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Factors Constraining the Exploitation of Enterprise Systems:
a Research Program

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Abstract

An ERP implementation is a significant intervention in organisational life. As such, it affects and is affected by many variables including the organisation's culture, decision-making strategies, risk taking orientation, leadership strategies and perceptions of the value of Information Technology.

ERP implementations are fundamentally agents for organisational change, and such change requires effective leadership practices, beyond the focus of personal qualities and technical skills. ERP benefit lies in achieving business performance improvement and this requires effort for process redesign. Any such process change involves risk and the organisation's orientation to risk in terms of adoption or failure avoidance may be a critical variable in an ERP success and exploitation. In addition, the adoption of a large alien system replacing homegrown systems is a significant change to the enshrined organisational practices and sense of ownership.

This paper reviews constructs associated with cultural change and systems implementation. It proposes a research program that seeks to develop appropriate models that assist organisations in exploiting their Enterprise Systems Investments.

Keywords

Implementation, Leadership, Organisational Culture, Information Systems Management, User Empowerment, Risk Management; Qualitative Research

INTRODUCTION

It is estimated that between one quarter (Mahapatra et.al. 1998) and one half of ERP implementation projects fail (Constantinos 2000) often with significant financial consequences for the organisations involved (Clemons 1998, Scott 1997). Bancroft, Seip and Sprengle (1998:133) name corporate culture as the top critical success factor and note the need to understand the culture in terms of its readiness and capability for change. Organisations are seeking to improve internal practices through adopting 'best-practice' processes within the packaged software and eliminate disparate information systems through adopting a total integrated solution (Klaus, Gable and Rosemann 2000). Unfortunately, both research (Scott 1998, Holland and Light 1999, Al-Mashiri and Zairi 2000, Parr, Shanks and Dark 1999, and Sumner 1999) and the popular press have reported that over 50% of these projects may be considered as unsuccessful.

The Gartner Group (1999) and the Boston Consulting Group (2000) predict that Enterprise Systems market will be larger than $20 Billion by the year 2002. They expect more than 90 % of the fortune 500 companies will purchase a module or set of modules from an ERP vendor by 2002. On the negative side, they report that only one third (1/3) of these implementations can be considered as successful. A common consensus is that the Enterprise System does not provide the value anticipated. Through 2004, both groups suspect that the majority of the organizations will still fail to see adequate returns on their investments. Hence, the issue of benefits realisation is a critical issue for all organisations and research is now being undertaken to determine appropriate goals and means of achieving promised business benefits (Shang and Seddon 2000).

Achieving business benefit from an Enterprise System requires radical restructuring to a process orientation, the adoption of external business models and systems and challenging workflow and power bases within the entire organisation (Davenport 1999, Deetz, Tracy and Simpson 2000). An Enterprise Systems implementation is a type of BPR project but not the radical BPR project demanded by Hammer (1990). The focus in an ES Implementation is on selection of process configuration and work flow model. Often the outcome of such an implementation is to flatten hierarchies and distribute decision making to the lowest possible organisation level.

Cameron and Quinn (1999) state that sustainable improvements in organisational performance is not possible without cultural change. They go on to demonstrate that successful BPR and TQM projects were framed as

cultural change programs; any such projects not so framed failed. These results suggest framing an Enterprise Systems implementation as a cultural change program (Deetz, Tracy and Simpson 2000: 153).

Holland, Light et al (2000) showed that most European organisations are still struggling with adopting these technologies, with few moving to adapt the environment to suite their current business environment. Very few organisations are able to innovate through their investment, perhaps because they have not framed the process as one of cultural change. Holland and Light (2000) suggest that the focus be shifted to determining the means to gain further benefit from the investments into Enterprise Systems. This element is aligned with the goal of exploiting IT for strategic benefit as suggested by Willcocks, Feeny and Islei (1997).

It is this latter aspect which drives the research project described in this article, namely what factors are preconditions to positioning an enterprise to exploit its Enterprise Systems Implementation? This paper describes some of these factors and discusses a research program currently underway, which seeks to a). Develop a model and factors of Enterprise Systems Exploitation, b). Refine models of User Empowerment within the research domain and c). Develop a model and measurement of Organisational Risk Orientation.

