The Dynamics of Diversification

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Abstract

A fundamental part of corporate strategy is the choice of what portfolio of businesses to compete in, and the managerial importance of this issue has stimulated an enormous amount of research focused on corporate diversification over the past three decades. However, after all these years of academic research on this topic, there are still many unanswered questions about what distinguishes successful diversification strategies from those that fail and progress on this issue seems to have ground to a halt. It is becoming widely accepted in the strategic management field that dynamic theories are more powerful and hold more promise for gaining understanding about strategy issues than their static counterparts, but there have been very few attempts to formalize the dynamic theories using approaches suited to investigate dynamic problems. This paper focuses on formalizing and extending the theories of diversification in a system dynamics simulation model which represents the multi-business firm as a bundle of resources embedded in an administrative structure.

1. Introduction

The economic raison d'être of large diversified firms in our society is achieving synergy between business units in order to create more economic value than the individual business units in isolation. In particular, diversified firms with related business portfolios should benefit from operational synergy through SBU inter-relationships. However, the evidence of previous research indicates that diversified firms, on average, fail to create economic value through increasing levels of diversification, and findings are mixed concerning the relationship between

diversification strategy and profitability. There has been considerable academic effort during the last three decades, but there are still many unanswered questions about how and when diversification strategy can lead to long term competitive advantage. Previous research has primarily examined cross-sectional performance differences across large samples of firms. This is disconcerting since the performance consequences of diversification are fundamentally disequilibrium phenomena, and the relationship is likely too complex to untangle using cross-sectional data.

The many conceptual models which have emerged in the diversification literature have cluttered the academic landscape with a wide array of terminology, a variety of contradictory definitions, and very little by way of frameworks which instill mental clarity about these issues. There is an important role for a dynamic, holistic model which can serve as an organizing framework piecing together the disparate threads of previous work. We still do not know why synergy in related diversification is so elusive to obtain given the high potential, and we do not fully understand the administrative costs of coordinating a portfolio as complexity increases. It is not clear if firms can pursue continuous growth through diversification without eroding profitability, or if a combination of factors limit firms to some optimal level of diversification? Lastly, we do not know how we should redesign diversified organizations in order to more easily exploit potential synergy and avoid any hidden managerial conflicts? This paper discusses a dynamic hypothesis, formalized in a system dynamics model (Forrester, 1961), which provides new insights on these issues. Section 2 provides an overview of the diversification literature, and Section 3 describes the dynamic hypothesis which emerges from this previous research. Section 4 reviews some of the simulation results, and Section 5 provides some concluding remarks.

2. Diversification Literature

There have been two major findings from previous research on diversification which are relevant for focus of this paper. The first finding is that increased levels of diversification increase performance up to a point, after which further diversification results in declining performance (Grant et al., 1988; Markides, 1995). Numerous large sample, cross-sectional studies have tested this diversification-performance relationship, and the evidence indicates a curvilinear relationship as shown in Figure 1. In explaining this observed behavior, scholars suggest that firms face constraints on the amount of diversity they can successfully manage resulting in an optimal limit to how much firms can diversify.

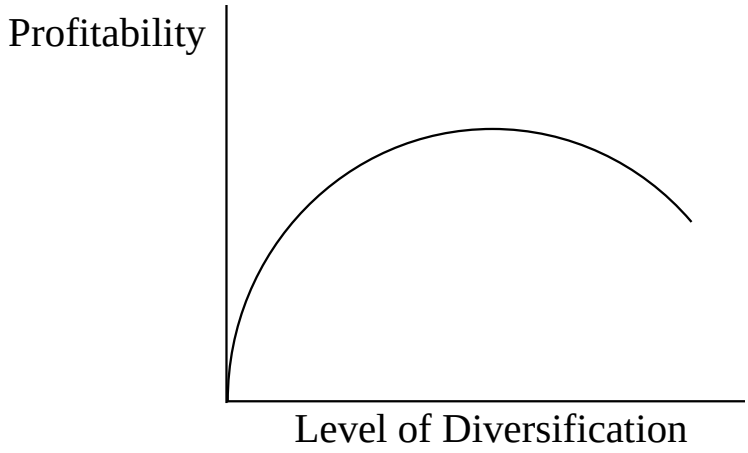

Figure 1. Curvilinear relationship between level of diversification and profitability.

Industrial organization economists have suggested that the optimal size of the multi-business firm is governed by rising administrative costs and diminishing benefits of increased diversification. The administrative costs include: 1) increased managerial tasks for recruiting, training and integrating new managers (Penrose, 1959); 2) increased information distortion and control loss from hierarchical coordination (Williamson, 1967); 3) growing danger of applying

core business dominant logic to strategically dissimilar businesses (Prahalad and Bettis, 1986); and 4) increasing allocative errors due to limited managerial spans of control (Hill and Hoskisson, 1986; Sutherland, 1980). As a firm continues to diversify, it is suggested that these administrative costs increase. The potential economic benefits of diversification discussed in the academic literature focus primarily on the economies of scope and scale from excess firm-specific assets. It is suggested that these economic benefits diminish with increasing diversification since excess assets that can be exploited by diversifying into other businesses lose their value as the firm moves further away from its core. Coupling the rising marginal costs curve with a decreasing marginal benefits curve, as shown in Figure 2, summarizes the economic reasoning for the quadratic relationship.

