

POWER RELATIONSHIPS THAT LEAD TO THE DEVELOPMENT OF FERAL SYSTEMS

D. V. Kerr

Griffith University, Queensland, Australia
Email: d.kerr@griffith.edu.au

Luke Houghton

Griffith University, Queensland, Australia

Kevin Burgess

Queensland Rail

ABSTRACT

This research identifies factors affecting the operation of a supply chain in a large, asset rich transport utility, and how a recent Enterprise Resource Planning System (ERP) implementation was perceived with respect to its usability for the task. A lack of trust in the ERP, ineffective training methods and complexity in extracting the data from the ERP were identified as a problem which lead to the development of “Feral Systems” (systems outside the accepted ERP or corporation condoned information systems – sometimes called skunkworks). This research uses an interpretative case study approach to gain insights into the human sense-making within the study organisation. The research argues that power relationships between operational managers and financial managers and processual power relationships between operational managers led to the development of these systems.

Key words:- Enterprise Planning Systems, Power, Feral Systems

INTRODUCTION

The implementation of enterprise resource planning systems (ERP) provides many advantages for the companies involved. These include the integration of information technology and all the competitive advantage possibilities associated with improved data access (Heizer and Render 2003). However, these advantages are not always easily achievable with many ERP implementations not producing the results expected and in some cases implementation projects are classed as failures (Umble, Haft and Umble 2003). This paper investigates end-user perceptions and power relationships within the supply chain of a large, asset rich transport utility in an effort to identify

some of the possible reasons for these failures; in particular, this research investigates the development and use of information systems for use outside the organisationally condoned ERP. To date there has been little research into the impact of ERP implementations on employee's motivation to develop their own information systems to supplement or replace the corporately endorsed system. This research looks into this aspect using a single case study approach. The research seeks to more fully understand the methods employees use to overcome ERP implementation problems. For example, previous research has highlighted many cases of end-user development of information systems and the resultant problems invariably associated with this approach (Kreie, Cronan, Pendley and Renwick 2000) and (McGill and Klobas 2005).

This area of research was initiated when it became apparent that end-user development was a significant factor in the way operational managers approached their work. This end-user phenomenon became a dominant theme throughout all stages of a series of interviews conducted within the case study organization (described later in this paper). Because of the unique features of these end-user developed systems, they have been described as "feral systems" by Houghton and Kerr (2006).

A feral system is defined as "an information system [computerised] that is developed by individuals or groups of employees to help them with their work, but is not condoned by management nor is part of the corporation's accepted information technology infrastructure. Its development is designed to circumvent existing organisational information systems" (Houghton and Kerr 2006, p 137). We contend that the feral system example is indicative of a general unease with the corporate approved information system by employees and that these are developed because of power tensions between financial and operational managers. In addition it is our contention that processual power relationships between operational managers lead to the formation of coalitions to help overcome these power tensions and to circumvent the existing ERP in an effort to improve work processes at the operational level of the organisation.

Previous research indicates that power relationships play a major role in ERP implementations, for example; Nandhakumar, Rossi and Talvinen (2005) have suggested that

n "imbalance in power relations between two divisional heads might restrict the progress of IT projects [and that] a strong hierarchical culture may prevent users from interacting directly with the designers of the technology" (page 225). The research outlined in this paper expands on the power imbalance suggestion by Nandhakumar, Rossi and Talvinen and contends that there are power relationships within the case study utility and that this power is having a major influence on the way that employees view the organisation and how they interact with the implemented ERP.

One power play that is apparent is processual power. Jaspersen, Carte, Saunders, Butler, Croes and Zheng (2002, page 401) describe processual power as "part of the decision making sphere and micropolitics of organisational life. Decisions and priorities involved in negotiations are emergent phenomena" They also refer to (Fincham 1992 p 743) who suggests that power lies "not in concrete resources but in strategies like coalition-formation and the manipulation of information that protagonists employ in the power game". The first proposition in this paper is that processual power is a driving force in the development of feral systems and this proposition is tested using the following case study.

