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Success and Failure of ERP Technology Transfer: *A Framework for Analysing Congruence of Host and System Cultures*

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Abstract

Enterprise resource planning (ERP) applications are spreading worldwide, including into developing countries. Problems related to cultural mismatches are one of the challenges that affect this global diffusion. Two main sets of culture can be identified in any ERP situation of development, implementation and use. On the one hand, there is a culture embedded in the ERP software reflecting the views of the ERP developers, vendors and consultants. On the other hand, there is a culture reflecting the views of the implementing organisation's project team, managers and users. We refer to the first as the *ERP system culture* and to the second as the *ERP host culture*. This paper presents a framework that allows analysis of these two cultures and their impact on ERP success and failure. The paper demonstrates the utility of this framework by applying it to a case study. Overall, we argue that good congruence between ERP system and host cultures can contribute to ERP success both in *process* and *outcome* terms. However, lack of congruence can contribute to ERP *process* and *outcome* failure.

Introduction

Enterprise resource planning (ERP) applications are spreading worldwide. In some developing countries, a number of large companies have implemented ERP solutions and some mid-sized companies are expected to follow suit. The transfer of information systems like ERP – typically developed in industrialised countries – to developing countries is often marred by problems of mismatch with local cultural, economic and regulatory requirements. This can result in undesirable design—reality gaps, which tend to lead to underperforming systems (Heeks, 2001; Walsham, 2001). This is because "… *tools transferred from one country to a specific enterprise abroad suffer a double-layered acculturation: the technology is confronted with a foreign national and alien corporate culture*" (Recht and Wilderom, 1998:8).

This problem can be exacerbated in the case of ERP because these systems represent solutions that are based on what are seen to be Western business best practices. In addition, whilst ERP is a global product, most of the ERP developers are located either in North America or in Western Europe. As a result, the developers' interpretations of business systems are likely to be reflected in and influence the software (Orlikowski, 1992). ERP systems thus incorporate values and practices that will not necessarily match all environments. For example, Soh et al (2000) surveyed "misfits" observed in ERP implementations and found that these tend to be higher in Asian companies because of differences from European and US business practices. Sumner (2000) also argued that ERP causes significant cultural transformation to the organisation and tends to reset organisational values in terms of discipline, change and processes.

We can sum up this issue of interpretations and values within the notion of culture; yet culture is an often overlooked or underemphasised influence affecting the success or failure of new technology adoption (Hoffman and Klepper, 2000). Further evidence from the cultural construction of technology literature indicates that universal applicability of information technology (IT) is more of a myth than a reality (Bijker and Law, 1992). In the parlance of Bijker and Law (1992:13) "… *technologies and technological practices are built in a process of social construction and negotiation, a process often seen as driven by the social interests of participants*".

This implies that the internal workings of the technology developers and the values of its members affect the technological outcome. By the same token, therefore, culture influences the application of IT and transforms the technology when in use.

As ERP systems diffuse into developing countries, it is essential to be aware of the implications of cultural assumptions embedded in ERP software and those reflected in developing country organisations. Such awareness can assist in assessing ERP suitability; in devising mechanisms to mitigate the impact of cultural misfit; and in increasing value from relatively expensive ERP investments. In this paper, we propose a framework that helps to identify the cultural assumptions of the ERP system and the host organisation and the impact of these on the likely outcome of ERP implementation. We also show the utility of the framework by applying it to a published case study. The paper ends by making suggestions for future research.

A. Information Technology and Organisations

ERP implementation is a significant intervention in organisational life. Currently, it is one of the most challenging issues for practitioners and researchers in the information systems (IS) field (Pozzebon, 2000). ERP systems have been found to have conceptual links with almost every area of IS research. Thus, the divergent definitions and perspectives associated with the "ERP—organisation" linkage depend on how IS researchers conceptualise and treat the linkage between IT/IS and organisations. Across the IS literature, the view of information systems and their assimilation in organisations acknowledges not only the technical, hard perspective but also the soft, human aspect.