The paper next examines two critical elements: culture and leadership. It then discusses key factors of organisational risk orientation and user empowerment. It then closes by discussing the research program underway. This research project has won an Australian Research Council Linkage grant in conjunction with SAP and is due to commence in 2002.

ORGANISATIONAL CULTURE AND TRANSFORMATION

What are the sources for Enterprise Systems Implementation failures? How can these failures be overcome? Part of the answer may lie in the fact that adoption of ERPs is essentially a business process improvement project, and so the literature on Business Process (Re)Engineering, Total Quality Management and Mergers and Acquisitions may inform on impediments to successful adoption. A review of these domains reveals one consistent theme. These projects are cultural change projects, and as such issues of change leadership, cultural change, and organisational empowerment a found to be critical success factors (Cameron and Quinn 1999, Tracey, Deetz and Simpson 2000, Davenport 1998, Romm, Pliksin, Weber and Lee 1991, Tolsby 1998).

Cameron and Quinn (1999) provide an integrated review of corporate culture theories and their relationship to sustainable change. Deetz, Tracy and Simpson link (2000) changing culture to leadership practices that use the tactics of vision creation and identification, effective communication programs linking with vision, mission, purpose and values, and the engagement of the employee in the adoption of the (information technology induced) transformation. Bass and Avolio (1985,1994, 1997) show how the application of a Full Range Leadership Model based on theory of Transformation Leadership (Burns 1978) leads to improved organisational performance, improved expressed leadership, and higher satisfaction by employees to the outcome. We propose to link these theories with developing an effective change management program that a). Identifies cultural barriers to achieving business benefit through the ES implementation and b). Identifies leadership improvements required to achieve cultural change programs. We next discuss one model of organisational culture linked with change programs.

Organisational Culture Assessment Instrument (OCAI)

Cameron and Quinn (1999) avoid defining corporate culture, but instead presents a framework for organizations to discuss and interpret key elements of organizational culture that can foster change and improvement.

They propose a two dimensional decomposition of organisation culture, based on the following factors: Organisational Leadership, Management of Employees, Organizational 'Glue', Strategic Emphasis, and Criteria of success (within the organisation). In addition, they characterise the organisation by its dominant features and label the final assessment by this dominant characteristic: Hierarchical, Clan, Market or Adhocracy.

Their instrument characterises firms according to a tendency for control versus flexibility, and internal versus external orientation. There are twelve characteristics measured leading to a classification according to the dominant characteristic. For a hierarchical organisation, the dominant characteristics are managing coordination, control systems and acculturation. For the opposite type of firm (Adhocracy), the dominant characteristics are managing innovation, future and continuous improvement. The Market firm is characterised by managing competitiveness, customer service and energising employees to close the deal. The opposite of the market firm is the Clan, which is characterised by a human resource orientation, where personnel development, team building and interpersonal relationships are important.

Cameron and Quinn go onto to show the prevailing organisational orientation is hierarchical with the least common being adhocracy. Table 1 summarises the findings according to industry type.

Sector	OCAI Type
Agriculture	Market
Finance	Hierarchical and Market
Mining	Market
Manufacturing	Market
Construction	Market
Public Administration	Hierarchy
Retail	Market
Services	Hierarchy, Clan, Market
Utilities	Hierarchical and Market

Table 1: Orientation according to OCAI Type (Cameron and Quinn 1999:68-69)

The average OCAI type for the aggregation of over 1000 firms are shown in a radar graph at Figure 1.
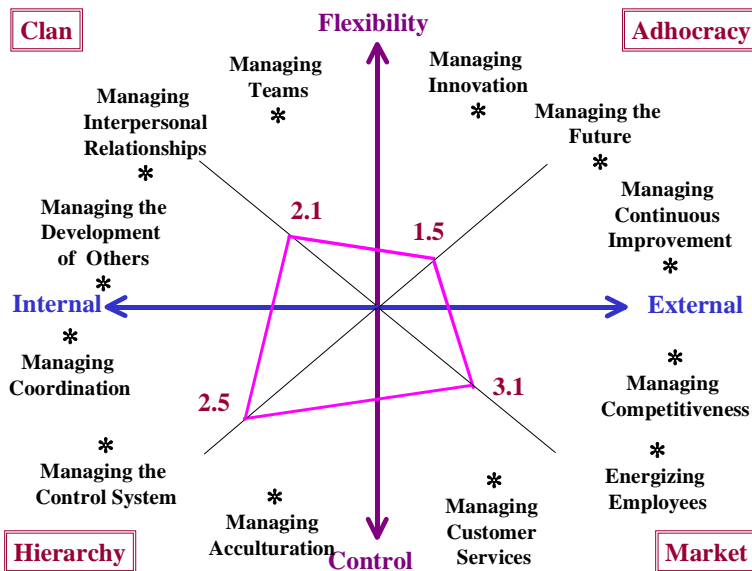