The consideration of power in the analysis of this data is consistent with Foucault's assertion that "every relationship is a power relationship" (Avgerou and McGrath 2007). In this paper, we assert that processual power is one of the driving forces in the development of feral systems as they are usually developed through the coalition of operational managers and their manipulation of information in parallel to or instead of the existing ERP system. As Jaspersen et al (2002) indicate, processual power involves coalition formation and information manipulation and we contend that

these are the basic ingredients in feral systems development. Boonstra and de Vries (2005) also cite Fincham (1992) and suggest that the power concept when related to inter-organizational systems can be viewed from the following perspectives:

1. processual power
2. institutional power and
3. organizational power.

Boonstra and de Vries go on further to say that “processual power is in the social interaction between interest groups” and “Institutional structures of inequality form the external bases from which power is mandated to organizations. Organizational power is embedded in the internal structure of organizations” (page 489).

Other authors (Waddell, Devine, Jones and George 2007) have described power in terms of the different types of power namely:

1. Legitimate power where the power is legitimized through the position the person holds within the organization
2. Reward power where the manager can give or deny rewards such as promotion or pay rises
3. Coercive power where the manager can punish others
4. Expert power where the power is based on special knowledge and skills possessed by the manager or others.
5. Referent power where the power comes from the personal respect and admiration given by subordinates.
6. Information power where the power is based on controlling information needed by others.

It is proposed in this paper that another reason for the development of feral systems is associated with an employee backlash against the other types of power being exerted by financial managers. These could include legitimate, reward, coercive, expert and information power that leads to the decision to implement a system that is not considered ideal by operational managers. This second proposition is also tested in the following case study.

THE CASE STUDY

The organisation used for this study is a large, networked transport utility. It is an essential utility service within Australia and has been operating since the 1860's. *Utilcom* (a pseudonym) has a global reputation for providing innovative and performance driven services, for example *Utilcom* employees advise and consult similar utilities at an international level on a regular basis. The corporation has an annual turnover of over 2 Billion dollars (AUD) and over 13,000 employees.

Utilcom recently implemented the ERP, SAP R/3. SAP (Systems Applications and Products in Data Processing) is a provider of business software solutions designed to integrate information technology resources for companies. The website describes their company as “Serving more than 36,200 customers worldwide, SAP is the world's largest business software company and the world's third-largest independent software company overall. Today SAP employs more than 38,400 people in more than 50 countries. Our professionals are dedicated to providing the highest level of

customer service and support” (SAP 2006, about us section). A full description of the SAP R/3 ERP is also shown on their website (SAP 2006).

The implementation was designed to improve reporting and other functions. The process involved conversion from an earlier version namely, SAP R2 to SAP R3 for 6,000 users. The modules involved in the implementation were: financial; material management; logistics; forecasting and planning; materials resources planning (MRP); human resources; information systems including executive information systems; project management; and office integration.

The research project reported in this paper was conducted as two stages. The first stage was designed to develop an understanding of the basic social, technical and political workings of the supply chain and how each of these factors interacted with each other. This first stage involved 31 semi-structured interviews with key stakeholders (operational managers, financial managers and other experts) along a supply chain associated with *Utilcom*. Interviews were conducted with a range of people from human resource personnel to operational staff and included the supply chain partners. The interviews were conducted to determine important elements in each individual’s job and how they related to the supply chain. This resulted in a substantial database of 157,000 words in 230 pages of transcript. The supply chain in question was an integral part of infrastructure building and maintenance for *Utilcom* and involved two other organisations, one was the manufacturer of the product and the other transported the product to the primary distribution point.

This first stage of the research pointed towards concerns about the future usefulness of the yet to be implemented SAP R/3. For the purposes of this paper we will refer to the first stage of the project as Stage one and the second as Stage two. In Stage two, 16 semi-structured interviews were conducted with previously identified experts in the *Utilcom* supply chain. These experts were identified as key personnel within the supply chain by the research team and in consultation with the General Manager of the supply division of *Utilcom*. The object was to gain a better understanding of the important social factors associated with the ERP implementation.