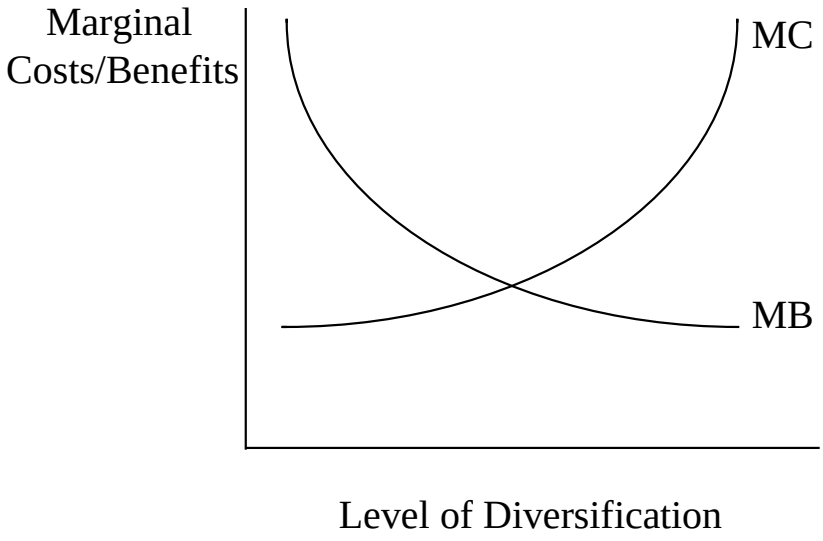

Figure 2. Diversification Marginal Costs and Benefits Curve.

It should be pointed out that Penrose (1959) disagreed with scholars who proposed there was an optimal size of the firm, and concluded instead that there is nothing inherent in the nature of the firm or of its economic function to prevent the indefinite expansion of its activities. The limiting

factor of firm growth through diversification of its activities, in her theory, is the firm's ability to adapt its administrative structure to larger and larger scales of operation.

The second major finding from previous diversification research is that empirical results are mixed regarding profitability differences between related versus unrelated diversification strategies. A large branch of diversification research focuses on the superiority of related diversification over unrelated diversification, and scholars in this school of thought argue that related diversification allows the corporate center to exploit interrelationships among different SBU's (Strategic Business Units) to achieve cost or differentiation advantages over rivals. Related diversifiers should outperform unrelated diversifiers, using this logic, since unrelated firms do not have access to such inter-business unit economies of scope. The relatedness of underlying firm resources underpins these potential economic benefits, and this resource relatedness falls into two categories: 1) resource sharing and 2) competence transfer (Markides and Williamson, 1994 and 1996). Resource sharing and competence transfers enable the diversified firm either to reduce overall operating costs in one or more of its divisions, and/or to better differentiate the products of one or more divisions resulting in a price premium (Porter, 1987).

In this context, the nature of a firm's diversification strategy has more impact on performance than the overall degree or level of diversification. Rumelt's (1974) study pioneered this stream of research, and his central finding was that highly diversified firms performed less well than those that "stuck to their knitting." There have been numerous follow-up studies supporting these results, but there have also been an equal number of studies which find no performance differences between related and unrelated diversifiers. To account for this lack of difference

between related and unrelated diversification strategies, it has been suggested that the costs of extracting operating synergy cancel out the potential economic benefits. In particular, exploiting operating synergy involves costs of coordination, compromise, inflexibility, time of skilled employees, cost of transfer opportunity identification, and implementation costs (Park, 1997).

The next section describes the dynamic hypothesis developed from this base of previous diversification research, which allows us to examine the two major findings through simulation experiments.

3. Dynamic Hypothesis

The dynamic hypothesis explaining observed behavior for the diversification-performance relationship has been developed incrementally from careful analysis of previous research and preliminary field work with a diversified firm. A system dynamics model formalizes the various diversification theoretical threads described verbally by different authors, resulting in a model which captures the core theory for which there seems to be general agreement in the field (Sastry, 1997). The model operationalizes the potential economic benefits and realization costs of a related diversified firm with a portfolio of two inter-related businesses. The components of this two-business model are shown in the high level sector diagram in Figure 3.

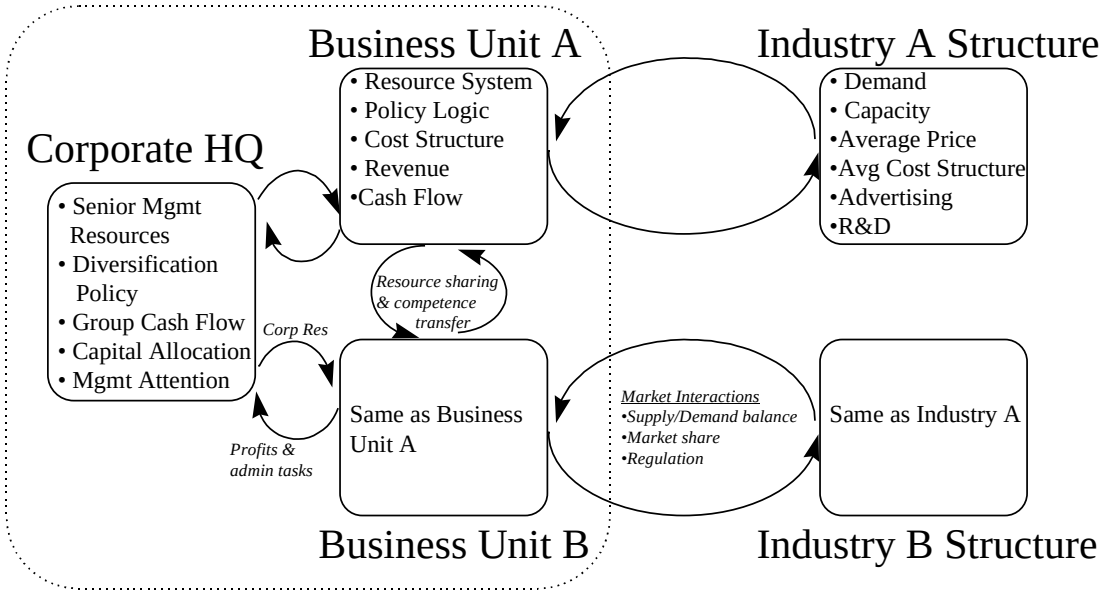

Figure 3. High level model sector diagram for two related business units.

