increasing productivity aspirations
1. Single Business Focus	√	5					
2. Ideal Related Diversification	√	5	√	√			
3. No Investment	√	5	√	√	√		
4. Myopic Investment	√	5	√	√	√	√	√
5. Myopic Investment Very Related Diversification	√	5	√	√ Higher	√	√	√
6. Myopic Investment with Higher Initial Slack	√	10	√	√	√	√	√
7. Maintain Slack	√	5	√	√	√	√	

smooth operation of the business. The firm is initially endowed with excess resources beyond what are required for normal, efficient operations in the core business. Furthermore, the firm cannot trade its excess resources in factor markets. Under these conditions, theory suggests that the firm's excess resources provide an economic justification to diversify into a new, related business (Teece, 1982; Williamson, 1985).

The resources that can be shared with the new business are represented as an asset stock that accumulates or depletes over time (Dierickx and Cool, 1989; Markides and Williamson, 1994; Penrose, 1959; Teece, Pisano, and Shuen, 1997; Thomke and Kuemmerle, 2002). This aggregate stock of resources represents any set of factors that can be shared in a diversifying firm, including tangibles and intangibles. Examples of shared resources include the senior management team responsible for strategic or financial budget decisions across businesses, plant and equipment that can be used to manufacture multiple products, a group of engineers or scientists using their expertise to advance new products in multiple businesses, or an experienced sales force cross-selling multiple products. An asset stock cannot be adjusted instantaneously, but rather evolves in response to the time path of investment flows (Dierickx and Cool, 1989). Equation 1 formalizes this stock of shared resources (R_t) as the initial value of shared resources (R_0) plus the integral of investment in shared resources over time (i_t).[1]

$$R_t = R_0 + \int_0^t i_t \, dt \qquad (1)$$

A related diversification move couples the established core business and a growing new business that will grow for several years before reaching equilibrium—typical logistic growth. For simplicity, growth in the new business can be measured by the size of the customer base. Equation 2 specifies growth in new business customers (N_t) over time using the standard logistic growth equation (Verhulst, 1977). PC is the number of potential customers in the market, N_0 is the number of initial new business customers, g is the normal growth rate of the customer base, and σ is a parameter that can take on values of zero or one to determine whether the firm follows the Single Business Focus strategy ($\sigma = 0$) or embarks on a related diversification strategy ($\sigma = 1$).[2]

$$N_t = \frac{PC \cdot \sigma}{1 + \left[\dfrac{PC}{N_0} - 1\right] \cdot e^{-g \cdot t}} \qquad (2)$$

Performance of the firm is operationalized in Equation 3, where firm profit margin (π_t) includes the economic implications of the diversification move. Revenue of the core business (κ) is constant over time, and new business revenue is determined by the number of new business customers (N_t) and the average revenue per customer each quarter (ε). The cost structure for the firm includes fixed costs (ψ), the costs of shared resources, and variable costs of servicing new business customers. The costs of shared resources are a function of the stock of shared resources (R_t) and the variable cost of each unit of shared resources (υ). The variable costs of servicing new business customers are a function of the number of new business customers (N_t) and the variable cost per new business customer each quarter (θ).

$$\pi_t = \frac{\kappa + (N_t \cdot \varepsilon) - [\psi + (R_t \cdot \upsilon) + (N_t \cdot \theta)]}{\kappa + (N_t \cdot \varepsilon)} \qquad (3)$$

The term in the denominator is total firm revenue, and the term in brackets in the numerator is total firm costs. Economies of scope arise through spreading the existing fixed costs (ψ) over both the established and new businesses and through higher utilization of shared resources.

To establish benchmarks for comparisons, the performance implications of the Single Business Focus and Ideal Related Diversification strategies are presented in Figure 1. Performance of the firm is reported quarterly over a 15-year time period, and performance is reported as a profitability index where all values have been indexed relative to the Single Business Focus profit margin. Previous

[1] The investment rate denotes the net investment in shared resources including the acquisition of new resources and the decay rate of existing resources.

[2] The formulation for new business customers can be considered a test input for growth in a new business. The logistic equation was chosen to represent organic growth. In general, this test input could take on any functional form including linear, quadratic, or a step function to represent an acquisition strategy.

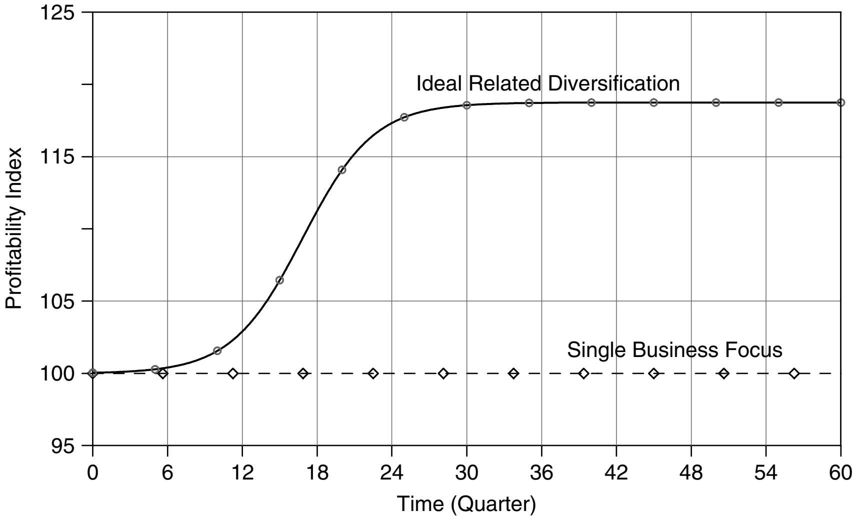

Figure 1. Profitability benchmarks for the Single Business Focus and Ideal Related Diversification strategies (indexed relative to Single Business Focus strategy)

research findings suggest that it can take up to 12 years before the full impact of a diversification strategy is fully realized (Biggadike, 1979), and a time horizon of 15 years ensures that we capture the full impact of the diversification move on performance. Model parameters have been chosen to represent a generic firm and are provided in the Appendix.

In the Single Business Focus strategy, the firm is focused exclusively on a mature core business that is neither growing nor shrinking over the entire time horizon. As shown in Figure 1, profitability for the Single Business Focus experiment is in a stable equilibrium. In this experiment, the firm starts with 5 percent excess resources and this organization slack is maintained throughout the simulation. In the Ideal Related Diversification strategy, also shown in Figure 1, the firm exploits these excess resources by embarking on a diversification move into a related, new business. This diversification move illustrates a strategy in which resource sharing between the two businesses yields significant economies of scope benefits, and profitability considerably exceeds the benchmark for the Single Business Focus strategy by the end of the simulation. Managers focused exclusively on the potential benefits of a related strategy may well envision this type of idyllic diversification move.

Figure 2 illustrates growth in the new business for the Ideal Related Diversification strategy. The new business customer base follows a logistic growth curve over time, starting near zero and ultimately saturating at the potential customer base of 500,000. Performance in this strategy exceeds performance in the Single Business Focus strategy due to leveraging shared resources and spreading out the fixed costs across both the core and new businesses. Revenues, earnings, and profitability all reach equilibrium as the customer base stops growing and reaches equilibrium.

Organization slack and implementation costs

Consistent with theory, the firm in the Ideal Related Diversification strategy is assumed to have excess resources prior to diversifying into the new business (Teece, 1982; Williamson, 1985). The concept of excess resources refers to the services of factor inputs available after the requirements for the continuing profitable operation of the core business have been met (Teece, 1982). This is very similar to the concept of slack, where organization slack is the cushion of resources above the combination of work demands within the organization (Bourgeois, 1981; Cyert and March, 1963; Nohria and Gulati, 1996). Excess resources are a necessary requirement for achieving economic gains in a related diversification move, and the organization slack construct must therefore be incorporated into the analysis to explore the process of implementing a related diversification strategy.