From the hard, technical point of view, information systems are seen as "engineered artefacts" expected to do exactly what they are designed for (Orlikowski, 1992). Likewise, organisations are seen as information processing systems, exchanging and handling information based on certain rules (Katzenstein and Lerch, 2000). There is a strong belief in "instrumental rationality" and formality. That is, all the processes and aspects of the working system can be reconstructed to formal and mathematical models. Hence, according to this perspective, the organisation is assumed to have clear requirements.

In contrast, several researchers such as Bostrom and Heinen (1977), Mumford and Weir (1979) and Orlikowski (1992) advocate a softer conceptualisation of information systems. As Probert (1997) argues, while information systems do have objective and touchable artefacts like processors and storage, they also have a subjective construct. This perspective of technology is closely related to Orlikowski's (1992:400) view where she argued, "*technology is not an external object but a product of ongoing action, design and appropriation*". We believe that the "softer" perception of technology broadens our understanding of potential problems during the implementation of an information system of ERP's size and scale.

In this paper, we submit to Orlikowski's (1992) understanding of information technology which, based on structuration theory, is enclosed in two concepts of "duality" and "interpretive flexibility". "Duality" addresses the assumption that agents and technology are not independent. In the parlance of Orlikowski (1992:406), "*technology is physically constructed by actors working in a given social context but also technology is socially constructed by actors through the different meanings they attach*". Thus, information technology as a product of human agents will include, and at the same time reflect, not only the "structures" – in other words the rules of behaviour of the social system that designs it – but also their interpretations of the social system it is going to serve (see also Rose and Scheepers, 2001; Walsham, 2002).

On the other hand, "interpretive flexibility" refers to "*the degree to which users of a technology are engaged in its construction (physically or socially) during development*" (Orlikowski, 1992:406). There is a time and space gap between the construction of the technology and its implementation; hence different users are likely to appropriate and use the same technology differently. This also means the same technology is likely to have different meanings and effects for different users (Pozzebon, 2000; Rose and Scheepers, 2001). Identifying this "time-space discontinuity" among the design and the use of the technology is a crucial point in IS research, particularly in the case of software packages that are not developed in-house (Pozzebon, 2000).

From the above discussion, it is possible to identify three key elements in understanding information technology and its deployment in organisations: *human agents*, *technology*, and *institutional properties (such as culture)* (Orlikowski, 1992).

B. ERP as a Socio-Technical System

On the basis of the arguments pursued so far, we conceptualise ERP systems as socio-technical systems. ERP can be seen as "*a technological artefact bundling material and symbolic properties in a certain recognizable form*" (Kyung and Kim, 2002:27). The structural properties of this technical system are, however, shaped by the human agents and institutional properties that develop and implement it. Likewise, the institutional properties also set the context for development, appropriation and use.

The environment in which an ERP system is developed, selected, implemented and used constitutes a "social activity system" (Skok and Legge, 2001). This ecosystem includes several stakeholders: from the developers of the system, to the vendors, to the consultants, the project team, and the ultimate users. Each one of these holds a certain cultural assumption towards the ERP implementation and use process. Particularly, the developers' and consultants' cultural assumptions are embedded in the very roots of the software (the technology) itself.