The expectations of the new implementation were manifold and the supply division of *Utilcom* considered SAP R/3 to be a useful system for determining inventory levels and transactions across the whole supply chain. However, the results from interviews conducted during Stage 1 of the research showed that some concern was expressed about understanding the day-to-day operations of the supply chain.

METHOD

This research is an interpretative case study approach (Klein and Myers 1999, Walsham, 1993) that attempts to gain insights into the human sense-making within *Utilcom*. The approach is to find an understanding of the situation as described by Klein and Myers (1999) “through social constructions such as language, consciousness, shared meanings, documents, tools and other artifacts (page 69).” This interpretative approach lends itself to a case study research method (Yin 1994, Stake 1995) using a combination of evidence sources as also advocated by Klein and Myers (1999). The sources used in this inquiry are described in Table 1.

Table 1 – Data used for this case study

Source	Sources used in this case study
Documentation	Intranet postings, company annual reports and reports by the information technology section of <i>Utilcom</i>
Participant observation	One of the authors worked at <i>Utilcom</i> for three days a week over a three month period, during this time he participated in training and conversed with personnel within <i>Utilcom</i> .
Interviews	The semi-structured interview approach was used

Three months was spent at the headquarters of *Utilcom* and this time enabled one of the authors to observe the implementation process of SAP R/3. This author was able to work within *Utilcom* as a contractor and was able to observe work processes as well as do the same training in ERP use as *Utilcom* employees. This period of study allowed the research team to more fully understand the power relationships and the underlying history of the SAP R/3 implementation. For example it was established through informal discussions with operational managers that SAP replaced a more operationally effective software package and that it was perceived by these managers that SAP was introduced to handle the financial aspects of the organisation rather than specific operationally based aspects. These managers felt that the previous software developed by MINCOM was superior to the newly implemented SAP R/3 system.

The relationships developed and observations made over the three month period at *Utilcom* enabled the authors to iterate through the hermeneutic circle with close attention being paid to the contextualization of the gathered data, interaction between themselves and the subjects and awareness of multiple interpretations and suspicion (Klein and Myers 1999). This allowed the authors to gain an appreciation of the broader context of the ERP implementation through the insights of the one author who observed the process over the three month period. This one author's involvement enabled a degree of relationship building with the actors within *Utilcom* and allowed for a credible and relevant interpretation of their knowledge and meanings with respect to the interview transcripts from the second stage of the research.

Documentation

The documentation at *Utilcom* portrayed a positive (technologically determinist see Houghton, Kerr and Burgess, 2004) slant to the ERP implementation and none of the publicly available documentation mentioned the use of relevant modules of SAP R/3 for decision making or forecasting. Intranet postings were available to all employees at *Utilcom* as soon as they logged on to their computer and in many instances these postings provided updates of the SAP R/3 implementation. Questions like the validity of the technology and its use in social systems is a question rarely asked in the literature and it's not surprising that industry practitioners and consultants would hold similar positions.

Interviews

Interviews were semi-structured and open-ended in nature with questions expanding on emerging themes asked as required. The initial 31 interviews (the first stage of the research) were conducted before the implementation of the SAP R/3 and the remaining 16 were conducted a year after

implementation. Coding of the relevant theme was completed by the open coding method (Nuemann 2003). This involved organizing transcript passages into concepts and emerging themes by looking for a consistent pattern by reading the printed transcripts and highlighting identified themes and key words with different coloured highlighter pens. This coding method provides a platform for examining the interviews for both observable themes and allows a comparison with abstract concepts found from informal discussions, observations and follow-up questions asked during the interviews themselves.

Insights from this first series of 31 interviews led to the following research question;

How effective is the current ERP approach in providing a method for employees to obtain data relevant to their own job requirements?

The Stage one interviews indicated that many of the staff at *Utilcom* was not fully convinced of the usefulness of the ERP implementation. This was emphasised in many occasions during both the first and second stage interviews and led to many “workarounds” by staff. This identification of “workarounds” led the authors to the concept of “feral systems”; reported later in this paper. It should be noted that a feral system is different to a workaround in that workarounds are designed to bypass of a recognized problem in a system and this is done usually as a temporary fix. Feral systems on the other hand are deliberate attempts to permanently circumvent a fully functional and operationally sound system.

