

An Agency Theory Model of ERP Implementation

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ABSTRACT

Enterprise resource planning (ERP) systems are becoming rapidly indispensable in order for large and medium sized organizations to run their operations. Therefore, management needs to know the factors that drive successful ERP implementation, a product of the continuous interaction between the implementation consultants and client firms. Agency theory has been successfully used by different researchers to explain relationships between two parties seeking a common outcome. This paper develops a model of testable propositions for applying agency theory to study the relationship between implementation consultants and client organizations deploying the ERP systems, and to consequently evaluate how the relationship affects the implementation success.

Categories and Subject Descriptors

H.1.1 [Information Systems]: Models and Principles – *Systems and Information Theory*

General Terms

Management, Performance, Theory.

Keywords

Enterprise resource planning, agency theory, implementation

1. INTRODUCTION

Top management views information systems outsourcing as an attractive option because IS vendors can achieve specialization and economies of scale in the business of processing information [14]. The economies of scale, as well as their past experience, enable vendors to offer cheaper and more effective solutions than those the individual clients could have achieved in-house.

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The increased popularity of enterprise resource planning (ERP) systems and of outsourcing services offered by ERP vendors has made ERP outsourcing an attractive option for many organizations. Although an outsourcing contract offers attractive opportunities, vendor failure can result in serious adverse short- and long-term results for the client [14]. In extreme cases, clients have been forced into bankruptcy, unable to tackle the financial consequences generated from outsourcing failure.

This is especially true in the case of ERP system implementation projects [15, 20, 50, 51]. For example, Foxmeyer went bankrupt in 1996 after three years of unsuccessful implementation of SAP, suing Arthur Anderson and SAP's U.S. subsidiary and in the process [1, 43]. This illustrates what can happen in large organizations when implementations go wrong in outsourcing situations.

Agency theory describes the environment within a firm or between a set of firms in terms of sets of contracts in which one party (the principal) engages another party (the agent) to perform a service on the principal's behalf which involves delegating part of the decision making authority to the agent [32, 39]. Several studies have applied agency theory to study both general project success and IS project success in principal-agent settings in which one group of people have delegated the responsibility of project implementation to another group [32, 31, 69].

Vendor relationship management is extremely important for the client to achieve both short- and long-term ERP project success. This study attempts to develop a model that will apply agency theory to explain the vendor-client relationship in ERP outsourcing.

2. OVERVIEW

Incentives and information affect the implied contractual relationships that exist between principals and agents, namely how principals select agents and how the selected agents subsequently behave [69]. The problem in agency relationships arises because (a) the principal and the agent have different goals and (b) the principal cannot determine if the agent has behaved appropriately [24]. Agency theory researchers refer to this problem as "opportunism" by the agent [24] and have been most concerned with describing the governance mechanism that solves this problem [38].

The first of the two propositions of agency theory, as described by Eisenhardt [24], says that agent opportunism can be curbed by incentive alignment between the principal and the agent. The second says that agent opportunism can also be curbed by

information systems that enable the principal to verify agent's behavior.

Two kinds of opportunism are cited in the agency theory literature. Known as *adverse selection* and *moral hazard*, they form two important aspects of the agency problem. *Adverse selection* refers to misrepresentation of ability by the agent. The agent may claim to have certain skills or abilities when he or she is hired. However, the principal cannot completely verify these skills and abilities either at the time of hiring or while the agent is working [24]. *Moral hazard* refers to shirking by the agent where the agent does not put forth the agreed upon effort [24].

ERP implementations are socially complex activities calling forth coordination of many firms involved [50]. The coordination between the implementation consultants and the client deserves special attention because several adopters have reported having conflicts (sometimes severe) with IT products and service vendors especially over contractual provisions (e.g., pricing and billing arrangement) and project directions (e.g., project management) [50]. Contracting out of information systems to a vendor or consultant is the principal-agent relationship at its clearest, with a written contract binding the parties [59]. The ERP client-consultant contract forms a subset of that relationship and hence may be appropriately analyzed from an agency theory perspective. With the consultant as agent and the client as principal, typical agency problems are expected to be evident in their relationship.

