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Reductionism and complex thinking during ERP implementations

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Abstract *In this paper, the authors contrast complex thinking and reductionism in organizational transformation processes, focusing on enterprise resource planning (ERP) systems. ERP has been promoted as a management panacea, and has resulted in immense investments by companies around the globe. Not surprisingly, many implementations fail to match expectations. For those dealing with organizational change, the ERP phenomenon may sound uncomfortably familiar: change theorists and practitioners have witnessed the coming and going of management panaceas for quite some time. This study presents an exploratory survey of 28 implementation experiences and discusses reductionism in the realm of ERP implementations. It is argued that by applying complex thinking we may open new avenues to explain these processes.*

Introduction

For those dealing with organizational transformation, the enterprise resource planning (ERP) phenomenon – and some of its pitfalls – may sound uncomfortably familiar. ERP represents one of the latest, and probably one of the most striking, of those managerial waves. ERP is a comprehensive information technology package built on the promise that all critical information should be totally integrated in one single information database. However, in practice things have worked slightly differently for many organizations, in which a golden dream has turned into a nightmare. Even when business media, software vendors and consulting firms make their best to divulge success sagas, some horror stories about ERP implementation are becoming notorious.

ERP implementations involve, in truth, broad organizational transformation processes, with significant implications to the organization's management model, organization structure, management style and culture, and particularly, to people. Unfortunately, many executives and consultants still have not realized the breadth and the significance of the organizational impacts that such implications can raise. Much of what is reported is known to be, at best, wishful thinking. In the meantime, a few consultants and academics are beginning to disrupt a certain misinformed unanimity and have even ventured to make a discouraging prognosis about the future of such systems (e.g. Davenport, 1998; Carvalho, 1998).

This paper addresses reductionism and the perils it presents to change processes. We argue that, in order to understand large organizational interventions such as wide-ranging ERP implementations, and to effectively favor

organizational development in their midst, one should first visualize their transformational nature. In other words, with the case at hand, one should realize that ERP is not only about information technology (IT), or IT plus reengineering: it is mostly about change and business transformation.

The paper is structured as follows: first, we summarize methods and results of an exploratory field survey involving 28 cases of ERP implementation. Subsequently, we present a brief discussion on reductionism and complex thinking. The paper is finalized with some speculative notes on causes for the predominance of reductionistic approaches during ERP implementations.

The exploratory survey

In this section we summarize and briefly discuss an exploratory field survey involving ERP implementations.

Research design and methodology

The field survey involved the investigation of ERP implementation in 28 organizations. The (non-random) sample included organizations from a large array of industries: pharmaceutical, chemical, textile, telecommunications, automotive, consumer goods, electronics, financial etc. Most of the organizations were large or mid-sized and 85 percent were subsidiaries of multinational corporations.

Each of them was represented by two respondents: one implementation agent (an employee of the organization who coordinated or intensively participated in the implementation), and one key user (an employee of the organization that made significant use of the system). The interview script contained 55 questions: seven multiple-choice questions, 45 Likert-scaled questions, and three opened questions, and it covered issues such as reasons to implement, implementation approach and outcomes of the implementation.

Findings and comments

Reasons to implement. In the sample, the main reason to implement the ERP was the "need to integrate the organization's processes and information" (91 percent). The other leading answers (respondents could mark multiple reasons) were: "the need to follow a trend" (71 percent), "the need to meet the pressures of the IT function" (41 percent), and "the pressures of the head office" (41 percent). The outcomes reveal an ensemble of substantive, institutional and political factors.

Substantive factors comprise all real imperatives, problems and opportunities that organizations face and for which ERP may constitute an adequate and effective response. Among them, we can underline: the need to integrate the operations of multinational companies, need to solve the Y2K problem, pressure to reduce costs and improve efficiency, and trend toward the adoption of process-based management models.

Institutional factors comprise all external forces existing in the organizational environment, which pressure the adoption of ERP. Institutional factors are commonly discussed in the literature on management fads and fashions. Such literature analyzes how fads are created and tend to follow cycles (Gill and

Whittle, 1992), their patterns of diffusion and rejection in organizations (Abrahamson and Fairchild, 1997), and reasons for adoption (Abrahamson, 1991; 1996). In the ERP survey, the most significant institutional factors found in the sample relate to the diffusion agents, such as vendors of hardware and software, consulting firms, management gurus, and training organizations.

