



ERP Implementations: The Role of Implementation Partners and Knowledge Transfer

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ERP systems are difficult and costly to implement. Studies show that a large portion of the overall implementation cost can be attributed to consulting fees. Therefore it becomes crucial to use consultants effectively to keep the overall costs low. On one hand organizations want to reduce the engagement of costly consultants, but on the other hand hardly any organization has the internal knowledge and skills to implement an ERP system successfully without external help. Choosing the right consultants and using their skills and knowledge appropriately, as well as transferring and retaining essential knowledge within the organization becomes essential to the overall success of an ERP system implementation. In this article the authors suggest a framework, which explains how the role consultants assume and the knowledge the implementing organizations have and obtain during the implementation, impacts the outcome of the project.

INTRODUCTION

Understanding the factors that lead to successful implementations of information systems has been a key interest for practitioners as well as many information systems (IS) researchers (Zmud, 1980; Haley, 1997; Ross, 1998).

Our study reflects implementation experiences made with integrated standard software solutions, designed with an organization-wide scope. This type of information system is commonly referred to as an enterprise resource planning (ERP) system.

As Thomas Davenport points out in a recent *Harvard Business Review* article, the promise of an off-the-shelf solution to the problem of business integration is enticing, but there have also been several horror stories about failed ERP projects, in which organizations sustained substantial losses or even went bankrupt (Davenport, 1998; Zeitz, 1996). The identification of factors leading to success or failure in particular of ERP systems is an issue of increasing importance, since the number of organizations choosing the ERP path is still growing (Deutsch, 1998).

While there appear to be many different factors that have an impact on the success of ERP implementations (Sumner, 1999), factors pertaining to project management and operation have been frequently cited as playing a crucial role (e.g. Davenport, 1998; Jiang et al., 1996). In addition studies show that a large portion of the overall implementation costs can be attributed to consulting fees (Zeitz, 1996; Meta Group, 1999).

An exploratory study conducted by the authors with the goal to elicit potential ERP success factors confirmed the importance of project management and operation issues. From this study two issues, related to implementation partners, appear to be particularly important for ERP implementations. First the role that implementation partners, in particular consultants, assume, and secondly the importance of the amount of knowledge held by the organization implementing the ERP system (the implementor) and the transfer of knowledge between the vendor, consultant, and the implementor. While the relationships between vendor and implementor and vendor and consultant are interesting, we focus in this article on the relationship between the implementor and the consultant. Not only are the costs of consulting services a very high proportion of the overall implementation costs, but also the

implementor has a large variety of options in terms of choosing a consulting service and its role. In this article we develop a framework to explain how project outcomes are affected by the role consultants assume and the knowledge an implementor has. The argument is rooted in agency theory (Eisenhardt, 1989) and illustrated with experiences from the cases from an exploratory study conducted by the authors.

CONCEPTUAL FRAMEWORK

In this article we address the following questions from an implementor's view:

- 1) How does the role consultants assume impact the project outcome?
- 2) How does the knowledge held by the organization implementing an ERP system impact the project outcome?

In the following section we define and describe the essential concepts of the framework and its theoretical foundation. This framework is then illustrated and discussed with evidence from cases.

The Implementor-Vendor-Consultant Triangle

In an ERP system implementation, there are usually three parties involved (see figure 1): the organization implementing the system (implementor), the organization, which developed the sys-

Figure 1: Implementation Relationships: Implementor - Vendor - Consultant

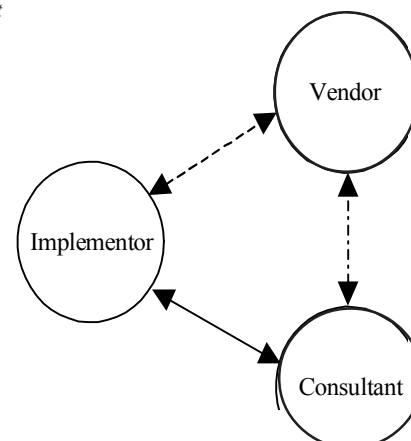
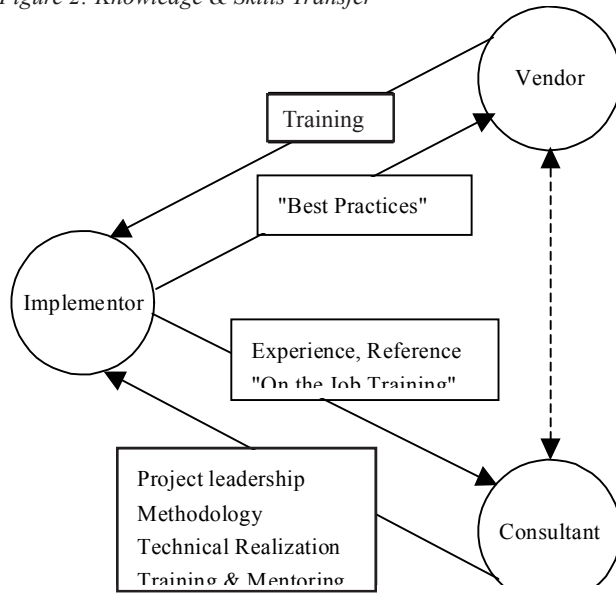


