Outsourcing of Information Systems as a Strategy for Organizational Alignment and Transformation[1]

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Abstract

Outsourcing of services is usually viewed as a way to increase or decrease capacity at the margin. By outsourcing a firm can vary its ability to provide goods or services such as information technology (IT) processing capacity or applications development, without taking on the long term commitment of permanent staff or equipment.

Today, outsourcing provides new options for managers to provide information technology infrastructures and services to a firm. In this paper we identify ways in which outsourcing may be used tactically to better align business and information technology strategies. Specifically, we consider how selective outsourcing enables alignment of incentives, business revenues and IT infrastructure costs, and how organizational intent can be made more consistent with a firm's capabilities. We propose that outsourcing as an information systems management strategy can enable better control and lower agency costs as managers benefit from better information through external benchmarking. We also consider the role of outsourcing as a vehicle to support major organizational transformation, and as a device for enabling new models of organization. Based on our analysis we propose a series of testable propositions about outsourcing.

The contributions of this paper include extension of business strategy and information technology alignment concepts to incorporate the interdependence between projects, product life cycles, and technology transfer. Most importantly, the paper highlights new directions for outsourcing research, focusing on the effects of outsourcing on the IT organization, the processes of internal technology development, and the transfer of technologies between organizations.

1.0 Introduction

Outsourcing is the subcontracting of a portion or all of the information systems (IS) functions and services of one firm to another. While the outsourcing of information systems is not a new phenomenon, there has been renewed interest in outsourcing as a way to meet pressures to downsize firms in a contracting or slow growth economy. Under these conditions, managers tend to concentrate on what they view are their firm's core activities and jettison peripheral activities for provision by a developed external market.

Today, management is increasing the scope of IS functions that are now being obtained externally, as exemplified by Eastman Kodak's and Continental Bank's decisions to outsource their complete IS functions. In addition, the frequency with which firms are outsourcing appears also to have increased. Consistent with these trends the market for outsourcing IT services is estimated to increase from $29 billion to $49.5 billion in 1994[3]. In addition, there is some evidence that firms are beginning to reverse prior outsourcing decisions and to re-internalize functions that were previously outsourced as well as maintaining mixed models of outsourcing and in-house provision of information systems functions (Reponen, 1993)[4]. It is clear the decision to outsource information technology services is complex and is more than just a simple response to economic pressure.

Empirical studies of outsourcing have primarily been case studies of outsourcing decisions, e.g., (Huber, 1993, Lacity and Hirschheim, 1993), or large sample descriptive surveys (Loh and Venkatraman, 1992a, Loh and Venkatraman, 1992b). While case studies have provided useful insights into the process surrounding specific outsourcing decisions they have not been used to construct more general theories to adequately explain the outsourcing decision or to provide useful prescriptions for managerial action. Similarly, while cross sectional surveys highlight specific outsourcing patterns among firms they yield few guidelines for effective use of outsourcing as a management strategy.

Theoretical studies of outsourcing have typically analyzed the phenomena from a discrete and narrow perspective such as the design of optimal principal-agent contracts under different conditions of information asymmetry and costs (Richmond, et al., 1992). While these studies provide prescriptive guidelines for outsourcing management, they do not consider the interdependence between a specific outsourcing decision, other information technology investment options faced by a firm, and the broader context in which the issue is framed. Finally, there is little systematic research on how different types of outsourcing alternatives affect the internal operations of the IS organization, or how managers use outsourcing in supporting other, often more political goals.

In this paper we review the dominant theoretical models that explain the determinants and consequences of outsourcing, and then propose a more dynamic perspective of outsourcing as an alignment mechanism integral to a process of organizational transformation. We develop a theory of outsourcing based on economic principles and then expand this to incorporate notions of resources and capabilities. We enhance this model by accounting for different forms of contracting. A series of testable propositions is developed along with managerial guidelines on the effective use of outsourcing[5].

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[3] Estimate of the Yankee Group for all Fortune 500 firms (Loh and Venkatraman, 1992b).

[4] Numerous examples are given in the trade press. (Hayley, et al., 1993)

[5] A survey instrument as well as detailed case studies are being implemented to test these propositions.

2.0 Models of Outsourcing: A Critical Review

The trend toward the outsourcing of business functions is increasing in the US economy (Brynjolfsson, et al., 1994) and promoted somewhat by the increased shift toward new organizational forms, such as value-added partnerships and network organizations (Antonelli, 1988, Drucker, 1988, Johnston and Lawrence, 1988).

Three perspectives, industrial organization, core competency, and technology transfer have been used to explain this trend toward externalization of functions. The dominant explanations for this trend are based on transaction cost and agency theory models of industrial organization, and focuses on why managers may choose contractual modes of governance instead of managing activities within firm boundaries through vertical or horizontal arrangements. The second set of models considers the role of organizational resources and capabilities in explaining the trend to outsource. These include constraints imposed by limited management resources and attention, and insufficient organizational capabilities to maintain and leverage core competencies. The third set of models considers the use of joint venture and other modes of outsourcing for the purpose of technology transfer and learning in order to enhance the capabilities of a firm. These different models are examined below.

2.1 Industrial Organization Perspectives on Outsourcing

Industrial organization studies of the economic structure and behavior of firms focus on market strategy and internal organization (Tirole, 1988). Within industrial organization, transactions cost and agency cost theories are used to explain the structure of firms. These theories model a firm and its interaction with the environment in terms of exchange relations and special emphasis is given to the design, selection and variation in governance mechanisms that are used to control exchange relations within the firm or between the firm and its environment. The principal focus is on designing contracts, incentives and the distribution of decision rights in a manner that efficiently allocates resources and safeguards against exchange related risks. From this perspective, the decision to outsource information systems falls within the general class of "make" or "buy" decisions (Walker and Weber, 1984).

