A Two-Tier Adaptive Approach to Securing Successful ERP Implementation

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STATEMENT OF ORIGINALITY

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, this dissertation contains no material previously published or written by another person except when due reference is made in the dissertation itself.

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17 Apr 2007

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ABSTRACT

In recent years, a significant volume of industrial and academic research has been directed towards understanding the evolution and development of ERP systems and their associated applications. However, the associated technological and social changes are significant, and although many corporations have successfully implemented ERP, there have also been many reported cases of failed implementation. This has led several researchers to examine in detail the causes of these failures, in an effort to identify critical success factors associated with successful implementation.

This dissertation reports on an action research study that arose from an initiative designed to improve the likelihood of success when implementing a particular UK-developed ERP system in China, namely 'System 21' from JBA International. The project in which this research is embedded was a joint venture between JBA and a leading US beverage company, Pepsi Cola.

The dissertation initially focuses on the analysis of underlying reasons for pilot project failures in this joint venture. This draws upon qualitative data from managers, consultants and other stakeholders involved in the ERP implementation at three geographically dispersed sites. The research then turns to an examination of ERP implementation methodology in the context of joint venture collaboration and associated issues such as change management and business process (re)engineering. This is grounded in a literature review of several approaches adopted by the major ERP solution providers.

The literature review phase is followed by the design and distribution of a detailed questionnaire aimed at identifying, and subsequently addressing, the concerns of various customer stakeholders in a number of Hong Kong based businesses spanning a range of industrial sectors. Its aim was to secure the necessary improvements in methodology required to underpin the successful implementation in future Pepsi Joint Venture projects in China. Ultimately, this led to a set of recommendations in the form of a strategic framework for implementing ERP systems in China.

In summary, a key deliverable arising from the research was the production of a business model for the achievement of success when implementing joint venture ERP systems in China. A second related deliverable is the improvement of the generic implementation methodology currently available to customers of 'System 21'. This has been achieved by developing a framework evolved from an adaptive approach to the implementation of ERP systems. To a great extent, the findings and recommendations are also applicable to other multinational companies who are operating in China and keen on implementing ERP systems within this particular setting, with its associated cultural and other restrictions.

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Glossary

AMR	AMR Research
BU	Business Unit
BW	Business Warehousing
CBU	China Business Unit
CRM	Customer Relationship Management
CSFs	Critical Success Factors
EC	Electronic Commerce
EPM	Enterprise Performance Management
ERP	Enterprise Resource Planning
ERM	Enterprise Resource Management
HCM	Human Capital Management
IDC	International Data Corporation
KPI	Key Performance Index
IS	Information Systems
IT	Information Technology
MRP	Material Requirement Planning
MRPII	Manufacturing Resource Planning
P&L	Profit and Loss
QA	Quality Assurance
SCM	Supply Chain Management
SIP	Structured Implementation Program
SSA	System Software Associate
SFA	Sales Force Automation

1. INTRODUCTION

Over the last decade, a significant volume of industrial research work has been conducted describing the evolution and development of ERP systems. Based upon a general assumption that enterprise software provides a highly effective 'back-office' application for supporting 'front-office' business operations, more and more new functionality has been incorporated. Hence applications such as customer relationship management (CRM), sales force automation (SFA) and electronic commerce (EC) have helped to make ERP a comprehensive survival tool for doing business in the current climate.

Success in moving from monolithic inventory and financial applications to full-suite ERP systems was a direct result of the general acceptance of initiatives aimed at improving efficiency by integrating various diverse sub-systems into a holistic, closed loop application. Rapid change in technology has also impacted the use of enterprise systems in many large corporations and even medium-sized companies looking for improved efficiency and reduced operational costs.

The emergence of Internet computing and electronic commerce has also brought these enterprise systems to a new horizon where they are seen to provide a key strategic competitive edge. However, although many corporations have successfully implemented their ERP systems, there have also been several reported failures of implementation. Consequently, many researchers have started to look critically into these failures in order to find out what to avoid, but also to identify the critical success factors (CSFs) for implementation of ERP systems.

Competition is fierce in the ERP market and ERP vendors are forced to differentiate their products, for example, in terms of functionality and focus on specific vertical markets. Some ERP vendors like JBA International came to develop their products for niche markets such as the Automotive, Style and Drinks industries, while others have focused on more generic applications. However, functionality is not really a significant consideration, given that any particular application, e.g. Sales Ledger, in

two ERP packages should have broadly similar functions. The real issue is rather a matter of how we should customise the business processes and the implementation programmes to suit a particular requirement. The problem stems from difficulties experienced in the adaptation of the supplied implementation methodology, since this is not readily modifiable. Hence the implementation of ERP systems appears to be cumbersome and, in most cases, takes more effort to complete, than is expected or acceptable. This is mainly due to the fact that ERP consultants are reluctant to change the way in which they are trained to perform implementations, while at the same time companies, in general, have difficulty in fully accommodating the arrangements thereby imposed.