The diagram indicates that detailed examination of the diversified firm's resource system is needed which will enable us to model the complex web of issues surrounding diversification. In particular, we need to understand more about how diversified firms are managed to reach performance objectives. These managerial policies have a significant impact on the success or failure of a diversification strategy, and may inadvertently produce unintended consequences (Morecroft, 1985). In addition, industry characteristics play a significant role in determining business unit performance, and must be taken into consideration in examining performance differences over time for the SBU's within the diversified firm.

Detailed analysis of the diversification literature led to the high level causal loop diagram shown in Figure 4. The Economies of Scope loop, labeled A at the bottom of Figure 4, focuses on the benefits from economies of scope and scale for the firm as it diversifies into related businesses. As the firm adds new business units, it has more opportunity to utilize idiosyncratic resources.

The increased resource utilization leads to higher performance and growth from the individual business units, because of the benefits from resource sharing and competence transfer. Higher performance and growth from existing SBU's meets senior management's desired performance targets, and results in less pressure for further diversification. The loop is of negative feedback polarity resulting in a balancing process whereby senior managers take action in order to meet their performance and growth objectives.

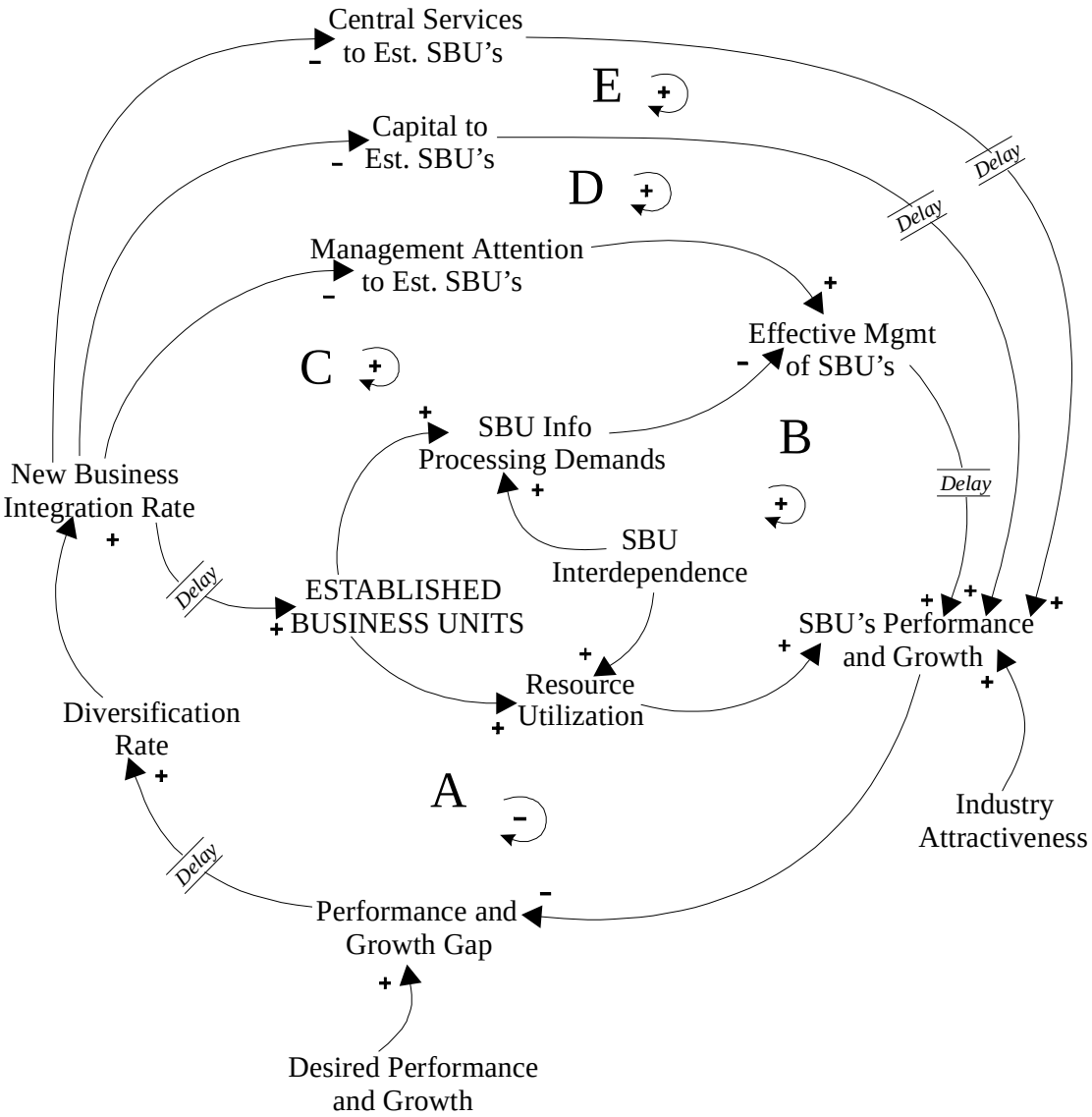

Figure 4. Causal loop diagram of the diversification-performance relationship.

