

AN AGENT-THEORETIC PERSPECTIVE ON THE MANAGEMENT OF INFORMATION SYSTEMS

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0. ABSTRACT

IS researchers and practitioners are increasingly recognizing the applicability and power of economic theories to provide insight into the management of information systems (MOIS). In this paper, agency theory, a relatively new approach that extends traditional microeconomics by including certain organizational variables, is proposed as a means of analyzing a large set of problems in the MOIS literature. The paper begins with an introduction to agency theory and then demonstrates its applicability to resource allocation and organization structure decisions in MOIS.

I. INTRODUCTION - PROBLEMS IN MANAGING DELIVERY OF ISS SERVICES

The key issues in the management of information systems are increasingly oriented towards organizational considerations as managers and users gain a growing understanding of the underlying technologies. The primary concerns of information systems professionals include managing the increasingly decentralized computing environment, measuring the effectiveness of information services and managing end-user computing [Arthur Andersen 86]. In order to address such issues, researchers are in need of reference disciplines that support model building in this domain. One such proposed reference discipline is microeconomics, which provides a well-developed set of models and tools that are useful in addressing such questions. This approach is relatively recent, and researchers are still investigating which aspects appear to be the most promising in terms of delivering insights into MOIS issues.

In their seminal paper on the applicability of economics to MIS, Kriebel and Moore suggest that agency theory "fits nicely" with a number of MOIS problems [1980]¹. The current paper proposes the use of agency theory, a relatively new application of microeconomics that extends traditional analysis by including organizational variables, to study the management and delivery of information systems services. Traditional microeconomics has proven extremely useful in analyzing resource allocation problems in a variety of

contexts, particularly in market settings or those involving inter-organizational transactions. However, it is limited in analyzing intra-firm allocation problems due to simplifying assumptions about the motivations of actors and information costs. In agency theory, the organization is viewed as a nexus of contracts among owners of the factors of production and customers [Jensen/Meckling 76]. This view facilitates an explicit recognition of the information asymmetries and conflicting motivations that exist within the context of the firm. The focus of agency theory is on the impact of organizational form and incentive structures on the performance of the firm. Agency theory may thus be viewed as the application of microeconomics in the context of asymmetric information and conflicting goals which also make it an attractive approach for analyzing issues in the management of information systems.

The organization of this paper is as follows. Section II presents a brief overview of agency theory. With this background, section III presents an analysis of the provision of information systems services through the perspective of agency theory. Section IV then provides some concluding remarks and suggestions for future research.

II. AGENT-THEORETIC APPROACH

A. Background

An agency relationship can develop whenever one economic actor depends upon the actions of another [Pratt/Zeckhauser 85]. A formal definition is provided by Jensen and Meckling, who define an agency relationship as

"...a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent." [1976]

This definition captures the essence of the employer-employee relationship and leads to the view of organizations as a nexus of contracts. This approach allows the development of a theory that explains how the conflicting objectives of the individual actors within a firm are brought into equilibrium to meet the relevant marginal conditions of traditional microeconomics with respect to inputs and outputs, thereby maximizing present value [Jensen / Meckling 76]. Thus, agency theory is specially useful in analyzing intra firm economic transactions.

¹This position was publicly reiterated by Moore at the December 1987 International Conference on Information Systems.

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The problems in an agency relationship stem from two central themes, goal incongruence and information asymmetries. Goal incongruence refers to the fact that the optimal actions for the agent to take from the viewpoint of the principal are unlikely to be the same as those that maximize the agent's utility. A common example is that people typically associate some disutility with hard work, and may seek to avoid it. However, hard work may be required to perform the service desired by the principal. Therefore, the agent may seek to minimize the amount of work expended (i.e. "shirking") in providing the service to the principal². Of course, this divergence would not be a problem if the principal could perfectly observe the agent's actions, and thereby provide compensation as a function of effort. However, real world situations are typically characterized by information asymmetries, wherein the principal has only imperfect information on the agent's efforts.