Founded in the early 1980s, JBA International, with its head office based in Birmingham UK, started its core business in the design, development and support of its ERP package – System 21 (formerly called Business/400). This was aimed at midsize companies involved in the manufacture, supply and service of industrial and domestic goods. In the early 1990s JBA had more than one and a half thousand consultants dedicated to providing its customers all over the world with implementation support and consulting services. Prior to its acquisition by Geac Computers in 1999, the largest software supplier in Canada, JBA International had already sold its software package to a total of 4,400 customers across 50 countries in Europe, Asia Pacific and the Americas. In 1999, JBA employed 3,100 people world-wide, working out of 46 offices around the world.

The System 21 package consists of hundreds of integrated commercial applications for a number of key modules including Financial, Customer Services and Manufacturing. By the mid 1990s, the package itself had evolved into two major variants, namely 'Style' and 'Drinks'. These products support the Garment and Beverage industries respectively. Both variants were ranked top in their respective areas in terms of functionality for mid-range computers.

Alongside System 21, JBA International originally developed a tailored implementation methodology, known as the Structured Implementation Program or

simply SIP. More recently, this has been replaced by a more sophisticated methodology called JBA Advantage. This new methodology is more scalable, although to a certain extent, it is also quite cumbersome. Some implementation consultants from within Hong Kong started moving across to adopt JBA Advantage shortly after SIP had proved to be a failure for Pepsi Cola. However, experience with JBA Advantage suggested that it still could not guarantee total success. Nor was it reliable enough for effective implementation. Pepsi Cola in China was a customer of JBA International.

The fundamental objective of initially undertaking this research was, therefore, to improve the chance of success for subsequent implementations using JBA Advantage in China and subsequently to identify a generic framework for securing the success of ERP implementations more generally in this complex business domain. The research first reviewed the academic literatures on ERP critical success factors and other prominent implementation issues. It also reviewed the reasons behind implementation failures, focusing in particular on JBA-led implementation projects and business-led projects in other prestigious corporations such as Chubb Security in Hong Kong. Chubb Security was the world's leading security provider also based in the UK with a yearly turnover of $3 billion in 2003. For the sake of validating the problem solving process at Pepsi Cola in relation to the implementation issues, Chubb Security in Hong Kong was explicitly referenced, since the company was also implementing an ERP package. The author initially worked at JBA International and moved to Chubb Security at the later stage of research. It also elaborates on comments from other companies who have been prepared and able to share their ERP experience. This allows comparison of JBA Advantage with other implementation methodologies available from major rival ERP vendors.

In short, the research question asks whether JBA Advantage and similar systems can be made more effective by incorporating further changes and additional components. To address this issue, the research methodology chosen was Action Research, whereby joint effort was deployed in resolving the implementation issues as faced by

Pepsi and JBA. The aim is to explore the extent to which their experience could be realised and transformed into a generic approach for implementing ERP systems. Action Research was clearly favoured amongst the contending options. Whilst case studies can be used for solving management problems, they do not necessarily involve joint effort and/or mutual agreement and control. Longitudinal or ethnographic research methods are also inapplicable to this particular aspect of management research, as their objectives are rather conceptual and predictive respectively. Nor is the approach of a true or classical experiment, which enables the researcher to test theories and hypotheses systematically under laboratory conditions, deemed to be suitable. Since the evaluation of ERP implementation is rooted in real-life problems in a management context, the undertaking of joint diagnosis and a collaborative action plan is critical to solving such problems. This is exactly what action research deals with, which explains why it was adopted as a primary research methodology for the research.

Rapoport (1970) defines the aims of action research as 'contributing both to the practical concern of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable, ethical framework'. Similar definitions are given by Lau (1997), Hult & Lennung (1978) and Susman and Evered (1978). Specific applications of action research have also been elaborated and documented by Lau, (1999), and by Baskerville and Wood-Harper, (1996). In action research, the client or researcher initially presents a problem and both parties then undertake joint diagnosis and production of an action plan (Gill 1982). Mutual control is maintained throughout. This contrasts with 'Pure' research, in which the researcher presents a problem, defines goals, carries out expert diagnosis and reports back to the client on what has been learned.