The Rising Administrative Costs loop, labeled B on the right-hand side of Figure 4, focuses on the increasing information processing requirements resulting from diversification into new related businesses. Rising SBU information processing demands, ceteris paribus, ultimately decrease the effectiveness with which SBU's are managed. After some time delay, SBU performance and growth suffers and falls short of senior management's performance and growth targets. This results in increasing pressure to pursue further diversification, and after some time delay the firm diversifies into new businesses. This feedback loop is of positive feedback polarity which is indicative of escalating or snow-balling effects.

The Diversion of Managerial Attention loop, labeled C on the left-hand side of Figure 4, emphasizes the effects of diversification into related businesses on the allocation of management attention. In this context, managerial capacity is an allocable resource referring to the managerial services of senior managers both in corporate headquarters and direct line management positions (i.e. business unit managing director teams). As a firm adds new business units, the administrative task of integrating these new businesses into the organization absorbs large quantities of senior management's attention. As a result, managerial attention allocated to existing SBU's decreases thereby reducing the effective management of SBU's. After some time delay, existing SBU performance and growth suffers and falls short of senior management's desired performance and growth targets. This results in increasing pressure to pursue further diversification, and after some time delay the firm diversifies into new businesses. This feedback loop is also of positive feedback polarity.

The Diversion of Capital feedback loop, labeled D in Figure 4, focuses on the effect of management's capital allocation policy in a multi-business firm. As the firm diversifies,

investment capital is diverted from established business units to the new business, leaving the established businesses under-funded. Extended periods of starving the established businesses of investment funding results in deteriorating performance and growth of the existing SBU's which fall short of senior management's desired performance and growth targets. This results in increasing pressure to pursue further diversification, and after some time delay the firm diversifies further into new businesses.

The Diversion of Central Services feedback loop, labeled E in Figure 4, is very similar except with a focus on corporate central services such as IT, engineering, etc. As the firm diversifies, central services are diverted from established business units to the new business, such that projects in existing businesses get delayed substantially. As the number of these delayed projects in the established businesses grows over time, eventually this results in deteriorating performance and growth of the existing SBU's which fall short of senior management's desired performance and growth targets. This results in increasing pressure to pursue further diversification, and after some time delay the firm diversifies further into new businesses.

The causal loop diagram was operationalized into a fully specified feedback model, and a portion of the aggregated model diagram is shown in Figure 5. Note that some detailed model structure has been omitted for clarity.