Figure 2: Knowledge & Skills Transfer



tem (vendor), and an organization aiding the implementation (consultant).

Each of these 3 parties contributes in different ways to the project. The vendors provide the implementor with hardware, software, and offer training programs in connection with their products. The consultants are brought into ERP implementation projects to provide additional skills, knowledge, or just manpower that is not available at the implementor or the vendor. Figure 2 shows a typical scenario of knowledge and skills exchange between the three parties (see figure 2).

Agency Theory

The argument we develop is rooted in agency theory (Eisenhardt, 1989). The domain of agency theory (see figure 3) is relationships that mirror the basic agency structure of principal and agent who are engaged in cooperative behavior, but have differing goals and differing attitudes towards risk. In this case we have the implementor as the principal and the implementation partners.

Agency theory addresses the problems that can occur in agency relationships. The first general problem is conflict of goals and the second is the verification of task performance. Agency theory acknowledges that much of organizational life is based on

self-interest. An important proposition of agency theory is that information systems, the exchange of information, can curb the agent opportunism and provide the principal with better control. There are two ways that an agent can show opportunistic behavior that can be detrimental from the perspective of the implementor. The first, moral hazard, refers to lack of effort on the part of the agent. The second one, adverse selection, refers to the misrepresentation of ability by the agent.

Impact of Consultant Role and Knowledge Transfer on Project Outcome

The proposed framework explaining how the role of consultants and knowledge impact consultant behavior is depicted in figure 4. Knowledge about project leadership and management, system customization and administration, as well as technical knowledge possessed by the implementor determines which additional knowledge and skills have to be obtained using a consulting service. The implementor's knowledge is a determining factor of a consultant's involvement. This knowledge also enables the implementor to monitor and control a consultant's behavior (Kirsch, 1996). The more control an implementor has and the less involved a consultant is, the lower is the risk of inappropriate consultant behavior, leading to undesirable project outcomes. The role a consultant is permitted to assume, also influences the degree of control an implementor has. For example, if the consultant takes on project management responsibilities, then the principal has less ability to control consultant behavior. The ability to control the behavior of the consultant, together with the role of the consultant assumes, influence the consultant's behavior.

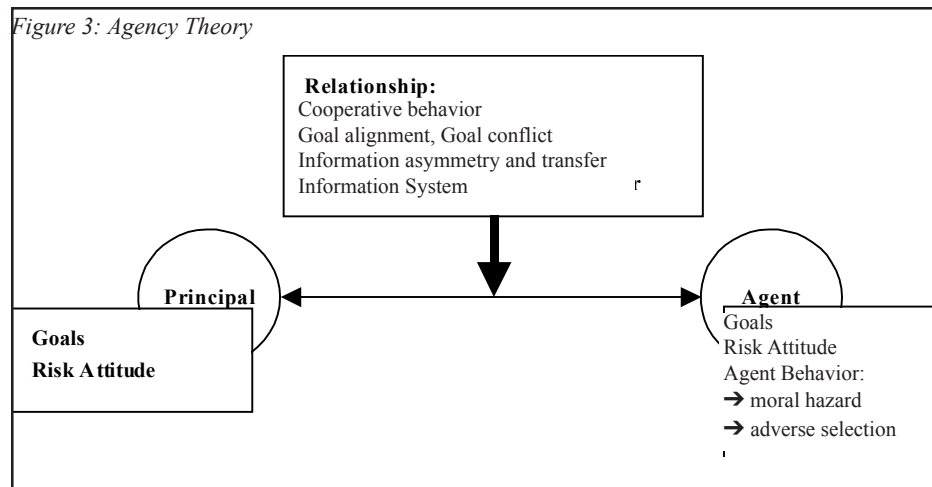
Besides the aspect of behavior control, it is also important to consider the knowledge, which has to remain in the organization after consultants complete their task. An organization has to assess which types of knowledge and skills are needed on a long-term basis to support the ERP system. This knowledge has to be then transferred in time into the organization.