Tuttle et al. [69] have already established that IS professionals tend to implement a project with quality problems in a moral hazard situation. They conducted a decision-making experiment to examine the effects of moral hazard on information systems professionals' decisions whether or not to knowingly implement a system with quality problems in their own organization. The top management of the organization acted as the principals and the IS professionals played the role of agents in this study. The research findings suggest that professionals who experience the conditions for moral hazard will exhibit a greater tendency to implement a system with quality problems than those who do not face a moral hazard situation. The IS implementation professionals in their study were the employees of the organizations in which the systems were being implemented.

However, the propositions developed in this study will apply agency theory to study moral hazard in a "contracting out" situation where the principal and agent do not belong to the same organization. Also, they will examine adverse selection in the same context.

3. CONSTRUCTS

The constructs in consideration for developing the propositions in this study are pre-qualification efforts, monitoring, adverse selection, moral hazard, incentive alignment, and ERP success.

3.1 Pre-qualification efforts

Agency relationships are often characterized by information asymmetry, that is, a situation where the agent possesses private information about himself or the object of exchange (product or service) that the principal is unaware of. Pre-qualification efforts refer to the procedures carried out by the principal to screen the agent's suitability and appropriateness for the assignment. These

efforts help the principal determine and apply a set of pre-specified criteria to evaluate the prospective agents. The principal can thus identify agents *ex ante* who have the skills necessary to act in the interest of the principal. Those who fail to meet the specified criteria are eliminated from consideration [53].

Researchers and other observers have suggested several ways of screening ERP consultants. For example, clients can require, and then thoroughly and carefully review each consulting firm's initial proposal [21]. They can investigate each competing firm based on its prior ERP implementation experience, its financial position, the vendor certification of its individual consultants, and its implementation experience in the same industry as that of the client [21, 30, 52]. They can also look into the reputation of the consulting firm [72, 56]. Finally, ERP clients can inquire about the consulting firm's expertise and commitment in terms of technical skills, business process knowledge, infrastructure support, target date adherence, and after sales service in prior implementations [56, 67].

3.2 Monitoring

Monitoring refers to the application of a feedback system to provide information to the principal regarding the actions of the agent. Self-interest on the part of the agent often makes him shirk his commitments and his responsibilities to the principal [9]. The feedback system allows the principal to supervise and keep track of the agent's activities. It thus helps ensure that the agent works in the best interest of the principal.

Researchers and practitioners have emphasized three broad phases during which a client monitors consultants. First, the client plans out the project into easily measurable outcomes termed as "deliverables" and obtains the consultants' agreement with the deadlines [18, 42, 54]. Second, the client verifies that the deliverables are being produced according to the original plan [26]. This calls for reviewing written and oral progress reports from the consultants regularly and thoroughly; meeting the consultants and holding workshops with them in a regular manner; and ensuring that the consultants share relevant information with the client in a timely manner, keeping the client apprised about project progress [29, 34, 64]. Third, the client checks that the consultants do not sacrifice the quality and scope of the project to meet the deadlines and they do not change the staff originally committed without the client's approval [42, 65].

3.3 Adverse selection

Adverse selection refers to the agent's concealing of relevant information or misrepresenting his ability. The agent may claim to have certain skills or abilities that he does not actually possess when hired. However, the principal cannot completely verify this [24]. In other words the agent has private information about his background, interests, capabilities, and similar characteristics that the principal cannot obtain without some cost [8].

The consultant's prior knowledge about the ERP package reflects his background and capabilities, influences the principal's decision to choose him [22], and thus constitutes the core of what he can conceal or misrepresent. Categories of such knowledge include knowledge about the IS infrastructure required by the package, the programming language of the package, the functionality of the package, the integration of the package with

the existing legacy systems, the best practices in the particular industry, and the users' application of the package [16, 22, 52, 56, 26, 70].