Political factors reflect the interests of stakeholders inside the organization. They relate to those situations in which ERP systems do not pose direct solutions to organizational needs, but do represent ideal avenues of power and influence. Despite its relevance, political factors are seldom mentioned in the literature on managerial and IT innovations (e.g. Frost and Egri, 1991; Brown, 1998; Davenport, 1998). Typically, the most significant political factors are related to centralization interests, standardization interests, and IT departments' quest to gain power.

These three sets of factors – substantive, institutional, and political – are closely connected. On one hand, they generate the demand for ERP; and on the other hand, they provide the arguments to legitimate the adoption. Additionally, they have strong influence over the evaluation of ERP's performance.

One should also observe that, whereas the current (reductionistic) discourse concentrates solely on substantive factors, we believe that the ERP phenomenon can only be understood if it is also perceived in terms of substantive, institutional and political factors.

Implementation approach. The results of the survey suggest that several distinct practices may exist in terms of the implementation method: 24 percent affirmed that the process was focused on its human side and on its transformational dimension, whereas 36 percent admitted that the process was more heavily focused on IT. In most companies (71 percent), implementation followed reengineering, or was conducted simultaneously with reengineering, but only 34 percent of respondents declared that the reengineering process was conducted in depth.

These outcomes revealed a remarkable diversity in terms of perspectives. Many organizations seem to perceive ERP implementation merely as another IT project, and not as a major organizational transformation. This is what we have later termed techno-reductionism. It was also revealed that some organizations seemed to adopt an expanded approach, i.e. one that considers the implementation as some type of "IT meets reengineering project". This is what we have later termed systemic-reductionism.

Outcomes. The overall perception of the respondents is that the implementation generated improvements to their organizations. However, one cannot mention unanimity, and when analyzing specific issues, we found significant levels of frustration. For example: 45 percent of the respondents did not perceive any improvements in terms of competitive advantage, 43 percent affirmed that no cycle time reductions were obtained, and 40 percent admitted that there were no gains in customer service. Moreover, several negative effects were cited in significant percentages, particularly relating to issues such as flexibility and costs. Also noteworthy are some disadvantages pointed by

respondents such as low fit between the system and specific business needs, which may lead to loss of some strategic functions and information.

Paradoxically, most of the respondents in the survey seem to agree that there is no alternative to the ERP trend, and that the outcomes are mainly positive. It is precisely at this point that it seems appropriate to point out the political and institutional context surrounding ERP implementations. If we combine, on one hand, the strong political and institutional drivers for its adoption, and on the other, the immense investments involved and the high hopes concerning the outcomes of the ERP project, one may expect it all to impair a critical assessment. In fact, one could state that there are many stimuli to "lip-service" (i.e. ceremonial) behavior (Meyer and Rowan, 1977; Caldas and Wood, 1997). Thus, even when results may be deceiving, assessments could remain mostly positive.

Overall, in many dimensions of the survey's results, one can perceive that respondents tend to:

- defend the adoption of the ERP as pure good business sense, even when it could not deliver the results expected from it;

- report an implementation that was commonly shallow in business process preparation and deep in the use of "templates" that tend to fit the organization to the system's requirements; and

- admit that although their organizations perceived ERP as merely an IT project, its consequences turned it into a large-scale transformation.

In other words, the implementations surveyed exhibited a trend to take complex phenomena and give it a quite ordinary treatment.

The part and the whole
In this section, we will focus on reductionism and complex thinking. Based on such concepts, we will discuss the amplitude of changes involved in the adoption of ERP.

Reductionism, holism, and complex thinking
Reductionism refers to the practice of dividing the whole into its parts, and then studying them separately (Flew, 1984). According to Piaget (cited in Landry, 1995), reductionism is also the tendency to reduce the complex to the simple. Holism, on the other hand, refers to the study of the whole with no division (Beed and Beed, 1996). Systemic thinking is therefore an holistic conception, popularized since the 1950s by von Bertalanffy (1968).

In Western culture, we have conditioned ourselves to think in a reductionistic and linear fashion. However, when we came upon the idea of systems, our reductionistic blurring tended to be substituted by an holistic blurring, one that is only able to see the whole. Thus, we oscillate between one extreme and the other.

Complex thinking constitutes yet another way of perceiving totality (Morin, 1977). Its fundamental principle is the complementary nature between the reductionistic conception and the holistic conception.