In order to more closely align the agent's utility maximization with his own, the principal can develop incentives, and to improve his information he can incur monitoring costs, whereby the actions of the agent become better known. In an employer-employee relationship an example of an incentive would be commissions for salespeople, so that the goal of selling more product is more closely shared. An example of a monitoring cost would be timeclocks to record when employees report to and from work. Agents may find it in their best interest to incur bonding costs that will credibly guarantee that they will not take actions that will harm the principal, or that if they do, the principal may be compensated. The sum of all these costs, plus the "residual loss" due to the divergence of interests after all of these actions have been taken are collectively referred to as agency costs [Jensen/Meckling 76]. The task facing organizations is to develop organizational structures, performance measurement and evaluation schemes, and incentive compensation systems that minimize these agency costs.

B. Some research in agency theory

Research in agency theory has proceeded in two streams [Jensen 83]. The first, sometimes referred to as "principal-agent theory", focuses on normative aspects of the contractual relation. This research tends to be highly mathematical, and builds models to provide optimal contracts that take into account such phenomena as the structure of preferences of the two parties in the relationship the nature of uncertainty, and the structure of information held by the principal and the agent. A few examples of such research include

²Even further, the agent, in maximizing his or her utility, may act in a manner that is actually counter to the principal's interests.

Ross's characterization of the principal's problem [1973], Mirrlees's explanation of how hierarchical organizations manage the choice of incentives and authority [1976], Holmstrom's work on moral hazard [1979, 1982], and Shavell's model of how information on the agent's effort and his risk preferences dictate the appropriate incentive structure [1979]. Shavell provides interesting applications of his model in areas as diverse as lawyer-client relationships, pollution regulation policy, and corporate shareholder relations.

Jensen's second categorization of agency research, the "positive theory of agency", concentrates on modeling the effects of information costs, the degree of specialization of assets, capital intensity and other additional aspects of the contracting environment on the form of the organizations that survive. The classic paper in this series is Jensen and Meckling's on the theory of the firm [1976], where the agency framework is used to analyze the conflicts of interest between stockholders, managers, and bondholders of the firm. Fama and Jensen [1983] explain how the separation of control from security ownership, as seen in large organizations, can be an efficient form of economic organization. Other papers of a more limited scope but representative of research in this area include Leftwich's work on explaining the variance from Generally Accepted Accounting Principles of some negotiated accounting rules in private lending agreements [1983], Smith and Mayers's explanation of the corporate demand for insurance [1982] and Watts and Zimmerman's history of the development of auditing [1983].

In summary, previous research has applied agency theory to a diverse set of managerial issues within organizations. Most of this research has originated in the fields of finance and accounting. It is proposed that the management of information systems is another arena in which valuable insights can be gained using an agency approach. In the next section, a framework for analyzing managerial issues in information systems is developed and some applications are demonstrated.

III. AN AGENCY PROBLEM FRAMEWORK FOR MIS MANAGEMENT ISSUES

A. Introduction

Broadly stated, the organizational task that is of interest here is for the organization to maximize the net value of information services. The problem is one of determining the optimal allocation of resources to the information services department as well as determining how these resources are to be consumed by the individual user departments. Traditional microeconomics suggests that the net value of information services is the value of information services minus the costs of production. Agency theory adds the notion that agency costs must also be subtracted. While traditional microeconomics suggests the use of a price system to allocate resources between users, agency theory also examines the impact of organization

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structures on the resource allocation scheme. Therefore, an agent-theoretic analysis includes a number of additional variables, particularly the organizational structure of the divisions within the firm (particularly the central MIS group), and the managerial performance measurement and reward systems.

B. The Agency Relationships in MIS

The framework employed for looking at the problems of managing MIS in an organizational context involves three sets of economic actors: 1) top management of the firm, 2) functional area departments (e.g., marketing), and 3) a traditional centralized MIS department. This relationship can be shown as a graph, as seen in Figure 1.

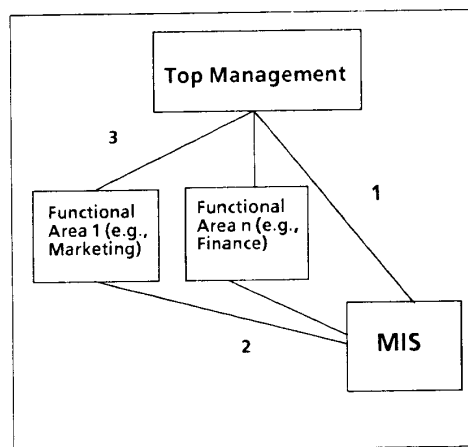


Figure 1. Agency Relationships

The arcs between the nodes on the graph represent relationships between the economic actors. One relationship is from top management to the MIS department, and can be viewed as a principal-agent relationship with top management as the principal. A second relationship is between a functional area and MIS, and again MIS is the agent.³ A third principal-agent relationship, between top management and the functional departments is also present, but since the interest in this paper is in MIS management issues, this relationship will not be examined any further.⁴

