

ERP Implementations – the pitfalls of a positivist outlook

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Abstract

Research into Enterprises Resource Planning Systems (ERP) has shown a disconcerting failure of implementations in organisations. This is alarming considering the phenomenal industry uptake of ERP's over the past decade. The reasons for such failure are not forthcoming however it is argued that domination of a positivist research paradigm gives little or no insight into why ERP's fail. Such research approaches are insufficient in that the focus is on surface elements (i.e. empirical data from one perspective) and cannot account accurately for large scale ERP implementations which involve complex interaction of social, technical and political elements. The case for a broader multidisciplinary research perspective that draws from existing models, methodologies and philosophies is advanced in order to establish a more holistic view of the reasons why ERP systems fail. This paper establishes two parallel trends, namely the scope of ERP failures and reliance of Information Systems research on positivist methods. A key argument is then made for a more diverse approach to Information Systems research in order to gain a more comprehensive understanding of ERP failures which could be used to generate more effective implementation solutions. The paper concludes with an exploration of the implications for widening the methodologies employed in Information Systems research.

Introduction

The objectives of this paper are as follows:

1. To determine the failure rate of ERP implementations and to understand why ERP implementations do fail
2. To demonstrate how, with the use of present day positivist approaches to both research and management, this trend of ERP failures will continue
3. To suggest an alternative method that can

allow us to understand the complexity of ERP implementations in the real world

There appears to be large disconnects between academia, vendors and actual outcomes of large scale IT implementations. After a literature search from consultants, vendors and academic sources, the authors found that implementing systems from a majority positivist/determinist perspective has more documented failures than successes. Chen and Hirschheim (2004) confirmed that between 1991 and 2001 that 81% of published empirical research into Information Systems (IS) was positivist. This research is supported by Mingers (2003) who argued that diverse research methods were scarce in nature, accounting for only about 20% of all research programs. This is significant because the reasons for such failures could partially be explained by a lack of deep theoretical research in information systems to date. We contend that concentrating on the surface level of the world, instead of investigating the reasons why such phenomena come into being, will only ever lead to assumptions without evidence. Such complex problems as ERP failures require a combination of thought and methodologies if the real reasons for such failure are going to emerge.

The reasons for this have already been argued for (see Walsham (1995), Klien and Myers (1999), Mingers (2003). These authors all share a common concern regarding the need for IS research to generate deeper understandings of the questions asked. When considering Quinne and Hooper (2001) and Kraemmergard and Rose (2002) the need for this kind of research in ERP failures is clearly evident. Taking the latter's argument on the need for "management competencies" and the need to see the social context, technical context and possibly the political context in one setting allows researchers to understand the real problem. That is, more specifically, the need for more diverse approaches to IS research already argued

for seems applicable to these kinds of research questions (Robey 1996).

This paper presents the reasons why analysing ERP failures needs a diverse approach by presenting the nature of the concerns from the point of view of literature and practice. The nature of the argument then is to present the reasons why such an approach is needed and to then suggest ways in which such an intervention or research approach can be undertaken. This paper begins with an examination of the state of affairs in ERP systems to date from the point of theory and practice, it then continues on to a critique of positivism and its failure to be able to handle such complex research questions. From this, the paper presents alternative models of research practice already used in Management Science and Operations Research. The paper concludes with suggestions for IS research to start considering the complex nature of such problems from a broader perspective.

Enterprise Resource planning failures

Historically IT vendors, senior management and IT departments across medium to large organisations have implemented large technological solutions such as Enterprise Resource

Planning (ERP) systems from a determinist standpoint. Johnson and Duberley (2003) suggest that this is done under the assumption that that management itself can be scientific and value free.

Over the past several decades medium to large organisations have been implementing large ERP systems such as SAP for three main reasons.

1. Their supply chain partners will only deal with companies that have compatible systems to allow for data interchanges e.g. Electronic Data

Interchange (EDI) for use in online ordering. (B2B, EBP, BBP, B2C etc.)

2. The year 2000 concern (Y2K), and

3. Vendors promise a competitive advantage by providing 'best practice', standardised systems.

According to Markus et. al (2000), success or failure of an ERP is measured by five distinct categories:

- (1) It can be viewed in technical terms.