EVIDENCE FROM CASES

The cases used to illustrate the framework described above are taken from two exploratory studies. The first one, conducted by the authors, is a study targeted at identifying the factors that contribute to ERP success in general. As of now this study includes 18 interviews with 21 CIOs and ERP project managers from 12 different organizations in the United States and Europe. The exploratory study was undertaken with the goal to elicit a wide variety of factors that contribute to the success of ERP implementations. The interviews were semi-structured and most questions

had an open ended nature. While the issues pertaining to project management clearly emerged from the interviews they were addressed with varying focus and varying depth in each interview. Since we did not specifically ask for the role, which implementation partners played and the knowledge transfer that occurred, not all of the interview results reflect these issues equally well. Nevertheless, the cases provide some interesting evidence to illustrate the proposed framework described above.

Figure 3: Agency Theory



Adverse Selection and Moral Hazard

Agency theory proposes that there are two aspects of the agency problem. One of them is adverse selection, which refers to the misrepresentation of ability of the agent. The other one is moral hazard, which refers to lack of effort on the part of the agent. In this case the agent is the consultant aiding the implementor.

5 out of the 9 organizations, which mentioned the issue, experienced misrepresentations of ability by the consultants. For instance, the CIO of one organization mentioned that while some consultants were good, most were learning by doing.

Inset 1:

HomeImproveCo

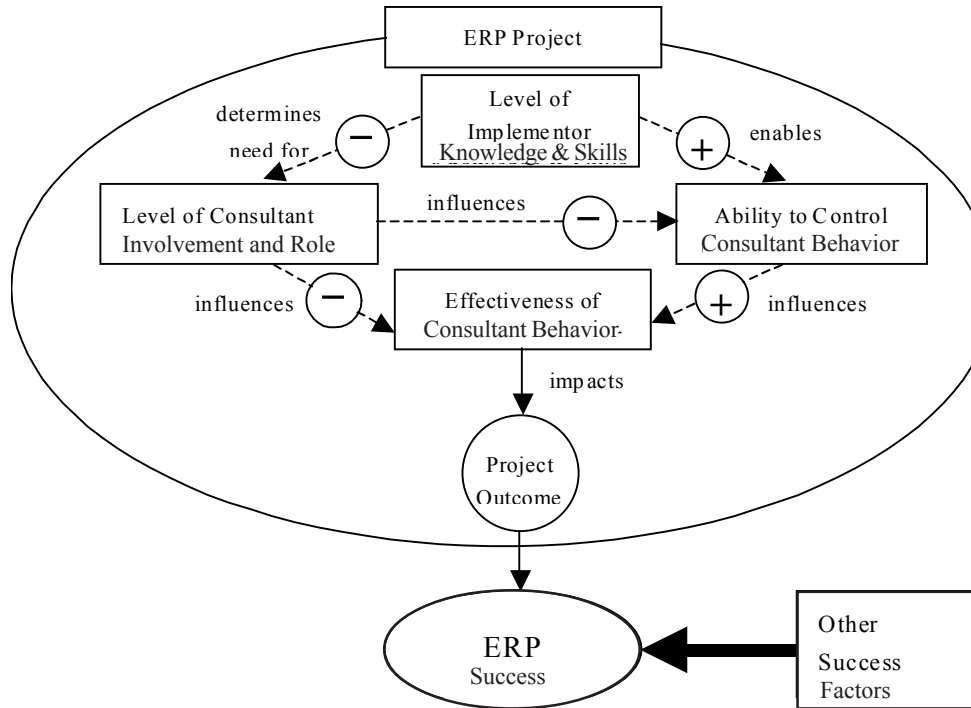
HomeImproveCo, a multi billion US\$ retailer of home improvement products, implemented a system to support the business areas of payroll and human resources. The consultants came from the vendor. After initially involving them in project management, the consultants only aided with the technical realization. HomeImproveCo emphasized training their own people versus using consultants. The outcome of the project is seen as clear success.

The CIO of yet another organization was disappointed with the skills of the consultants working on his project. He expected more guidance from the consultants. The project manager of HomeImproveCo (see inset 1) reported that the consultants often had questionable skills. While the project managers of AirSpaceCo (see inset 2) were satisfied by the knowledge and skills of the consultants from the ERP system vendor consulting services, they mentioned that third-party consultants often learned more from the implementation, than they contributed to it.

