The People's Republic of China enacted the concept of “one country, two systems” when it regained sovereignty over Hong Kong. Since 1997, two socio-economic systems have coexisted within China’s boundaries. My research of strategic management and organizational change in China, and enterprise resource planning in particular, reveals a similar coexistence at the organizational level.

The first type of organization in China is the state-owned enterprise (SOE), which were established as the Communist Party nationalized large parts of the mainland Chinese economy after acquiring political power in 1949. Consistent with a primary reliance on central planning, government ministries not only set prices but also assign employees and specify output quotas for SOEs.

The second type of organization emerged after Communist Party leader Deng Xiaoping initiated economic reforms in 1979. These reforms eased restrictions on private (non-state) ventures and encouraged foreign investment with an open-door policy. Although the state still owns or controls most productive assets, the mainland Chinese economy has become increasingly decentralized and market-oriented [4]. Local entrepreneurship is thriving while many overseas firms have established joint ventures or wholly foreign-owned enterprises in China.

Organizations across China have invested billions of dollars in ERP. More than 1,000 Chinese sites had an ERP system by the end of 2001. Nearly 300 of these used SAP’s R/3 software package, according to scenarios and forecast data provided by the Gartner Group and IDC. Since 1998, I have completed eight intensive studies of cases where this SAP package was implemented—four SOEs and four private ventures (PVs). Although the same software was implemented in every case, I discovered fundamental differences between the two aforementioned types of organizations in terms of both the process and the outcomes of implementation. Using case study methodology, I also examined the mechanisms (how) and rationales (why) behind these differences.

Recently, I reviewed the results of a large-scale user survey sponsored by SAP Greater China. The survey data collected from 189 SAP customers [8] confirmed the fundamental contrast I had discovered earlier. This is significant for IT managers and organizations that can guide research on ERP-related organizational transition.

ORGANIZATIONAL TRANSITION TO ENTERPRISE RESOURCE PLANNING SYSTEMS: THEORETICAL CHOICES FOR PROCESS RESEARCH

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Abstract

The number of organizations implementing enterprise resource planning (ERP) software solutions is rapidly increasing. Transition to ERP systems is often combined with a business process reengineering effort and intended to produce radical organizational change. Prior to conducting research on ERP transition, researchers need to become aware of the theoretical choices available to guide their studies. In this paper, three dimensions of process theories used to explain organizational change are identified: form, motor, and theoretical content. Whereas form deals mainly with the amount and frequency of change, motor refers to the mechanisms explaining how and why change unfolds, and theoretical content consists of specific constructs and their interactions that produce change. In order to make complete theoretical choices, researchers should consider all three dimensions of change in the design of their research. The three dimensions are combined in a framework that can guide research on ERP-related organizational transition.

1. INTRODUCTION

Technology-based organizational transitions have captured the interest of researchers for more than 40 years. Each major technological advance has prompted claims that organizations will be fundamentally altered (Robey and Boudreau 1999). The newest information technology to make this claim is enterprise-wide software solutions, more commonly called enterprise resource planning (ERP) systems. ERP systems, or packages, are integrated sets of modules that allow companies to manage multiple operations including manufacturing, human resources, finance, and logistics. ERP permits a company to replace mission-critical legacy systems—notorious for their age, size, complexity, inflexibility, and fragmentation—with fully integrated systems. ERP has become very popular because it promises significant business breakthroughs. It was predicted that the global ERP market would grow at a compound annual rate of 37% over the next five years, reaching $52 billion by 2002 (AMR Research 1997). Analysts have claimed that nearly every sizable manufacturer in the United States and Europe either has ERP, is acquiring ERP, or is considering acquiring it soon (Deutsch 1998).