The behavioral assumption consistent with this approach is that all participants act out of self-interest. While there are obvious possible divergences between

the goals of individual actors within each of the three classes and the goals of their principals, this is neglected in the present analysis in order to highlight the critical differences between the three groups. Thus, it is assumed for present purposes of exposition that the aim of top management is to maximize the objective function of their principals (the shareholders), the goals of end-users within a functional department are to maximize the objective function of the department head, and those of MIS staff are to maximize the objective function of the MIS manager. These latter goals, as will be suggested below, may differ significantly from those of the firm, depending upon the performance measurement and reward systems that are in place.

To illustrate these differences, some of the objectives of each of these actors are considered in turn below, focusing on the MIS aspects of the principal-agent relationships. The conflicts between these groups result in agency costs. The assumption throughout this analysis is that the goal of top management is to maximize the value of the firm, and therefore, with respect to MIS activities, this implies that the objective is to maximize the net value of information services to the organization. The organizational task is then to allocate the decision rights related to the provision of information services to the different players within the firm in a manner that is consistent with such maximization.

While net value maximization of information services is often the stated intent of MIS managers, their actual behavior patterns sometimes suggest that their objective function may be quite different [Mendelson 88]. For example, the salaries of these managers are often related to the scale of their operation, inducing them to indulge in so-called "empire-building". A related problem arises because of the value managers place on the control of a resource that may increase their political power within the organization. Another problem has been termed the "asymmetric cost" problem. Here, managers often make sub-optimal decisions because their own performance evaluation is often based upon the quality of services provided rather than on their ability to cut expenses. This is often stated in the practitioner literature as "no one ever got fired for buying IBM". MIS managers also often suffer from the "professional syndrome", wherein they have incentives to acquire the newest hardware and software technologies with insufficient regard for cost justification. This is consistent with maximizing behavior for the information systems professional whose market value is partly determined by his familiarity with new technologies.

⁴ Of course, MIS may play a role in that relationship as well, e.g. producing reports that the functional area delivers to top management. However, this role will be subsumed within the functional area-MIS relationship.

³ Actually, this is a set of relationships, given that there is more than one functional department, but this complication will be suppressed for present purposes of exposition.

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On the other hand, the goal of an end user department is to maximize the net value of information services to itself, rather than to the firm. Thus, in firms where users are not required to pay for their usage of computing resources, they may overstate the value of their demands for those resources. For example, a user may request a higher priority on a timesharing machine than is really warranted by the task, or may demand a more powerful personal computer than the one that is the most cost-effective. In such cases, the cost imposed on other users stems from a reduction in resources available to them. Even in cases where chargeback systems are in place, these systems are typically imperfect and users can often develop strategies where they do not reveal their true valuations in order to bias the outcome in their favor. The cost of a particular end-user's actions are imposed on other users rather than on the beneficiary of the action.

In summary, the simple examples above illustrate why a definition of IS value maximization based only on value less production costs, while providing insights into the production of information services, may be inadequate to explain many observed phenomena, since managers may not act in a manner that is consistent with such models. The task confronting top management in the organization is the design of mechanisms to reduce agency costs. The primary mechanisms for control are the organization structure and the implied performance measurement and reward schemes.

IV. SOME MOIS ISSUES ADDRESSED BY AGENCY THEORY

The focus of agency theory has been on the impact of organization structures on resource allocation, taking into account goal incongruence and information asymmetries. These issues and dimensions are also at the heart of many MIS management questions. A central question to IS managers is how best to organize the supply of IS services. The following sections describe an agent-theoretic approach to this question, in three parts: 1) central MIS as a cost or profit center, 2) the agency aspects of transfer pricing, and 3) goal incongruence and information asymmetries in a departmental computing situation.

A. Cost vs. Profit centers

While traditional analysis of the cost versus profit center question usually deals with the idea of a selling division producing an intermediate good that can be sold to the buying division, this notion can be expanded upon to include the idea of IS services as an intermediate good that the buying division uses to create the final good or service to the customer.