To operationalize organization slack, it is first necessary to specify the work demands within the

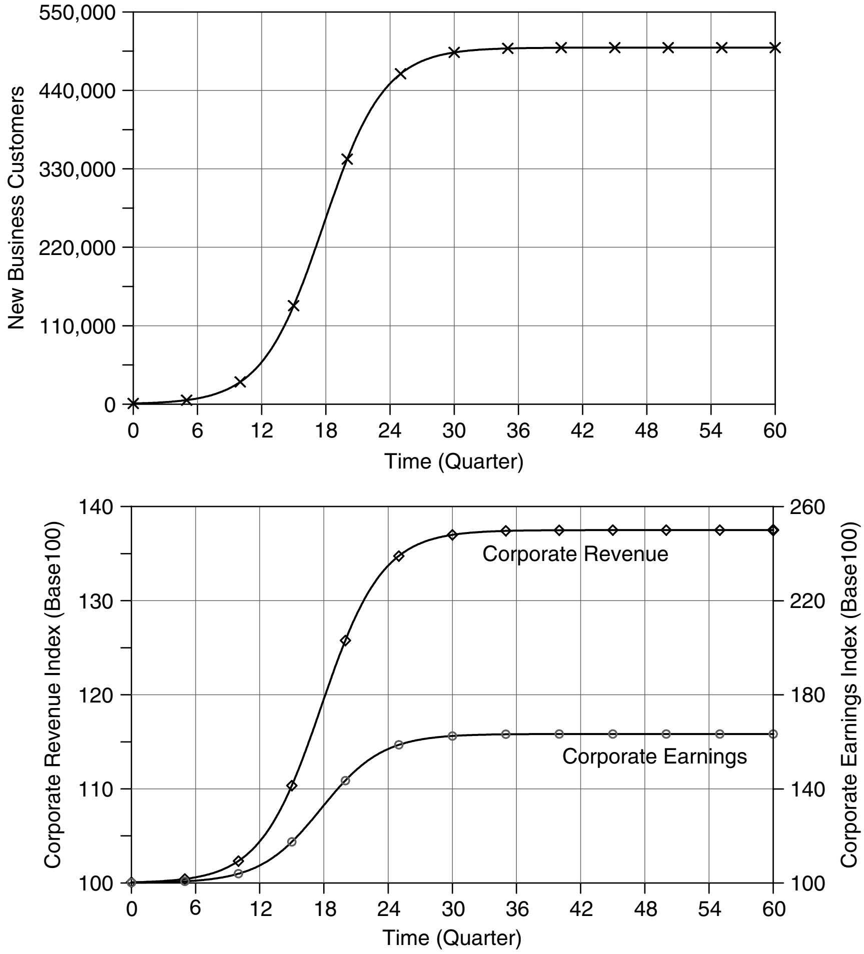

Figure 2. Growth in New Business Customers, Corporate Revenue and Corporate Earnings, for the Ideal Related Diversification strategy

firm and the level of resources required to meet those work demands. Organization slack can then be defined as the level of resources in excess of what is required for the 'normal' efficient operation of the firm (Bourgeois, 1981; Teece, 1982). In Equation 4, the firm's total work demands (d_t) are defined as the workload of the core business (χ) plus the workload of the new, related business. The work demands of the core business (χ) remain constant throughout the simulation horizon, consistent with a mature core business in equilibrium. Work demands in the new business are proportional to the number of customers in the new business (N_t). The work demands of each new business customer (λ) are assumed constant; each quarter every new business customer generates a fixed amount of work for the firm. This is consistent with theory on the growth of the firm: 'the total amount of work to be done at any time in a firm depends on the size of the firm's operations' (Penrose, 1959: 46–47).

$$d_t = \chi + (N_t \cdot \lambda) \tag{4}$$

Given the total work demands each quarter, the firm requires a certain minimum level of resources capable of completing those work demands for the normal, efficient operations of the firm (Bourgeois, 1981; Teece, 1982). Equation 5 specifies the level of resources required (R_t^E) for the efficient operations of the firm as the total work demands (d_t) divided by the maximum efficient productivity of shared resources (ρ). Productivity is defined as the output of any production process, per unit of input; it is a measure of the ability to create goods and services from a given amount of resources—labor, capital, materials, land, knowledge, time, or any combination of those.

$$R_t^E = \frac{d_t}{\rho} \tag{5}$$

The firm's level of excess or slack shared resources (s_t) is operationalized in Equation 6 as the percentage difference between the current shared resources in the firm (R_t) and the amount of resources required for the normal, efficient operations of the firm (R_t^E). A value of slack greater than zero indicates excess resources. If organization slack is zero, the stock of shared resources is perfectly sized to match the total work demands for the efficient operation of the firm. A value of slack less than zero signifies that the stock of shared resources is overstretched or strained, and cannot adequately cope with the total work demands. This formulation is consistent with definitions of slack in previous research (Bourgeois, 1981; Teece, 1982).

$$s_t = \frac{R_t - R_t^E}{R_t^E} \tag{6}$$

Theory suggests that increased utilization of excess resources should result in improved financial performance (Markides and Williamson, 1994; Teece, 1982). However, increased utilization only improves firm performance if there are shared resources in excess of what is required for the normal, efficient operation of the firm. Rapid growth, through diversification into a new business, may result in steeply rising work demands that quickly outstrip the initial organization slack that motivated the diversification move in the first place. When total work demands exceed the level of shared resources required for the smooth operation of the business, the result is rising costs of spreading the firm too thin. As the demand for shared resources increases in the firm, 'bottlenecks in the form of over-extended scientists, engineers, and managers can be anticipated' (Teece, 1982: 53).

Overextended managers, engineers, and scientists, with too many demands on their time, will reduce the attention given to each individual work task or will only attend to the highest priority or most noticeable demands. Spending less time and effort on individual tasks allows the engineers, scientists, and managers to keep up with increasing work demands, but research finds such adjustments also reduce thoroughness and the overall quality of work and decision making in the long run (Levitt *et al*., 1999; Oliva and Sterman, 2001). These implementation costs of overstretching shared resources are consistent with previous research on the costs of expansion and firm growth (Baumol, 1962; Penrose, 1959; Rubin, 1972), administrative diseconomies of coordination and control (Coase, 1952; Pondy, 1969; Williamson, 1985), and escalating opportunity costs or losses associated with increasing decision errors (Sutherland, 1980). In the diversification literature, research findings support a nonlinear relationship between the degree of diversification and performance, indicating rising administrative diseconomies of coordination and control for greater levels of diversity (Grant *et al*., 1988; Hill and Hoskisson, 1987; Markides and Williamson, 1996; Palich, Cardinal, and Miller, 2000).

Generally, these coordination costs are expected to arise from limited managerial spans of control. Information processing demands increase as the size and complexity of the firm increase, eventually overwhelming the cognitive limitations of management to make effective decisions and to coordinate and control the organization. This logic also holds for scientists, engineers, and other skilled human productive services that are subject to cognitive limitations. Beyond these cognitive limitations, research findings indicate that work overloads result in coordination bottlenecks, quality problems, and overall performance deterioration (Levitt *et al*., 1999; Oliva and Sterman, 2001). These same effects are also at work when other tangible factors of production, such as plant and equipment, are overstretched. Increasing the speed of a production assembly line beyond the normal, efficient operations can result in lower production quality, higher defect rates, higher incidence of employee injuries, and increased line shutdowns. All of these side effects of overstretching resources are costly for the firm.