Inset 2: AirSpaceCo

AirSpaceCo is a multi billion US\$ aerospace company. It has a large IT department with wide variety of key skills available internally. An ERP system including almost the complete suite of modules offered by the vendor was implemented. As consultants Airspace used mainly the consulting services offered by the vendor. A few outside consultants were used occasionally. The consultants were mainly used to aid with the technical realization of the system. According to the project manager, the strategic effort has to come from within the organization. The project management of AirSpaceCo put a lot of emphasis on leveraging internal skills and training project team members as well as users. The outcome of the ERP implementation is seen overall as a clear success by the CIO and project management.

Figure 4: Knowledge, Role and Consultant Behavior



The learning and knowledge transfer occurring during the implementation was mentioned as one of the factors leading to this success.

The second aspect, moral hazard, became evident in 3 of the 9 cases. The evidence of moral hazard does not have to mean that consultant showed unethical behavior, such as consciously producing substandard work results, working on unrelated tasks, or billing the implementor for activities that were not performed. A moral hazard may also be related to the incentive structure motivating the consultants.

CookieCo (see inset 3) initially put their consultants in charge of project leadership and management. The project was not proceeding as desired by the implementor. Eventually the consultants were relieved from their leadership and management role and just helped with the technical realization of the project. According to the project manager, the consultants were not goal driven enough and did not put the effort needed into the project.

Inset 3: CookieCo

CookieCo, a multi-billion US\$ cookie and snack producer, has implemented a SAP R/3 system to support the business areas of materials management, production planning, finance, costing, and sales & distribution across the European organizations. CookieCo has a large IT department with a wide variety of skills and project experience in-house. CookieCo established an extensive and decentralized training program for their project staff and users. The consultants initially had a project leadership and management role, but were relieved from this role during this project. The project manager sees the implementation as a success.

While CookieCo had the knowledge in-house to detect the undesirable behavior by the consultants, this was not revealed in the case of PumpCo (see inset 4). At PumpCo this undesirable

consultant behavior was not revealed. Several instances of questionable advice regarding project management were given to the PumpCo project staff and users. For instance, the consulting staff managing the project allowed training to be marginal, testing to be neglected, and a too ambitious timeframe to be used. As a result, PumpCo encountered severe problems in the first months of operation, such as shutdown down of production for almost a whole month. It turned out that the consulting company undersold themselves to PumpCo and therefore seemed to be mainly interested in finishing this project as soon as possible without losing too much money. This would explain the short timeframe and the lack of training and testing. In the case of HomeImproveCo the project manager revealed that consultants wrote bills for activities that were never performed.

Inset 4: PumpCo

PumpCo, a pump manufacturer with revenues of 100-300 million US\$, has implemented a SAP R/3 system to support the business areas of general ledger, accounts payable, accounts receivable, inventory, and purchasing. PumpCo chose a European-based consulting company. PumpCo had only a very small IT group and a small internal project team. The consultants were used for the technical realization, but also had influence in terms of project management decisions, such as training and testing. The system faced major problems in the first months of operation.

Knowledge, Consultant Role, and Consultant Behavior

To achieve a positive project it is important to avoid undesirable consultant behavior, as described above. We identified two factors that influence the consultant's behavior. The first factor is the ability of the implementor to control the consultant's behavior. The second factor is the role that the consultant assumes (see figure 4). We see the knowledge an implementor possesses as a determining factor for the role a consultant plays, as well as the ability of the implementor to control a consultants behavior.

The more the consultant becomes involved in the project, in particular in its strategic aspects, such as project leadership and project management, the more opportunities there are for a consultant to exhibit undesirable behavior. In addition the implementor, despite the level of knowledge, decreases its ability to control the consultants behavior, by increasing the consultants involvement.

In the case of CookieCo the consultants initially did not only help with the technical realization of the project, but also had project leadership and management functions. CookieCo has a large IT department with a variety of knowledge and skills and also established an intensive training program for project team members and users. We see the internal knowledge as one reason, why CookieCo was able to realize that the consultants were not managing the project in the best interest of the organization. It took a while to recognize this though, which we attribute to the fact that the consultants were in charge of managing the project. According to the project manager, the consultants were not goal driven enough and did not put the effort needed into the project. As a consequence the consultants were relieved from their leadership and management role and only helped with the technical realization. The current implementation is now considered a clear success by the project manager.