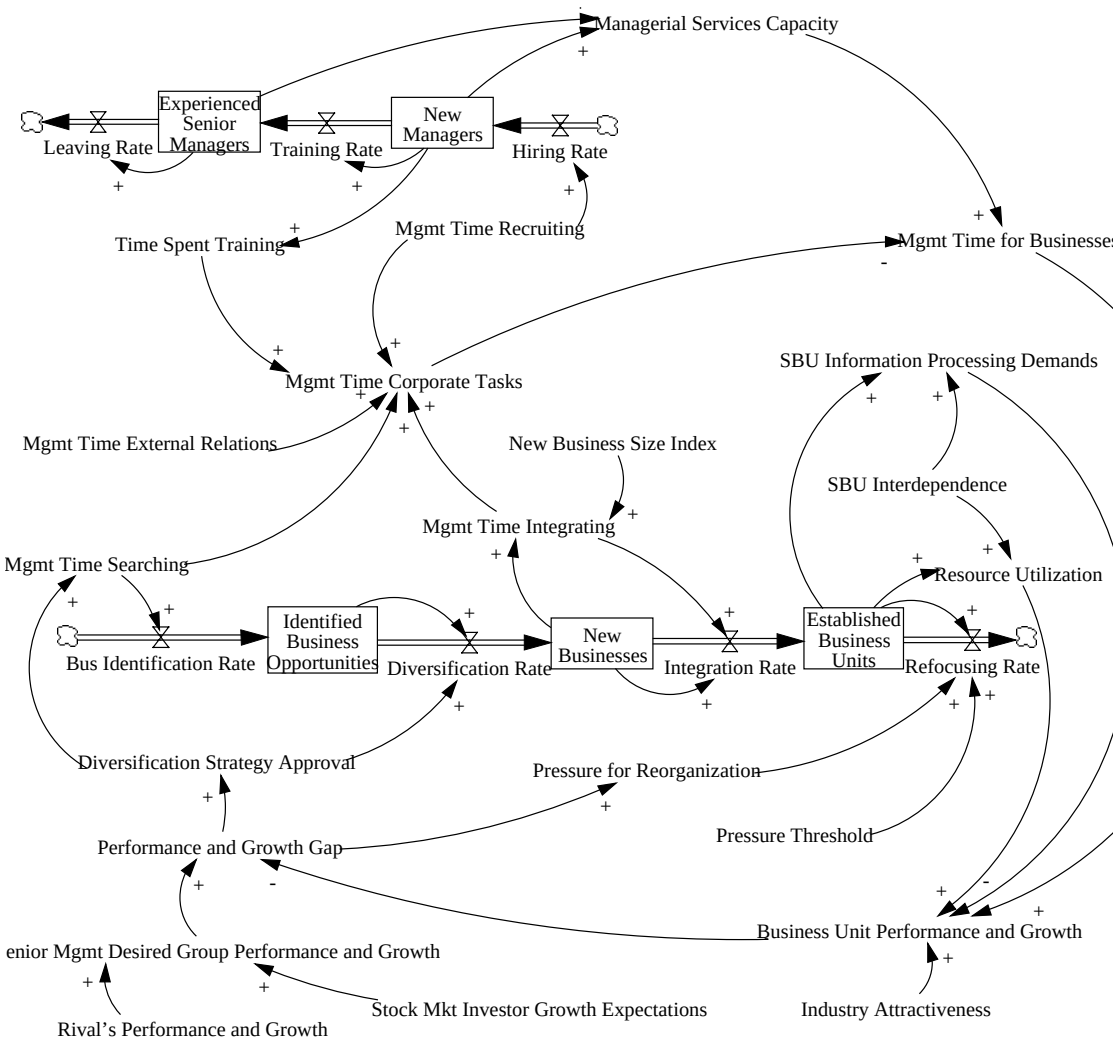

Figure 5. Aggregated model diagram of diversification from a corporate perspective.

The aggregated model diagram does not show the detailed representation of resource utilization and SBU interdependence within the fully specified simulation model, but it should be obvious that it is necessary to unpack the resource system within business units in a diversified firm to really understand the performance implications of diversification (Warren, 1997). Specifically, the model captures the benefits and costs of resource sharing and competence transfer between two related businesses. For example, transferring a competence from SBU A to SBU B provides economic benefits by accelerating the accumulation of resources in SBU B. Equation 1 shows

the resource production rate in business unit B is defined as the stock of SBU B resources, multiplied by a function of the stock of competence, and multiplied by SBU B's productive capacity for this particular resource. The competence learning rate within business unit B has two distinct components in a multi-business firm as shown in Equation 2. The first component represents learning by doing, defined as SBU B's resource production rate multiplied by a learning parameter. The second component represents competence transfer from business unit A, and is defined as the stock of SBU A resources required to transfer the competence multiplied by the learning transfer productivity indicating the learning per transfer effort of the competence from business A to B.

$$\frac{dR_B}{dt} = R_B \times f(C_a) \times K_B;\ f'(\cdot) > 0,\ f(0) = 0,\ f(\max) < \infty \qquad (1)$$

$$\frac{dC_B}{dt} = (l_B \times \dot{R}_B) + (R_A \times l_{ab}) \qquad (2)$$

The next section reviews some of the simulation results from the model to examine the net effects of the potential benefits and costs of diversification.

4. Simulation Results

The model represents a single business firm with endowed stocks of resources and competencies necessary to compete successfully in a mature industry. The simulation begins in the year 1990 with the business unit falling short of senior management's performance and growth expectations due to industry conditions. By 1991 pressure for senior management to begin searching for a new business in which to diversify builds to a sufficient level to start the search. The

diversification strategy is realized in 1992, as the senior management team enters a new business they believe will increase firm performance. The diversification move increases firm revenue, but decreases overall profitability. Figure 6 shows the graph over time for group cash flow from operations through the year 2000 for both the single business without diversification and the firm which diversifies into a new business in 1992.

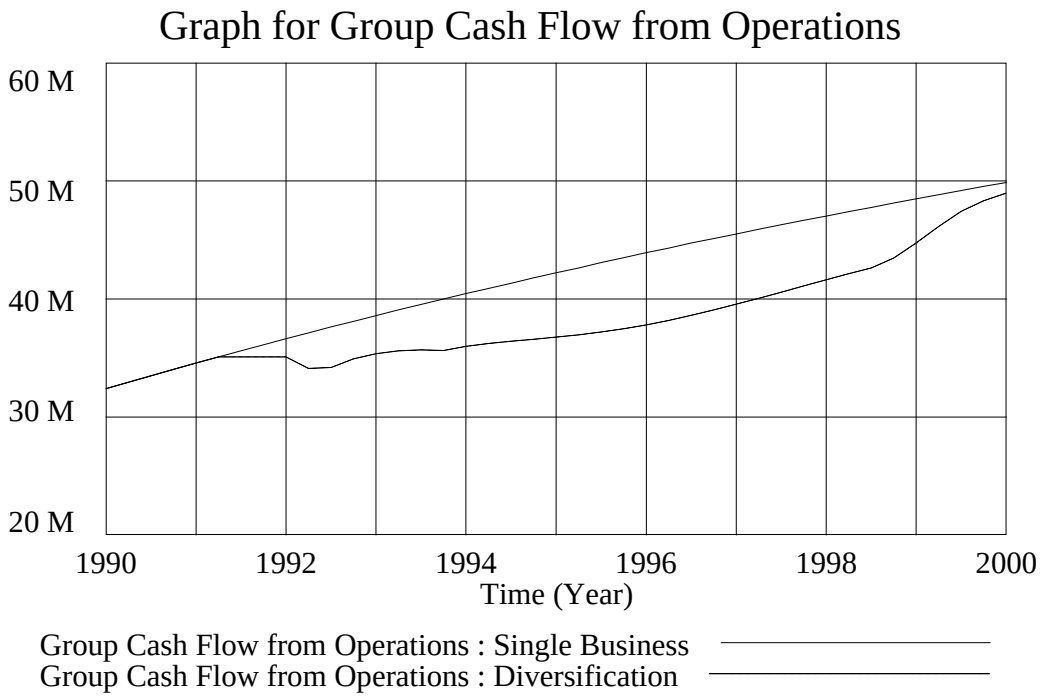

Figure 6. Graph of cash flow over time.