Equations 7, 8, and 3.1—a modified version of Equation 3—incorporate the costs of overstretching shared resources into the formal model. To represent the relationship between organization slack and costs of overstretching, we postulate a two-stage response process capturing both the immediate and cumulative impacts on costs. A value of slack less than zero has an immediate impact on costs, but there is also a cumulative impact on costs from the carry-over effect of past resource overstretching. Reduced thoroughness, lower work and decision quality resulting from straining shared resources, may take several months or even years to impact performance through higher costs. This formulation is consistent with long-standing models capturing staged or delayed impacts over time (Montgomery, Silk, and Zaragoza, 1971; Nerlove and Arrow, 1962). In Equation 7, the current impact of overstretching on costs (O_t) is formulated as an exponential smooth of the unrealized cost of overstretching shared resources (u_t), with a time lag of $1/\beta$. The unrealized cost of overstretching shared resources (u_t), defined in Equation 8, is a piecewise linear function of organization slack (s_t). Values of slack $s_t \geqslant 0$ indicate excess or perfectly balanced resources, and there are no costs of overstretching. When slack $s_t < 0$, the unrealized cost of overstretching (u_t) increases.

$$O_t = O_{t-1} + \beta(u_{t-1} - O_{t-1}) \quad (7)$$

$$u_t = f(s_t) \quad \text{where } f(s_t) = 1 \ \{s_t > 0\}; \quad (8)$$

$$f(s_t) = 1 - \frac{2}{3}s_t \ \{0 \geq s_t \geq -0.75\};$$

$$f(s_t) = 1.5 \ \{s_t < -0.75\}$$

There are many alternatives to the simple piecewise linear function specified in Equation 8. For example, Sutherland (1980) suggests a more sophisticated function to represent the minimum feasible unit cost for a firm with known coefficients of economies of scale and elasticity of administrative diseconomies. The piecewise linear function has been used here for simplicity, and is consistent with expansion cost curves adopted in previous research on firm growth (Baumol, 1962; Rubin, 1972), and the rising costs of administrative diseconomies in diversification (Grant *et al.*, 1988).

Overstretching shared resources eventually leads to an increase of the total costs of the firm. In Equation 3.1, O_t has been added into the profit margin equation as a multiplier on the total costs of the firm. When the firm maintains slack resources, there is no impact on costs ($O_t = 1$). When slack drops below zero, the impact of overstretching shared resources on costs can increase the total costs of the firm by as much as 50 percent. This formulation is consistent with previous research representing the costs of firm growth through the impact on total firm costs (Baumol, 1962).

$$\pi_t = \frac{\kappa + (N_t \cdot \varepsilon) - [\psi + (R_t \cdot \upsilon) + (N_t \cdot \theta)] \cdot O_t}{\kappa + (N_t \cdot \varepsilon)} \quad (3.1)$$

Experiments of different implementation strategies

The implications of integrating these well-established constructs into the theory can now be explored through simulation analysis of different implementation strategies. Figures 1 and 2, already discussed, provide the Single Business Focus and Ideal Related Diversification performance benchmarks for comparison to several alternative diversification implementation strategies in which there are costs for poor implementation of sharing resources. The following pages examine the five different implementation strategies already highlighted in Table 1: No Investment in additional shared resources, Myopic Investment, Myopic Investment Very Related Diversification, Myopic Investment with Higher Initial Slack, and Maintain Slack strategies.

The No Investment strategy shown in Figure 3 exploits the same potential synergy benefits of the Ideal Related Diversification strategy. Total work demands, shown at the top of Figure 3, increase as the customer base grows to 500,000 customers. Total work demands are shown as an index, and the growth of the new business customer base is not shown because it is identical to the Ideal Related Diversification simulation already discussed. In this implementation strategy, management does not invest in additional shared resources as total work demands rise. This represents a case in which the diversification move was motivated by a desire to leverage the existing resources of the firm to increase utilization and capture economies of scope. Management holds firmly to that mindset throughout the diversification move. As a consequence, organizational slack—also shown in the top of Figure 3—steadily declines from an initial value of 5 percent down to −16 percent as total work demands rise and ultimately exceed the capacity of shared resources. This negative value indicates the firm has a shared resource shortfall of 16 percent compared with the level required for the normal, efficient operations of the firm; shared resources are considerably overstretched.

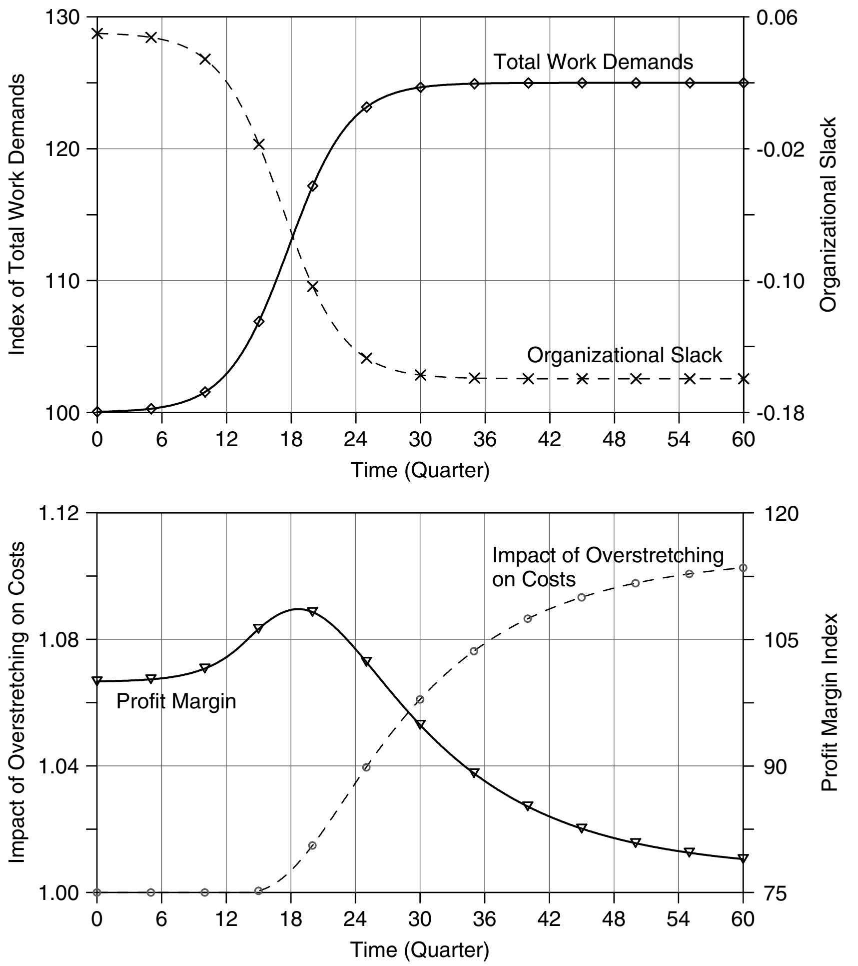

Figure 3. Evolution of Work Demands, Organizational Slack, Overstretching Costs (expressed as a multiplier of total operating costs), and Profit Margin for the No Investment strategy

Unlike the Ideal Related Diversification strategy, this simulation experiment also includes the implementation costs of overstretching the firm's stock of shared resources. It takes time for overstretching shared resources to have an impact on performance. Poor decisions or work quality throughout the firm—resulting from overextended managers, scientists, sales staff, engineers, and other factors of production—may take several quarters to impact overall financial performance. The impact of overstretching shared resources on costs, shown at the bottom part of Figure 3, indicates that overstretching costs start rising around the fourth year and continue rising gradually over the rest of the simulation. Overstretching costs are expressed as a multiplier of the total operating costs of the firm, so that by the end of the simulation overstretching burdens the firm with an additional 10 percent over the ordinary operating costs. For the first 15 quarters of the simulation, there is no distinguishable difference between the profitability of the Ideal Related Diversification and No Investment experiments. However, after this point, profitability in the No Investment strategy shows a dramatic collapse as the rising costs of overextending shared resources undermine firm performance. By the sixth year, profitability is declining rapidly even as the new business continues to grow. After appearing to create value for the first several years, by the end of the time horizon the related diversification move destroys value compared to the Single Business Focus and Ideal Related Diversification benchmarks.

The No Investment strategy demonstrates how a firm can destroy value through poor implementation in a related diversification move even when there are significant potential synergy benefits. The simulation results in Figure 3 are certainly driven by the assumptions about the magnitude and timing of the costs of overstretching shared resources. The exact magnitude and timing of overstretching costs will depend on the context, but the existence of such administrative coordination costs is well established in the economics (Baumol, 1962; Penrose, 1959; Rubin, 1972; Williamson, 1985), organization theory (Pondy, 1969), and diversification (Grant *et al*., 1988; Hill and Hoskisson, 1987; Markides and Williamson, 1996; Palich *et al*., 2000) literatures.