The two common organization structures for centralized MIS groups are the cost center and the profit center. In a cost center approach, the costs of the central MIS group are allocated back to the requesting user departments, and the performance of the MIS manager is typically

evaluated by his or her ability to remain within budget. In a profit center approach, a price is set for each MIS service, and the performance of the MIS manager is evaluated on the magnitude of the profits generated. One debate among MOIS researchers is which of these two structures is the preferred alternative for a central MIS organization. Arguments are suggested to support both alternatives. For example, Allen has argued recently for a profit center approach [1987] while others have noted a number of disadvantages to this approach [McFarlan/McKenney 83, ch. 6, Mendelson 85].

One approach to sorting through these arguments is to adopt an agency theory perspective⁵. The transfer of IS services from the central MIS organization to the user (buying) division can be viewed as a multiple agent problem consisting of the firm's top management (the principal) and the buying and selling divisions (the agents). The basic dimensions in this analysis are whether transactions between the divisions are mandated (i.e., can the buying division purchase from outside the firm) and whether the transfers are effected at a market transfer price or a full cost transfer price.

The classic paradox in this situation has always been that solutions that are desirable in the sense of allocating resources optimally tend to do less well at signaling divisional performance, and vice versa [Kaplan 82, ch. 14]. Consider the case of a profit center where the performance of the information systems manager is measured by the magnitude of profits generated by his department. In this situation, the manager is provided with incentives to produce information services efficiently. Such an approach usually results in positive impacts on service levels, decision making and new technology adoption [Allen 87]. However, in the case where transactions between the user departments and the information systems department are mandated, the information systems manager possesses market power. As an agent seeking to maximize his own welfare, he will exercise his market power by pricing information services at higher than marginal cost, maximizing the profits of his division, but resulting in a lower consumption of information services than is optimal and a reduction in welfare of the organization. Even in the situation where transactions are non-mandated, the information systems manager possesses a degree of market power due to the additional costs incurred when users seek information services outside the organization.

Top management must take such agency behavior into account when determining the organization structure of the information systems department. Several options exist to reduce the market power of the information services department. First, transactions need not be

⁵Much of the following argument is based on [Eccles 85].

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mandated between users and the information services department. Thus, users may be free to seek such services outside the organization or by implementing departmental computing. However, the nature of information services - security, uncertain demand and economies of scale, for example - makes it costly to seek services outside thereby limiting the value of this option. The use of departmental computing to reduce the market power of the information services department is also limited by the lack of ability to exploit economies of scale and specialization. However, these options can serve to reduce the market power of the information services division. A second approach that top management can adopt is to determine the mechanisms by which prices are set. For example, the price can be set by a committee including users as well as information systems managers. It should be noted that information system managers possess significantly more information about costs and capacity than users, an information asymmetry that will probably lead to terms that are still favorable to the information systems department. Alternatively, the price can be set using market prices. However, it is unlikely that market prices can be determined for many services due to the specific nature of the transactions involved. A detailed discussion of transfer pricing issues is presented in the next section.

The alternative approach is to implement information systems as a cost center. In the case of a cost center, the costs of transactions are usually charged back to the user departments at either a cost-based transfer price or at a cost-plus price. The price may either reflect only variable costs or be a full-cost transfer price. In such systems, the manager is measured by his ability to stay within budget or through comparisons to standard costs. The information systems manager no longer has incentives to act as a monopolist. However, such a system also no longer creates incentives to produce services efficiently or to control costs. The use of standard costs as a measure of performance is seriously limited by the fact that information system products are usually unique. Some standard measures of unit costs for some inputs such as hardware or labor can perhaps be developed, but these have limited applicability in measuring the overall performance of an information systems department. Thus, without the signals generated from a profit center solution, the principal will have to expend additional resources on monitoring costs to ensure the performance of the selling division. Also, there is likely to be some reliance on non-financial performance measures, such as service levels and user satisfaction that would not otherwise be necessary. The existence of these instruments in practice is consistent with the presence of agency behavior.

The choice of organization structure for information services is a difficult one and there is no obvious solution. Each approach has its advantages and disadvantages. Another form of organization that has been proposed is a hybrid form wherein the information

services department is operated as a profit center receiving a market price for its services and the user departments are charged a transfer price that reflects the marginal costs of the service. This form has not been widely implemented in organizations, however, since it provides supplier managers with weak incentives to become efficient producers and it does not provide departmental managers with clear signals about the level of decentralization sought by top management [Horngren/Foster 87]. In addition to the arguments made above, the choice of organizational form depends on the organization structure of the other divisions of the organization as well as the degree of interdependence among them.