Action research can also be described as a process of a cyclical and iterative nature, encapsulating a learning spiral. Diagnosis of a problematic situation comes as an initial stage of the learning spiral, followed by a development plan that precedes the actual intervention. This then leads to the evaluation of consequences of the action, which in turn triggers a period of reflection leading to a final process of internalised

or externalised learning. The process is repetitive and continues until a suitable exit point is attained.

In the case of Pepsi, Action Research was deemed to be a good fit for this research, which is aimed at exploring and making public the reasons behind its initial project failure in China, thereby cultivating, as a result, a framework whereby successful ERP implementation can be secured. Evaluation of action is also crucial, as implementation would extend into other facility locations. This leads to reflection and learning from the failure of initial projects, as a result of which, similar problems in subsequent projects can be avoided or tackled in a more efficient manner.

Based on the research findings, a thorough analysis and discussion is presented, focusing on methods for improving the implementation process through its various stages including managing customer expectation, improving the communication mechanisms, choosing the right partners, consideration and application of selective outsourcing, adoption of integrating technology and processes, cultivation of organisational change and assurance of overall implementation quality.

To conclude this research, a framework embracing a business model was developed, in association with JBA Advantage, which aimed to reduce the risk of failure and hence secure the chance of achieving success when implementing ERP systems in China.

2. RESEARCH METHODOLOGY

Amongst the various contending options available for answering the central research question, as defined above, Participative Action Research emerged as the favoured choice, through a process of elimination. Pure case studies were one of the options considered as these can prove useful for solving particular management problems. However, they do not necessarily involve joint effort and/or mutual agreement and control. Longitudinal or ethnographic research methods were also considered but these were also considered to be inapplicable to this particular situation as their objectives are rather more conceptual and predictive respectively, that was required here. Nor was the classical experiment, which enables the researcher to test theories and hypotheses systematically under laboratory conditions, deemed to be suitable.

It was therefore concluded that since the evaluation of ERP implementation is rooted in real-life problems in a management context, the situation demanded joint diagnosis and a collaborative action plan. This is considered critical to solving such problems. However, this is exactly the domain that action research deals with. For this reason it was adopted as the overarching methodology for this research programme.

2.1. Action Research Principles

Rapoport (1970) defines the aims of action research as 'contributing both to the practical concern of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable, ethical framework'. Similar definitions are given by Lau (1997), Hult & Lennung (1978) and Susman and Evered (1978). Specific applications of action research have also been elaborated and documented by Lau, (1999), and by Baskerville and Wood-Harper, (1996). In action research, the client or researcher initially presents a problem and both parties then undertake joint diagnosis and production of an action plan (Gill 1982). Mutual control is maintained throughout. This contrasts with 'Pure' research, in which the researcher presents a problem, defines goals, carries out expert diagnosis and reports back to the client on what has been learned.

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In the case of Pepsi, Action Research was deemed to be a good fit since it offers the opportunity to explore and make public the reasons behind its initial project failure in China. Another key output following the cultivation of observations in the research is the production of a validated framework whereby successful ERP implementation can be secured. Evaluation of action is also crucial, as implementation would extend into other facility locations. This leads to reflection and learning from the failure of initial projects, as a result of which, similar problems in subsequent projects can be avoided or tackled in a more effective manner.

2.2. Action Research at Pepsi

Obviously, classical experiments, where researchers are able to manipulate the incidence of one or more independent variables and observe any consequent changes in the dependent variables were impractical in this situation. Since the Pepsi Cola company was at the centre of the research and its senior business executives had decided to solve the implementation problems for themselves in collaboration with JBA International. For the reasons discussed above, Action Research was adopted as a valuable variant of the quasi-experiment.

As Lau (1997) explains, in participatory action research participants solve problems for themselves by setting their own research agenda, collecting and analysing the data and controlling overuse of the findings. In the research, reported here, core members of the implementation project team and consultants from JBA International were heavily involved in conducting the research within a setting to which the research

findings are directly applicable. Observation was therefore important to understanding what went wrong with the operations and what should be improved.

The research schedule, as depicted in Figure 2.1, comprised three main phases of action research. The first of these has been titled Problem Identification and Theory Exploration. Following some preliminary observations including the identification of problems outstanding and the fundamental research question as outlined above (broadly categorised as diagnosis) the research moves to an extensive review of the literature. This focuses on ERP development and its relevant subject areas, such as the critical success factors for ERP implementation, change management and business process (re)engineering. This phase also involved observations and meetings with consultants from other ERP suppliers who provided another major source of data.