Cash flow from the new business is negative from 1992 to 1993, just the first year after entry, and therefore is not responsible for the erosion in group operating profits. Instead, the increased administrative demands placed on senior management by the diversification move outstrip the firm's total managerial capacity as shown in Figure 7.

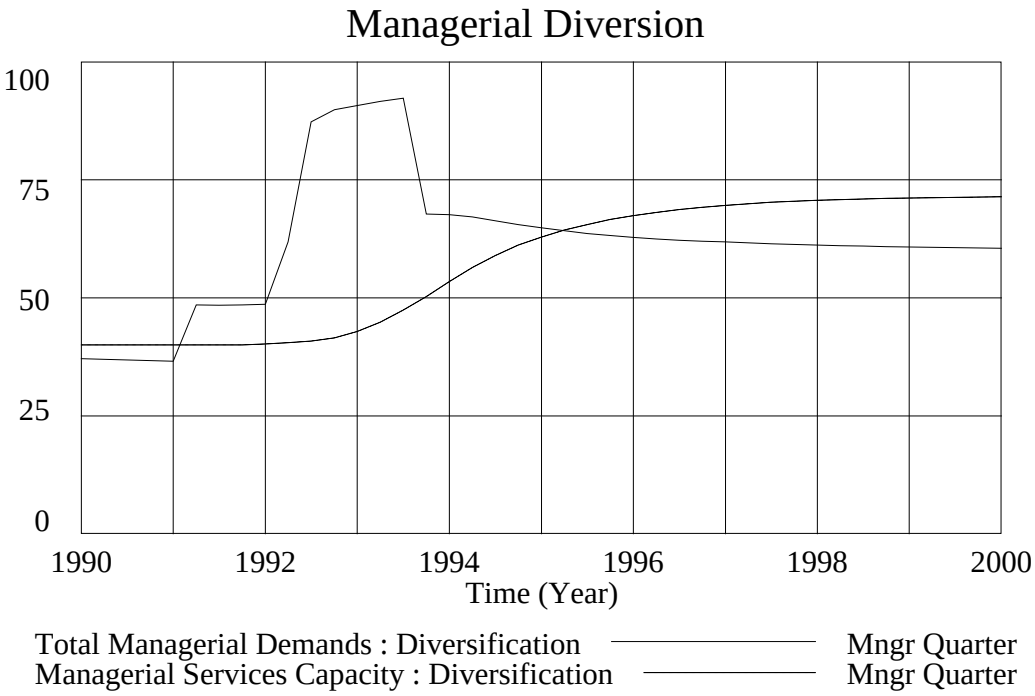

Figure 7. Graph of Managerial Demands versus total Managerial capacity over time.

In 1991, the process of searching and identifying a new business opportunity increases the demands placed on management's time. After the search is over, the senior management team becomes heavily involved in integrating the new business into the firm beginning in 1992 with a large increase in total managerial demands. By the end of 1993, the integration has been completed and demands on managerial time decrease substantially, although remain higher than for a single business firm since there are the normal day-to-day managerial demands from the new business unit. During this time, managerial capacity rises slowly to adjust to the new demands reflecting the structural delays which exist in recruiting, hiring, and training new managers.

The managerial capacity shortfall results in the diversion of managerial attention away from the established business units to the corporate issues associated with the diversification move. Figure 8 shows the SBU required managerial services are not met during this period of searching for and integrating the new business.

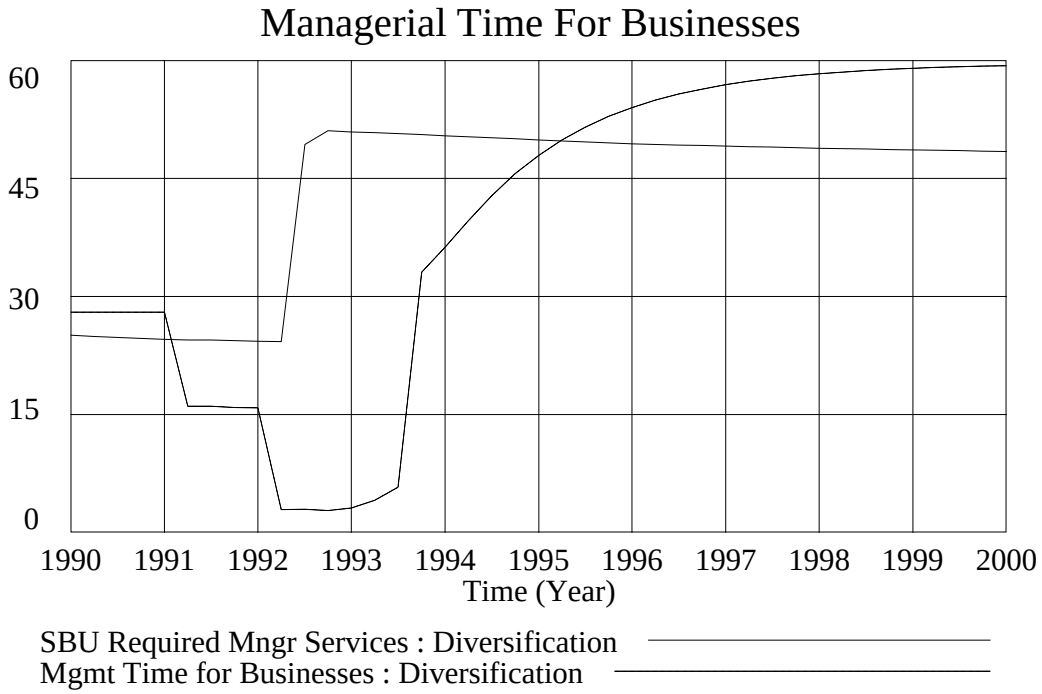

Figure 8. Graph of SBU required managerial services and allocated managerial time.