PumpCo only has a small IT group and a limited set of knowledge and skills in-house. The consultants helped with the technical realization as well as influencing the project management by giving advice regarding the timeframe of the project, training, and

testing. It appears plausible that the inability of PumpCo to detect the inappropriate behavior was a combination of the lack of knowledge within PumpCo and the fact that the consultants were involved in the project management. As the project manager stated: "Part of the problem was that we did not know which questions to ask." As it turned out, the guidance provided by the consultants was not in the best interest of PumpCo.

At the HomeImproveCo consultants are not used for project management purposes any longer after the moral hazard experience reported above. In addition HomeImproveCo emphasized training internal staff and bringing knowledge in-house. With the current set of knowledge and skills internally available the need for consultants is overall reduced and limited to the role of helping with specific aspects of the technical realization. Because the implementation is well understood internally it is also easy for HomeImproveCo to evaluate and control the consultants behavior.

We see two options organizations have to avoid inappropriate consultant behavior. The first option is to increase their internal knowledge and thereby limit the need for consultants to non-strategic aspects of the project and increase the ability to control the behavior. The second option is to engage another consultant with the purpose to control the first consultant. This is in effect purchasing an information system to give feedback on the first agent's performance. This creates a more complex set of relationships between the vendor and the consultants, having its own set of problems. An additional consultant also incurs additional costs and as the CIO of one organization mentioned, to focus on a single consultant can create a greater sense of ownership by the consulting house and result in consistently better talent provided for the project. It appears plausible that a critical mass of internal knowledge, in particular in the more strategic areas of the project, is necessary for the implementor to effectively involve consultants.

Knowledge Transfer

In 5 out of 9 cases referred to in this article knowledge transfer is explicitly mentioned as an important factor for the success of the implementation. The project managers from AirSpaceCo reported that significant learning and knowledge transfer occurred during the project. It was part of the project strategy to leverage internal skills and transfer and retain knowledge within the organization. This was viewed as one of the keys to success by the project management. The vendor consultants appeared to be effective from the view of AirSpaceCo, due to their good technical knowledge and the close communication ties to the vendor. The CIO of one organization concluded, "Let the guys who learn by doing be your own people [and not the consultants]." He also realized that transferring and retaining knowledge in the organization was essential and a big effort. He admitted that the learning curve was initially underestimated.

The organizations used different approaches to train and mentor their staff. The most common approach of training was to train key users and key project team members and establish an internal training program, using the externally trained key users and key project team members as trainers ("Train the trainer" approach). This approach was explicitly mentioned by 6 out of 9 organizations. The training of users was often decentralized and responsibility was given to the individual departments. Only one organization, PumpCo, had no significant training program. For this reason and the fact that almost all of the technical realization and even project management issues were handled by the consultants, hardly any knowledge was transferred from the consultants to the internal staff at PumpCo.

The project managers of one organization explicitly acknowledged that due to their relatively small IT department and the limited skills available in-house, the knowledge and skills provided by a consultant will be essential to the success of the implementation. They report another organization in the same industry that failed using a “do-it-yourself” approach, but was later successful with the help of consultants.

Conclusion

According to agency theory, organizations implementing ERP systems and engaging consultants to fill in the knowledge gaps have to consider that organizational life is largely driven by self-interest of the parties involved. For the principal-agent relationship of an implementor and a consultant this means that the implementor has to be able to control the consultants behavior to curb opportunistic behavior by the consultant.

Our model suggests that the key to ensuring desirable behavior is the knowledge possessed by the implementor. This knowledge enables the implementor to evaluate the consultant’s behavior and also determines the role that has to be given to a consultant in the first place. It is obvious that the more knowledge and skills are available internally, the less dependent an organization becomes on consultants. But in the case of an ERP implementation hardly any organization has all the necessary knowledge in-house. Some knowledge is only needed temporarily and does not have to be retained. It appears that an organization is better off if it has the knowledge and skills in-house to fill the strategic roles in an implementation project, such as project leadership and management. Methodology and technical knowledge and skills needed during the implementation may well be provided by consultants. The implementor has to be aware, though, that some of the technical skills, such as system administration, system customization, as well as a good conceptual understanding of the system, are needed beyond the day of going “live”. If not already present these skills need to be transferred into the organization during the implemen-

tation.

The framework presented in this article is currently only based on anecdotal evidence collected from an exploratory study with a much broader perspective. To validate and refine the framework more focused research efforts will be necessary. We see this framework as a starting point to gain a better understanding of how to effectively involve implementation partners into an ERP implementation project.

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