Many companies are attracted to ERP because it implies fundamental organizational changes. Indeed, ERP usually instigates, or is instigated by, business process reengineering (Bancroft, Seip and Sprengel 1998). Along with an organizational transition to ERP, whole departments must be retrained, jobs redefined, and procedures discarded or rebuilt from scratch (Deutsch 1998), ultimately transforming core processes (Caldwell and Stein 1998). The business processes embedded in an ERP package allegedly represent best practices, from which adopting organizations are presumed to benefit. Benefits include streamlined business processes, better integration among business units, and greater access to real-time information by organizational members. For many organizations, the transition to an ERP system has the potential to provide dramatic gains in productivity and speed (Davenport 1998).
It is thus tempting for both researchers and managers to assume that the rollout of ERP will generate substantial organizational change. Indeed, ERP is often assumed to be a deterministic technology because enterprises are forced to align their work processes with those embedded in the software package (Glass 1998; Markus 1997). Although the processes embedded in an ERP may be customized through configuration tables, modification of a package’s software code to satisfy organizational idiosyncrasies is highly impractical. It is usually necessary for an organization to redefine its business processes to fit the best practices inherent in the software. Thus, ERP is often considered to be a unique kind of technological change, one that is capable of significantly transforming organizations.

Despite such expectations, past research provides little confidence that the transformational power of information technologies materializes as intended. Indeed, research results covering a variety of technologies implemented in many different kinds of organizations have revealed that changes induced by information technology are often resisted (Kling and Iacono 1989), that modification of intended changes is common (Kraut, Dumais and Koch 1989), and that unanticipated and contradictory changes may result (Robey and Boudreau 1999). Consequently, researchers should not automatically assume that the claims about ERP’s deterministic effects are valid. ERP researchers should be aware that information technology has rarely confirmed prior expectations about its impacts and be suspicious about arguments that treat ERP as a special technology that has predictable consequences. Although ERP has greater scope than most information technologies and poses some distinctive constraints on business processes, organizational outcomes are not necessarily determined by ERP implementation. Rather, researchers studying ERP transitions need to be open to a wider variety of theoretical choices explaining organizational change. This paper presents a research framework to guide research on fundamental organizational changes associated with information technology, such as those expected from ERP transitions.

2. THEORETICAL CHOICES

To investigate ERP transition as organizational change, it is necessary to appreciate the different dimensions used in theories about organizational change. In this section, the choice of a process approach for studying ERP transition is first justified. Then alternative forms, motors, and theoretical contents of organizational change theories are evaluated. Each of these three dimensions of change provides a particular lens for viewing a phenomenon. Form deals mainly with the amount and frequency of change. Motor refers to the mechanisms explaining how and why change unfolds. Theoretical content consists of specific constructs and their interaction, from which change occurs. Considering the panoply of theoretical choices available for studying organizational change, no single theory necessarily applies to ERP transitions. However, an understanding of the whole picture may shed light on the implications of different approaches for conducting ERP transition research.

2.1 Organizational Change as a Process

Studies about organizational change have typically concentrated on two questions: what are the antecedents or consequences of change and how does organizational change emerge, develop, grow, and terminate over time (Van de Ven and Huber 1990). Although researchers have manifested more interest in the first question, answering the second question gives greater insight into what happens between the antecedents and consequences of change, that is, the process of change. In this paper, a process approach is assumed to be more valuable in research designed to explain the dynamics of ERP transition.

A process approach to theory differs from a variance approach (Mohr 1982; Sabherwal and Robey 1995). Whereas the latter addresses the “what” question by predicting levels of outcome variables from levels of predictor variables, the former seeks to explain how outcomes develop over time (Markus and Robey 1988). In the information systems field, the process approach has

1The typical ERP contains 800 to 1,000 business processes that may be customized with the help of approximately 8,000 configuration tables (Glass 1998).

2Other dimensions could be added to the three we proposed. Woodman (1989), for example, applied seven “thematic” categories that reflect significant trends within the organizational change literature. Nevertheless, our purpose is to focus on more encompassing, “conceptual” categories underlying most organizational change research efforts.
counterparts. PV leaders envisioned ERP as a bet-the-business initiative and viewed their own clearly demonstrated commitment as a critical success factor. In contrast, top SOE managers were commonly reluctant to become directly involved in the ERP project. This reluctance can be attributed to the prevalence of hierarchical authoritarianism in Chinese societies. Top managers enjoy status and power primarily because they are greatly respected by their subordinates. This respect would be compromised if they demonstrated unfamiliarity and/or discomfort with an ERP implementation. By delegating ERP responsibilities to middle managers, they implicitly signaled that the ERP project was not that critical to their organization.