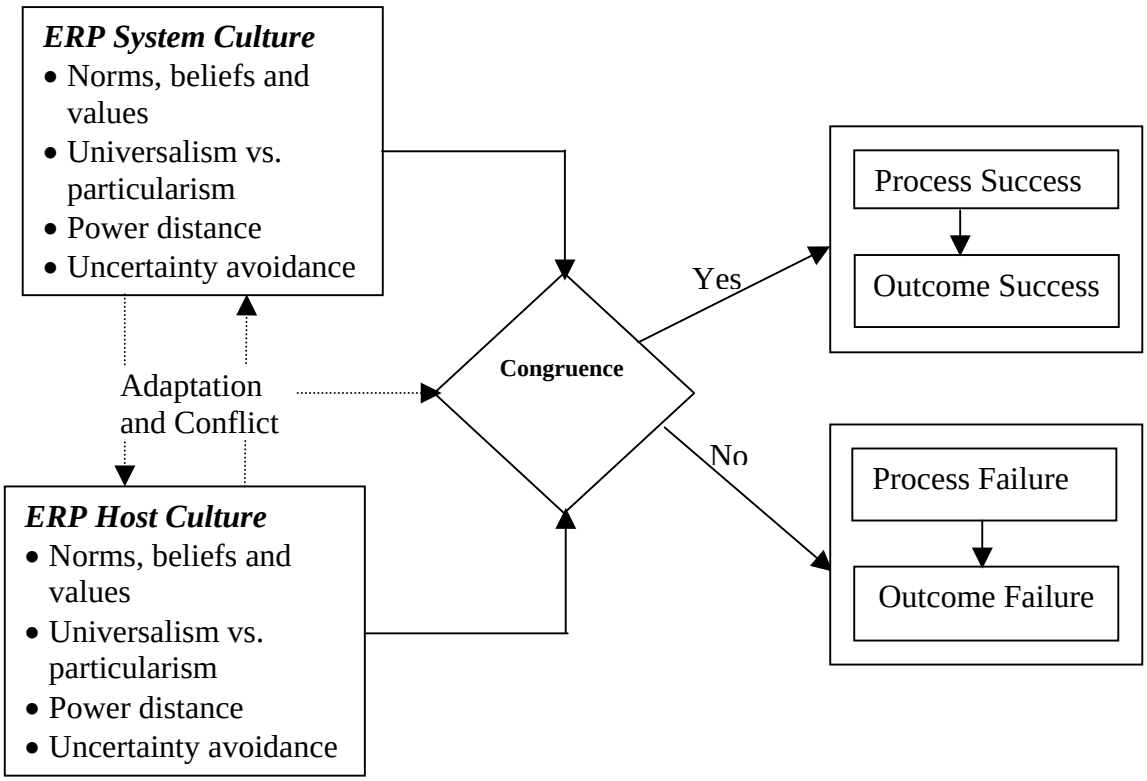
We can identify two main sets of culture at work in any ERP situation of development, implementation and use. On the one hand, there is a culture reflecting the views of the ERP developers, vendors and consultants which, as described above, will come to be "written in" to the ERP system. On the other hand, there is a culture reflecting the views of the implementing organisation's project team, managers and users. We refer to the first as the *ERP system culture* and to the second as the *ERP host culture*.

ERP system culture represents a certain understanding of problem solving, which is often implicitly promoted in the form of "best of breed" business practices (Davenport, 1998; Davison, 2002). For instance, ERP vendors and consultants consider that ERP embodies the best universally applicable business processes without taking into consideration potential clients' cultural distinctiveness. Because

of the designer's focus on core competence, low cost strategies and mass production, ERP appears to reflect a universalist culture (Skok and Doringer, 2001). Yet the cultural assumptions within ERP systems and the whole notion of cultural universalism are challenged. For example, when ERP systems are implemented in the public sector they are criticised as reflecting a specific "ideology of the private sector" (Allen and Kern, 2001).

During an ERP implementation, there can be conflicts and accommodations between the institutional properties of the host organisation, in particular its organisation culture, and the institutional properties of the ERP system, i.e. its in-built features and the underpinning cultural assumptions embedded inside the software via the institutions pushing the software. We argue that congruency between the two cultures contributes to ERP success both in process and outcome terms. However, lack of congruency can lead to cultural gaps and can contribute to ERP failure. Figure 1 captures a visual impression of this ERP success/failure framework.