Figure 1: Average Culture Orientation of 1,000 US businesses (Cameron and Quinn 1999:66)

This model leads to the following research questions:

a. What correlation (if any) is there between organisational success with ES Implementation to OCAI type?
b. What outcomes for the enterprise system are expected according to OCAI type?
c. What barriers exist (if any) to ES Implementation according to OCAI type?
d. What changes to change management programs must be made to accommodate OCAI type?
e. What factors within this model are enablers or barriers to Enterprise Systems Exploitation?

We also note that the orientation of the firm to each of these cultural aspects may also effect the manner in which it perceives the strategic value of information technology. We also conjecture that cultural elements do influence to Enterprise Systems Implementation Success. No work has been discovered that links these concepts in an empirical study: organisational culture, strategic value of information technology and ES Implementation Success. It is this conjectured relationship that stimulates our research program.

Some hint of the association of culture with change management, and in particular with leadership and OCAI type are elaborated by Cameron and Quinn (1999:42). Here, they report differences in the perception of successful leaders according to OCAI type. Those leaders deemed successful by their subordinates, peers, and superiors, and those that are more rapidly promoted are those managers that adopt the leadership style congruent to the organisational culture. No prescription is given for effective leadership of such cultural change programs, so we next briefly describe Transformational Leadership as a means of effecting the management of cultural change.

TRANSFORMATIONAL LEADERSHIP

Leadership theory and practice can be grouped in terms of the motivational characteristics of the leaders: transactional (TX), transformational (TF), and charismatic (C) (Hollander 1994). Potter and Anderson (1976) introduced a fourth term (Laissez Faire (LF)). The leadership models of Likert (1968) and McGregor (1970)

focused on the degree of participation and delegation allowed or encouraged by the leader and the supporting organisation, but do not describe the strategies that extra-ordinary leaders use. The studies of Bass and Avolio (1986, 1987, 1989, 1993, 1996, 1997) focus on extra-ordinary leadership and they were the first to characterise the attributes of these transformational leaders and develop a validated instrument to determine performance in these factors.

Transactional leadership styles are: *'those exchanges in which both the superior and the subordinate influence one another reciprocally so that each derives something of value.'* (Yukl 1986). Woodford and Goodwin (1994) describe transactional leaders as *'those leaders that 'supply the follower's needs, should the follower's performance be adequate'*.

These definitions portray leadership as a transaction of reward to the followers on completion of acceptable performance: that is, there is an exchange of valued outcomes. These transactions may also be of punishments should the follower not achieve the required output or standard. The nature of the exchange varies according to the task, the team and the situation. High quality transactions are characterised by a reinforcement of the interpersonal bond between leader and follower (Kunhert and Lewis, 1987: 194).

Bass and Avolio (1986, 1993, 1996, 1997) have led a series of studies, which have sought to operationalise this concept of transformational leadership and have developed a validated instrument (the Multi-factor Leadership Questionnaire) that measures a persons leadership behaviour using 9 scales and 3 outcome measures. Their model essentially partitions leadership into transformational behaviours that motivate a person to perform beyond expectation, transactional behaviours that describe 'classical' or ordinary leadership and non-leadership. The transactional scales include Active Management by Exception or Passive Management by Exception. Reward systems are called Contingent Transactions or Contingent Reward. Non leadership behaviour is known as Laissez Faire leadership (LF).