- (2) It can be viewed in economic, financial or strategic business terms.

- (3) It can be viewed in terms of the smooth running of business operations.

- (4) It can be viewed by the ERP-adopting organization's managers and employees.

- (5) It can be viewed by the ERP-adopting organization's customers, suppliers, and investors.

Markus et al (2000), also suggests that there is three phases where success or failure should be measured:

1. Success in the project phase

2. Success in the shakedown phase

3. Success in the onward and upward phase (Markus et al, 2000)

The authors of this paper also believe these phases should be expanded to include system rollover to new versions. This will enable management to get the full picture as to whether a ERP system was successful. For example, the move from SAPR2 (the mainframe version) to SAPR3 (the client server version) should also be evaluated. It is therefore suggested that a format that that could be used to evaluate success or failure of a system would look something like Figure One.

Figure One. The four phases in determining success or failure.

Target group	Project phase	Shakedown phase	Onward and upwards phase	System completion phase	Totals
Technical					
Economic, financial, strategic					
Operations					
Managers					
Employees					
Customers, suppliers and investors					
Totals					

The values of evaluating ERP implementations are twofold:

1. As a tool for senior management to determine the differences between the real world implementation and what they are told by technologists, vendors and consultants and;
2. As a tool for researchers to provide information from a pluralist standpoint of success and failure of ERP installations.

Scheer and Habermann (2000) claim that customers spend between three and seven times more money on ERP implementation and associated services than they spent on purchasing the software license. Much of this expense is unexpected and unplanned.

Failures of ERP system implementations have been known to cause business to lose millions of dollars in lost shareholder wealth, business confidence or in the worst case scenario, bankruptcy. Davenport (1998) describe how FoxMeyer Drug's ERP system helped drive the company into bankruptcy and how Dow Chemical spent seven years and close to half a billion dollars implementing a mainframe-based enterprise system; only to decide to start over again with a client-server version. (Davenport 1998)

The literature has many examples of varying degrees of success and failure for ERP systems. The reasons for failures range from organisational cultural differences (Krumbholz and Maiden 2001) to a lack of fit between the ERP and the organisation (Hong and Kim 2001). Other authors describe critical success factors for implementations as being important (Umble et al 2003) while still others describe the complexity of implementation as being a critical factor (Sarkis and Sundarraj 2003). Sarkis and Sundarraj (2003) contend that there is a belief amongst company CEO's that approximately two-thirds of such systems are failures in the United States of America. Yen and Sheu (2003) describe the implementation process as being unexpectedly difficult in many manufacturing firms while Larsen and Myers (1999) contend that even if the implementation project was deemed to be a success, it can soon turn out to be a failure in the long term because in-house expertise disappears and reductions in "head counts" usually occurs with the most skilled employees leaving and those with lesser skills remaining. Other factors reported by Larsen and Myers (1999) included a lack of reporting and a lack of ownership, which they presumed was because key personnel left after implementation.

Yusuf et al (2004) report on a case study of an

ERP implementation in Rolls Royce and list problems such as inadequate matching of process to software, inadequate training, equipment not being delivered on time and the need for massive data cleansing as the reasons why the "full benefits of the project will not be fully experienced until the system becomes established and has a period of full stability.

Findings from Shehab, et al (2004) showed that the success of ERP systems depends on when it is measured and that success at one point of time may only be loosely related to success at another point of time. Companies experience problems at all phases of the ERP system life cycle and many of the problems experienced in later phases originated earlier, but remained unnoticed or uncorrected. These findings suggest that researchers and companies will do well to adopt broad definitions and multiple measures of success and pay particular attention to the early identification and correction of problems.

Wood and Caldas, (2000) characterised the goals of ERP systems and questioned whether the current interest in ERP in the business community is justified more by political reasons than by sound managerial reasoning. Indeed, these authors found low levels of satisfaction in their survey of firms having implemented ERP systems with 45 per cent of firms perceiving no improvements whatever from implementation and 43 per cent claiming that cycle time has not been reduced despite promises by ERP vendors to the contrary.