Figure 1: ERP Success and Failure via System and Host Culture Congruence



C. Cultural Dimensions for ERP Analysis

In social and management science research, culture is divided into two main categories: organisational and national (Krumbholz and Maiden, 2000). One of the most well-known ways of understanding of organisational culture comes from Schein (1985). Schein identified three levels of cultural phenomena in organisations, each distinguished by their visibility and accessibility to individuals. The first level is called the "*surface manifestation of culture*" and includes *artefacts, symbols, norm*s and *rituals*. The second level includes "*espoused organisational values and beliefs*". Finally, at the deepest level are the "*basic underlying assumptions*" and include those things that organisations take for granted as correct ways of doing things.

In terms of national culture, the most influential definition (framework) of culture which dominates IS research is that of Hofstede (1980). Hofstede argued that people carry mental programmes, which are developed in the family in early childhood and reinforced in schools and organisations, and that these mental programmes contain a component of national culture. Hofstede further captured his notion of national culture along five dimensions – *individualism, power distance, uncertainty avoidance, masculinity* and *time orientation.* Although Hofstede's work on culture has been widely accepted in the IS literature (Myers and Tan, 2002), it has also been equally criticised (Avison and Myers, 1995; Walsham, 2002). However, critique of Hofstede's work, although interesting, lies outside the scope of this paper.

Several other authors have conceptualised culture (organisational and national) and suffused it with their own interpretation. For instance Johnson and Scholes (1993) identified *stories, symbols, power structure, organisation structure, control systems* and *rituals and routines* as indicators of organisational culture. Trompenaars (1996) identified seven dimensions of national cultural diversity: *universalism versus particularism, collectivism versus individualism, neutral versus emotional, diffuse versus specific cultures, achievement versus ascription, human-time relationship and human-nature relationship (internal versus external control).*

To operationalise the concepts of ERP system and host culture for an individual ERP application in an organisation, a central focus must be the idea of *norms, beliefs and*

values from organisational culture theories. These three concepts are chosen because previous studies have found them to be important manifestations of organisational culture (Krumbholz et al, 2000). For any given ERP system and host, there will be case-specific aspects to these organisational cultural dimensions that must be recognised.

However, we cannot focus solely on the organisational culture. As noted above by Recht and Wilderom (1998), the transfer of ERP into developing countries is likely to face the "*double-layered* [national and organisational] *acculturation*" problem. Hence, it is essential to address cultural dimensions that cover both these two layers. This is consistent with the approach of Krumbholz et al (2000:269) who argued that "*corporate and national cultures can be described using multiple dimensions which give us a set of overlapping characteristics with which to describe aspects of culture*".

With this in mind, we can look for more generalised dimensions that draw from work on national culture, though recognising that national culture impacts norms, beliefs and values at the organisational level (Ciganek et al, 2004). One starting point for identification of these generalised dimensions is the knowledge that national differences in approaches to problem solving may create problems during ERP implementation (Krumbholz and Maiden, 2000). To reflect this in the framework, we find it relevant to incorporate Hofstede's "*power distance*" and "*uncertainty avoidance*" dimensions. Another starting point for identification of generalised dimensions is the fact that ERP systems are global products which embody supposedly universal business models of industry best practices. To reflect this, we find Trompenaars' *universalism versus particularism* national culture dimension relevant.

D. ERP Success and Failure

The literature on ERP success and/or failure is inconclusive. While some analysts report positive impacts and outcomes of ERP application, others have revealed ERP failures. One of the reasons behind these different views lies in the multidimensionality of the concept of success and the difficulty of developing a single success/failure measurement.

Based on review of both ERP and IS success and failure literature (Al-Mashari et al, 2003; Bingi et al, 1999; Davenport, 1998; DeLone and McLean, 2003; Gable et al, 2003) we identified two dimensions of ERP success/failure – *process* and *outcome* – that are likely to be influenced by the degree of congruence between ERP system culture and ERP host culture.