Following evaluation of the concepts revealed in phase 1 and reflection upon their consequences for this research, the second cycle of investigation was initiated. This took the form of a series of three linked case studies based on interviews with the BU project managers. The research examined the likely reasons underpinning the project failures that had been experienced at the pilot site of Pepsi Cola in China.

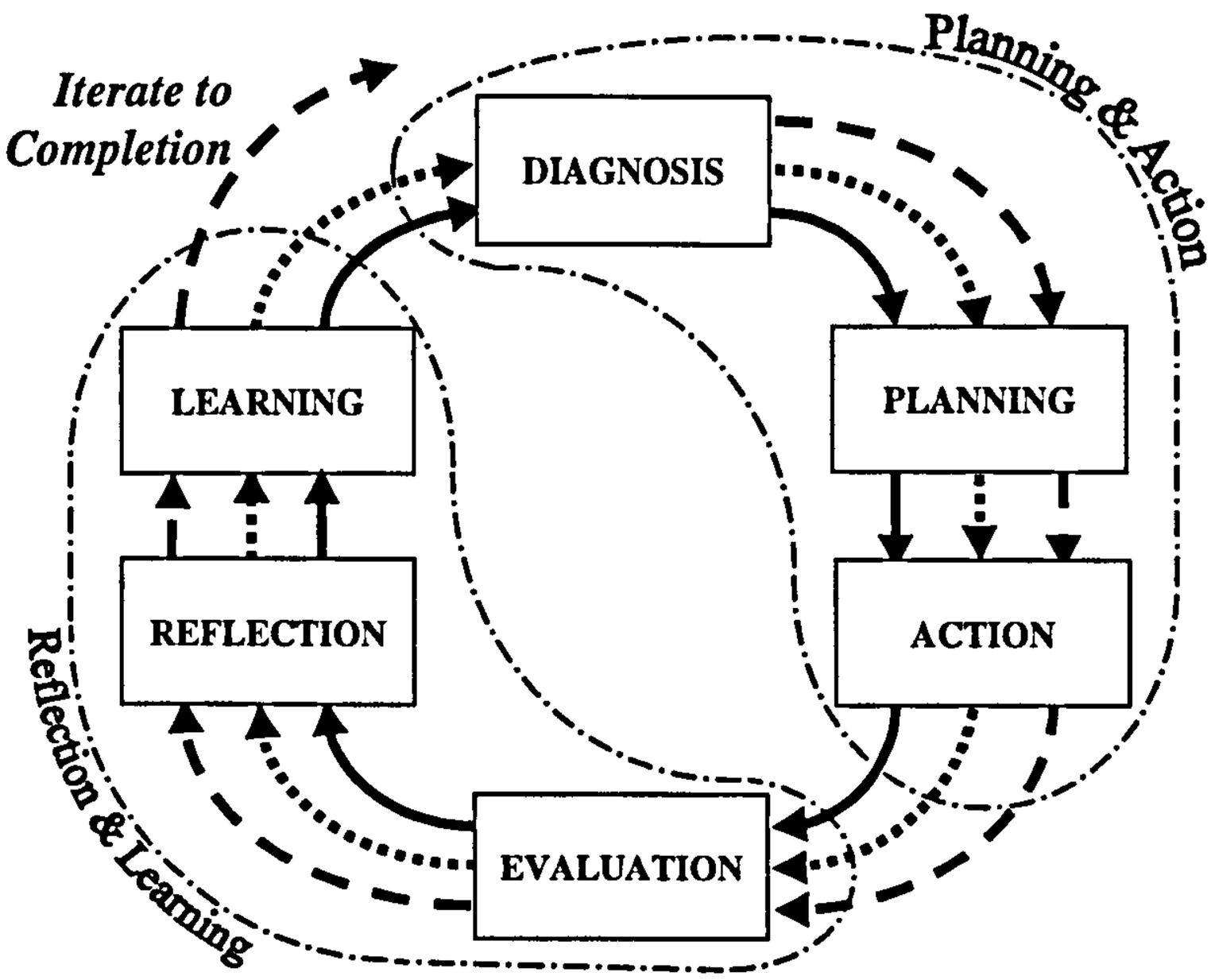


Figure 2.1 Action Research Cycle at Pepsi

Experiences from the first two cycles around the Action Research spiral were then used to formulate a questionnaire which was then deployed in a wider survey of potential stakeholders (Phase 3). This was then used for the purposes of validating the interview comments leading to the postulation of a revised framework for the implementation of System 21. The changes primarily dealt with managing customer expectation, incorporating the use of prototyping and simulation, and integrating BPR to facilitate organisational readiness for the ERP implementation.