It might seem inconceivable that management would neglect to invest in additional shared resources when entering a growing new business. However, if management embarked on the diversification strategy to leverage the existing resource base, such objectives may be difficult to change. Also, the time delays separating overstretching shared resources and rising implementation costs can obfuscate the causal relationships, leaving management unsure about the root cause of the performance problems. In addition, the aggregate stock of shared resources captured in the current model is a vast simplification for the myriad of potential shared resources within a large diversified firm. Management must coordinate investment in numerous shared resources, while also managing a variety of other unshared resources, to prevent overextending any one them. The performance consequences of overstretching one or a few resources may not be as dramatic as shown in the No Investment strategy, but the qualitative behavior of underachieving potential synergy benefits would be the same.

Purposive management and organizational learning

In a related diversifying firm, the implementation challenge for managers is to increase utilization of excess resources while maintaining an adequate stock of shared resources to meet changing work demands. As shown in the No Investment strategy experiment, overstretching shared resources can have a detrimental impact on firm performance. To maintain a level of shared resources that meets the requirements for the normal, efficient operations of the firm, management's role is to choose the appropriate time path of investment flows in shared resources (Dierickx and Cool, 1989). There is substantial evidence from behavioral research indicating that managers use simple, purposive, goal-directed heuristics for a large variety of administrative decisions (Cyert and March, 1963; March and Simon, 1958; Morecroft, 1985). From this line of research, it is well established that organizations use targets and goals to simplify decision making and to provide a concrete link to managerial actions. Consistent with this view of decision making, previous strategy process research found that managers make investments to reduce the discrepancy between actual and desired levels (Bower, 1970). In the context of determining the investment rate in shared resources, the process of decision making within the diversifying firm can be represented with a managerial policy that includes a goal for the desired level of shared resources and a rule of thumb that determines the investment rate in shared resources when the actual level deviates from the goal.

Equations 9 and 10 specify a managerial policy that guides investment in shared resources (i_t). In Equation 9, the current level of shared resources (R_t) is subtracted from the desired level of shared resources (R_t^*) to compute the discrepancy gap between the desired and actual values. Net resource investment (i_t) is equal to this resource gap divided by the average time to correct shared resources (τ^R), which represents time lags inherent in collecting, assembling, and interpreting data and delays in taking action (Morecroft, 1985). The desired shared resources goal (R_t^*) is management's assessment about the level of shared resources needed to cope with total work demands at any point in time. As specified in Equation 10, management determines this goal using two pieces of information: (1) the total work demands of the firm at any point in time (d_t) and (2) the target productivity of shared resources (ρ_t^*); the perceived workload or target amount of work to be done by a particular person or machine in a period of time. This policy represents management's attempt to maintain an adequate stock of shared resources to meet varying work demands. It is a simple decision-making heuristic consistent with previous research modeling managerial decision policies (Cyert and March, 1963; Morecroft, 1985; Sastry, 1997) and is consistent with process accounts of how management makes investment decisions (Bower, 1970).

$$i_t = \frac{R_t^* - R_t}{\tau^R} \tag{9}$$

$$R_t^* = \frac{d_t}{\rho_t^*} \tag{10}$$

Firms that are in a position to diversify typically have routines that have proven effective in their core business over time. Diversification and growth can be viewed as an organizational learning process directed at developing the knowledge and decision-making routines necessary for success in a new domain (Kazanjian and Drazin, 1987). As the firm diversifies into a new business, the established routines for choosing appropriate investment flows in shared resources will evolve as the organization learns about the new business. In order to set an appropriate productivity target (ρ_t^*), the organization must learn how productive shared resources are in the new business and the workload levels across both businesses that shared resources can carry out.

Organizational learning research has established that aspiration levels, targets, and perceptions are incrementally adjusted in response to experience (Lant, 1992; Levitt and March, 1988). Further, empirical research indicates the attainment discrepancy model provides the most robust description of the evolution of targets or aspirations (Lant, 1992). This formulation is adopted in Equation 11 to capture the adjustment process for target productivity of shared resources (ρ_t^*) as management learns about coping with work demands in the new business. Incremental changes to target productivity are based on the deviation between the prior target (ρ_{t-1}^*) and the current workload per shared resource (d_t/R_t). The attainment discrepancy coefficient (ω) determines how quickly the target is adjusted toward the actual value. Examples of this process include the adjustment of unit sales objectives (Lant, 1992), service quality adjustments in service industries (Oliva and Sterman, 2001), and adjustment of target profitability (March and Simon, 1958). In this formulation, past experience and current workload values shape management expectations for target productivity.

$$\rho_t^* = \rho_{t-1}^* + \omega\left(\frac{d_t}{R_t} - \rho_{t-1}^*\right) \tag{11}$$

Figure 4 shows the results for the Myopic Investment strategy incorporating this managerial policy for investing in shared resources. As in the No Investment experiment, total work demands, shown in the top part of Figure 4, grow over time as the customer base exhibits logistic growth. In response to rising work demands, management invests in additional shared resources, but the stock of shared resources rises much less than total work demands. The explanation is that target productivity or workload levels, also shown at the top of Figure 4, rise over time. Shared resources are coping with increasing amounts of work—by devoting less attention to each task—as work demands increase within the firm. All three of these variables have been indexed relative to their initial values.

Over the time horizon, organizational slack, shown in the bottom part of Figure 4, declines from an initial 5 percent to roughly −11 percent. The firm continues to operate with negative organizational slack over time, because there is no signal for the need to invest in additional shared resources. It has become usual standard operating procedure for shared resources to cope with higher workloads, and target productivity reflects this established norm. As a consequence, the impact of overstretching shared resources on costs rises to approximately 7 percent of total costs by the end of the time horizon.

Figure 5 provides a comparison for the performance consequences of the Myopic Investment strategy relative to the Single Business Focus and Ideal Related Diversification benchmarks. Performance in the Myopic Investment strategy reveals no ill-effects of overstretching in the first 18 quarters, but then profitability declines dramatically as the delayed consequences of straining shared resources come to light. In the end, the Myopic Investment strategy destroys value relative to the Single Business Focus strategy. The behavioral aspiration adjustment processes at work within the organization ensure the underlying resource inadequacy problems remain hidden, and performance remains depressed throughout the rest of the simulation. This experiment demonstrates how boundedly rational managerial policies for investing in additional shared resources can undermine potential synergy benefits. Such behavior could explain why many related diversifiers fail to realize potential synergy. These firms invest in some additional shared resources, but organizational learning

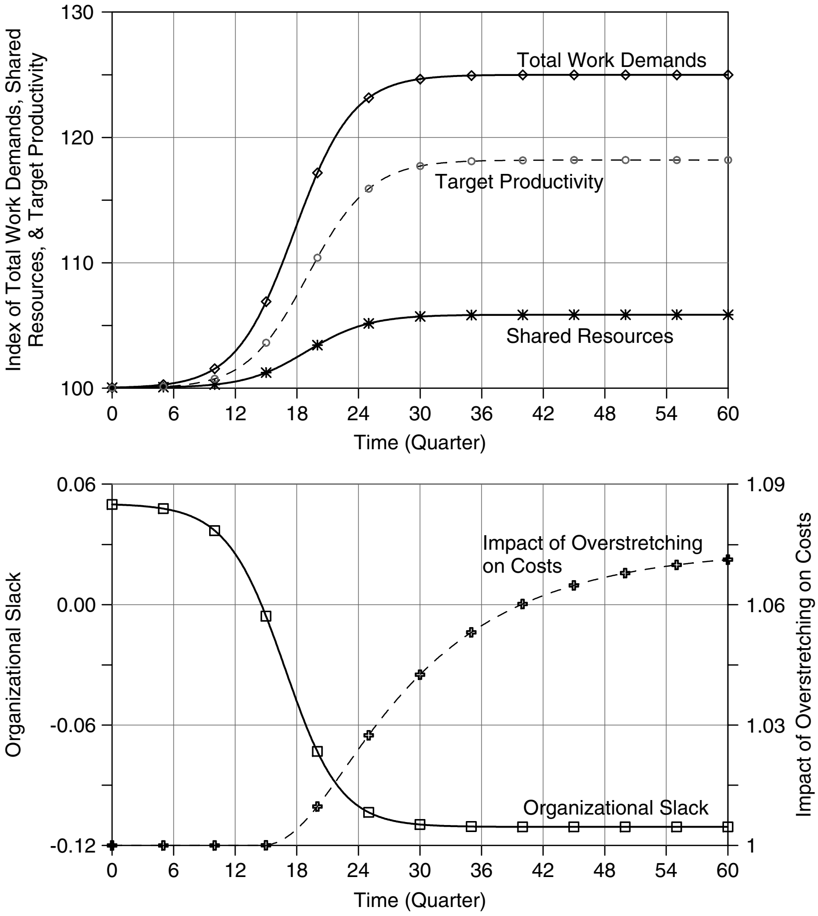

Figure 4. Evolution of Work Demands, Shared Resources, Target Productivity, Overstretching Costs (as a multiplier of total operating costs), and Slack for Myopic Investment Strategy