Dierckx and Stroeken (1998) studied the relationship between information technology and innovation in small to medium enterprises (SMEs). From this study, a number of general conclusions were drawn, of which the need for cooperation and networking was foremost. They also concluded that the standardization and differentiation/specialization necessary for innovation can only be established through an increasing integration within companies or branches of industry. The authors suggest that IT can play an important role by providing process standardisation and workflow that enables automation, a lowering of training requirements and less reliance on tacit knowledge for routine tasks such as procurement. This allows more time to be set aside on the high value tasks that help differentiate companies and provide competitive advantage.

The link between Information Technology and innovation leads the authors to add another important aspect to systems implementation which is generally overlooked, by both management and vendors. That is, system compatibility with all

other members of the supply network. Generally, the larger companies implement an ERP system and then force small and medium enterprises to become compatible with their system or lose status as a tier one supplier. An example of this trend is Union Pacific which unequivocally states it is to the supplier's advantage to use EDI to engage with them. '... With each application, data flows more quickly and reliably than with fax or postal service. For example, all invoices that are received by 5:00 p.m. (Central Time) are processed that evening. Suppliers who are not already using traditional EDI to do business should seriously consider these applications as a way to enhance their operations with Union Pacific.' (UPRR Suppliers, 2004). In another example, the United States Department of Defense (USDoD) has a separate policy for IT procurement, to highlight two conditions which relate to ERP systems and the associated business rules;

1. The IT Catalog shall be web accessible, and
2. For orders accepted from the DoD E-Mall, information will be sent via EDI (850 with embedded purchase card) or secure e-mail, or other electronic format agreed to that is based upon best practices (DOD EMALL, 2004) This highlights the point that EDI is the preferred method for the USDoD to deal with vendors.

The company also has an exit clause that links the technology to being 'based upon best practices'. This allows USDoD to change the EDI method if a better technology is introduced. A literature search by the authors based on information from four major consulting firms for ERP implementations suggest that two factors may work against their ability to provide objective and broadly researched advice. Firms such as SAP do not implement ERP systems themselves but rather rely on large consulting firms to do this work. As is the case with all businesses, these consulting firms seek to maximize revenue and profit and therefore have a vested economic interest in pushing ERP solutions. In addition to the profit maximisation, these firms ability to critically evaluate the effectiveness of ERP systems is diminished by a predominately positivist's framework of thinking and decision making. According to Johnston and Duberley (2000) operating from this positivist framework is hardly surprising as management is itself steeped in such a tradition.

Academic writing is meant to add rigour and independence to research, however it may be equally feasible to argue that some academics may be being drawn into vested interests of the

organisations which promote them, provide them with research opportunities, publish and distribute their work. Universities which employ such academics also face difficult issues as they are forced to move more to self funding. ERP manufactures have shown a willingness fund chairs and research centres and the universities also sell courses on how to use such applications.

The research stance from consultants appears to be positivist and this is very much in alignment with most of the academic papers on the subject (Chen and Hirschheim 2004). The following examples give an insight into the style of thinking which appears to dominate the decision making processes in consulting firms.

Reddy and Reddy (2001) argue that "Over the past few years, Fortune 500-type firms have reengineered their internal processes and systems using technologies such as enterprise resource planning (ERP) systems. Where implemented correctly these systems have provided significant advantages in operational effectiveness and profitability" The key point to this statement is "where implemented correctly ... " Different organisations would argue to standardise their systems is to lose their competitive edge, therefore they cannot correctly implement an ERP system.

Thorp (1998) argues that "If treated as silver bullets, these packages (ERPs) can actually become silver cruise missiles – packing a lot of power than can become dangerous if their business guidance systems are not properly adjusted"

"The technology (ERP Programs) is sound. The primary problem is how it is being applied in a business setting". (Thorp 1998). John Thorp works for DMR Consulting Group – IT –IS consulting firm. This shows a bias, or even a warning, that you should use consultants to aid your implementation or dire consequences can be encountered. In another example, Berger, and Gattorna, 2001 said that "Enterprise resource planning packages and data bases will remain the bedrock of companies' information technology infrastructures. Most companies have yet to achieve the goal of a single ERP system"... "It is unlikely that those organisations that wish to be effective in an interconnected business world will be able to do so with fragmented systems. Rather, there must be a single ERP system across the entire company..."