Transactions cost and agency theories provide two complementary models for understanding the decision to outsource information services rather than use in-house production. The central tenet of transaction cost economics is that profit oriented firms will organize in a manner that minimizes both production and transaction costs. Williamson (1975, 1985) defines transactions costs as those of searching for a supplier; drafting, negotiating and safeguarding a contract; or those costs incurred due to correcting or adapting to contract misalignments, setting arbitration mechanisms and effecting secure commitments. Williamson identifies three critical factors that determine the magnitude of transaction costs: asset specificity, uncertainty and transaction frequency. Asset specificity refers to the degree to which an asset is specialized to a specific exchange relation, and where asset value depends upon the continuation of the exchange relation. The higher the amount of such sunk investments devoted to a particular relationship, the higher the potential magnitude of "appropriable quasi-rents" or losses from hold-up of the transaction by the other party (Klein, et al., 1978). The greater the uncertainty about the future performance of an exchange, or the value of the item to be exchanged, the more difficult it is to write specialized contracts covering the exchange. Increasing uncertainty and asset specificity therefore increase transaction costs as more complicated contracts and governance mechanisms are needed to manage the exchange. If a specific transaction is repeated frequently, transaction costs can be reduced through the specialization and reuse of the governance mechanism, i.e., the contract. As transaction costs increase, firms will tend

to internalize production through their hierarchy instead of undertaking exchanges with the market unless the market enjoys significant production economies. These relationships are illustrated in Figure 1.

Malone et al., (1987), propose that a shift away from hierarchies to market modes of obtaining production (an increase in outsourcing of production) will occur as a consequence of improving economies of scale in production and improved information processing. They suggest that cheaper and more efficient information processing reduces the transactions costs of writing contracts, and monitoring and ensuring secure commitments making external provision of production more attractive. The resulting increase in demand combined with economies of scale in production, enables external producers to aggregate production and achieve lower per unit production costs than can be obtained in-house, permitting product costs to be lowered further.

IS products and services lend themselves especially to economies of scale in production as the marginal cost for processing additional volume is low. This combined with decreasing transaction costs associated with monitoring and writing of contracts make outsourcing of IS most attractive in that large suppliers should have a cost advantage over smaller, in-house production. For example, this is illustrated in the credit card processing industry where third party processors accounted for 51% of all bank card processing as the minimum efficient scale for processing required 10 million accounts (Steiner and Texeira, 1990).

A variation of the traditional transactions cost model for outsourcing is suggested by agency theory and the more recent work in incomplete contracting (Grossman and Hart, 1986, Milgrom and Roberts, 1990). Milgrom and Roberts (1990) propose that bargaining and influence costs are more important than asset specificity, uncertainty and frequency of transaction in determining the selection of governance systems for exchange relations.They note that unconstrained short term bargaining to resolve price haggling and disputes is inefficient. In this case, firms will tend to centralize authority and insource services, utilizing the hierarchy to resolve disputes and reduce bargaining costs. Two sources of bargaining costs are involved. First, coordination failure occurs in competitive markets where there is interdependence between actors in implementation of an exchange. Second, when there are problems in measuring the value of a good to be exchanged, or when individual valuations are unknown, significant resources can be spent in acquiring information. These can lead to haggling and non-optimal patterns of bargaining and exchange behavior.

However, in a centralized authority system, such as a hierarchy where producers and exchange parties are integrated into a single organization, inefficiencies are introduced by the central authority or management. Here, inefficiencies arise when exchange parties invest substantial resources to lobby and *influence* management, or when management intervenes unnecessarily in transactions. This model provides a second motivation for outsourcing as centralized authority is not always efficient at allocating resources, given the unequal influence of different individuals within hierarchies. This model suggests that managers must trade-off short term bargaining costs in markets with influence costs in hierarchies when deciding how to obtain information services.

The agency perspective considers a firm to be a nexus of contracts among self-interested individuals. These contracts exist between the owner of the firm and its employees, all of whom seek to maximize their own utility. Agency costs are incurred due to incentive misalignments between the agent and the principal. Specifically three forms of agency costs are incurred, primarily by the principal. *Monitoring costs* are those incurred in measuring the performance of the agent. *Bonding costs* are losses incurred as agents seek

to reassure the principal of their good intentions and work. *Residual loss* refers to losses incurred due to incentive misalignments. In addition, within an organization there are significant internal coordination costs incurred in processing information and communicating between decision makers. Organizations tend to act in a manner that minimizes their agency costs.

A variation of the agency theory considers the relationship between ownership and incentive alignment. Grossman and Hart (1986) note that the ownership of assets provides the owners with residual claims on profits as well as residual rights of control over the allocation of the asset. Hence ownership is the critical source of authority. They argue that in certain cases internalizing production within a firm may be inefficient as it removes production incentives from parties to the exchange who are not owners of the means of production. These parties have no incentive for efficiency as they have no residual claims on profit. In such a case, outsourcing would increase efficiency as the provider of outsourcing services has strong incentives to make a profit and control costs. This reduces residual losses arising from incentive misalignments and provides a third motivation for outsourcing.

To summarize, the transactions cost and agency approaches identify the costs of writing and monitoring contracts, the costs of bargaining and influence activities, and residual losses from incentive misalignments as key determinants of firm boundaries and the selection of information systems governance mechanisms. This incomplete contracting approach to information systems governance is partly illustrated by the work of Richmond, Seidmann and Whinston (1992). However, a key problem with the application of transactions cost and agency theory explanations of information systems outsourcing are that they provide static comparative frameworks for alternate governance choices and do not take into consideration various other factors that may affect the outsourcing decision. These include resource constraints on the firm, the requirements for a firm to learn how to effectively utilize new technologies, the interdependence between outsourcing and other investment decisions faced by the firm, and how production costs vary during the business life cycle. We consider these factors later.

2.2 Core Competence and Focus Perspectives on Outsourcing

A second explanation for increased information systems outsourcing arises from the tendency of firms to specialize and focus on their core business activities. This is known as organizing around strategic core competencies (Prahalad and Hamel, 1990). According to this notion, in turbulent and competitive environments the success of a firm is determined by excellence in maintaining, growing and leveraging a few core competencies and translating these into products and services. The scarcity of effective management resources leads to the divesting of non-core activities so that attention can be concentrated on those few critical factors that determine success. When information systems are not a core business activity they are outsourced so that management attention and other scarce resources can be focused on those business activities central to the mission of the firm.

Indeed, Robert C. Ayres, of Eastman Kodak, explained their decision to outsource information systems as a desire to concentrate on core competencies:

> "Kodak is capable of being a leader in our core business of imaging technology. We are not interested in being a leader in telecom or MIS," he commented. "Imaging is a critical function to Kodak, whereas telecom and MIS are only strategic functions," he elaborated. To find partners for PIP, Kodak underwent a five-phase process -- preparation, selection, negotiation, implementation, and ongoing relations -- in each of four areas. Ultimately, the

> partnerships formed were DEC for telecommunications (the "Telstar" alliance), IBM for data centers and the IBM network ("BlueStar"), Businessland for PC Support Services ("Microbuddy"), and Tigon for voice messaging ("KMX"). (Emigh, 1992)

While a focus on core competence explains some information systems outsourcing (Willcocks and Fitzgerald, 1993) there is little empirical support for this notion as an effective business strategy. There is scant support for outsourcing of information systems enhancing the ability of a firm to successfully manage its core activities.