Transformational leadership involves changing the belief state and the perception of needs and values of the follower. Factors of transformational leadership include Indealised Attributes, Idealised Behaviours, Inspirational Motivation, Intellectual Stimulation, Individualised Consideration. Leadership outcomes can be measured in terms of task attainment or effectiveness (EFF), follower satisfaction with the tactics of the leader (SAT), or extra effort by the follower as a direct result of the leader's tactics (EE). (For a definition of these terms see Bass and Avolio, 1997: 30..36).

Recent studies (Bass and Avolio 1998) present a more parsimonious 6 factor model grouping Idealised Attributes, Idealised Behaviours and Inspirational Motivation together, and grouping together Passive Management by Exception and Laissez Faire behaviours. These new factors were determined after a comprehensive survey undertaken on Platoon Leadership in the US Army (Bass and Avolio 1998). The MLQ 5X survey is still used to identify leadership behaviours according to either factor model.

Howell and Higgins (1990 : 249) describe the behaviour of transformational leaders as *'articulating a mission or vision in ideological terms, demonstrating a high degree of self-confidence, communicating high performance expectations to followers and confidence in follower's ability to meet such expectations, and showing individualized concern toward followers'*. They go on to show that successful champions of technology innovation tend to use these tactics. Champions were often leaders who inspired and challenged staff, risk takers and attempt to influence others more frequently and adopt a wider variety of influence tactics. Thus, transformational leadership is effective change leadership.

These studies show the means by which change agents can become effective leaders. We propose to use Bass and Avolio MLQ to benchmark leadership practices and correlate leadership with ES exploitation. This results from the application of this instrument will be correlated with leadership measures in the OCAI It may also lead to the identification of a practical leadership improvement as part of the implementation process.

ORGANISATIONAL RISK

Though risk taking is seen as a leadership trait (Kotter 1996) and a also characteristic of innovative organisations (Cameron and Quinn 1999), it appears that no agreed model for Organisational Risk Orientation exists, nor a means of measuring such a construct.

In an environment where rewards are given for the absence of failure rather than for an acknowledgement of success, the concept of risk taking is both difficult to appreciate and difficult to explain to individuals who have developed in risk averse or risk neutral cultures. Fisher (1997) suggests that the working culture has programmed learned helplessness and non-responsibility into workers, where obedience takes precedence over initiative, discipline over risk taking and where showing up for work every day is considered fulfillment of the work contract. Reprogramming workers into a climate of risk taking and contribution remains the challenge that takes

intelligence, creativity, patience, time and expert cultural engineering, rather than faddish practices and quick fixes.

Developing a risk culture is inevitably linked with user empowerment and can only be developed once the employee has been empowered. It would appear that risk is involved in ERP implementations at two distinct stages of a project. The risk analysis and management prior to project implementation, for which there are many risk management models for enterprise-wide solutions to select from, is the stock in trade of consultancy companies.

A culture that does not properly allow an executive to take responsibility for failure, without risk of any type of personal hardships may be the ultimate cultural barrier to the success of ERP implementations. The possibility of consultants themselves admitting to a "state of failure" is possibly even more remote. It may therefore be prudent to attempt to understand the corporate culture of the consultants themselves, as well as that of the client when analyzing potential cultural barriers.

Shapira (1995) evaluates organisational risk through a process of survey and interview. He examines risk taking, risk promotion and rewards for risk. He concludes that one can improve risk taking by focusing on attention patterns of managers in their perceptions of risk, through offering incentives and rewards for risk taking and achieving success through risks, to provide more information on issues relating to risk. He finds that fear of failure is the greatest impediment towards risk taking. Shapira calls for research that evaluates risk propensity and risk aversion in organisations. One sub-project of this research program is to develop a model of organisational risk orientation and then to correlate this factor with exploitation of Enterprise Systems.

USER EMPOWERMENT

Large systems development requires user involvement in order to be successful. This involvement occurs from the very beginning of the project feasibility study and continues through detailed design, testing and deployment. The role of user involvement in an ERP implementation is qualitatively different from that in a large system build, as there is limited scope in influencing the final products look and feel, and limited control over the range of process models to be considered for implementation. This change in decision input may lead to a sense of impotency in the user community, which is exacerbated by the number of interfaces between functional groups. A sense of satisficing may become pervasive and this may affect the perception of system success in meeting business unit requirements. This pessimism may also influence the organisational culture in that the users may feel less empowered to make effective decisions benefiting their group.