Berger, and Gattorna's focus sees a review of trends and possible recipes on how to deal with the future. They paint a vision of a world of firms coming together in cyberspace. Gasttorna is both a consultant and

academic who was originally trained in engineering. Since recently leaving Accenture he has moderated his position on technology and ERP in particular. He has developed a model which categorises industries into four types of which he claims ERP only suits one. He also claims his latest research suggests too much faith has been placed in technology where as the critical variables in supply chain management is people and culture and that logistics research has generally neglected

the social factors (pers comm. 2004). Figure one provided a framework by which to assess ERP implementations at different stages. We applied this measure to a case study to pilot the applicability of this measurement framework. The organisation was a large corporation with a \$AU2.5b revenue and 12, 000 staff geographically dispersed over very large distances. The results are shown in Figure Two.

Figure Two. Results based on assessment of ERP implementation in a large corporation.

Target group	Project phase	Shakedown phase	Onward and upwards phase	System completion phase	Totals
Technical	Success	Success	Success	Success	Success
Economic, financial, strategic	Success	Failure	Failure	Failure	Failure
Operations	Neutral	Disruptive	Failure	Failure	Failure
Managers	success	Disruptive	Failure	Failure	Failure
Employees	Neutral	Disruptive	Failure	Failure	Failure
Customers, suppliers and investors	Neutral	Disruptive	Failure	Failure	Failure
Totals	Success	Disruptive	Failure	Failure	Failure

The ratings varied with the stakeholder group but overall it is clear that the further into implementation the more likely it was to be rated by a larger number of stakeholders as a failure. Measured at the project phase the project came in on time and on budget. Managers and especially senior managers tend to measure success on these criteria. In the shakedown phase most stakeholders while not happy tended to suspend absolute judgement instead choosing to believe they would have to tolerate some disruption as part of the transition to a better system. In the latter phases however perception that the improved promised system did not materialise lead to disillusionment and seeking ways to work around the limitations. Technical was the only variable which was rated as a success across all phases. The reason is that it was self referential as the information specialists measured performance in their own terms and tended to not refer to the end user to assess uptake and relevance. While a single case study can hardly justify this framework the pilot suggests it is robust enough to have wide applicability. It particular it helps provide the greater granularity needed to understand what type of success is being discussed in an ERP implementation.

As suggested in Figure 2 how success is defined depends on how it is measured and by

whom. Figure Three

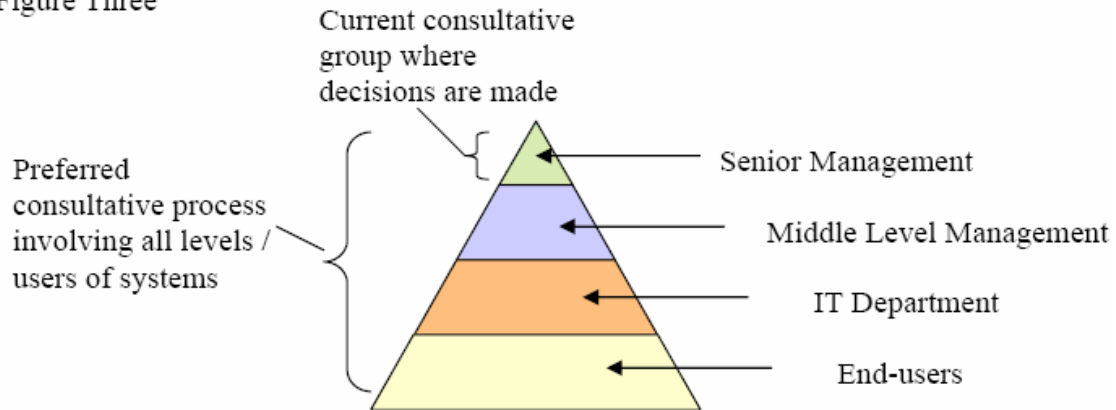
represents the authors' views based on a combination of literature reviews and involvement in a typical large scale ERP implementation. The figure reflects current organisational structures in the case study and how the real consultative process varied from the preferred process in this vertically aligned hierarchical organisation. In this situation, decisions are made at the senior management level with little or no consultation with operational staff, and sometimes without consulting middle management. Where such consultation is done it tends to be done in such a way that despite listening to user needs, any conflict between these user needs and the ERP technology sees the problem resolved in favour of the technology. Different levels in the organisational hierarchy have different issues to address and therefore would define success on criteria which is applicable to their level of management concerns.