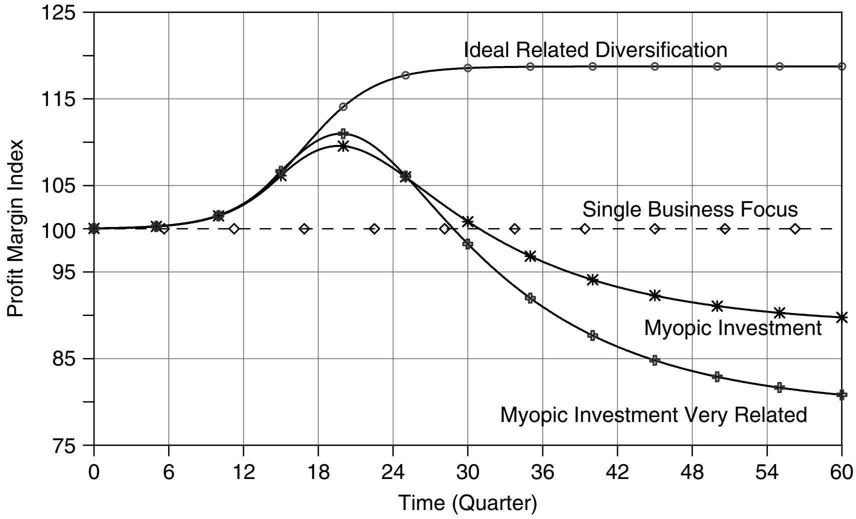

Figure 5. Comparison of Profitability for the Myopic Investment and Myopic Investment Very Related Diversification strategies relative to the Ideal Related Diversification and Single Business Focus benchmarks

difficulties inhibit development of new decision-making routines necessary for realizing the potential benefits of relatedness (Kazanjian and Drazin, 1987).

Also shown in Figure 5 is the Myopic Investment Very Related Diversification strategy, representing an even more related diversification move. In this strategy, the new business is even more related to the core business than in previous simulations and benefits from this higher degree of relatedness by gaining access to a larger pool of potential customers. For example, the new business might be able to leverage a strong reputation with a large customer base in the core business to realize such benefits. This customer synergy is in addition to the potential economies of scope benefits captured in previous simulation experiments. In the Myopic Investment Very Related Diversification strategy, the potential customer base is increased by 50 percent at the beginning of the simulation. Counter-intuitively, this strategy results in lower profitability than the Myopic Investment strategy—an experiment that represents a less related diversification move.

Figure 6 shows that in the Myopic Investment Very Related Diversification strategy the higher degree of relatedness was not beneficial for the firm. The more related diversification move resulted in more rapid growth and ultimately a larger new business customer base compared with the previous experiments. However, this larger customer base only served to stretch the stock of shared resources even further. Organizational slack falls to below −17 percent and, consequently, the costs of overstretching shared resources were higher in this more related experiment and undermined the larger potential synergy benefits.

The simulation results of the strategies presented thus far demonstrate how poor implementation can undermine any potential synergy benefits of a

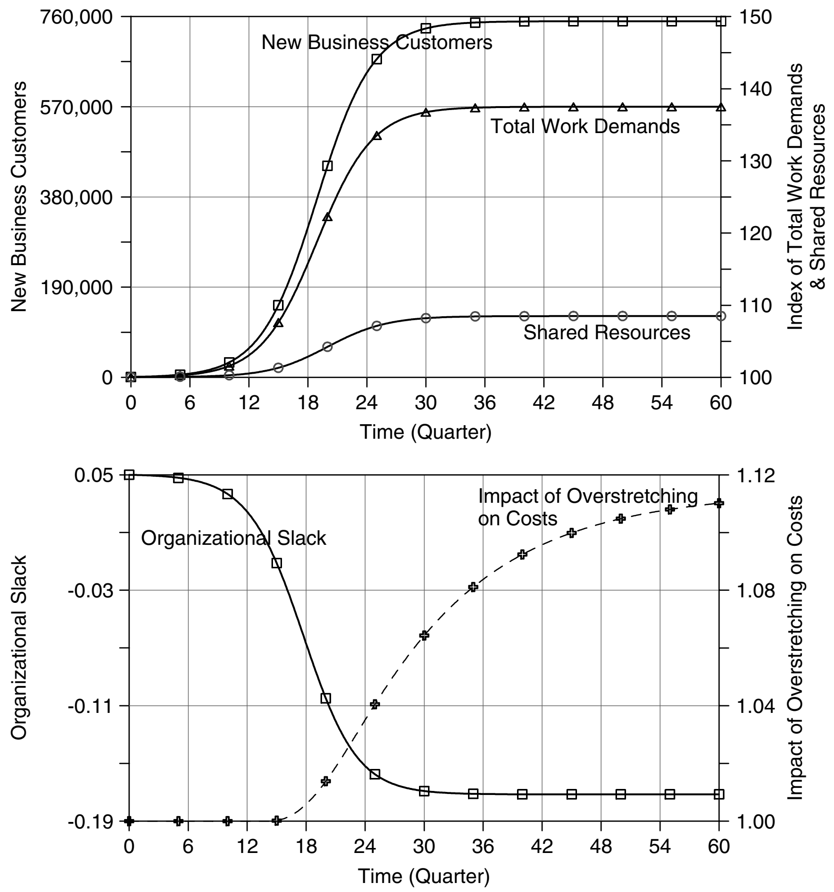

Figure 6. Evolution of New Business Customers, Work Demands, Shared Resources, Organizational Slack, and Overstretching Costs for the Myopic Investment Very Related Diversification strategy

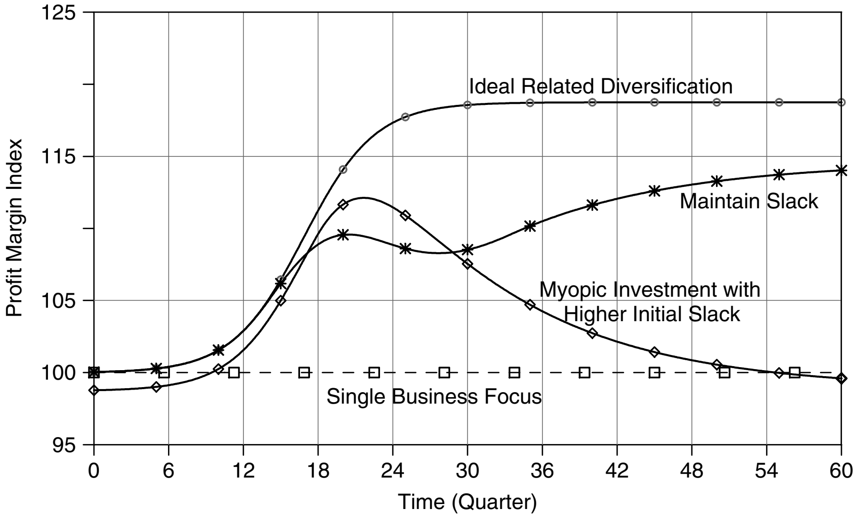

Figure 7. Comparison of Profitability for the Myopic Investment with Higher Initial Slack and Maintain Slack strategies relative to the Ideal Related Diversification and Single Business Focus benchmarks

related diversification move. The next set of diversification implementation strategies examines how management can successfully extract the economic benefits of resource sharing. Figure 7 compares the performance of two new strategies with the Single Business Focus and Ideal Related Diversification benchmarks. The Myopic Investment with Higher Initial Slack strategy represents a policy in which management embarks on a diversification move only when there is at least 10 percent slack in the organization, compared with 5 percent initial slack resources in all previous strategies. The rationale for such a policy is that the additional organizational slack enables management to maintain the balance between shared resources and total workload demands with the extra buffer of excess resources in place before the diversification.