The first dimension looks at the success/failure of an ERP implementation process. Implementing an ERP system often constitutes a company's largest-ever IS investment, and in many cases the largest-ever corporate project (Sumner, 2000). There are a variety of "cost" factors that may escalate the initial budget. These include implementation assistance cost, cost of system integration, reengineering cost, cost of changing a companies' IT architecture to support ERP technology, etc. (Cotteleer et al, 2003; Shang and Seddon, 2002). Furthermore, depending on the implementation strategy a company adopts, ERP projects are often long and intense (Cotteleer et al, 2003). According to one survey, the average time for implementing an ERP system is 23 months (Umble and Umble, 2002). Process success/failure gauges whether an ERP project is completed inside the time and budget schedule.

Outcome success/failure looks at the extent of post-implementation ERP benefits. Organisations implementing ERP expect transactional, informational and strategic benefits (DeLone and McLean, 2003; Markus et al, 2000; Mirani and Lederer, 1998). Transactional benefits include reduction in IT operations costs, inventory-carrying costs, business process costs and operating labour costs. Informational benefits include the extent to which ERP increases the quality, accessibility and flexibility of information, and improves managerial decision. Strategic benefits include improvements in competitiveness and customer service. The context and constituencies specific to the desired level of analysis should be considered in evaluating ERP benefits (Markus et al, 2000).

E. Case Application of the ERP Success/Failure Framework

The framework proposed above is intended to be applicable in any context, including that of developing countries. Unfortunately, the case evidence on ERP implementation in developing countries is currently very limited in terms of both depth and breadth: a shortcoming that urgently needs attention. Because of this, we demonstrate the utility of the framework developed above by analysis of a European case study.

The case (Krumbholz et al, 2000) involves the implementation of an ERP package in the UK and Swedish subsidiaries of a large European multinational company. Both the UK and the Swedish subsidiary experienced problems and received several complaints from their employees and managers concerning the new integrated system; in particular its warehousing module. Some of these problems included "*lack of practical system use before implementation, warehouse staff not working in the warehouse enough, system over-acknowledges warehouse operation, failure to meet local requirements for warehouse systems and employees cannot match delivery schedules and purchase orders*" (Krumbholz et al, 2000:276).

We now apply the framework to this case. First, we compare the system and host cultures (though without specific discussion of 'power distance' due to case data limitations). Second, we relate the findings on cultural congruence to process and outcome success/failure.

E1. ERP System Norms vs. Host Organisation Norms

Norms are expected behaviour modes based on organisational values and beliefs. In the Scandinavian subsidiary, there was a norm formulating employee's perceptions about warehouse activities. The norm was "*warehouse personnel perform physical tasks and all warehouse personnel believe they should perform physical tasks*" (*ibid.*:274). Stakeholders indicated "*the warehouse personnel worked "out there" in the warehouse and performed physical tasks such as moving products*" (*ibid.*:274). This value emerged from the social interaction of the company's employees and was

the product of shared values and meanings towards the warehouse personnel activities.

ERP systems often reflect a number of assumptions concerning human involvement in organisations about how employees are related to the object of their work. The established norm in the Scandinavian subsidiary that the warehouse staff should do physical tasks was not "compatible" with the ERP software's implicit culture, which required warehouse personnel to get involved in doing administrative tasks. The result was that "*…the warehouse staff were spending more time using the system and less time out there in the warehouse*" (*ibid.*:274) doing "proper" warehouse activities. Hence, there was incompatibility between the software's way of dealing with warehouse work, and the accepted norm in the organisation in terms of what constituted warehouse activities.

E2. ERP System Values/Beliefs vs. Host Organisation Values/Beliefs

Both the UK and Swedish subsidiaries had in the past developed and used their own bespoke systems. The implementing consultant perceived these systems as the source of several organisational problems and considered ERP to be the solution. However, employees in the subsidiaries valued very highly the old system functionality and believed that their previous system was exactly what the company needed. For instance a marketing manager complained: "*the old system was just for our needs and was very effective*" (*ibid.*:274). Another key marketing user maintained "*…we bought a jumbo when we needed a bicycle*" (*ibid.*:274). As a result, the ERP system was perceived as very complicated, with very structured functions and at certain level inflexible. Thus employees had difficulties in working with it because it clashed with their own values. For example, one sales user stated "*order entry in SAP is quite cumbersome because of the way it is set out and because of the information that we have to enter it can make life quite difficult*" (*ibid.*:274).