Difference #3. Each PV had a cross-functional steering committee. This committee met frequently and made decisions based on a majority vote or, less commonly, through a group consensus. Resistance was reduced by getting users involved early in the project and providing significant rewards for meaningful contributions. In contrast, SOEs had a much more centralized management structure. A small group of senior managers (usually the oldest rather than the most capable) tended to control rather than supervise the ERP project. Cross-functional conflicts and user resistance were often suppressed rather than resolved. This observed difference highlights two issues: the need to distinguish clearly between the management of a project, by a designated individual, and the supervision of a project, by a steering committee; and the clear benefits of being proactive when addressing both cross-functional conflicts and user resistance.

Difference #4. PVs were more likely to hire consultants, and their external contractors tended to have considerable experience, both with IT in general and ERP specifically. These consultants demonstrated an ability to guide ERP projects forward at critical junctures by drawing upon their expertise to resolve problems and conflicts. SOEs had limited experience with consultants. SOE managers worried their competence would be questioned and authority undermined if they hired consultants. They rarely engaged outside help, and their consultants tend to be IT generalists, not ERP experts.

Difference #5. PVs commonly adopted a cross-functional focus and applied ERP modules across their entire organization. Similar efforts in SOEs spawned functional conflicts. The accounting and finance department often squabbled with either the purchasing or manufacturing department, while the latter two departments argued among themselves. These conflicts moderated the application of ERP and demonstrated the importance of the "danwei" in SOEs. This internal union tends to protect employee and work group interests at the expense of broader economic interests.

Difference #6. ERP implementation was also faster in PVs. They introduced more software modules simultaneously and cut over to the ERP system at once rather than operating old and new systems in parallel. In contrast, SOEs implemented their ERP in phases. SOE managers tended to rely greatly on personal relationships and their own intuition. They commonly resisted change and were reluctant to trust an impersonal system. The relative inexperience of SOEs with automation and standardization also tended to limit the tolerable pace of change. This elaborates previous findings that incremental and continuous change is preferable to radical and episodic change in China [6].

Difference #7. SOEs had comparatively more data maintenance problems after adopting the ERP system. These problems tended to reflect the neglect of material and customer data issues during the project. Many SOE employees worried about their job security, particularly after the ERP system was implemented. Their priority was continued employment at the SOE or finding a new job rather than making the IT application work. Akin to a case in Hong Kong [2], SOE employees were also reluctant to assume responsibilities associated with empowerment. The non-management employees of non-state ventures contributed comparatively more to the success of ERP projects than their SOE counterparts. These PV workers were less distracted by personal issues.

Historically been neglected in favor of variance models of inquiry. However, process research models can be "valuable aids in understanding issues pertaining to designing and implementing information systems, assessing their impacts, and anticipating and managing the processes of change associated with them" (Kaplan 1991, p. 593).

Process theory is described in different ways in the literature (Sabherwal and Robey 1995; Shaw and Jarvenpaa 1997; Van de Ven 1992). In the study of ERP transitions, processes may be conceived as sequences of events that occur over time and lead to outcomes of particular interest. This approach to process theory differs from the approach of dividing processes into a priori stages, such as in Nolan’s (1979) model describing the stages of IS growth in organizations. Stage models are limited because they portray only one possible sequence of events, through which all organizations are expected to progress. Researchers using a priori stages in their research may also find their results becoming self-fulfilling prophesies (Poole and Roth 1989). Hence, research on ERP transitions is likely to benefit more by treating processes as sequences of events that emerge over time, unconstrained by any a priori definition of stages of change. Larsen and Myers (1997), in their study about an ERP implementation ensuing from a reengineering effort, adopted such a process approach.

In the following sections, theoretical choices concerning form, motor, and theoretical content of change are discussed. Figure 1 displays these choices in a three-dimensional framework, which implies that a complete theory consists of specified form, motor, and content. Four forms of change are specified, including alternative forms that have appeared as additions to the three more traditional choices. Four motors drawn from the work of Van de Ven and Poole (1995) are also shown. Theoretical content is left open-ended because of the wide variety of theoretical content that may be used within process theories of organizational change.

Figure 1. Dimensions of Theoretical Choices for Guiding Research on ERP Transition

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1Orlikowski and Baroudi (1991) found that only 4.5% of the research conducted in information systems focused on issues of process.
2.2 Forms of Organizational Change

Forms of organizational change are typically described in terms of the magnitude and pace of change. Three main views have been taken: treating organizational change as radical, as incremental, or as punctuated equilibrium. Whereas the radical view describes organizational change as fundamental and discontinuous, the incremental view portrays change as consisting of minor improvements or adjustments. The punctuated equilibrium view combines elements of the preceding views, treating change as alternating between radical and incremental periods.