As shown in Figure 7, the Myopic Investment with Higher Initial Slack strategy starts with slightly lower profitability than the previous experiments due to higher initial shared resource costs. Performance improves as the new business grows and drives up resource utilization, but then performance begins a rapid descent around the fifth year of the simulation. By the end of the simulation, profitability is back down to the Single Business Focus benchmark, resulting in a value neutral diversification strategy. This experiment demonstrates that additional initial slack can delay and limit overextending shared resources, suggesting there is substantial value in investing in slack shared resources prior to a related diversification move. However, the additional initial slack was not sufficient in this case to prevent overstretching and aspiration adjustment, and ultimately the firm was no better off than simply remaining focused on the core business. In different competitive environments, the appropriate level of initial slack might vary considerably and it is not obvious that management would be in a position to identify the appropriate level *ex ante*, indicating this is not a robust policy.

The Maintain Slack strategy, also shown in Figure 7, represents a policy in which management explicitly continues investing in shared resources to maintain organizational slack as work demands rise. There is no aspiration adjustment for target productivity in this simulation. The Maintain Slack strategy results in profitability that is substantially higher than the Single Business Focus benchmark, resulting in a successful diversification strategy. Profitability approaches but is still a bit below the profitability level of the Ideal Related Diversification benchmark since additional shared resources are required to maintain slack resources in this simulation.

The time paths of total work demands, shared resources, and target productivity for the Maintain Slack experiment are shown in the top part of Figure 8. Growth in new business customers increases total work demands, and management invests in shared resources to correct the resource

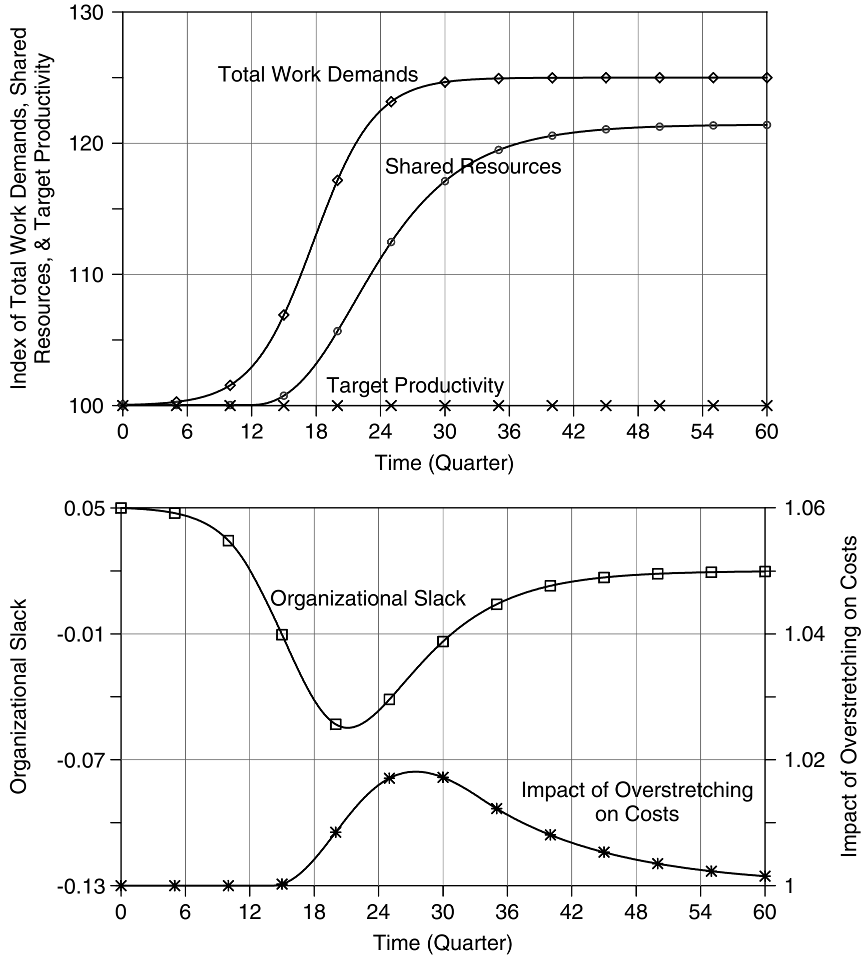

Figure 8. Dynamics of Work Demands, Shared Resources, Target Productivity, Organizational Slack, and Overstretching Costs (as a multiplier of total operating costs) for the Maintain Slack Strategy

shortfall. As the two lines diverge in Figure 8, total work demands grow more rapidly than shared resources over the first 30 quarters. However, target productivity remains constant over the entire time horizon. These first three variables are all indexed relative to their initial values in order to compare them on the same left-hand vertical scale. The imbalance between total work demands and shared resources during the first 30 quarters is reflected in declining organizational slack—shown in the bottom part of Figure 8. Slack declines from an initial 5 percent down to a low of approximately −6% in quarter 21, indicating small levels of resource overstretching. As organizational slack drops below 0 percent, overstretching costs reach nearly 2 percent, after a time lag, indicating a small rise in total firm costs due to overstretching. However, since target productivity remains fixed, the signal for management to continue to invest in expanding the stock of shared resources remains strong over this entire period. Eventually, organizational slack recovers, restoring the balance between shared resources and total work demands, and overstretching costs slowly decay back to zero.

This successful diversification strategy demonstrates the importance of maintaining organizational slack throughout a diversification move, and management's important role in coordinating resource sharing through actively monitoring and managing slack. Table 2 provides a summary of the results for the managerial diversification strategies already discussed, and also includes sensitivity test results for nine different parameter values across the No Investment, Myopic Investment, and Maintain Slack strategies. Three performance

Table 2. Sensitivity results on some key parameters for the managerial diversification strategies

	Profit margin[a]	Cumulative profits[b]	Cumulative overstretching costs[c]
Single Business Focus	100	100	—
Ideal Related Diversification	119	145	—
No Investment	79	117	100
Myopic Investment	90	124	70
Maintain Slack	114	138	12
No Investment Very Related	67	120	163
No Investment with Higher Initial Slack	88	124	71
No Investment 15% Initial Slack	97	130	45
No Investment Higher Costs	59	103	150
No Investment Lower Costs	99	131	50
No Investment Short Cost Delays	78	109	129
No Investment Rapid Resource Correction	—	—	—
No Investment Slow Resource Correction	—	—	—
No Investment Rapid Aspiration Adjustment	—	—	—
Myopic Investment Very Related Diversification	81	131	120
Myopic Investment with Higher Initial Slack	99	131	41
Myopic Investment 15% Initial Slack	109	137	14
Myopic Investment Higher Costs	76	115	105
Myopic Investment Lower Costs	104	134	35
Myopic Investment Short Cost Delays	89	119	90
Myopic Invest Rapid Resource Correction	97	129	51
Myopic Invest Slow Resource Correction	85	121	83
Myopic Invest Rapid Aspiration Adjustment	85	121	83
Maintain Slack Very Related Diversification	118	153	24
Maintain Slack with Higher Initial Slack	114	139	8
Maintain Slack 15% Initial Slack	114	139	4
Maintain Slack Higher Costs	114	136	18
Maintain Slack Lower Costs	114	140	6
Maintain Slack Short Cost Delays	115	138	12
Maintain Slack Rapid Resource Correction	114	140	4
Maintain Slack Slow Resource Correction	113	134	26
Maintain Slack Rapid Aspiration Adjustment	—	—	—

[a] Profit margin results are reported for the last quarter of the simulation time horizon, and have been normalized relative to the Single Business Focus strategy benchmark.
[b] Cumulative profits have been summed over the entire the simulation horizon through to the final quarter, and are reported as normalized values relative to the Single Business Focus strategy.
[c] Cumulative overstretching costs indicate the value lost by straining shared resources over the entire time horizon through to the final quarter, and have been normalized relative to the No Investment strategy.

metrics—profit margin, cumulative profits, and Cumulative Overstretching Costs—are reported in this 3×9 experimental design. Profit margin results are reported for the last quarter of the simulation time horizon, and have been indexed relative to the Single Business Focus strategy. Cumulative profits have been summed over the entire simulation horizon, and are also reported as indexed values relative to the Single Business Focus strategy. Cumulative overstretching costs indicate the value lost by straining shared resources over the entire time horizon, and have been indexed relative to the No Investment strategy.