Swedes are widely characterised by very low scores in Hofstede's uncertainty avoidance dimension. Therefore Swedish employees are likely to choose less structured and more flexible working practices. However, SAP's ERP package "*…is a typically German way of doing things*" (*ibid.*:274) and was seen as more applicable to

the type of rigid approach associated with manufacturing operations rather than a distribution company's more open activity profile. In this way, the German vendor's cultural assumptions that were embedded in the software were not compatible with the cultural assumptions of staff in at least the Swedish subsidiary.

E3. ERP System Universalism vs. Host Organisation Particularism

In the UK subsidiary, there were problems due to the universalistic "best practice" operating assumptions embedded in the ERP software by the designers. For instance, "*updates of purchase orders assumed perfect information and processes even when this was not always the case*" (*ibid.*:275). In addition, updates of the ERP package reflected changes in German legislation only and assumed this to be universally applicable. However, changes in UK legislation were much faster than those embedded in the ERP. Hence "*the package is deficient in not keeping up with changes in local legislations*" (*ibid.*:275).

Further, warehouse personnel dealt with complex delivery schedules and expected the system to be flexible in order to adapt to and process these specific orders. However, "*the ERP package failed to adapt to the local circumstance*" and was unable to deal with the complex delivery schedules. As the IT materials management developer stated "*you can have a complex delivery schedule against the purchase order in theory and then the supplier may acknowledge different quantities and different dates and it is not actually possible to match those perfectly, but the package has made an attempt and it just falls down*" (*ibid.*:275).

E4. ERP Success/Failure

The incompatibilities in culture between the ERP system and the host subsidiaries led to a number of process and outcome problems. Both of the subsidiaries were forced to reconsider their initial implementation process plans in terms of time and budget. In the UK, for example, the implementation process was extended for almost five months and extra financial resources were required for its completion.

Regarding outcome measures, in the Swedish subsidiary, it was difficult to obtain a holistic and integrated view of the data. This compromised the potential informational benefit of ERP. The low perceived usefulness of the ERP package led to an initial fall in the performance of the sales and warehouse departments. Serious delays in deliveries and purchase order processing occurred. Customer enquiries were not handled adequately. All the above undermined the potential for transactional benefits from implementing ERP. Further, the inefficiencies in the warehouse and sales had a negative impact on the level of service provided to customers. As a result, the companies were forced to reconfigure the ERP warehouse module in order to "acknowledge" local requirements in terms of legislation, delivery schedule and purchase order process.

F. Summary and Future Work

The global diffusion of IT requires growing awareness of cultural diversity and, ultimately, the need for development of IT solutions for heterogeneous target environments. This paper conceptualised ERP as a socially constructed technological system that encapsulates certain structures of behaviour, values, beliefs and norms. ERP is not a culturally-neutral phenomenon. Rather, it is loaded with cultural values of the vendors, developers, and implementation consultants. Its transferability to other cultures that do not necessarily share those embedded cultural values will continue to be challenging.

However, the 'host culture' should not be conceived as a static and culturally homogeneous environment. Therefore, understanding how organisations (including those in developing countries) in different cultures accommodate and/or resist the cultural assumptions embedded in ERP will contribute knowledge to the application of IT in the global context.

The paper identified two sets of culture that can prevail in any ERP implementation situation: ERP system culture and ERP host culture. The paper further argued that the extent of [in]compatibility between these two can affect the process and outcome of implementing ERP. Secondary analysis of a case study offers some preliminary evidence on the importance of cultural alignment between an ERP system and the

organisation that implements the system. Awareness of the cultural assumptions embedded in ERP and introduction of mechanisms to mitigate any cultural mismatch may improve the likelihood of ERP process and outcome success. Future studies are needed to fully explicate the research framework and identify its theoretical and managerial implications.

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