2.3 Outsourcing as Technology Transfer

A third perspective considers outsourcing as a way for a firm to acquire technology and know-how. This is especially important in environments characterized by rapid technological change where firms require new types of specialized expertise on a recurring basis. In this view alliances and joint ventures provide a firm with opportunities to learn, transfer or acquire critical technologies when the internal rate of technology development does not keep up with the requirements of its market (Ciborra, 1992, Kogut and Zander, 1992) . Hence firms will outsource or enter into joint ventures in order to acquire new skills, knowledge, or technologies, especially when the internal IS organization fails to keep up with the rate of technical change or fails to maintain a technological infrastructure similar to those adopted by leaders in the industry. Effective acquisition and adoption of innovations is especially important when new technologies give significant performance or cost advantages.

The information systems trade literature points to many examples of outsourcing motivated by a need to acquire specialized expertise and technology. However, few critical success factors have been identified and there are infrequent assessments of the effectiveness of information systems outsourcing as a learning and technology acquisition process. We return to this theme later in this paper. Now we subject these notions to critical assessment.

2.4 Critique

The transactions costs and agency perspectives have been used to develop normative economic models of outsourcing. These perspectives, however, primarily provide a static perspective on the determinants of outsourcing. They do not take into account the effects of project interdependencies on the choice of a method for governing exchange relations, or the social and political settings in which such decisions are made. These perspectives lack a process dimension that would explain the dynamics of the situation.

Second, these perspectives have provided few guidelines for the selection of a governance mechanism to guide exchange relations. Neither have they considered the effects of outsourcing on the structure and function of the IT organization.

Third, the effectiveness of the core competency strategy is not yet validated, and the role of outsourcing as a technology transfer strategy has yet to be examined.

This paper extends the prior research to develop distinct models of outsourcing which address some of these limitations. Specifically, we consider outsourcing as a strategy to support the alignment of incentives, business intent and organizational capabilities of a firm. In addition, we consider the role of outsourcing as an enabler of organizational transformation. We denote these perspectives as the *alignment* and *transformation* models

of outsourcing and propose that they can be applied to the analysis of other resource governance decisions contemplated by a firm.

3.0 Outsourcing as an Alignment Strategy.

Information technology is an increasingly important factor in shaping firm strategies and in enabling new ways of competition (Porter and Millar, 1985). Indeed, IT is becoming a strategic necessity (Clemons and Row, 1987, Clemons and Row, 1991). The importance of information technology as a strategic resource requires closer linkages between the formulation and execution of a firm's business and information technology strategies. Henderson and Venkatraman (1991) note that achieving this integration requires that the information technology and business strategies be reconceptualized into a more comprehensive and interrelated planning framework. Consistent with previous strategic planning models, they propose that information technology and business strategy be "aligned" or "fit" across multiple dimensions and levels, for example, in strategic fit and functional integration.

Strategic fit refers to the alignment of the business and IT strategies with a firm's organizational infrastructure and technology infrastructure capabilities. Strategy in this sense is defined in terms of a firm's or the IT organization's external market posture as represented by the scope, distinctive competencies and governance mechanisms used to manage relations with the environment. Organizational and IT infrastructure are the internal arrangements required to implement a strategy; they include administrative or technology infrastructures, processes and skills. Functional integration is the alignment of purpose and capabilities across the business and IT functional domains (refer to Figure 2) (Henderson and Venkatraman, 1991).

The alignment models identify key dimensions among which there must be congruence of purpose and fit between the external posture of an organization and its internal capabilities. Indeed, if there isn't alignment across domains, firms face substantial business and technical risk in implementing information technology based strategies. However, the model does not identify the mechanisms of alignment for various dimensions, what a proper configuration is, or the effects of resource constraints and financial objectives on the selection of strategies or infrastructure configurations.

In the next section we adapt the alignment model and examine how firms can use IT outsourcing as an information technology governance mechanism to achieve better "fit" between business intent, resources, capabilities and implementation.

3.1 Outsourcing as an Incentive Alignment Mechanism

Information systems researchers have observed that information asymmetries and incentive misalignments between developers, the user organization, and management give rise to various agency costs (Gurbaxani and Kemerer, 1989). Information asymmetry and incentive misalignment can lead to three forms of opportunism: adverse selection, moral hazard and hold-up.

Estimating time and effort required to develop an information system is difficult. Due to domain expertise, the internal IS department will tend to have superior knowledge, relative to a user, on the effort and time required to accomplish a project. Without competition, the internal IS group will tend to over-estimate span time and cost for a project in order to assure there are sufficient slack resources to complete it This inflation is called adverse

selection between principal and agent. When the bidders on a project are more representative their bids tend to better represent the actual resources required to accomplish it.

The moral hazard problem occurs when the proper incentives do not exist to use resources efficiently. For example, given the difficulty of monitoring an IS development project, there is little incentive to accomplish the work in less time and with less resources than estimated. Typically, the internal IS departments does not share the same high powered incentives and risks as does the user or business unit that buys the system. Thus, internal IS does not share the costs of delayed systems in the same way as does the user.

Finally, if users are fragmented, and are dependent upon a fixed information technology infrastructure, the internal IS group can hold the user up (hold-up) until extra resources are allocated to the project. This is a form of blackmail. For example, if users share a network, a project to enable full connectivity may be delayed until the budget of the IS group is increased or more staff added to the project. Information asymmetries, incentive misalignments and irreversible investment can give rise to opportunism and agency costs.

We propose that outsourcing (or the threat of it) can be used to attenuate opportunism risks and better align the interests of the internal IS organization with those of management and users to provide timely, efficient and effective information services. For example, the presence of outsourcing alternatives reduces information asymmetry and provides a price discovery mechanism for managers. Bids from external service providers is a way to estimate the costs of projects and benchmark the efficiency of the internal IS function. These benchmarks increase the information available to line managers on the potential costs of information services.

Second, outsourcing contracts can be structured to share risks between the purchaser and provider of the system or service. For example, an outsourcing provider may be liable for delays in system delivery or lapses in product quality or service. In addition, competition among outsourcing concerns provide incentives to reduce costs and to maintain a high reputation for performance. These forces serve to make both vendors and the IS organization more customer focused and to constrain the problems of opportunism.