The first sensitivity experiment tests the impact of the Very Related Diversification already discussed for the Myopic Investment strategy. In the No Investment and Myopic Investment strategies, the Very Related Diversification destroys value relative to the less related diversification. However, the Maintain Slack Very Related Diversification strategy creates value relative to the less related diversification. To tap the additional relatedness benefits, management must ensure adequate levels of shared resources to minimize the value lost through overstretching costs. The next two sensitivity tests provide the performance implications of starting with higher levels of initial organizational slack: 10 percent and 15 percent slack vs. 5 percent. Starting with more initial organization slack improves performance in both the No Investment and Myopic Investment strategies, with the additional slack acting as a buffer to offset the costs of overstretching. In the Maintain Slack strategy, the buffering effect of additional initial slack against overstretching costs is minimal and does not impact performance.

The Higher Costs and Lower Costs experiments test the impact of the cost function for unrealized costs of overstretching. Unsurprisingly, the results demonstrate that higher overstretching costs destroy value and lower costs improve performance in the No Investment and Myopic Investment strategies. However, performance in the Maintain Slack strategy is not negatively impacted by the higher cost function. Maintaining organizational slack ensures minimal periods of overstretching and therefore insulates the firm from the overstretching costs that would destroy value. The next set of sensitivity experiments, Short Cost Delays, tests the impact of shorter delays between the unrealized and current impact of overstretching costs. Reducing these delays by a factor of four has no significant performance impact in any of the implementation strategies.

The Slow and Rapid Resource Correction experiments test the impact of delays in correcting the discrepancy gap between desired and actual resources. In the Myopic Investment strategy, more rapid resource correction decreases the value lost through overstretching costs and improves performance. Longer resource correction delays exasperate resource overstretching and negatively impact performance in the Myopic Investment strategy. Longer or shorter delays in correcting resources do not have a material impact on performance in the Maintain Slack strategy, because slack provides a buffer for adjusting resources before the problems of straining resources arise. The speed with which different firm resources can be acquired or removed varies considerably, and this analysis demonstrates that long time delays in adjusting resources can be problematic if adequate slack is not maintained when expanding. The Rapid and Slow Resource Correction experiments do not apply in the No Investment strategy since the resources in the firm remain fixed throughout the simulation.

In the final sensitivity experiment, rapidly adjusting target productivity negatively impacts performance in the Myopic Investment strategy. As total work demands increase faster than shared resources, higher workload targets reduce the signal for needed resource investment and worsen the overstretching shared resource problems. The Rapid Aspiration Adjustment experiment does not apply in the No Investment or Maintain Slack strategies, since aspiration adjustment is not relevant in these cases.

Overall, the sensitivity results demonstrate that the qualitative behavior of the model is not sensitive to parameter changes. In addition, a couple of key patterns emerge from the analysis. There are only two experiments where the diversification move in the No Investment and Myopic Investment strategies improves profitability above the Single Business Focus strategy. In contrast, diversification moves using the Maintain Slack strategy result in substantial value creation relative to the Single Business Focus strategy in all of the experiments presented. Also, parameter changes have a material impact on performance in the No Investment and Myopic Investment strategies, but performance in the Maintain Slack strategy is very resilient, indicating this is a robust implementation strategy for realizing synergy in related diversification.

DISCUSSION AND CONCLUSIONS

This study explored the process of implementing a related diversification strategy and the associated performance consequences. The simulation analysis offers several contributions to understanding the performance of firms attempting to extract synergy benefits through related diversification. First, the results demonstrate that even if significant economies of scope benefits exist for a related diversification move, these benefits may be wiped out if management's implementation strategy does not maintain adequate shared resources for the normal, efficient operations of the firm. These results are consistent with research highlighting the role of implementation difficulties in offsetting potential relatedness benefits (Nayyar, 1992; Reed and Luffman, 1986). The potential benefits from sharing resources are not automatically realized, and synergy initiatives often fall short of expectations (Goold and Campbell, 1998). There is also evidence that firms often pursue diversification by focusing primarily on the potential benefits, without sufficient consideration of implementation difficulties (Nayyar, 1993).

Second, the results illustrate the importance of managerial policies to maintain and monitor organizational slack as workload demands evolve. A firm must have excess resources prior to diversifying into a new business for there to be an economic justification for diversification (Teece, 1982; Williamson, 1985). However, an overlooked consequence in the literature is that the firm must maintain some level of organizational slack throughout the diversification move to prevent overextending shared resources. This reserve of slack resources can take many forms: financial slack on the balance sheet, human resources, and technology. Firms should consciously plan for slack resources, and policies to maintain slack must be aligned to match the growth rate of the firm. Beyond diversification, recent research indicates that maintaining slack is important for firm growth and expansion generally (Mishina, Pollock, and Porac, 2004). Research findings also suggest that slack plays a crucial role in successful post-acquisition integration (Meyer and Lieb-Doczy, 2003; Thomson and McNamara, 2001). Successful acquirers such as General Electric have created entirely new roles for managing the post-acquisition integration process, and these new roles provide managerial slack ensuring minimal distraction from other businesses in the corporate portfolio (Ashkenas, DeMonaco, and Francis, 1998). Adequate slack enables innovation and flexibility, and provides a protective buffer from change, but too much slack leads to rising agency costs of inefficiency, shirking, and complacency (Hambrick and D'Aveni, 1988; Nohria and Gulati, 1996; Singh, 1986). Managers want enough organizational slack to prevent unintentionally straining shared resources, but not too much to encourage inefficiency. This delicate balance is compounded by limited operating knowledge of a new business in the early stages of a diversification move.

Third, a counter-intuitive result is that a higher degree of relatedness between businesses may negatively impact financial performance. Traditional thinking posits that more related diversifiers should outperform less related firms (Markides and Williamson, 1994, 1996; Rumelt, 1974, 1982). The analysis in this study demonstrates that a higher degree of relatedness may actually exacerbate resource overstretching and result in lower profitability compared with a less related case. Any point of relatedness that increases the growth rate of the firm can further compound resource overstretching. This is consistent with previous research indicating coordination problems are more serious during periods of expansion and that expanded diversification results in administrative diseconomies (Grant *et al*., 1988; Markides and Williamson, 1996; Palich *et al*., 2000; Penrose, 1959). These results highlight that there are potential costs of increased relatedness in addition to the commonly accepted potential synergy benefits.

As discussed in the introduction, previous empirical research has found mixed results regarding the performance implications of diversification strategy. However, there is growing consensus about the relationship between increased levels of diversity and performance. In a study re-examining his initial diversification categories, Rumelt found 'a pattern of declining profitability premiums with increasing diversity' (Rumelt, 1982: 367). Montgomery (1985) also found significant performance differences between high and low diversifiers; low diversifiers earned higher returns on invested capital. In addition, several subsequent studies identified a nonlinear relationship between product diversity and firm performance (Grant *et al*., 1988; Markides and Williamson, 1996; Palich *et al*., 2000). These studies find that profitability increases with product diversity up to a point, and further diversification beyond that point has a negative impact on profitability. These findings of rising administrative costs of complexity are also consistent with the model in this paper. A firm's initial diversification moves may create value through increasing resource utilization and reducing organization slack. However, once slack falls to zero, further diversification only serves to overextend firm resources and results in rising overstretching costs.