The radical view on change is often labeled as revolutionary (Tushman and O’Reilly 1996), second-order (Bartunek and Moch 1987), quantum (Miller and Friesen 1984), or strategic change (Nadler and Tushman 1989). Radical change is “so great that it must be considered a fresh start rather than an extension of what preceded it” (Kanter, Stein and Jick 1992, p. 173). It involves “breaking out of a current pattern of congruence and helping an organization develop a completely new configuration” (Nadler and Tushman 1989, p. 196). The radical view of change is carefully articulated by Miller and Friesen, who emphasize two dimensions of change: quantum and dramatic. On the one hand, change is considered quantum (as opposed to piecemeal) when many things change together, that is, when structures change in a concerted way. On the other hand, change is dramatic when elements quickly change a great deal. A revolutionary change, according to Miller and Friesen, is a change that is both quantum and dramatic. To illustrate, an ERP transition may be considered quantum if it requires simultaneous implementation of technological, business, organizational, and individual changes (Bancroft, Seip and Sprengel 1998). It may also be interpreted as dramatic if the transition employs a “rapid implementation” approach, using tools and methods to speed the process (Nanekamp, McGowan, and Mather 1999). Thus, an ERP transition may conform to a revolutionary form of change because it can be concurrently quantum and dramatic. Implementing multiple ERP modules at the same time in multiple divisions—termed a “big-bang” approach (Schneider 1999)—is indeed revolutionary.

An incremental form of change is also referred to as evolutionary (Tushman and O’Reilly 1996), tuning and adaptation (Nadler and Tushman 1989), or first-order change (Bartunek and Moch 1987). The incremental view contends that even large-scale organizational realignments result from continuous small-scale adjustments. Proponents of this view disagree about the degree of rational intent implied in incremental change. Some (e.g., Lindblom 1979) describe incremental change as piecemeal, remedial and disjointed—a form of patchwork rather than planned change. Others (e.g., March 1981; Quinn 1980) regard incremental changes as deliberate and purposeful. It has been argued that an ERP transition should be made evolutionary through phased rollouts that seek quick successes and generate momentum for later changes (Bancroft, Seip and Sprengel 1998; Schneider 1999). By selecting a limited number of modules to be implemented, a “small-bang” approach gives organizational members time to understand and assimilate change (Bancroft, Seip and Sprengel 1998). Moreover, ERP vendors and consultants may also benefit from such an incremental pace because of their own learning needs.

The punctuated equilibrium model of change (Tushman and Romanelli 1985) is a third form of change frequently mentioned in the organizational change literature. It claims to integrate the radical and incremental views (Choi 1995) by proposing two interrelated and alternating processes: a process of convergence, which operates through incremental change mechanisms, and a process of reorientation, wherein patterns of consistency are fundamentally reordered. Convergence is defined as a “process of incremental and interdependent change activities and decisions which work to achieve a greater consistency of internal activities with a strategic orientation and which operate to impede radical or discontinuous change” (Tushman and Romanelli 1985, p. 178). By contrast, reorientation is represented by relatively short periods of discontinuous change where strategy, power, structure, and controls are fundamentally transformed. Although ERP transition has not been studied as punctuated equilibrium, it is conceivable that the implementation of an ERP system be conducted incrementally and that its subsequent organizational impacts be regarded as radical (Lozinsky 1998).

Although radical, incremental, and punctuated equilibrium are the forms of change most commonly described in the literature, other variations have also appeared. For example, Henderson and Clark (1990) proposed “modular” and “architectural” technological changes as extensions to incremental and radical change. Likewise, Greenwood and Hinings (1996) distinguished between convergent, radical, revolutionary, and evolutionary change. For Greenwood and Hinings, the convergent-radical dichotomy involves the nature of change and the evolutionary-revolutionary dimension refers to the scale and pace of change. Whereas evolutionary change occurs gradually, revolutionary change happens swiftly and affects virtually all parts of the origination simultaneously. ERP transition could conceivably fit any of these alternative forms, as well as more conventional forms.