The threat of outsourcing also serves to align incentives by making the internal market for information services within a firm more "contestable." Given the high fixed cost of information systems and services, and increasing returns to scale, the traditional internal IS department is typically a monopoly provider of services to the firm. Baumol, Panzar and Willig (1982), however, show that a credible threat of entry has an effect on the behavior of an incumbent monopolist by causing it to reduce its price of services to a more competitive level. Similarly, we expect that the credible threat of entry posed by outsourcing into the internal market of a firm will result in making the internal IS groups more competitive. For example, the serious consideration of outsourcing by a major computer and software manufacturer led the internal IS department, in order to maintain the service in-house, to revise and lower cost estimates and to improve performance commitments for running a data center[6].

The existence of outsourcing alternatives outside of a firm is unlikely to automatically transform pricing and performance of the internal IS organization. Instead, it is necessary for managers within the firm to make the possibility of outsourcing credible. The first way to do this would be to request outsourcing bids for a development project or the operation

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[6] Interview with the Director of Telecommunications of a New England firm.

of a processing facility. The second is to selectively outsource a few activities to illustrate a strong commitment to finding good price and quality combinations. This process makes the likelihood of complete outsourcing more credible. We believe that selective outsourcing of some internal IS functions will transfer and provide sufficient incentives that performance will improve in other IS functions that have not been outsourced.

As a summary, we propose a set of testable propositons for how outsourcing can be used tactically by management to remove information asymmetries and to better align incentives within a firm for providing information services.

P1: Managers will selectively use bids from potential outsourcers as a price discovery mechanism to estimate the cost and time required for information systems projects.

P2: Managers will selectively outsource work in order to benchmark the performance of the internal information systems group. The performance of the internal IS organization will be compared to the performance of outsourced projects.

When outsourcing is used to remove information asymmetries and to align incentives:

P3: The internal IS organization will revise price, schedule, production quantities and service to match the bids of outsourcers. Outsourcing of IS activities is likely when it is infeasible for the internal IS group to match the external bids given the existing technologies and practices within the firm

P4: Selective outsourcing of IS services will lead to improvements in overall performance of the internally provided IS service. Improvements will be realized along timeliness, cost, quality, schedule, availability, risk and service dimensions.

P5: Internal information systems groups will be less risk averse, i.e., assume greater risk in responding to bids when there is a credible threat of outsourcing.[7]

Outsourcing, from this perspective, serves to align IT and business strategy. It reduces inefficiencies due to monopoly behavior of the internal IS function, especially agency costs that result from incentive misalignments and opportunism. However, managers must be cognizant of the possibility that the internal group when threatened by outsourcing will bid below costs and assume greater risks to undertake the project in-house.

3.2 Outsourcing: Alignment of IT Strategy with the Business Life Cycle

A second dimension of alignment considers the linkage between the IT investment strategy followed by a firm and its financial strategy. For example, Kambil, Henderson and Mohsenzadeh (1993) propose that adopting a "real options" approach to IT investment helps to more effectively align the financial objectives and IT investment strategies of a firm. But, the role of outsourcing as a mechanism for alignment of financial and IS objectives is not well specified.

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[7]In a preliminary field experiment to test some of the above propositions, Fish (1994) found that when outsourcing was framed as an alternative, managers were willing to take more risky solutions.

Loh and Venkatraman (1992b) note that firms with high business cost structure and low performance are more likely to consider IT outsourcing. Low business performance generates pressure for outsourcing in order to reduce cost. They also show that the stock market typically reacts favorably to outsourcing as a strategy. This highlights the value of outsourcing as a mechanism to align financial and information technology strategies. However, this perspective is typically static and does not provide guidelines for managing information technology investments during the life-cycle of a business or technology strategy.

We maintain that it is important to consider the alignment between an information technology sourcing strategy and the firm's revenue and information systems cost structures at different stages of a product's life cycle. This is especially important given two trends: the compression of product life-cycles and the move toward mass customization of products. A compressed product life-cycle demands that a firm recoup its investment in specialized information technology used in product development more quickly. Mass customization requires a higher investment in specialized information processing resources in order to track individual preferences. In addition, the investment in information processing resources comes at, or increases in later stages of the product life cycle. These relationships are shown in Figure 3.

Consider a four stage product life cycle consisting of *product introduction*, a *growth* stage, *shake-out*, and *maturity*. Compression of life cycles and increased information technology costs of mass customization strategies make it increasingly inefficient for product line managers to rely on internal information systems as these have high fixed costs during the shake-out and mature stages of a product life cycle. Even if the business is very profitable during these stages, an internal IT sourcing strategy can reduce margins significantly for information technology intensive product or service. This is especially the case in various banking and financial services where markets such as corporate trust are declining, but the costs of maintaining legacy systems, and their integration into newer systems increases information processing costs. This reduces the firm's profits in later stages of the life cycle.

Outsourcing of infrastructure becomes an attractive option for managers during later stages of the life-cycle as the fixed costs of basic information processing infrastructure costs can be shared across multiple products or services and it enables the service provider to achieve economies of scale. Second, from the purchasing firms perspective the price for information systems services can be converted to a variable cost if it is specified in terms indexed to the number of transactions or sales. This provides managers with more direct control over costs and extends the period over which they earn positive margins for a product during its life-cycle. It can also enable managers to lower costs. This is illustrated in Figure 4.

Under the assumption of a four stage product life-cycle with increasing fixed costs (as illustrated in Figure 4), we propose the strategies for managing information technology sourcing during a product life cycle for an information processing intensive product shown in table 1.

During the start up stage outsourcing is the preferred information technology governance strategy because it minimizes both capital and management resources which are scarce. As a product shifts to the growth stage and information technology needs become known it becomes attractive to insource in order to achieve economies of scale. In the shake-out stage of a line-of-business or a product it becomes more attractive to outsource to allow for a reallocation of capital and management resources. During decline, firms still have an

opportunity to make a profit as a low cost producer. Thus, information processing should be outsourced to control costs by shifting to variable processing costs.

The above analysis leads to the following propositions:

P6: During the shake-out and declining phase of a product or line-of-business managers will tend to outsource related IT in order to achieve greater control over margins.

P7: Managers will tend to outsource a larger proportion of the IT infrastructure during the declining phase of a product life cycle to reduce the fixed costs of IT infrastructure.

To date there has been scant research on information systems budgets during the life-cycle of a product. The compression of product life-cycles and the need for product customization promise to make the alignment of IT costs with the revenue cycle a critical factor in firm performance.