The literature appears to emphasize the importance of user empowerment in the structure and maintenance of corporate cultures, and this loss of power may have a negative impact on the operant culture, despite the desire to achieve a better corporate level integrated business system. Stated corporate objectives and policy and corporate reality can be quite different. It is unlikely that the operant culture in the business sub-units is what management states to be the culture. Thus, successful implementation must address the benefits and seek to move the organisational culture to a state in which business benefits are seen and are achieved.

Spreitzer (1995: 1443-1445) presents a partial nomological network determining psychological empowerment through integrating work from the literature. The dependent variables for this construct are 1) meaning ('the value of a work goal or purpose judged in relation to an individual's own ideals or standards'), 2). competence (the individual's belief in their capacity to perform activities with skills'), 3). self-determination (individual's sense of having choice in initiating and regulating actions') and 4). impact (the degree to which an individual can influence strategic, administrative or operating outcomes'). High values in these constructs will lead to managerial effectiveness and innovation. The independent variables include 1). locus of control (the degree to which individual's believe that they, rather than external events control life outcomes (Bandura 1986), 2). self-esteem (a general feeling of self-worth), 3). access to information on organisational mission and sub-unit performance , and 4). rewards (the incentive scheme that rewards performance). Her work provides an orienting framework for measuring user psychological empowerment. Spreitzer states that the nomological network needs extending to consider other organisational aspects including culture, context, and levels of management, structure, job-design and high-involvement practices. This research project will specify these elements using Enterprise Systems Implementation as a source of innovation a determine the effect of user empowerment on ES Exploitation.

Sigler and Pearson (2000) extended Spreitzer's work to examine the relation of psychological empowerment to organisational culture (building on the work of Schein 1992 and Hofstede 1984). Sigler and Pearson sought to develop a causal model of culture empowerment. They found that the following factors increased perceptions of empowerment 1). a doing orientation (outcome oriented); 2). a collective orientation (fostering interdependence and loyalty to group over individual independence and individual initiative); and 3). high power distance

between manager and line work. They also found that increased perceptions of empowerment positively affected organisational performance (fully supported), and organisational commitment (partially supported). They suggest that further research undertake a longitudinal study (collecting data before, during and after an empowerment effort), and involve front-line workers (business process operators and owners). They also suggest that any TQM projects must involve an assessment of the organisational culture to determine its potential effects on empowerment.

A research objective of this project is to integrate measures of organisational culture by using Cameron and Quinn's OCAI and adding measures of power-distance, collectivism and outcome orientation. This aggregated instrument will then be used to undertake correlational studies of Enterprise Systems exploitation. The cultural assessment will be accompanied by measures of user empowerment extending Spreitzer's model and instrument. This will enable assessment of the perceptions of user involvement in the Enterprise Systems Implementation, and practices of user empowerment within the organisation.

RESEARCH PROPOSAL

The specific aims of the research are:

a. Develop an instrument to measure organisational risk orientation and correlate with Enterprise Systems implementation success, benefits realisation and ES exploitation,

b. Develop an instrument to measure user empowerment and user involvement and correlate with Enterprise Systems implementation success, benefits realisation and ES exploitation,

c. Use the Cameron and Quinn Organisational Culture Assessment Instrument and correlate cultural characteristics with Enterprise Systems implementation success, benefits realisation and ES exploitation, and (possibly)

d. Undertake an action research project within the change management program of the target organisations using the instruments developed above for organisational risk orientation, user empowerment, user involvement, leadership practices and innovation plus elements of Cameron and Quinn's Organisational Culture Assessment.

Research methods and research plan

The research will use multiple methods, including Case Study (Yin 1994) and survey techniques. It may involve an action research component to test the change management programs associated with an Enterprise Systems Upgrades and longitudinal measurements of systems exploitation. The case study and action research programs will be informed through the empirical results from using the OCAI and MLQ instruments, the developed organisational risk orientation instrument and the refined models of user empowerment.