The overall schedule of the work for Pepsi is depicted in the form of a project management bar chart in Figure 2.2.

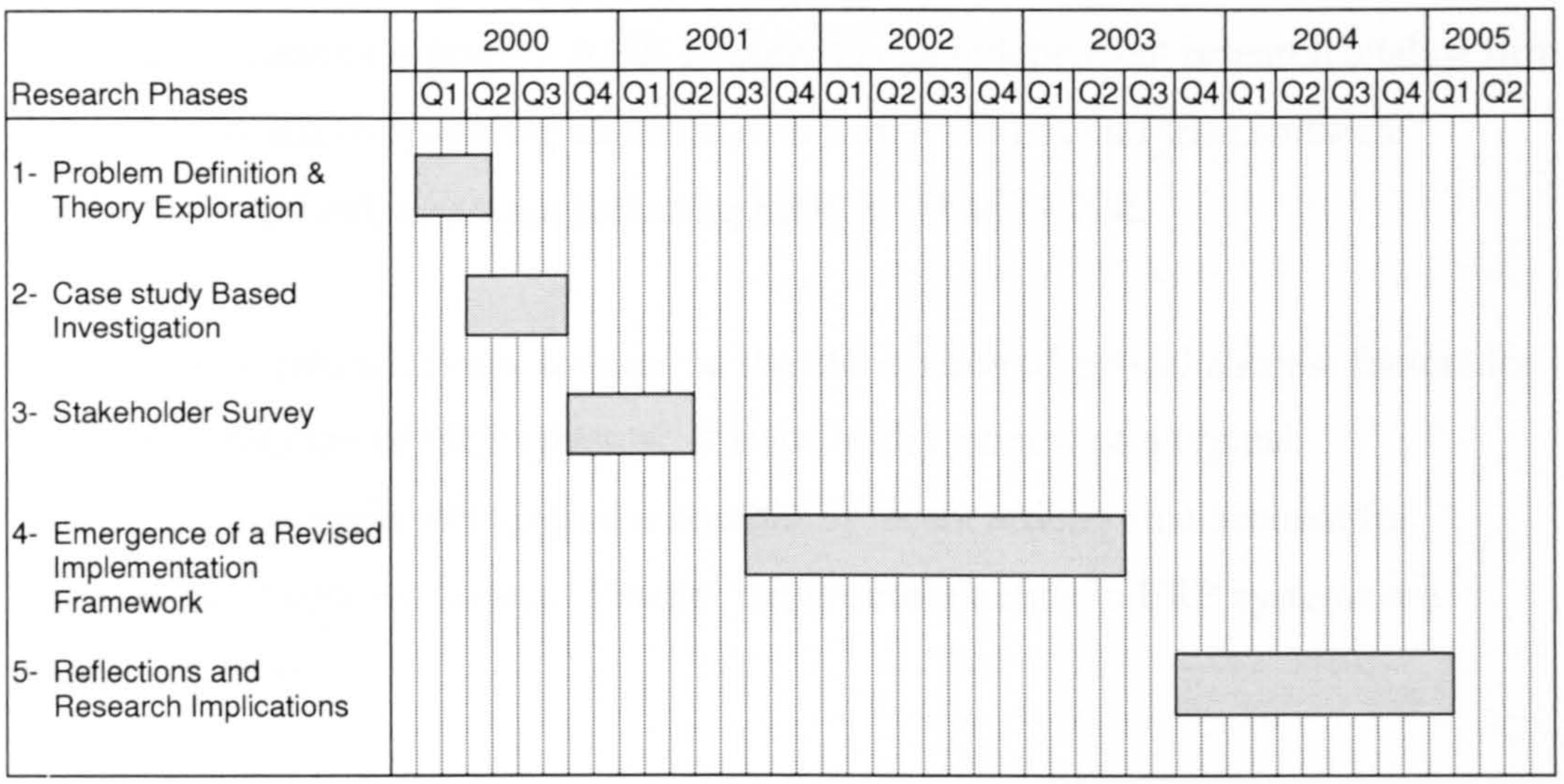


Figure 2.2 Schedule of Action Research Programme

To conclude the action research, the model or framework as proposed was implemented and validated against the expected effectiveness. This led to a final stage of overall reflection on the implications of the research for the companies involved and for the wider research community.