3.3 Outsourcing: Alignment of Intent and Capability

In addition to cost containment and life-cycle investing, a third motivation for outsourcing IS is the need to align the capabilities and resources of a firm with its strategic intent. Given the desire to execute a specific business strategy requiring information systems support, or the need for specialized information technology skills to develop and implement systems, outsourcing becomes an attractive way to acquire organizational capability quickly. This is especially the case in situations where competitive pressures require rapid deployment of a system and a firm lacks expertise or capability with the underlying technology.

Outsourcing is also a way of extending organizational capability when it is required for only a short time. This approach enables a firm to reduce the costs of fixed long term commitments, such as pension benefits for full time employees or specialized computer equipment.

Finally, firms with major strategic initiatives will outsource routine processes to re-allocate skills and talent to strategic projects. Outsourcing is a way to support "legacy" systems while shifting resources to projects more closely related to the firm's strategy. Thus outsourcing will be used by firms in order to align internal capabilities with their strategic intent.

Hence we propose:

P8: Outsourcing of information services will be undertaken to increase organizational capacity and to better align a firms internal capability with its strategic intent and external demand.

P9: Short term outsourcing will focus on acquiring specialized expertise

P10: Long term outsourcing will be used to reduce a firm's fixed long term financial commitments, such as personnel benefits, main frame computing equipment and large operational systems

In this section we have developed three distinct perspectives on outsourcing as an alignment mechanism. However, the above strategies were primarily tactical and generally

presumed the existence of a product strategy. Below we consider outsourcing as an enabler of organizational transformation.

4.0 Outsourcing as Organizational Transformation

Transformation of a firm's information systems organization may be required in order to re-orient its goals, missions and values. This re-orientation may be needed to alter inbred behavior, culture, or in response to technological discontinuities which radically change the underlying technologies and architectures that can outmode the skills and abilities of internal IS staffs.. In this section we consider the role of outsourcing as an enabler of organizational transformation, and as means for coping with technological discontinuities.

4.1 Outsourcing as an Enabler of Organizational Transformation

Rockart and Short (1989) as well as others highlight the importance of re-engineering the internal IS organization in a turbulent and interdependent environment to more effectively support the mission of a firm We take a broad perspective of outsourcing that views it as part of a larger process of organizational transformation. As a firm re-engineers its critical business processes, the internal information technology organization must correspondingly be changed to improve its output and performance along cost, service and quality dimensions.

Organizational transformation, however, is a difficult process. Effective change requires that the beliefs of members of the IS organization in how information technology services should be provided be altered. Schein (1988) proposes three distinct phases to such a re-orientation process: unfreezing, cognitive restructuring and re-freezing. In unfreezing, a critical event along with data gathered by organizational members is used to challenge the established beliefs. Cognitive restructuring is the process by which members of the organization formulate new views of the organization, that is where change actually takes place. Refreezing is the process by which a new set of beliefs embodied in incentives and practices are adopted.

Outsourcing provides managers with new options for managing the organizational transformation process. First, outsourcing is an unfreezing event that can be used prior to re-orienting the goals and missions of the IS organization. The benchmarking that occurs with outsourcing makes the internal IS department aware of how they compare to industry standards. Second, outsourcing is a means of providing temporary capability while the organization changes it mission and direction. That is, it can be used to substitute for internal services should those be unavailable during periods of transition. Third, outsourcing of training is a way to refreeze new beliefs through the acquisition of new skills and by example. Thus, we expect managers to use outsourcing as a mechanism during restructuring of the IS organization. This is exemplified by the increased use of consultants in change agent roles. Hence, we propose:

P11: Selective outsourcing will be used by general or IT management as part of major IS organization transformation. The outsourcing vendor will be used as a benchmark facilitating the unfreezing of the organization, and as a change agent by serving as a new role model and will provide temporary capabilities during the transformation process.

4.2 Outsourcing as a Strategy to Cope with Technological Discontinuities

The information systems marketplace and practice in organizations is typically characterized by many technological discontinuities[8]. These constitutes a second driver for transforming the information systems function and for outsourcing. As Tushman and Anderson (1986) point out, technological discontinuities can be competence enhancing or competence destroying. Competence enhancing discontinuities enable the organization to substitute a new technology for an existing one and achieve orders of magnitude performance increases without rendering obsolete the skills that were used with the old technology. In contrast, competence destroying discontinuities require major shifts in the knowledge base required to operate the new technology.

For example, the shift from one level of microprocessor to another (Intel 80286 to 80386) can be viewed as competence enhancing. Here, the performance of computer systems are substantially enhanced without transforming the skills required for their use. However, the shift toward distributed processing (client-server) architectures and the new object oriented application development methods are competence destroying. These changes require firms to develop both functional knowledge about a new technology as well as specialized architectural knowledge to integrate functions and combine them to provide products and services. Successful adaptation to competence destroying discontinuities requires major organizational transformation and learning, often with drastic change in personnel and leadership.

Adapting the perspective of outsourcing as technology transfer discussed earlier we propose that outsourcing can be an effective means to quickly acquire and apply knowledge to transform internal know how and skills. Specifically, we propose that outsourcing is a viable mechanism for acquiring the specialized functional and architectural knowledge required to take advantage of technological discontinuities. Indeed, in contrast to functional knowledge, a key source of value in the outsourcing relationship is the architectural knowledge that is owned by the vendor firm in organizing and combining different technologies into products and services.

Outsourcing as a technology management and acquisition strategy is more feasible and desirable because large outsourcing vendors develop in-depth knowledge about industry segments and are able to master new skills and technology more rapidly than an internal IS organization. They must do this in order to effectively compete. Specifically, in comparison to smaller IS groups within a firm, large outsourcing vendors are able to acquire and leverage new technical and architectural knowledge more rapidly through specialization, large investments in in-house training in the new technologies, and by integrating and learning from many different client consulting experiences. This enables the outsourcing vendor to benefit from experience curve effects and specialization of functions not easily matched by an internal IS organization that, in addition, may be burdened by maintaining legacy systems. The advantage of vendors will be reflected in the comparative rates at which vendors and internal IS organizations develop formal routines, methods and procedures to implement new technologies in a firm.

Hence we propose:

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[8] Technological change is normally incremental and cumulative. Technological discontinuities punctuate the change process by a major advance in price-performance improvements that cannot be matched by existing technologies and their refinement.

P12: Outsourcing is an efficient way of acquiring expertise and achieving architectural knowledge in the event of technological discontinuities.