Researcher Bias

The first named author is an experienced researcher with a systems thinking approach within the positivist school. He has some knowledge and appreciation of the qualitative approaches undertaken within the Information Systems discipline. He was and still is a university employee and was on academic study leave while undertaking the participant observation during this case study. He had some knowledge of the problems of ERP implementations at *Utilcom* through his previous association with a general manager at *Utilcom* (the third author in this paper). This author was able to closely involve himself in the daily operations at the supply division of *Utilcom* and attended meetings and training sessions as well as having informal discussions with *Utilcom* staff.

RESULTS

The results for this study are divided into the main problems discovered from the three approaches namely, observations from the documentation provided to employees, participant observation of *Utilcom* and analysis of the interview transcripts.

Feral Systems

There was an extensive use of end-user developed systems referred to as “feral systems”. These computer systems were developed by individuals outside the accepted SAP environment. For example, statements by middle management (an engineer) in the early stages of the research (Stage 1 interviews) provided illustrations to support this assertion, for example;

... I rely heavily on we've got a diary that tracks all material usage on a daily basis so it will have on there how many [of the product] we unloaded today so Bruce will come in write in the diary in what section, how many lengths of [product] he does. That diary then goes into a database internally within here and onto a spreadsheet ... I do the inventory audits probably once every 3 to 6 months ... sort of thing. (Construction Engineer)

This indicates a high level of internal information systems (feral systems) are developed and used to either supplement the SAP system or replace it.

The use of feral systems was further confirmed in Stage 2 interviews when the researcher mentioned the feral systems concept, respondents recorded statements such as;

Yes that's a very good point and the people that make these feral systems will have no end of argument about why they are needed and yes there may be justifications but at the end of the day if everyone goes down their own little track with their own systems we are going to be in the same position as we were before we implemented R3
(Upper level manager)

Other respondents indicated that feral systems may not be as much of a problem as indicated and that they could be confused with other reporting tools, for example;

Certainly we've pulled data out of SAP and put it into Access databases or Excel spreadsheets to do various manipulations so to that extent yes we are doing that but I don't see them as feral systems. I see those as different reporting tools (Upper level manager - commodities)

On the other hand the same respondent indicated that he could see problems with feral systems in certain cases where there was little or no visibility for the organisation, for example:

At the other end of the equation there are a number of customers who are doing their planning outside of SAP so there is no visibility for the organization because their planning exists in Excel spreadsheets or access databases and isn't rolling up into any corporate plan so that does create a problem (Upper level manager - commodities)

And

(Interviewer) The information from [supervisors], how does that information come? Is it stored in [enterprise] system?

(Interviewee) [no] stored in email and excel. But can be referred back to.

(Interviewer) Is that shared with others or not.

(Interviewee) No not really. [we use] emails and telephones. With [Place A] and Infrastructure, once a week, usually Thursday. Thursday's loading day at [Place A]. So therefore we know exactly what, Thursday and Friday mornings is loading day, and it leaves [Place A] Friday afternoon. So by Thursday, we know exactly what's going out, hopefully if there's going to be a problem we, we've addressed it before then. and that's basically all there is. [Place A] faxes the information to us, to here, Allen has a copy, I take a copy, I then inform Infrastructure on what we're doing, see if there's any problems. Infrastructure will then tell me if there is a change in the deliveries, and it's a step back down the line, back to [Place A]. (Contracts Administrator)

Notice in these selected quotes that there is no perceived need to get this crucial information back into the main ERP system for either forecasting or knowledge management purposes. Again, this highlights the use of 'feral' systems and a local conceptualisation of a supply chain. Some other quotes:

You have to have good information storage, albeit in a social rather than technical system.
(Production Manager)

Oh yeah, very much with others. Couldn't do it alone. In terms of working with others, I don't need to worry about what they are doing as such, rather I am suggesting I take almost a helicopter view in this, sort of checking where things are at and therefore needing a lot of information on how they are going ... That's right. What I also feel works well is our systems accuracy. Although, I guess, a little bit of question about what

doesn't work well, I might talk about limitations in the system but what we do have is very accurate. We never have occurrences where in our documentation there is any discrepancies in the volumes and product we send. Or what we send. I don't have detailed knowledge of the systems but from ... it seems to me that they are very robust. (Sales)

(Interviewer) And where do you get this [information] from? People or systems?