3. LITERATURE REVIEW

This chapter gives a brief understanding of what ERP actually stands for, including a review of the history of ERP. The functionality of a typical ERP system is elaborated. The general benefits and pitfalls are explained. It also identifies who the market leaders are and where their respective markets reside. With reference to the IDC Asia Pacific and AMR Research, ERP's growth and development through to 2003 is explained.

To recap, International Data Corporation (IDC) is among the global market intelligence and advisory firms competing in the information technology and telecommunications industry. AMR Research is an independent research analyst firm that is committed to providing unbiased, frank analysis of enterprise software applications and infrastructure including ERP, SCM and CRM.

Most of the literature review focuses on the elaboration of critical success factors for the implementation of ERP systems. It starts with a review of a typical implementation cycle, drawing on a number of recent articles that account for acknowledged success factors. Finally, likely future trends in ERP systems are elaborated upon.

3.1. Overview and Definition of ERP

Evolving in the manufacturing industry, Enterprise Resource Planning (ERP) was first introduced by the Gartner Group in the early 1990s, as an extended version of the well-established Manufacturing Resource Planning (MRPII) technologies. The original ERP systems ran on mainframes and IBM AS/400 systems, and included mainframe products such as SAP R/2 and MAPICS from SAP AG and Mapics Inc. respectively. Other AS/400 based packages included 'Systems Software Associates' BPCS and 'JD Edwards's One World'. Since then, enterprise applications have evolved dramatically, becoming survival tools for companies needing to improve operational efficiency. Increasing competitive pressures induced by globalisation,

technical advances in IT and communications, and internal pressures arising from business process reengineering have forced many organisations to invest heavily in ERP systems.

The evolution of ERP is based upon pressure to introduce aggressive cost control initiatives, including a need to analyse costs and revenues on a product or customer basis, flexibility to respond to changing business requirements, more informed management decision making, and changes in ways of doing business.

A typical ERP system is functionally rich, including a complete set of activity support such as accounts receivable and payable, sales order processing, sales analysis, transport planning, inventory control and warehousing, production planning and control, EDI, human resource management and customer relationship management. More recently, ERP systems have come to offer a wide variety of new capabilities such as supply chain management, workflow management, product data management and electronic commerce. However, no matter how hard ERP vendors work on improving their software, none of the ERP systems is perfect and there are always some limitations from a user perspective in regard to functionality and application. Also, from a business point of view, ERP systems only become really worthwhile when they prove capable of achieving the target benefits enumerated above.

3.2. The Evolution of Enterprise Application Systems

The history of Enterprise Resource Planning (ERP) can be traced back to the 1960s with its inception as an inventory control system basically combining information technology and business processes for maintaining the appropriate level of stock in the warehouse. Since then, it went through two more evolutionary stages (i.e., MRP and MRPII) before it was strategically expanded and finally positioned as an enterprise solution that is today, commonly called, ERP.

Evolving directly from an inventory system in 1970s, MRP utilises software application for scheduling production processes. It generates schedules for raw

material purchases and the operations based upon the production requirements of finished goods, the bill of materials and the current inventories levels. Taking a simple functional view, it is defined as an application which calculates what materials were needed, when they were needed and in what optimal quantities (Ptak and Schragenheim, 2000). In a more specific view, MRP was originally designed for coordinating manufacturing processes from product planning, parts purchasing, inventory control to product distribution. With regard to business functions, MRP encompassed master scheduling, rough cut capacity planning, detailed capacity planning and shop floor control.

Entering the 1980s, MRP continued to evolve and was further expanded to include a financial interface, sales and operations planning, and simulation as part of the system (Wallace and Kremzar, 2001). However, it was still a stand-alone application system.

With a business need to further optimise the entire plant production process and improve the profitability and customer satisfaction, MRPII was extended to embrace new functions such as finance, forecasting, sales order processing, sales analysis and reporting and monitoring tools. In the 1990s, ERP appeared, as a result of integrating other business activities across functional departments, from product planning, parts purchasing, inventory, product distribution, and fulfilment to order tracking. A typical ERP system now includes accounting and controlling functions (with report generator), sales and distribution, materials and production management, quality management, plant maintenance, human resources and project management. Recently, many ERP systems also integrate with SCM and CRM functions.

3.2.1. A different Evolution Path for ERP Implementation in China

While the ERP evolution in western countries is generally considered as a natural development, ERP development in China took another path. Research and development of ERP started in 1988 and went through three stages: accounting software, financial software and ERP ("ERP Application Guide", 2002). The

accounting software included accounting management reporting payment calculation, asset calculation, material calculation and sales calculation.