P13: Large outsourcing vendors will develop and formalize methods or procedures for new technology implementation more rapidly than within firm IS departments. Large outsourcing vendors can accumulate multiple project experiences more quickly to progress down the experience curve.

The availability of outsourcing as an effective option for managing information technology and coping with innovations suggests significant changes for the IS function. Specifically we expect within firm IS groups to be downsized and that their focus will shift from production of systems toward requirements analysis, evaluation and purchase of externally provided IT solutions to business needs and the provision of assistance to users in the adoption of new systems (technical liaison role). This will require the acquisition of new skills, new metrics and models for evaluating IS organizations. Hence we propose:

P14: Increased use of outsourcing will lead to downsizing of the IS organization and a shift in IS management focus to requirements analysis, vendor evaluations and relations, and user assistance in technology adoption.

In the above section we have proposed that outsourcing as a management strategy can enable major transformation of a firms internal IT function and infrastructure. In addition, we have proposed that outsourcing is an effective means of acquiring new technologies. However, the research to date on how IS organizations respond to technological discontinuities and the effects of such discontinuities on organizations and systems is sparse. This situation suggests an urgent need for systematic research to understand the role and effectiveness of outsourcing as a response to technological discontinuities and as an enabler of organizational transformation. It also highlights the need to redirect information systems research to systematically explore how firms absorb new information technology capabilities and its effects on the IT organization.

5.0 Conclusions

Outsourcing provides new options for the provision and governance of information technology resources for a firm. In this paper, we have identified ways in which managers may use outsourcing tactically to better align business and information technology strategies by making incentives, revenues and cost structures more congruent over a business cycle, and by providing specialized expertise and increasing organizational capacity on a temporary basis. We have considered the role of outsourcing in supporting major organizational transformations needed to cope with technological discontinuities.

This paper contributes to a refinement of the business strategy and information technology alignment frameworks; and to a deeper understanding of the interdependence between projects, product life cycle effects, and technology transfer. The paper expands the potential of outsourcing as both a tactical and strategic management activity and provides a series of testable propositions. Most important, we highlight new directions for research that focus on:

- the alignment of incentives between information systems managers and business managers, and the use of outsourcing for benchmarking and price discovery,

- the alignment of information technology budgets and sourcing strategies with product or market life-cycles,
- the development, and the transfer of technologies between organizations,
- the processes and organizations used by firms to absorb new technologies.

As the extensive use of outsourcing is relatively new, with mixed results (Lacity and Hirschheim, 1993), little is known about effective processes of managing relations, and integrating them with strategic objectives and planning activities of a firm. Effective use of outsourcing in practice will require careful consideration of vendors, along with the structuring of relations and contracts.

This paper outlined the emerging potential of outsourcing as a management strategy for governing the provision of information services to an organization. Based on our analysis, we expect these new management options provided by outsourcing will, in the long run, result in improved organizational performance through more effective use of technology, and better utilization of capital and human resources. We believe the principles developed in this paper can also be extended to the outsourcing of other services by firms.

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Business Market Life-cycle	IT Governance	Strategy Assessment
Start-up	Outsource if possible	In the start-up phase of a new firm or line of business in a new market, both capital and management resources are scarce. In this phase outsourcing is a useful mechanism for preserving start-up capital while acquiring the necessary technology support and infrastructure. Outsourcing preserves capital and management focus for the key business. Insourcing may be required to develop internal expertise
Growth	Shift toward Insourcing	Growth of the firm or line of business justifies the capital investment in IT with internal support as specialized information systems can be used to differentiate products and services. As the business grows, the economies in scale associated with information technology - software and hardware make it more economical to insource more systems development and maintenance.
Shake-out	Shift toward outsourcing	In the shake-out phase of a line of business or product the information technology infrastructure supporting the product should increasingly be outsourced. This allows for reallocation of internal capital equipment and management resources toward emerging businesses while extending the life cycle for older products.
Decline	Outsource	In a declining market, firms still have an opportunity to make a substantial profit as a low cost producer in the market. This requires transformation of the cost structure underlying a product or service toward a lower variable cost structure. Outsourcing provides a mechanism to shift from a high fixed cost structure toward a variable cost structure such that the total costs to the firm decline with decreasing market share.