(Interviewee) A lot of it is from the systems and a lot of it is communication between people. Cause usually if Mike Gore has got some orders coming up we get some enquiry, he'll contact me by phone or email and we will discuss it on how best we can do it. Put it into practice. (Despatch)

Here are two quotes that show how two parts of the supply chain relate to each other by bypassing established systems. The people that send out the goods (despatch) rely on email and telephones to keep track of orders that come from the sales people. With such a large organisation this is surprising, given that sales occur in the millions on a regular basis. Recent problems at the organisation have indicated that such reporting has led to 'missing' stock and may not be as efficient as claimed above. More examples of this kind of thinking are shown below:

If they are doing the ordering system right then I know about it. The only trouble is sometimes they don't do the ordering system right and they might not order it off the right plan and I don't know about it for two weeks. Generally people ring up so communication is a lot of to-ing and fro-ing, backwards and forwards which is a bit ad hoc, unfortunately. But because if somebody wants brand new [product] they probably need it soon and it's all this other stuff that takes time. You know there is a project happening, there is a project manager that's also in the background who may be saying to us, 'Six months ago I need [product] for such and such.' He is not the person who ordered it so, yeah, we go off the formal thing so we know where to get the information from. (Project Officer)

I think we would work pretty hard to maintain that, because it is very, you know we've got websites and stuff like that, but they can't see it. But from my point of view, I can see, and it is not to see to be critical, it is to see to help to sometimes, you know what can we do? Like the example of what's happening while it's pouring rain, ... they can send emails, and they can quote information, and we can look at information and share information, it's not top secret, it's stuff that we both need to know and make sound decisions about what are we going to do here. Do we stop, do we keep going here, or whatever. (Transport Manager)

(Interviewer) How do you get the wagons, how do you put that process in place?

(Interviewee) Via email the wagons are there. If they are not at [Place A], the rotations of the wagons is predictable. Just goes round in circles like a Hornsby set. Goes on Sunday, will come back Monday night. Has a process, it could run itself really.

(Interviewer) Are you able to track it?

(Interviewee) Yes. (Logistics Officer)

The following quote demonstrates a more explicit connection between the ERP system and the operations of Firm A:

(Interviewer) Why not just use SAP for your records?

(Interviewee) SAP isn't ... doesn't have the functionality. With our three-way checking system the order is raised on SAP but it's only when the boys at [the station] acknowledge receipt for payment that it then goes into the SAP inventory system. That's

too ... I need information before then and with more function to tell if something is going wrong. The only time SAP would tell you if something is wrong is when the invoice doesn't match the money stated in the order. There is a hell of a lot more happens than that so I need far more information to be able to plan, tell customers what is happening and fix problems when things go wrong.

(Interviewer) Can you expand on what you do with the faxes and the emails from Firm A?

(Interviewee) Like I say, it's cross-check. The emails are really only there if something goes wrong. I can then work it out. But it is the faxes that really count coz they are raised when things are actually dispatched. The emails are from a different source and more around what was produced. I keep track of all the faxes in the Excel spreadsheet I have set. I need the system to do my work with the accuracy for supplying [product]. I would struggle to function without it. (Commodity Analyst),

In these sampled quotes, 'feral systems' conceptualisations are clear. They reflect a wide range of thinking about how crucial information and communication technology is used. In some cases the functionality of SAP, which it is known for, was argued not to exist. This is more than likely a lack of knowledge on behalf of the person who said it, but it also highlights the lack of conception of the meaning and purpose of the system and the underlying conflict that is evident.

DISCUSSION

The interpretative research principle of the hermeneutic circle, multiple interpretations, contextualisation and abstraction and generalisation (Klien and Myers 1999) were applied in this study and iteration between individual transcripts and how they related to the whole were made throughout the analysis. The now long standing relationships between the researcher and the staff at *Utilcom* and the three month period of working within the utility has made a deep understanding of the interview transcripts possible. This is due to the transcripts being able to be viewed in a holistic manner and the researcher being able to relate them to the corporation's cultural and historical context (Stake 1995).