B. Transfer Pricing

The choice of a transfer price has a significant impact on the behavior of managers and is central to the performance of any organization structure. In general, the task confronting top management is to determine that the transfer price being set leads the managers of the buying and selling divisions to make decisions that are optimal for the firm as a whole. The transfer price may be set at a market price, a full cost price, a cost plus price or there may even be no chargeback system. Each of these pricing systems promotes different behaviors while also posing different implementation problems.

Economic theory suggests that the net value of information services to the organization is maximized when the transfer price is equated to the marginal cost of providing these services [Kriebel/Raviv 80]. While there are several issues in determining what costs should be included in the appropriate marginal costs of production, the discussion of these issues is deferred until later in this section. The task facing the organization is to determine how to implement such a pricing scheme. Note that it is inadequate to mandate such a scheme since the information systems department has incentives to implement a pricing structure that will favor it.

One such approach is to use market-based transfer prices. The rationale underlying such an approach is that in a competitive market, the market price is the marginal cost of production. In the case of information services, the determination of market prices for some products is made difficult by the fact that they are for internal use only, and are therefore at least differentiated products if not unique ones. This is particularly true for many software development and maintenance tasks. Thus, the existence of a market for the identical central MIS service outside the firm is doubtful. Additionally, software development activities are often undertaken for multiple user groups or may utilize existing systems, making cost allocation difficult. In addition, the provision of the service in large volumes and the longevity of the relationship between central MIS and the user department are other factors that make determining a market price very difficult.

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When market prices are unavailable or inappropriate, or when determining them is costly, an alternative approach is to use cost-based pricing. The main implementations of cost based pricing systems involve either variable or full costs and sometimes include a predetermined profit margin for the selling division. The major advantages of full cost systems stem from their convenience. The primary disadvantage of full cost or cost plus transfer prices is the lack of incentives to control costs. In the case of cost plus transfer prices, inefficiency is actually rewarded. The use of variable cost transfer pricing is also an attempt to approximate marginal costs. Once again, the information systems department has specialized information about its cost structure and can exploit the complex nature of the production of information services to determine a price schedule that it finds favorable.

An important question that must be addressed in determining the optimal transfer price is the computation of the appropriate marginal cost. Pricing computer services at the market price or using variable costs ignores the externalities that users impose on other users. The value of a computing task is often dependent on its timeliness. In a timesharing system for instance, the marginal costs of a user's task include not only the variable costs of production but also the costs of the delay imposed on other users [Mendelson 85]. Thus, the "correct" price to be charged to users should reflect the delay costs. However, eliciting the information required from users to implement such a scheme is difficult in the presence of agency behavior and requires the design of incentive-compatible pricing schemes. In practice, these schemes are complex and are sometimes vulnerable to collusive behavior on the parts of agents.

A particular problem that arises with marginal cost pricing in the information systems environment, which is characterized by high fixed costs is the issue of cost recovery. The notion of cost recovery is a central one to the discussion as it illustrates vividly the importance of creating goal congruent incentive structures in an organization. Marginal cost pricing schemes often result in an accounting loss for the information systems department. It has been shown that under certain conditions, the welfare of the firm as a whole might be maximized even though the information systems division showed an accounting loss [Mendelson 85]. However, the division manager has incentives to fully recover costs since the failure to do so may be flagged as a sign of poor performance. This may in turn lead him to argue for pricing systems that lead to cost recovery even when these are sub-optimal for the organization.

The desire of the information systems manager to recover costs is also a factor in their preference for input pricing (e.g., by CPU second, EXCPs, etc.). On the other hand, the functional areas desire a pricing system that is comprehensible and predictable, so that they can monitor the accuracy of their past charges and predict their future ones. These goals often suggest a product

pricing solution, whereby users are charged by some business unit that they understand (e.g., per paycheck or per report) [Nolan 77]. This approach tends to make it more difficult for a central MIS administration to fully recover its costs, and this is why input pricing is more prevalent.