3.4 Incentive alignment

Incentive alignment refers designing the compensation structure in such a way as to make the preferences and interests of the agent similar to those of the principal. Agency theory deals with the effect of incentives on the behavior of individuals in an organization in terms of the implied contractual relationships that exist between principal and agent [5,6, 24]. Under this theory, the consistency of the agent's interests with the principal's objectives motivates the agent to dedicate his efforts to the principal's interests. Agency theory thus recognizes that agents are sometimes (i.e., in the absence of incentive alignment) motivated to act contrary to the objectives of the principal [5].

A client can take a variety of actions to align incentives. For example, he can link payments for the project to the consultants' completion of the deliverables [42]. Sharing cost savings or cost overruns with consultants are thought to work as strong motivators for the agents [12, 37]. The contract can also specify incentives and penalties related to time of completion and other predetermined performance measures [12, 14].

3.5 Moral hazard

Moral hazard refers to the shirking of efforts by the agent [24]. Shirking includes actions or behaviors inconsistent with the goals of the principal [69]. The moral hazard construct is central to agency theory and provides the basis for the assertions of agency theory regarding goal-incongruent behavior [69].

Eisenhardt [24] illustrates a moral hazard situation in which a research scientist works on a personal research project on company time. Because the research is very complex, his corporate management cannot detect what he is actually doing. Thus the scientist in this case is an agent who is supposed to act in the interest of the company (i.e., the principal) but in reality is not putting forth the required, agreed upon effort to satisfy the goals of the principal.

Researchers have described two broad shirking behaviors by the agent in a contractual relationship [40, 19]. One is the agent's avoidance of contractual obligations when the principal is not watching and **when the** agent has a profit motive for doing so. The second is the agent's misrepresentation of the facts and problems to receive favor from or avoid reprimand by the principal.

3.6 ERP success

Outsourced software, such as ERP, is one category of information systems projects [41]. Therefore, the general success characteristics of projects can be applicable to ERP.

Time, cost and performance form the prime project success measures [4, 13, 17, 28]. They are so critical that they are referred to as the "iron triangle" [3] and the "eternal triangle" [17, 57]. It's important that the project comes in on time and within budget. Also, the project needs to work in a manner so that it solves the problem for which it was developed, creates minimum start-up

problems, is used by the intended clients, and results in improved decision making and performance for the clients [61].

In today's increasingly competitive marketplace, customers have a wider range of options in selecting projects, vendors, and consulting firms. As a result, client satisfaction has emerged as an important indicator of a successful project in addition to the three abovementioned already established success measures [7, 62].

4. PROPOSITIONS

4.1 Pre-qualification efforts and adverse selection

Under adverse selection, the agent deliberately misrepresents his ability or fails to disclose his "true attributes" in order to win the contract [73, 46, 66]. According to agency theory, the principal can avoid the adverse selection problem through prior acquisition of information about the agent's true characteristics and attributes [32].

Pre-qualification efforts provide the principal with an information-gathering strategy to determine a potential agent's true characteristics [9]. They enable the principal to obtain pertinent information about the agent's suitability for the assignment. This reduces the level of private information held by the agent and thus reduces the agent's ability to misrepresent. Pre-qualification efforts have been shown to be an effective measure to select the appropriate agent [53]. In formal terms,

Proposition 1: The greater the pre-qualification efforts, the less the adverse selection.

4.2: Monitoring and moral hazard

Under moral hazard, the agent pursues his own interests, even if his actions are contrary to the goals of the principal [69]. According to agency theory, the principal's and agent's goals may conflict. The agent attempts to maximize his own utility; as a result, under the situation of goal conflict, the agent may shirk on some actions that the principal would like him to perform [9].