This study tries to identify the organisational cultural factors and reward systems that drive the employee perceived need to develop feral systems where end users develop their own systems presumably because the SAP system does not provide the information they want. It is our contention that these feral systems are developed due to processual power factors whereby operation staff want control over their own work and work processes. There are indications that operational managers are concerned about the highly financial nature of SAP and the fact that the SAP R/3 software replaced a more operationally useful software package developed by a local software firm, MINCOM. Thus employees developed feral systems to gain back some control. It is also the case that expert and informational power was exerted by the financial managers through their insistence that the SAP R/3 ERP be implemented and that it replace the more operationally effective, MINCOM system. It is this exercise of power that the authors consider to be a major factor in the decision of operational managers to develop feral systems. If the more operationally effective software is being introduced, then employees needed to develop their own systems to help in operational matters.

On the other hand, it could be the case that these feral systems were developed some time ago (before the ERP implementation) and could be classed as legacy systems. Kwasi (2007) suggests that "users of these legacy systems typically have vested interests, valuable experience and know-

how in those systems. Replacing legacy systems means that people have to “relearn” new skills and their unwillingness to do so might lead them to perceive the ERPs as being difficult to use.”

However, the proposition that processual power is a reason for the development of feral Systems is a more likely reason because the vast majority of operational managers considered the previous MINCOM software package to be a very good fit to their work needs. If this is the case at *Utilcom*, it could answer some of the questions asked about the reasons for this phenomenon and could be another reason for the apparent lack of commitment to the ERP implementation by some employees. The acceptance of feral systems would depend on corporate policies with respect to management’s tolerance of such systems. In *Utilcom*, tolerance of feral systems seems to be reasonably high and further research would have to be conducted to see if it applies to other utilities.

The research conducted here indicates that employees at *Utilcom* are aware of the advantages that ERPs provide under ideal conditions with respect to integrated IT resources and better decision making through better access to data. However, in practice these ideal situations do not eventuate, especially under a networked asset rich utility environment. This appears to be due to social and other factors such as a lack of strategic and operational communication, a lack of alignment with other reporting systems, the use of feral systems instead of SAP and a general mistrust of the ERP itself. It is suggested that this could be due to *Utilcom*’s environment where computer literacy levels could be lower in employees who have more secure job tenure and the motivation to make the ERP work is not as great because the organisation does not have an incentive to reduce head counts. In other words the employee’s job is not “on the line” as may be the case in a commercial enterprise.

Other aspects were identified in this study but were too numerous to report in this paper, however a summary of these factors are provided in this paragraph as they relate to employee perceptions of the processes used in the implementation of SAP and to the reasons why these power tensions occurred. The integrity of the data used in SAP and the links to meta-data was discussed and deemed to be problematic by some staff members. Other issues associated with *Utilcom* and of relevance to other ERP implementations, were end user information literacy, poor computer literacy levels and the ways organisations can make people want to engage with the ERP. The apparent lower computer literacy levels could be due to the job security levels associated with the utility. Employee turnover is less in the case study environment and the incentive to re-skill may be less, resulting in a workforce with lower computer literacy levels. This lack of desire to re-skill was evident in the period the author was working at *Utilcom* with managers lamenting about the low number of graduates employed by the corporation. In addition, procurement and invoicing practices differed in the various areas of the state and it became obvious that country based employees had different approaches to procurement because as quoted by one respondent “they have to live in the district and rapid payment to suppliers was a big priority for them”.

We contend that the additional factors reported in the previous paragraph all have some bearing on the reasons why there are power imbalances within *Utilcom* and hence the reason for the development of feral systems. For example the low computer literacy levels can have a direct bearing on perceptions of expert and informational power and can lead to more faith in systems developed by operational managers with limited but still significantly higher computer skills than fellow co-workers.