Increasingly, research in diversification and mergers and acquisitions indicates that realizing synergy requires an appropriate implementation strategy. Paradoxically, an important aspect of realizing synergy may be to invest in additional resources and maintain slack. One successful related diversifier, 3M, implements such a strategy by maintaining 15 percent slack in scientists and engineers so that they can use that excess time to explore their own ideas. Such an explicit target for slack resources ensures that the firm can absorb growth without overextending scientists and engineers. There is always a tension between investing in excess resources in anticipation of growth vs. waiting until growth materializes before investing in needed additional resources. The danger with waiting for growth before investing is that such a policy can unintentionally limit the growth or scope of the firm by resulting in systematic underinvestment. After embarking on related strategies, many diversified firms find that expected synergy or business growth does not materialize, and then divest the business (Markides, 1995). This refocusing strategy may be successful in improving profitability largely because it reduces resource overstretching, including overextended managers operating beyond their spans of control. If there really are substantial potential synergy benefits, investing in additional shared resources could unleash those benefits and may create more value for shareholders than divesting businesses.

The relationship between diversification strategy and performance is complex, and this study is a first step in developing a dynamic theory of diversification. A number of well-established variables and relationships were incorporated into the model, but there is significant scope for theoretical elaboration and empirical testing of the constructs and associated relationships. There are also numerous other factors that could be included to extend the causal model and increase the complexity of the dynamic theory. The benefits of learning through transferring core competences is one factor that could be incorporated into a more complete causal theory of diversification. Diversified firms can gain from leveraging deep expertise or knowledge across multiple businesses (Markides and Williamson, 1994; Prahalad and Hamel, 1990). Like the benefits of resource sharing, these learning benefits are not automatically realized. M&A research findings indicate the post-acquisition integration period is characterized by one-way knowledge transfer from the acquiring firm to the target, and knowledge transfers from the target back to the acquirer tend to be elusive (Vermeulen and Barkema, 2001).

Another factor that could be incorporated is learning that occurs in the normal process of operating a business, resulting in productivity improvements over time (Penrose, 1959). Such gradual improvements are unlikely to prevent overstretching in the short- and medium-term time scales, but would certainly be important over the longer term. Yet another type of learning that could also be included in a more complete theory is learning about the diversification process. Research findings in mergers and acquisitions suggest management teams improve their ability to evaluate, integrate, and manage acquisitions with experience (Hayward, 2002). Accumulated experience or deliberate learning seems to facilitate development of more effective routines and policies to manage corporate development activities.

The model could also be extended for an in-depth exploration of mergers and acquisitions, joint ventures, or alliances. The basic logic that managers unintentionally overstretch firms' stocks of shared resources, when pursing corporate development activities, certainly applies to these other modes of growth. Any form of corporate development activity will result in some 'redeployment of resources and redirection of human energy' (Rumelt, 1974: 1). A merger or acquisition requires acute managerial attention during the integration phase. Similarly, firms in joint ventures or alliances may divert limited resources in their core businesses to provide support for the joint venture or their alliance partners. Elaborating the model to specifically explore M&A or JV corporate development activity would require additional constructs to represent the cultural integration issues, restructuring processes, and other implementation process factors previous research has established as important in these areas.

Finally, while the model and associated simulation experiments examine the first diversification move of firms, the basic logic that managers unintentionally overstretch the diversified firms' stocks of shared resources applies equally to firms that have engaged in multiple diversification moves over many years. In fact, further diversification may in many cases be a response to stagnant growth in the existing corporate portfolio due to the hidden and unintentional costs of overstretching resources. Ultimately, this process of further diversification is often reversed if the performance of the firm remains depressed long enough. These feedback processes from performance to further diversification and from performance to refocusing the portfolio are not represented in the model, and provide another clear opportunity for extending the model to explore the dynamic nature of diversification profiles.

To test and extend the ideas presented in this paper, future empirical studies of diversification could take many paths. One obvious path would be to collect firm-level, longitudinal data on the diversification moves of firms, potential synergy benefits of each diversification move, organizational slack in each SBU and in the corporate center over time, and the magnitude of overstretching costs associated with different levels of negative organizational slack. For these purposes, any useful operationalization of slack will need to measure both the work demands and resource capacity over time. Also, recent research provides specific examples on how to measure the costs of overstretching resources by getting closer to the operational details of each business (Levitt *et al*., 1999; Oliva and Sterman, 2001). Another path would be to investigate the actual managerial policies for investing in shared resources in diversified firms. Managerial policies fill the natural role of integrating strategy formulation and implementation, and we need to understand in detail the heuristics and rules of thumb adopted within diversified firms for managing shared resources across the corporate portfolio. Given the nature of the data needed to follow either of the above paths, small-sample, clinical studies using a comparative research design are more likely to yield insights than large sample empirical studies—at least until we understand more about the interrelationships among these variables. Also, experimental studies of decision making provide a promising alternative to investigating managerial policies.

A complete causal theory of firm diversification is still in the embryonic stages, but this is a start. Motivations for diversification, mode of diversification, industry factors, and organizational design and structures supporting diversification moves would all be welcome additions to the basic dynamic theory presented in this paper. The model presented in this study is purposely very simplified, so that we can begin to build on our current understanding with a parsimonious, causal model. Making the assumptions explicit and more precise should enable others to challenge, improve, and extend the theory (model) to forward our understanding of this important area of research.

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Appendix: Model Constants and Initial Values

Parameter	Description	Units of measure	Value
β	Overstretching cost realization delay	1/Quarter	1/12[a]
g	New business customer base growth rate	1/Quarter	0.35
ε	Revenue per new business customer	$/Customer/Quarter	150
θ	Variable cost per new customer	$/Customer/Quarter	100
κ	Core business revenue	$/Quarter	200 million
λ	New customer work demands	Work units/Customer/Quarter	0.0005
μ	Variable cost per shared resource unit	$/Resource month	50,000
N_0	Initial new business customers	Customers	1000
O_0	Initial overstretching on costs	Dimensionless	1.00
PC	Potential new business customers	Customers	500,000[b]
ρ	Maximum efficient productivity	Work units/Resource month	5
ρ_0^*	Initial target productivity	Work units/Resource month	$\rho/(1+s^*)$
R_0	Initial shared resources	Resource months/Quarter	$R_0^* \cdot \frac{1+s_0}{1+s^*}$
s_0	Initial slack	%	5[c]
s^*	Desired slack	%	5[d]
σ	New business switch	Dimensionless	1[e]
τ^R	Time to correct shared resources	Quarters	6[f]
$u_t = f(s_t)$	Unrealized cost of overstretching	%	$1 - \frac{2}{3}s_t$[g]
χ	Core business work demands	Work units/Quarter	1000
ψ	Fixed costs	$/Quarter	150 million
ω	Attainment discrepancy coefficient	1/Quarter	1/2[h]

[a] Equal to 1/3 for the Short Cost Delays sensitivity tests.
[b] Equal to 750,000 in the Very Related sensitivity tests.
[c] Equal to 10% or 15% in the Higher Initial Slack sensitivity tests.
[d] Equal to 2% in the Maintain Slack strategy simulations.
[e] Equal to 0 in the Single Business Focus simulation.
[f] Equal to 3 in the Rapid Resource Correction sensitivity tests, and equal to 12 in the Slow Resource Correction sensitivity tests.
[g] The slope of the piecewise linear equation, equal to 2/3 in all other simulations, changes to 1/3 in the Lower Costs sensitivity tests and to 1 in the Higher Costs tests. Note that this also changes the maximum value of the function at $s_t < -0.75$ in the Low and High Costs tests to 1.25 and 1.75 respectively.
[h] Equal to 0 in the Maintain Slack strategy simulations, and equal to 1 in the Rapid Aspiration Adjustment sensitivity tests.