Table 1: Product Life-cycle and Technology Sourcing Strategies

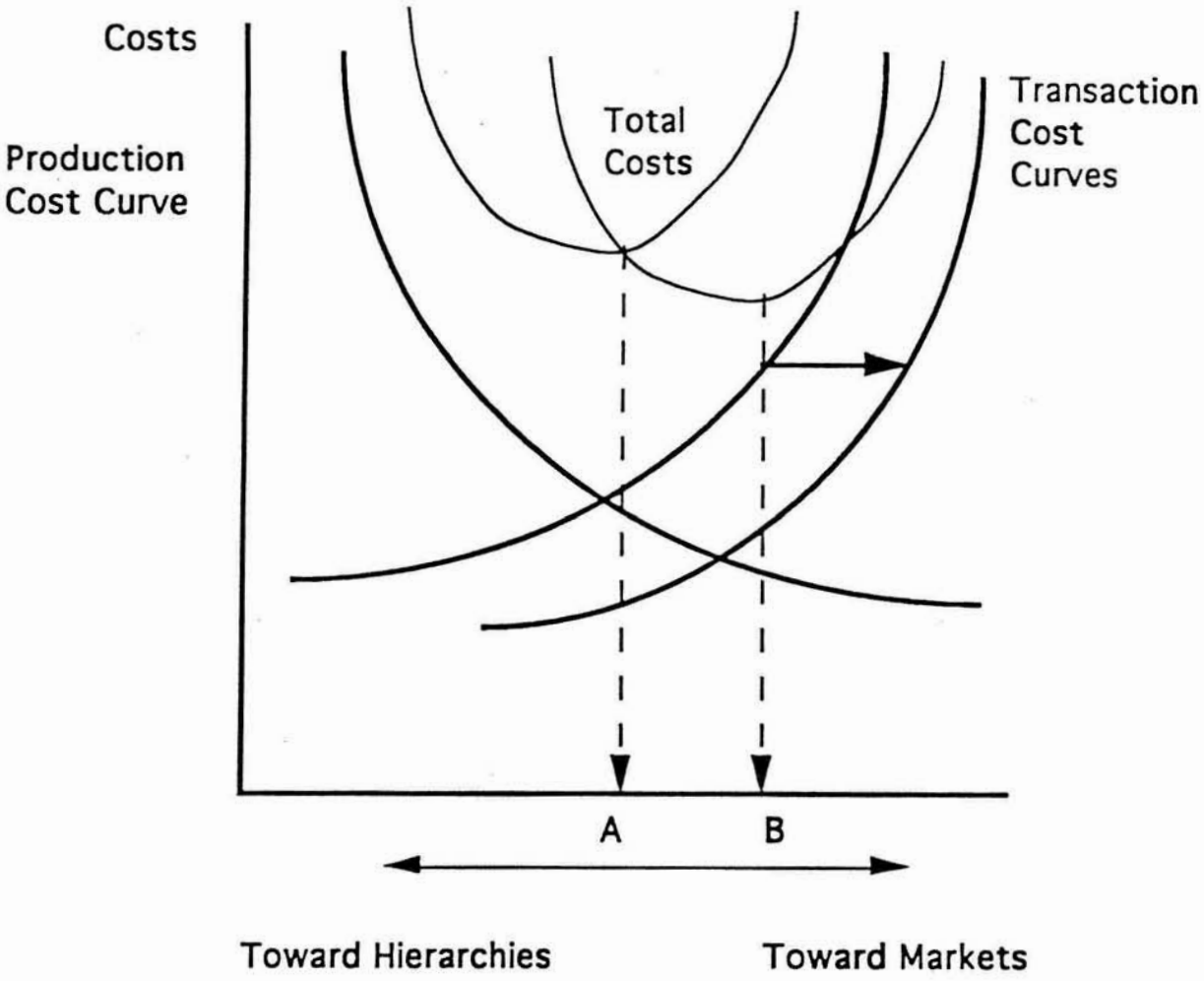

Figure 1. Transaction Cost and the choice of Organization[9]

As transaction costs are reduced there is a shift toward markets.

[9]Source: (Brynjolfsson, et al., 1988)

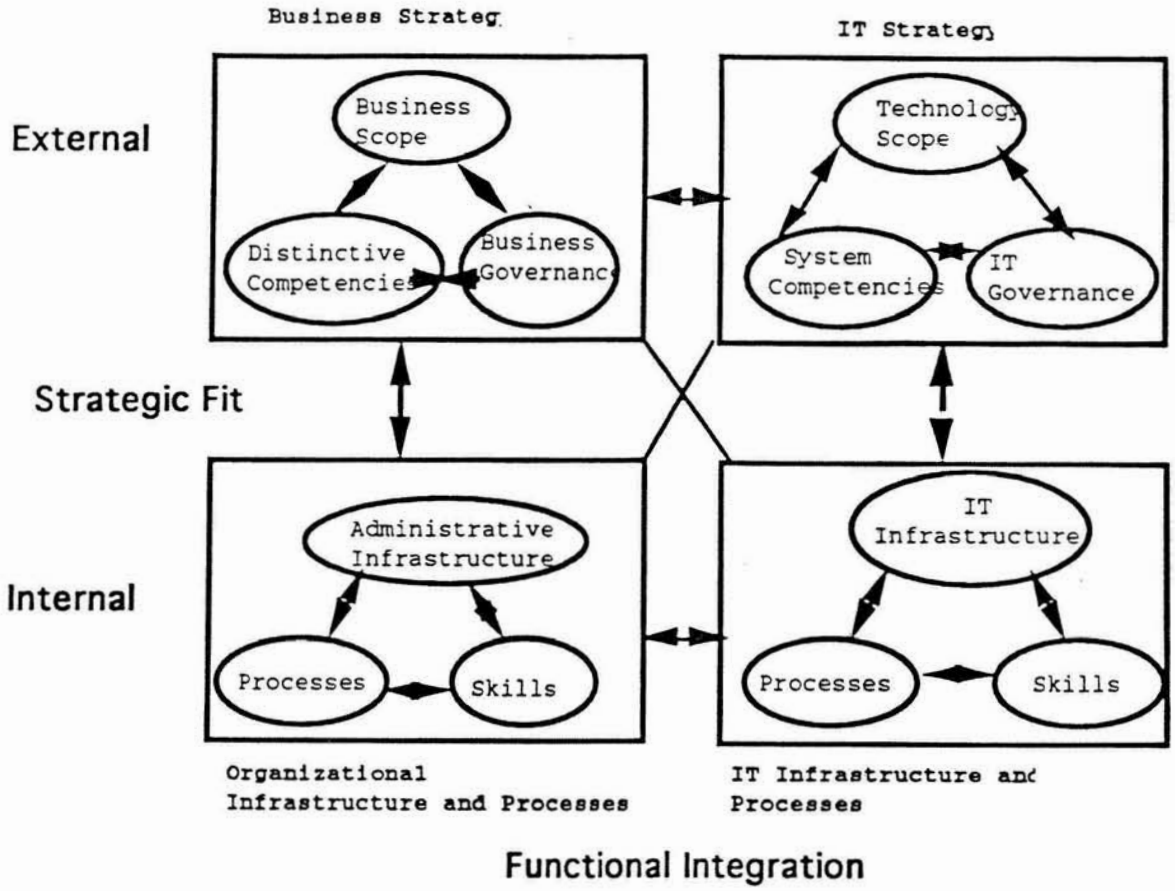

Figure 2: The Strategic Alignment Model[10]

The strategic alignment model identifies dimensions of business and technology strategies that must be aligned to derive benefits from information systems.

[10]Source: Henderson and Venkatraman, (1991)