CONCLUSIONS

This study has uncovered problems with the use of the implemented ERP system within *Utilcom*. Despite a number of relevant modules within SAP, many employees were not aware their existence, in addition, organisational cultural and social aspects such as inconsistent procurement policies makes the effective use of the ERP very difficult. Some of these problems were related directly to *Utilcom*, while others were more generic in nature.

The authors believe that *Utilcom* employees have developed feral systems because of the power relations between operational managers and financial managers and that these power relationships work both in a top down manner (expert, informational and coercive power) and in a bottom up manner (processual power). These power relationships need to be investigated at a much deeper level as they indicate a real and possibly universal concern with respect to ERP implementations across a wide range of industries.

This study identified many aspects associated with the ERP implementation and many have not been reported in this paper, however we suggest that they have underlying causal connections to the reasons why there are power imbalances at *Utilcom*. The only way a firm connection between these factors and the power imbalances can be determined is through a whole of system approach to the research problem, however under the present guidelines to publishing in information systems literature this is deemed to be too ambitious a project. Perhaps the information systems discipline needs to consider ways of reporting research projects that have a more holistic view of business problems.

REFERENCES

- Boonstra A. and de Vries J. (2005) Analyzing inter-organizational systems from a power and interest perspective, *International Journal of Information Management* 25 485–501
- Heizer, J., & Render, B. (2003). *Operations management—International edition* (7th ed). Upper Saddle River, NJ: Pearson Education Inc.
- Houghton L and Kerr D.V. (2006) A study into the creation of feral information systems as a response to an ERP implementation within the supply chain of a large government-owned corporation *Int. J. Internet and Enterprise Management, Vol. 4, No. 2*, pp 137-142.
- Houghton L, Kerr D.V. and Burgess K (2004) SAP - is it systematic research bias, which is to blame for such post implementation disappointment? 15th Australian Conference on Information Systems, Hobart, Tasmania, (1-3 December 2004)
- Klein H. K. and Myers M.D. (1999) A set of principles for conducting and evaluating interpretive field studies in information systems, *MIS Quarterly* Vol 23 (1) pp 67-94.
- Kreie, J., Cronan T.P., Pendley J. and Renwick J.S. (2000) Applications development by end-users: can quality be improved? *Decision Support Systems* 29 pages 143–152
- Kwasi A.G (2007) Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation *Computers in Human Behavior* Vol 23 pp.1232–1248
- McGill T. J. and Klobas J.E. (2005) The role of spreadsheet knowledge in user-developed application success *Decision Support Systems* 39 pages 355– 369.

- Nandhakumar J, Rossi M. and Talvinen J (2005) The dynamics of contextual forces of ERP implementation *Journal of Strategic Information Systems* 14 pages 221-242
- Nuemann L (2003) *Social Research Methods*, 5th Edition, Allyn-Bacon/Pearson, USA.
- SAP (2006) SAP Forecasting and Replenishment (2006)
http://www.sap.com/industries/retail/pdf/BWP_forecasting.pdf accessed February 6 2006.
- Stake, R. (1995). *The art of case research*. Thousand Oaks, CA: Sage Publications.
- Umble E.J., Haft R.R. and Umblene M.M. (2003) Enterprise resource planning: Implementation procedures and critical success factors, *European Journal of Operational Research* 146 pp 241–257.
- Waddell D, Devine J., Jones G. R. and George J. M. (2007) *Contemporary Management*, McGraw-Hill Irwin, Australia
- Walsham G., (1993) *Interpreting Information Systems in Organizations*, John Wiley, Chichester.
- Yin R. K. (1994) *Case Study Research: Design and Methods* Sage Publications London.

APPENDIX - MAJOR QUESTIONS FOR STAGE 2 OF THE RESEARCH

1. What does your job entail?
 - a. Roles
 - b. Responsibilities
 - c. Is your job understood by others?
2. If you had a magic wand, what would you do to make your job better?
 - a. Better for whom?
 - i. Customers
 - ii. Yourself
 - iii. Others
3. What information could be provided to help you with your work?
4. What information is provided already that helps you with your work?
5. What would you need to help you make better decisions?
6. Of all the suggestions you have given, what are the most important?