The specific case at hand, technological reductionism, has been covered before in *Organization Studies*. Hodgson (1985, 1988), for example, has criticized those, as he sees being the case of Kay (1984, 1988), who reduce almost every problem to the one of information. The argument is that "informational reductionism" inhibits the recognition of the difference between conscious and unconscious processes and the perceptual, cognitive, and conceptual processes involved in decision making and organizational reality.

It is not about IT, it is about change

In this paper, one of our main arguments is that the changes involved in an ERP implementation transcend the "IT plus (shallow) reengineering" domain. The reason for this is that ERP implementations tend to provoke considerable impacts on organizational design, on the management model, on the interaction among individuals and groups, on the definition of autonomy and authority limits, on managerial style, and even on strategy.

At best, to perceive an ERP implementation in the reductionistic mode may reduce its potential to drive organizational transformation. At worst, it may submerge the organization in a blinded change process, in which the impact on the dimensions mentioned above is frequently ignored.

In our field survey, several respondents did mention negative effects of the implementation, such as the loss of strategic functions, lack of flexibility of management and organization models, etc. Indeed, those features are in the very core of the competitive position of organizations, and are crucial in any coherent organizational transformation move. Such results should serve as an alert to the risks that organizations adopting ERP are taking when embracing a reductionistic approach.

Conclusion

In this final section, we will conjecture on the reasons for the predominance of reductionistic reasoning during processes of adoption and implementation of ERP systems, and present our final comments.

Why reductionism?

What leads so many organizations to adopt a techno-reductionistic or systemic-reductionistic perspective during the implementation of ERP? Based on the field survey, we believe five factors might answer this question.

(1) The first factor is the predominance of reductionistic thinking in our business culture. Our mind is "formatted" to think in a linear and reductionistic manner. In fact, such condition reflects the spirit of our times. Crushed by the acceleration and by the increase in connectivity in the business environment, many executives and consultants tend to adopt monotonic and simplistic discourses.

(2) The second factor is the aggressive communication of diffusion agents, and it is directly related to the institutional factors mentioned before. After

many years of exposure to the rhetoric of consultants, software and hardware suppliers, and business media, several decision makers seem to have assimilated their discourse. It happens that such discourse is almost inevitably reductionistic. To sell their services, many agents utilize dramatic communication (Lampel, 1995). The same occurs frequently among business journalists. To make news interesting to their readers, such professionals at times rebuild reality from fragments of information they judge to be more appealing. This process ends up being reproduced within organizations, when internal change agents reproduce the discourse of external agents to overcome resistance to change.

(3) The third factor is the limited information about business transformation. Many implementation agents simply have no systemic vision of the variables involved in a broad organizational transformation and/or do not perceive ERP implementations as part of it.

(4) The fourth factor is the inhibition caused by the difficulty to sell and to conduct large organizational transformation processes. Some consultants do perceive ERP implementations as complex processes. However, they can seldom make such vision explicit to their clients. The same happens among executives. On that account, many consultants and executives are afraid of losing business or support for their projects if its complexity is thoroughly realized.

(5) The fifth factor relates to interests of stakeholders within the organization, and is closely connected to the political factors mentioned before. Stakeholders may be politically interested in conducting or influencing the ERP implementation. Such position may materialize as an appropriation or manipulation of narratives and discourses. The "management of meanings" has usually a reductionistic character, since it underlines certain dimensions interesting to the group, overruling or reducing the importance of others.

Altogether, these factors result in a barrier to the development of non-reductionistic reasoning. The possible evolution, which some change agents have realized and many executives have accepted, has been in the direction of adding to ERP implementations a few initiatives such as communication plans, change awareness workshops, user training and, sometimes, (superficial) revision of organizational architecture. This denotes what we have called systemic reductionism.

Final comments
ERP recent diffusion has been bolstered by an intense institutional apparatus. Such an environment inhibits reflection and is characterized by low level of criticism. The most common outcome is the proliferation of failures in implementation and growing dissatisfaction.

In this paper we have argued that many organizations are taking large interventions they have been conducting from a reductionistic perspective. As an alternative, we proposed that ERP should be understood as a complex phenomenon.

We hence recommended that ERP implementations should be understood as major organizational change processes, and therefore that they should be planned and conducted as such, within a non-reductionistic view. We also consider this paper an initial study, to be followed by further discussion and empirical research.

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