Monitoring is an important governance mechanism by the principal to assure that the agent's behavior is in line with the principal's interests [45]. Monitoring the agent's actions in the post-contractual stage helps the principal to find out if the agent is acting appropriately. It consequently helps the principal ratify or appreciate the agent's actions. At the same time, it also creates social pressure on the agent and thereby increases the probability and extent of the agent's compliance [10, 72]. The agent, knowing that he is being observed, is less likely to shirk or act against the interest of the principal. Monitoring can be effective in controlling agent behavior and curbing post-contractual agent opportunism [24].

Research has confirmed the effects of monitoring. Boards of directors use monitoring to effectively control and assess the managers making important decisions in large professional organizations [25]. Non-monitored agents have exhibited greater commitment to and have allocated more funds to failed strategies than monitored agents have [45]. In formal terms,

Proposition 2: The greater the monitoring, the less the moral hazard.

4.3: Incentive alignment and moral hazard

Agency theory addresses the effect of incentives on the behavior of individuals in an organization in terms of the implied contractual relationships between principal and agent [5, 6, 24]. According to this theory, moral hazard arises when performance incentives are based on an imperfect surrogate of the desired behavior [69]. The design of an imperfect incentive structure provides the agent with a motive to shirk his effort because such a structure lets his own economic interest diverge from that of the principal [13]. On the other hand, the incentive scheme can be designed to align the interests of both the agent and the principal. In that case, the agent will lack any incentive to shirk, because hurting the principal will also hurt himself.

Eisenhardt [24] similarly asserts that incentive alignment through an appropriate reward structure significantly reduces the conflicts of self-interest between principal and agent and helps to curb agent opportunism. Incentive structures in outsourcing contracts help to align the motives of the agents and the principals to facilitate project success [12]. A well-designed incentive structure with a balance between penalties and rewards predicts increased desire on the agent's part to meet the terms of the contract. It also predicts agent behavior that is consistent with the principal's best interest [14]. In formal terms,

Proposition 3: The greater the incentive alignment, the less the moral hazard.

4.4: Adverse selection and ERP success

Adverse selection refers to the agent's concealing his shortcomings or misrepresenting his ability to win a contract [24]. Under this circumstance, it may be logical to assume that a project delegated to an agent who lacks appropriate skill, will not be fully successful. Ford Corporation met with disastrous results in its attempt to outsource the seats of the Taurus model from Lear Corporation. Lear did not have the necessary expertise and deliberately committed to a contract that it knew it would not be able to fulfill. It missed deadlines, failed to meet weight and price objectives, and supplied poor quality seats. As a result Taurus lost its market share [71, 72].

Hence, a situation of adverse selection is expected to hinder or reduce ERP project success. In formal terms,

Proposition 4: The greater the adverse selection, the less the ERP success.

4.5: Moral hazard and ERP success

When moral hazard is present, an agent acts to serve his own interest while neglecting that of the principal. His actions may even hurt the interest of the principal. The agent's misplaced effort is expected to result in poorer quality and sub-optimal outcome for the principal [53].

Project managers and information systems professionals tend to implement an unprofitable project or an information system with quality problems in the presence of moral hazard more often than they do in its absence [31, 69]. It is thus expected that moral

hazard will have an adverse effect on ERP project success. In formal terms, we hypothesize,

Proposition 5: The greater the moral hazard, the less the ERP success.

Pre-qualification efforts, monitoring and incentive alignment thus form the independent variables for this set of hypotheses. Adverse selection and moral hazard stand as mediator variables. ERP success stands as the dependent variable.

5. CONTRIBUTION

Post-ERP implementation experiences have often been frustrating for client organizations with wasted time, effort, and money. These disappointments in turn have created problems for consultants because they sought satisfied clients in order to maintain their reputations and produce more consulting business.

This paper develops a conceptual model with the variables and relationships that may play a critical role in explaining the sources of that frustration. It offers a foundation for research that can extend the applicability of agency theory, can help clients and consultants manage their relationships during the implementation process, and thus help them enhance the probability of ERP systems implementation success. It may also be useful for managing other outsourced IS projects that have implementation settings similar to ERP.

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