Notably, in China, the enactment of the China Financial Software Data Interface Standard by the China Financial Software Association enhanced and encouraged the development of Chinese financial software (Xue et al., 2004). In other words, the Chinese government fostered the first two stages of the development as many companies implemented accounting software or financial software in response to the government's advocacy. Hence starting in the mid 1990s, accounting software development shifted its strategic focus to financial software development which could better support business decision making. New functions included financial analysis, financial prediction, financial control and planning were included, in addition to inventory management.

Toward the millennium, the China software industry started to reposition its financial software development which expanded to cover production, supply chain, human resources and customer service functions. This gave birth to ERP which again covered the cross-functional coordination and integration in support of the production process.

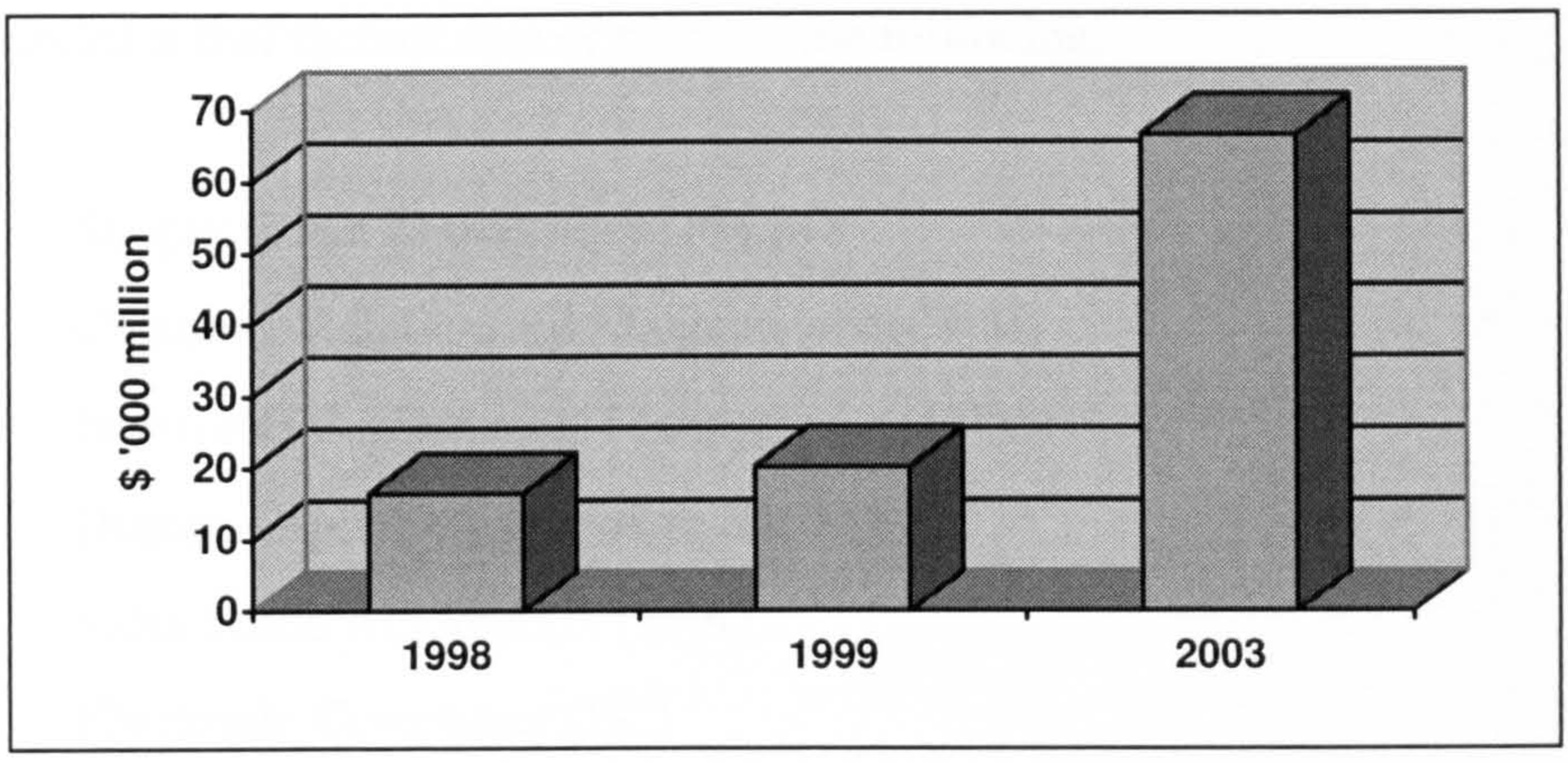
3.3. Recent Developments in The Evolution of ERP Systems

The ERP market, including services, has grown rapidly in recent years and is predicted to increase from $20 million in 2001 to $31 million in 2006, according to AMR Research Inc. - a Boston-based consulting firm (Konicki, 2002). Earlier AMR Research predicted, as shown in Figure 3- 1, that ERP growth in the Asia Pacific market, including professional services, would reach $20.2 billion and $66.6 billion in 1999 and 2003 respectively. At that time the compound growth rate was believed to be 32%.