This example also illustrates an information asymmetry, whereby MIS's knowledge of the working of the system allows it to propose a pricing system that is not well understood by a typical member of the traditional user community. An additional example is the case where, if pricing is to be on an average cost basis, then the capacity of the resource needs to be known. Differentiating between the potential, practical, and actual capacity of a centralized computer service requires technical expertise that may not be present outside of the MIS group [Kriebel/Raviv 82]. Therefore, some of the key pieces of information to management decisions about pricing are held by the MIS department, whose goals may differ from those found elsewhere in the organization.

C. Decentralized IS Service production

In the above analysis, it was suggested briefly that the decentralization of computing was a means of reducing the agency costs stemming from the market power of an information systems manager. In this section, an agency theory perspective of the growth of decentralized computing is developed.

As the costs of computing decrease, the decentralization of computing is a commonly observed phenomenon [Rockart/Flannery 83]. While the cost of hardware permits end user departments to build their own information services groups, one debatable issue in the MIS literature is whether the computing function should be centralized or decentralized. The changes in technology (more capable microcomputers, more easily used programming languages) are really only enablers, not determiners, of end user computing. The technological changes are necessary, but not sufficient to move computing from the central MIS department into the functional departments. Rather, the movement can be traced to goal incongruence and information asymmetries between the economic actors in the agency relationships⁶. In the paragraphs that follow these goal incongruence and information asymmetry issues are described.

One example of goal incongruence is the difference between top management, who would like to view information systems as a strategic resource, and some MIS groups. Top management requires an IS capability that is very flexible to meet changing needs and is

⁶A more detailed presentation of these issues is made in [Gurbaxani/Kemerer 88].

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abreast of the latest technology in order to take advantage of new opportunities and to meet possible competitive threats. MIS may find it easier to manage an environment that is very stable and uses technology that is well understood by the MIS staff members. As discussed earlier, IS managers are often influenced by the problem of asymmetric costs wherein they face a relatively low payoff associated with success when compared to the costs of failure, reducing their incentives to originate and undertake risky projects. This goal incongruence may supply some of the understanding as to why so many of the well-understood examples of the strategic use of information systems have originally come from functional (user) areas, and not central MIS [Rockart 87]. A recent management response to this shortcoming is the creation of the position of chief information officer, whose defined role is the inception of strategic and organization-wide systems.

A second, similar example of goal incongruence is between MIS and the functional departments. The functional departments desire application responsiveness, while MIS, who typically must maintain the software, desires application stability [Henderson / Treacy 86]. This leads to different preferences about issues such as software and hardware standards, use of developmentally fast but operationally slow fourth generation languages (4GLs), and the need for a formal systems development lifecycle. End users, in the quest for responsiveness, will seek the most applicable hardware/software combination and easy to use 4GLs, and will forsake protracted systems development life cycles with their attendant documentation. MIS, whose role is increasingly to provide an information technology infrastructure, desires a stable environment that is easy to maintain with a minimum of operational problems. Given these legitimate differences in goals, it is not surprising that end user computing should be the source of such controversy in many organizations.

Of course, goal incongruence can extend to other areas of the decentralized computing debate as well. MIS's desire to retain control over the corporation's information technology may play a role in arguments against end user computing [Rothfeder 88]. The desire of some individual MIS directors for "empire building" can also be a factor. This is in counterpoint to the aspirations of some newly computer-literate end users, or simply their desire to "wrest control from the techies" [Schwartz 87]. All of these factors can be viewed as contributing to the goal incongruence of centralized MIS and the functional areas.

Information asymmetries also play a role in the debate over end user computing. A traditional systems life cycle application software development project contains a number of information asymmetries. At the project's inception there is the need for the users to communicate their business requirements, information that is often incompletely understood by the MIS systems developers.

While the above is not a direct outcome of agency behavior, the user's needs would be better met through the use of functional systems analysts who specialize in the application systems of a specific area. Indeed, over time the numbers of such systems analysts are growing.

MIS develops a time and cost estimate that is likely to be viewed suspiciously by the end users, as they typically do not possess the experience or technical skills required to understand the entire set of ramifications stemming from a request for a new or enhanced application system [DeMarco 82]. The end user cannot readily observe MIS's effort on his project, and therefore cannot discern what percentage of the activities are oriented toward directly fulfilling his immediate request and which are necessary due to other factors, such as interfaces with other systems, corporate IS standards, or the tools and methodologies chosen by the MIS group [Rockart / Flannery 83]. Finally, the average application backlog of approximately two years at many large corporate MIS departments contributes to the end users' dissatisfaction with that approach [Gallant 86].