This managerial time shortfall for the established business unit results in a decreased cost improvement rate as shown in Figure 9. The established business unit improves the service cost per customer at a constant rate as long as management can focus adequate attention to oversee the task as shown for the single business firm which does not diversify. However, this improvement rate stops altogether if management does not have enough time to devote to the established business during the integration of the new business after a diversification move. The

disruption lasts for almost three years before the established business unit resumes its cost improvement, and is responsible for the cash flow erosion shown in Figure 6.

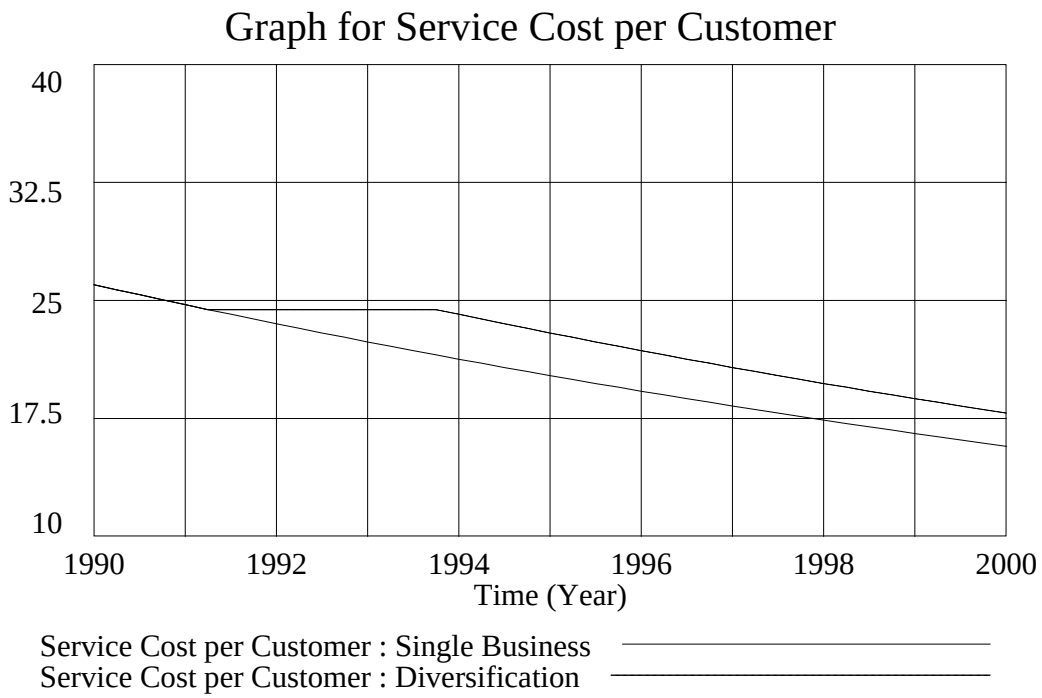

Figure 9. Graph of service cost per unit for the single business and diversified firm.

In these previous simulations, the firm was limited to one diversification move to bridge the gap between actual performance and growth targets. The performance of the firm becomes increasingly worse if senior managers react to performance shortfalls by pursing further diversification. The continuous strain on limited managerial resources resulting from multiple diversification moves can thoroughly undermine the performance of established business units as shown in Figure 10. This graph shows the managerial time required only for corporate tasks such as searching for and integrating new businesses, managing external relationships, and training new managers. The demands of the single business firm are shown to remain flat over

the entire time horizon, the demands of the one diversification move firm increase for a period of about 3 years to fully integrate the new business, and the demands of the continuing diversifying firm are shown to increase with each diversification move.