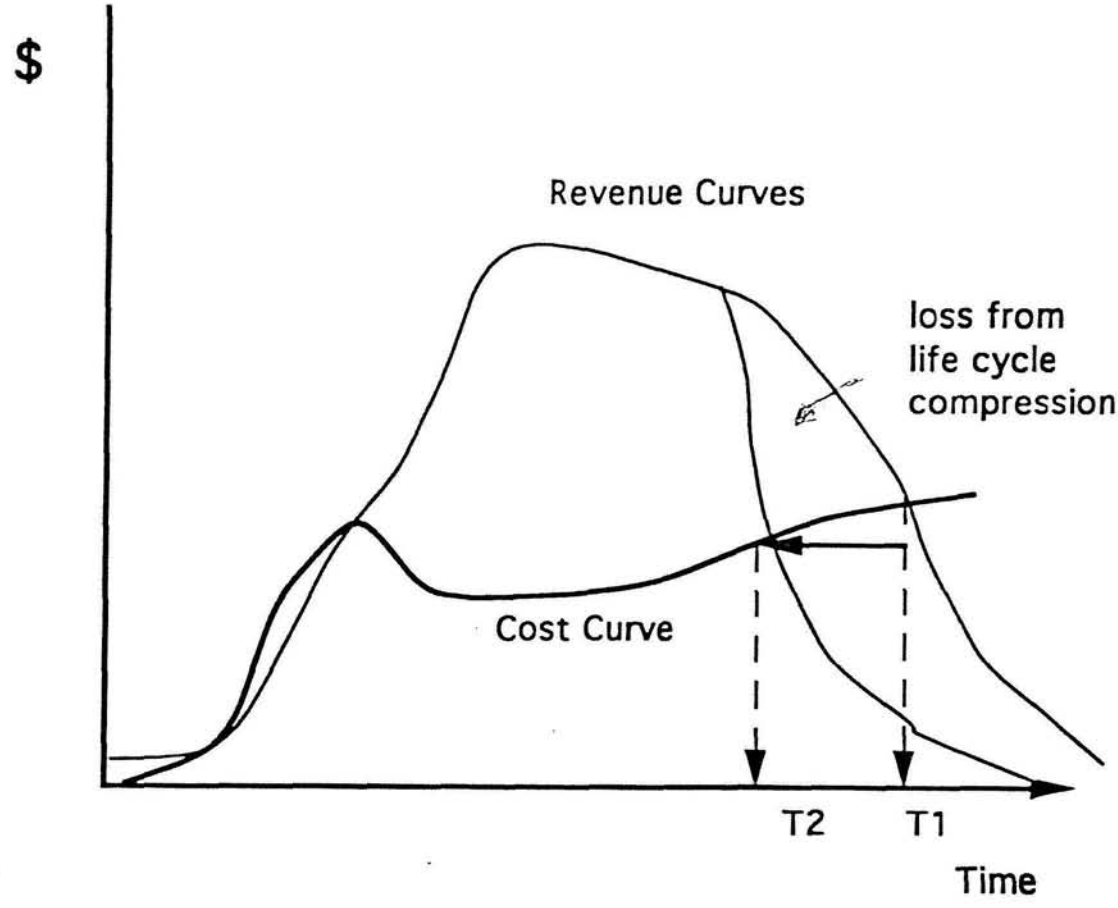

Figure 3: Aligning IT Investments with Product Life-Cycles

The costs of implementing and maintaining systems increase over time as modifications are made to the original system, and as it is integrated with newer systems. If product life-cycles are compressed as we have observed in many markets today, the revenue curve shifts to the left as illustrated in the above diagram. In this case the time at which the product is no longer profitable shifts from T1 to T2, forcing the firm to exit the market or encouraging it to outsource systems to reduce costs. For the purpose of illustration we assume that information services drive the shape of the above cost curve.

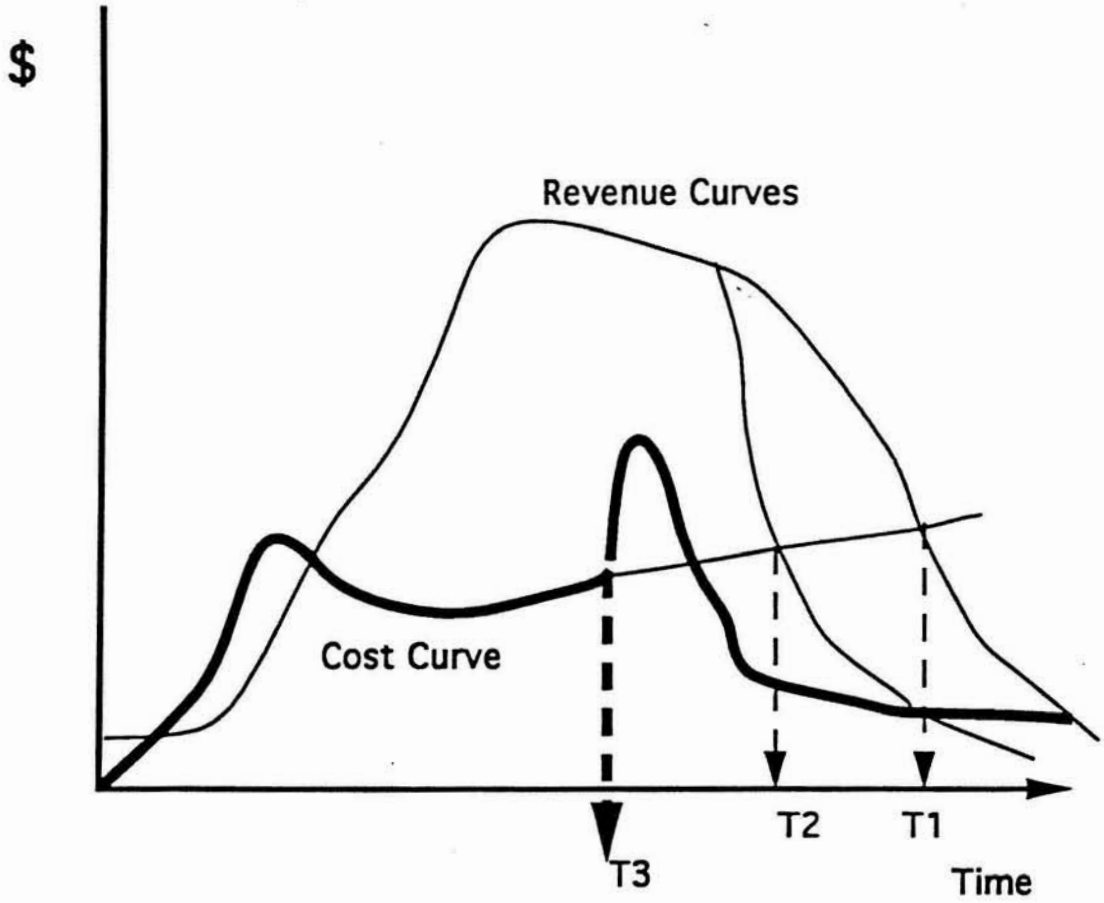

Figure 4: Extending Product Revenues and Life through Outsourcing

In the previous figure we illustrated how compression of product life cycles reduced the time frame for the firm to achieve positive revenues from T1 to T2. In the above diagram, the firm chooses outsourcing at time T3 to convert is information procession costs toward a variable cost regime. This permits the firm to extend the lifetime of positive revenues from an information processing based product in a market place, from T2 back toward T1. The new cost curve is illustrated by the dark black line.

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