The case study that the authors have reported provided incentives for the consultants to finish implementation in the shortest possible time. Bringing the project in below budget and under the time allowed was done by capturing details of user requirements which did not fit the technology and

excluding them from the project. It was argued such requirements would be added after the system was implemented. In short, the project failed to

meet most of the success criteria detailed in Figure one. Such a situation occurred because the senior managers judged success on far narrower criteria.

Figure Three



Failure of positivism

While Figure three suggests ERP failures are linked to inadequate consultation with key stakeholders we claim the inability to address such weaknesses is linked to a wider weakness in the dominant research paradigm applied to ERP implementation. Davenport (1998) states in relation to ERPs “Such convergence around a single software package should raise a sobering question in the minds of chief executives: How similar can our information flows and our processes be to those of our competitors before we begin to undermine our own sources of differentiation in the market?” This raises the question, even if the implementation is a success are organisations left in a better position to compete with other players in the same market?

Accenture's research (2003) indicates that the majority of public-sector ERP implementations over the last 10 years have not achieved organizational and process transformation benefits. Business processes were not changed to the extent that would have exploited all of the capabilities of ERP systems. Although governments were aware of the importance to business process change, technology needs (driven by Y2K), the advent of client server and Web technologies, etc, superseded all else, and difficult political issues surrounding workplace changes made it tempting to minimize business process change. In the end, users have to struggle with gross inefficiencies. Clearly the time has come to start putting organizational improvements in place.

We find Accenture's findings interesting from several perspectives.

1. ERP's are very useful, and despite the list of reasons given for their failure, these reasons never suggest that it may be the ERP logic itself.

2. Other technology is seen as the "problem" – The authors would have thought the technological determinism type arguments which is inherent in the above comments would at least allow space for a view that ERP systems has been replaced by more efficient and effective technologies. However, ERP systems are still seen as the ultimate of technological achievement.

3. "Political issues" are seen as a big problem and the positivist bias is often used to imply irrational, dysfunctional situations. This is in stark contrast to the rational functional logic of ERP's. If “political issues” are so difficult then surely this opens the door to question just how well ERP's are designed in terms of engagement with the social system. The answer may be that this is why you need workflow changes to get rid of the social factors all together.

ERP implementations treat the organisation as if everyone will happily implement what is requested (ordered). Within a positivist paradigm which believes in a single unifying objective truth such an approach is very logical. However there is considerable evidence, especially from the postmodernist literature that organisations do not operate on a single unifying reality. In many cases people try to get around the corporate system by creating 'Feral Systems'. Houghton and Kerr (2004) describe a feral system as one that “is created or constructed in an ad-hoc way as being part of the organisation but autonomous at the same time.” Davenport (1998) quotes an executive

at a semiconductor company as saying, "We plan to use SAP as a battering ram to make our culture less autonomous." The manager of the ES implementation at a computer company expresses a similar thought: "We've had a renegade culture in the past, but our new system's going to make everybody fall into line."

We argue that the disconnect between positivist management philosophy and the interpretist stance of operational staff lays at the heart of the failure of successful ERP implementation. In a case study that the authors performed on a materials handling supply chain for a large government owned transport and logistics company, it was found that of the 33 interviewees (which covered from Senior Executive level to operational level employees) that they all used a form of feral system to 'get the job done'. These ranged from telephone and fax to confirm deliveries right through to developing their own system to perform forecasting and planning functions which were already available through the ERP system itself. The main reason for the development of these "feral systems" was lack of trust in the implemented system which failed to be able to engage with the context specific realities of the various actors across various parts of the chain.