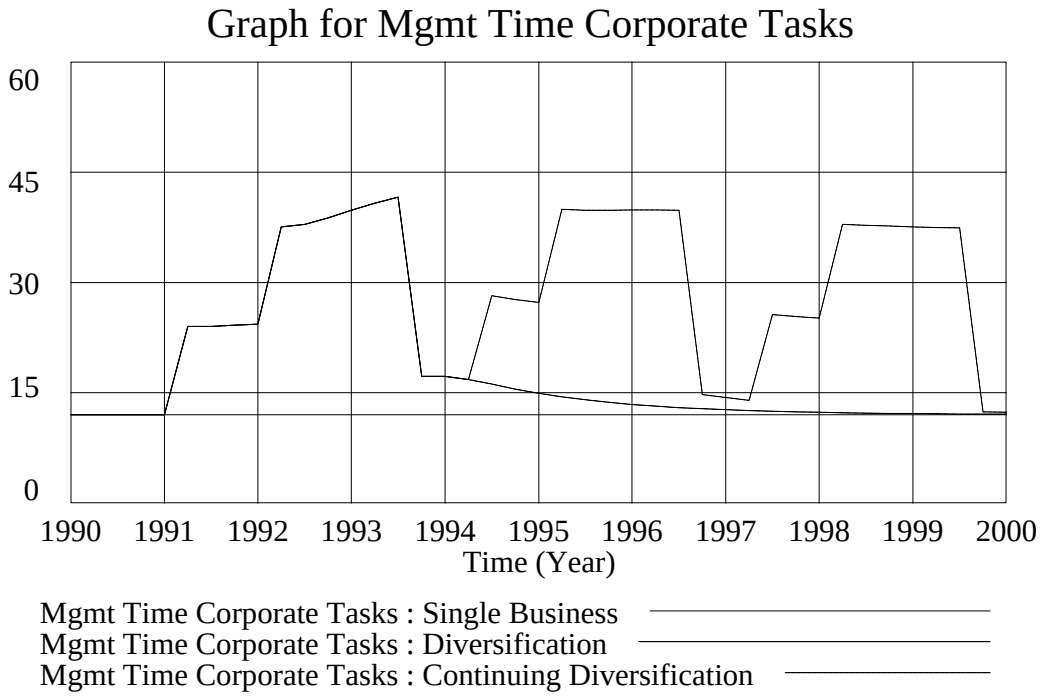

Figure 10. Graph of management time required for corporate tasks.

5. Conclusions

The dynamic hypothesis provides explicit allocation of management capacity to various administrative activities, and suggests that the number of different businesses a firm participates in, and not just the overall size of the firm, will have a direct impact on the amount of managerial resources required. In particular, managerial resources are required to evaluate the performance of each business unit, and this administrative task is one determinant of effective business unit management. Simulation results indicate that the rate of diversification has a significant impact

on the allocation of managerial attention, and may be very important in understanding what distinguishes successful diversification strategies from those that fail. The comparison of independent and coupled business units illuminates the dynamics of diversification, and helps us discover how dynamic complexity frustrates well-intentioned diversification efforts.

The next step in this continuing research project is to ground the dynamic hypothesis in a detailed case study of a diversified firm. Operationalizing the model within a specific case will help refine the dynamic hypothesis through clarification of variable interrelationships. Where possible, each causal link indicating a relationship between two variables has been specified through careful examination of multiple verbal descriptions of the relationship available in the diversification literature. However, there were some relationships for which judgments had to be made in the absence of any discussion from previous literature, and data from the primary case site will be used to specify these relationships (Sterman et al., 1997). Of particular interest for the case specific model are the senior management policies regarding allocation of management attention to various administrative tasks; allocation of capital to different SBU's; allocation of central services; allocation of shared resources between SBU's; allocation of experienced employees between SBU's; management recruiting, hiring, and training; and diversification approval. The business-to-corporate headquarters coupling through these managerial policies may, inadvertently, result in unintended consequences such as erosion of profitability.

References

Forrester, J. W. (1961): Industrial Dynamics. M.I.T Press, Cambridge, MA.

Grant R. M., A. P. Jammine and H. Thomas, (1988). "Diversity, Diversification, and Profitability Among British Manufacturing Companies, 1972-1984," Academy of Management Journal, 31(4), 771-801.

Hill, C. W. L. and Hoskisson (1987). "Strategy and Structure in the Multiproduct Firm," Academy of Management Review, 12;2: 331-341.

Markides, C. C. (1995). Diversification, Refocusing, and Economic Performance. Cambridge, MA: The MIT Press.

Markides, C.C. and Williamson, P. J. (1994): "Related Diversification, core competencies and corporate performance," Strategic Management Journal, Vol. 15, Special Issue, pp. 149-165.

Markides, C. C. and Williamson, P. J. (1996) Corporate diversification and organizational structure: A resource-based view. Academy of Management Journal, 39(2): 340-367.

Morecroft J. D. W. (1985), "Rationality in the analysis of behavioral simulation models," Management Science, 31: 900-916.

Morecroft J. D. W. (1985), "The Feedback View of Business Policy and Strategy," System Dynamics Review, 1,1: 4-19.

Park, C. (1997). "Why Does Related Diversification Fail?: Theory and Empirical Evidence," SLRP Working paper, London Business School.

Penrose E. (1959), The Theory of the Growth of the Firm. New York: Wiley.

Porter, M. E. (1985) Competitive Advantage: Creating and Sustaining Superior Performance. New York, New York; Free Press

Prahalad C. K. and R. A. Bettis (1986), "The Dominant Logic: a New Linkage Between Diversity and Performance," Strategic Management Journal, 7, 485-501.

Prahalad C. K. and G. Hamel (1990), "The Core Competence of the Corporation," Harvard Business Review, May-June.

Rumelt, R. (1974): Strategy Structure and Economic Performance. Division of Research, Harvard Business School, Cambridge, MA.

Sastry, A. (1997). "Problems and Paradoxes in a Model of Punctuated Organizational Change," Administrative Science Quarterly, 42: 237-275.

Sterman, J. D.; N. Reppenning and Kofman. (1997). "Unanticipated Side Effects of Successful Quality Programs,' Management Science, 43, 4, 503-521.

Sutherland, J. W., (1980). "A Quasi-Empirical Mapping of Optimal Scale of Enterprise," Management Science. 10, 963-981.

Warren K. (1997), "Building Resources for Competitive Advantage," Mastering Management, 591-598, London: FT Pitman Publishing.

Williamson, O. E. (1967), "Hierarchical Control and Optimum Firm Size," Journal of Political Economy, 75,2, pp. 123-138.