An often observed outcome of the conflicting motivations of the end user departments and the information system department is the growth of end-user and decentralized computing [Arthur Andersen 86]. When an end user group implements a departmental computing solution, the responsiveness of its own computing professionals to its needs is significantly greater than that of the centralized computing department. The reason for this is quite simply that the goals of the departmental computing professionals are consistent with the goals of the department head. While decentralized computing is a solution to some problems in the management of information systems, it also creates a new set of problems. The production of information services is a task that is characterized by economies of scale and scope. Further, the implemented solutions to different applications requests may overlap in the inputs used such as the hardware, databases or computational procedures. The exploitation of production gains through the elimination of redundancies is significantly more difficult in a decentralized environment than in a decentralized environment.

A popular management attempt to maintain at least some of these gains is through the specification of hardware and software standards. In fact, the issue of standards in the area of hardware and software is a critical component of the debate over decentralized computing. Given a situation where a new systems development project is proposed, what is the software and hardware configuration that should be employed to develop the system?

The principal in this case, the user, is likely to want the combination of hardware and software that best meets his or her needs. However, central MIS, acting as the agent, is likely to have strong preferences for previously employed solutions. Given their need to support a variety of end user clients, they will avoid some costs by

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reducing the variety of solutions as much as possible. This allows economies of scale in staff training and in systems maintenance, and also permits much greater flexibility in the assignment of MIS staff member to projects. If MIS allows a wide variety of non-standard hardware and software, then small 'islands' of expertise will develop. In order to assure being able to operate and maintain these systems, MIS will inevitably build up excess capacity of staff trained in each of the various configurations. Alternatively, if MIS avoids the overcapacity approach, then the islands of expertise may lead to greater power accruing to individual staff members, who realize, due to their specialization, that they are part of a very small supply of labor that fulfills a key role. Of course, the above problem is mitigated by the fact that staff members may be skilled in more than one hardware/software configuration. However, for problems requiring deep knowledge, that is, true expertise, this dilemma clearly holds.

This need for ongoing maintenance and support is one contributing factor to the tendency of many central MIS's to cling to relatively older approaches, such as the use of COBOL as a programming language, when many other more modern approaches have been suggested. Given a demand for COBOL-skilled staff to maintain existing applications, a pressure is created to continue developing applications in this manner to avoid fragmenting the MIS labor resource.

Information asymmetries may also play a role in the debate over hardware and software standards. The user-principal, in proposing a system, may be unaware of the spectrum of technical options in relation to his project. Or, his knowledge is at least limited to other systems in his department or systems that he is aware of from competitors. The central MIS agent, on the other hand, has the entire firm's inventory of systems with which to contend. In order to promote current or future data sharing, MIS may propose a technical solution that follows the firm's compatibility standard. For example, the choice of a micro-based system may subsume the decision on a number of standards, including the operating system, user interface, and available application software packages. The fact that MIS has different goals than the user (including compatibility with previously installed systems) may be obscured in all the discussions about the technical capabilities of the various options. Indeed, users may place themselves at risk by dealing with an agent who possesses a great deal more technical information.

V. CONCLUDING REMARKS

This paper has suggested a new perspective on the management of information systems services, that of agency theory. Through the analysis of issues from the

MOIS literature it has been shown that agency theory provides a useful lens for IS researchers. It has been suggested that the next steps should involve applying the theory in depth in order to build models of MOIS issues.

One such example is some current work on end user computing [Gurbaxani / Kemerer 88]. Gurbaxani and Kemerer suggest that many of the results in the end user computing field can be explained through an agent-theoretic perspective. Other issues that may lend themselves to this approach would be the compensation of IS executives, and the retention of MIS staff for software maintenance. In short, agency theory appears to be fertile ground to build testable hypotheses about the management of information systems.

Economists have suggested that empirical research is the next area in which substantial advances in the area will be made [Schmalensee 88]. One example of a model of empirical research from the marketing area is Anderson's study of the use of a direct salesforce versus manufacturer's representatives [Anderson 85]. Similar studies in MOIS should reap large benefits in terms of greater understanding of the underlying managerial and economic phenomena.⁷

⁷Helpful comments from H. Mendelson are gratefully acknowledged.

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