Figure 2 also demonstrated where ERP implementations were seen to fail. We argue that continuing with even more positivist research on the areas marked as failure will waste scarce resources doing more of the same. A fresh approach to exploring this area is required to deliver richer research findings. Applying non positivist methods which recognise multiple realities seem a logical starting point. Such a research stance seems far better equipped to deal with things such as feral systems and the findings of this study which suggest that trying to pursue and unify staff into the one reality suggested by ERP is doomed to failure. If this view is accepted then the debate around ERP failures is turned on its head. Instead of blaming the social system for not fitting into the technical, the issue becomes why the technology does not recognise a richer and more diverse reality and developers build technology accordingly. Application of multi-method research would assist in better understanding the needs of users and provide system designers with far richer perspectives on what is needed for a successful implementation.

Some Possible Alternatives to Understanding the Problem

If it is accepted that knowledge is socially constructed and is context specific, then alternative

research paradigms to positivism may assist in revealing a wider range of issues associated with ERP implementation. Several such alternatives are available as an overview of the following examples illustrates.

Brocklesby (1995) argues that soft systems methodology (SSM) provides a framework for dealing with complex ill-defined problem situations, such as ERP systems implementations. With roots in the hermeneutic/phenomenology/interpretive tradition, systems concepts are used as an epistemological device to facilitate learning about problem situations with a view to taking action which is acceptable to the key stakeholders involved. Essentially SSM is a specialized form of action research where the aim is to improve practices and understanding of situations through participants' self-reflective enquiry. (Brocklesby, 1995) Flood and Jackson (1991), said that SSM, uses systems as an organizing framework for thinking, and not as a representation of reality; and identifies two "paradigms" (hard and soft), each with different assumptions and therefore methodological principles, particularly the understanding of social situations via perceptions of it.

Checkland (the instigator of SSM) said of his book *Systems Thinking, Systems Practice: Includes a 30-Year Retrospective*, that the central concept 'system' embodies the idea of a set of elements connected together which form a whole, this showing properties which are properties of the whole, rather than the properties of its component parts... The phrase 'systems thinking' implies thinking about the world outside us, and doing so by means of the concept 'system'... (Checkland 1999) Therefore to implement a ERP 'system' we should be looking at all connecting elements, which in ERP's case includes, not just technical, but the other elements mentioned earlier, the social and political components (Checkland and Scholes 1991).

The approach of multi-methodology (Mingers 2001) and a disciplined methodological pluralism (Robey 1996) all create interesting alternatives to investigate the failure of ERP systems. Stafford Beer and his work on the viable systems model (Beer 1994) is ignored in the literature almost completely, such a model would go a long way to explaining why social systems behave the way they do when faced with the intense reality of an ERP system. Angell (2000) is yet another example of a radical humanist analysis that can give insights into why ERP systems fail.

We are not necessarily advocating a particular approach but rather seek to highlight that a handful

of researchers are acknowledging that there are many other well credentialed alternative methods of inquiry to positivism presently in use in the field of ERP research.

Suggested approaches for IS research

It is simply not enough to investigate single causal elements and ignore the complexity of organisational failures as is often the case in IS research. When considering the breadth and depth of approaches available to uncovering such problems why is it that the empirical level of analysis continues to prevail? Quite clearly the empirical level of analysis gives us insights into the facts of the situations, but facts follow from what has already occurred and may not help in explaining the reasons why we have the problem in the first place.

An alternative approach for IS researchers may be to explore the diverse complex problem with diverse complex method or methodology. Mingers work on multi-methodology is a start (Mingers 2001) which follows the perceived need called for by Bandry and Landville (1992), Robey (1996), Goles and Hirshhiem (2000) and Chen and Hirshhiem (2004). If we are to understand complex problems such as those that occur with ERP implementations, then surely we need a complex approach.

Conclusions

The ERP literature has clearly demonstrated wide spread failure in a range of industries. Such failures may in part be due to no clear criteria for measuring success. Figure 1 suggests a way such difficulties could be addressed. It was further argued that persistence with even more positivist research into these areas of failure would not generate fresh insights into how to overcome such difficulties. Indeed such a research stance is contributing to the problem by mis-specifying the problem and refusing to entertain the possibility of multiple realities. Based on the findings of an ERP implementation in a large corporation it was demonstrated that multi-method research methods could be applied to generate fresh insights into persistent ERP failures and that an alternative approach to IS research would concentrate on evaluation of not only the technical aspects of implementation but also the social and political.

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