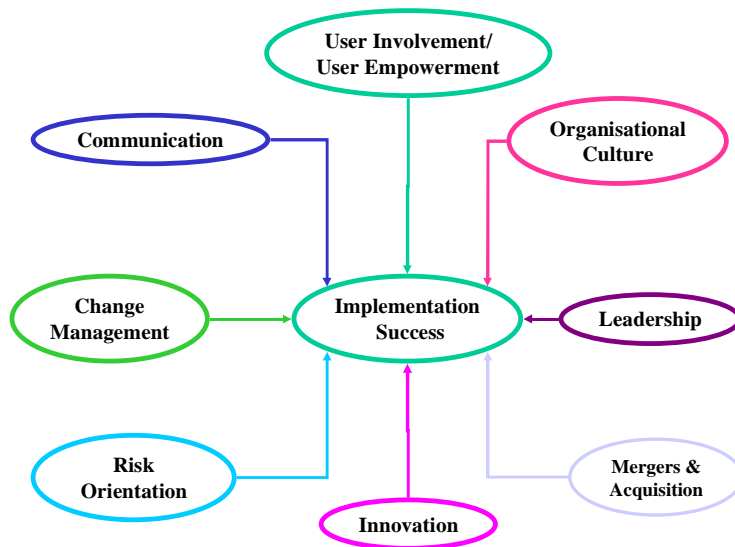The components for this study, together with its reference disciplines are shown at Figure 2.

Figure 2: Conceptual Framework

Instrument development is informed by referent theories of corporate culture (Cameron and Quinn 1999), risk orientation (Shapira 1995), self-efficacy (Bandura 1986) and leadership (Bass and Avolio 1994, 1997,1999).

There are three concurrent programs being executed: development of a model of ES exploitation, development of a model of organisation risk orientation, and development of a model of user empowerment in the ES domain. In addition, correlational studies are being undertaken linking leadership behaviour and organisational culture to ES success, benefits realisation and exploitation.

A set of readings has been developed for each of the factors above. These readings will guide the Ph.D. student in their literature review. A detailed research plan for each component is currently being crafted, thus fast-tracking the student through their program. Graduate students can work collaboratively, sustaining each other by linking their work through this integrating project. Seminars on individual outputs will inform other students on organisational issues impacting their work, methodological issues and theoretical outcomes. Access to a coherent set of test sites will ensure minimal disruption to the industry partners, yet guarantee access to the required people and data.

We have identified four sets of organisations that will be targeted in the data collection phase. These sets are:

a.   stalled adopters (those organisations where the use of the system has peaked or even stopped),
b.   adapters (those organisations where the business process are being adapted to the purchased system),
c.   expanders (those organisations where additional system functionality is being sought) and
d.   exploiters (organisations which are pushing the envelop in systems use by seeking strategic and innovative ways of deploying the Enterprise Systems Technology).

This program of inter-dependent studies will lead to the objective of developing a benchmark set of best practice processes that are directed at achieving organisational exploitation of their Enterprise Systems investments.

CONCLUSION

Corporate Culture, Change Leadership, Organisational Risk Orientation and User Empowerment appear to be critical success factors in Enterprise Systems Implementation and in subsequent exploitation. We have discussed each of these components and proposed a research program which will a). Develop a model and factors of Enterprise Systems Exploitation, b). Refine models of User Empowerment within the research domain and c). Develop a model and measurement of Organisational Risk Orientation.

We have shown how Cameron and Quinn's Organizational Assessment Instrument (OCAI) and associated methodology provides the behavioural modification program to plan, execute and achieve cultural change. We have shown how transformational leadership tactics developed in the full range leadership model of Bass and Avolio gives the change manager and change agents the personal skills to effectively lead, craft effective communication plans and orient the organisation to success. Finally, we described a research program in which a model of Enterprise Systems Exploitation is being developed and (possibly) applied in an action research program for an ES upgrade.

During the conduct of the research, we will be surfacing how these variables of organisational culture, and leadership are impacted through an Enterprise Systems Implementation. We intend to identify additional theory elements of organisational risk orientation, and user empowerment. Finally, we seek to assess how these factors might constrain the success of the Enterprise System through the conduct of a longitudinal study of cultural changes associated with the adoption, adaptation and infusion of the Enterprise System. Possible extensions to this work include measuring culture using the OCAI before and after an ES implementation, and correlating the perceptions of business value of the Enterprise System according to culture type, or the success of Enterprise Systems Implementation according to culture type.

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