Strategic use of enterprise systems for automating back-office operations was generally the priority in 1999. An estimated 70% of Fortune 1000 companies have

either begun implementing ERP systems or plan to do so in the coming years. According to AMR Research, the spending for 1999 on enterprise application accounted for some 40% of the total corporate budget in both large and medium-sized companies, whereas only 10% to 20% was spent on supply chain management and about 18% on manufacturing software.

Figure 3.1 ERP Growth in Asia Pacific



Source: AMR Research (1998)

However, due to the influx of other forms of enterprise software such as CRM, SCM and ERM, and the prevailing world-wide economic turmoil, ERP market growth proved to be difficult and slower than expected. While ERP spending made up 47% of the entire enterprise software market in 2001, it was expected to shrink to 27% by 2006. However, a steady growth can still be seen (Konicki, 2002).

Within the overall market for ERP, considerable segmentation is also apparent. With 32% of the market share, SAP AG, in reporting annual revenue of $5,011 million, ranked as the top market leader in ERP systems in 1999. Other market leaders included Oracle Corp., PeopleSoft Inc., JD Edwards & Co. and Baan Co. N.V. Together with JBA International, these constituted another 33.6% of the total market share.

In 2002, SAP AG accounted for 25.1% of software license revenue, while Oracle Corp. and PeopleSoft Inc. made up 7.0% and 6.5% respectively (Pettey, 2003). In

May 2001, AMR Research predicted that total ERP company revenues would grow at 14 percent compound annual growth rate, improving to $36 billion in 2005 (Romeo, 2001). IDC Asia-Pacific also reported that the Asia Pacific ERP market grew by about 27% in value and was worth $685 million in 1999 and a forecasted $860 million in 2000, with China being one of the three hottest countries with around 22% growth rate each year.

In recent years, ERP vendors such as SAP and Oracle have been keen on integrating new capabilities that include one or more of the following:

- Supply Chain Management (SCM)
- Customer Relationship Management (CRM)
- Enterprise Performance Management (EPM)
- Human Capital Management (HCM)
- Sales Force Automation (SFA)
- Electronic Commerce (EC)
- Business Information Warehousing (BW)

As well as integrating the enterprise functions above, ERP systems have also extended further into third party software integration to help process information more efficiently using especially advanced graphical interfaces. Investment in Web-enabled ERP systems is therefore another, and probably the most recent development program of the major ERP vendors. For example, PeopleSoft has entirely rewritten its applications for the Internet and SAP has developed its XML technology to facilitate cross-application integration and Web-based data exchange. Most recently, SAP has also announced plans to release an updated version of its e-commerce applications (Gilbert, 2003).

3.4. Major ERP Vendors and Their Challenges

In addition to the major suppliers identified earlier, there are also several smaller ERP vendors who compete with one another in certain specific market segments. Hence,

due to strong competition, no two ERP vendors are evolving in exactly the same way. Consequently they continuously attempt to differentiate their products by, for example, introducing more generic functions and features or focusing on selected vertical markets.

It is well known that all ERP systems offer a wide variety of capabilities that are highly integrated to provide closed loop solutions to business support. However, each major supplier of ERP has entered the industry with its own particular strategy. For example, Oracle specialised in relational database management systems before moving into ERP, while SAP originally appeared with a sophisticated product in manufacturing automation, prior to developing into full ERP. PeopleSoft has been consistently seen as a market leader in providing human resources applications as a major part of its ERP system. This implies that no single ERP system can optimally fit all requirements. For example, GM selected SAP as its world-wide supplier of accounting functionality and PeopleSoft for its human resources functions. However, this presents another substantial challenge for most ERP vendors if and when they are called on to integrate their products with other vendors' ERP systems (a point that is followed up later).

In addition to pursuing distinctive competency, ERP vendors are also differentiated in terms of flexibility. Krasner (1999) contends that the Oracle ERP product is among the most flexible while SAP is among the least flexible. Hence differentiation of products has again emerged as a strategic imperative. For example, JBA International focuses on developing new functionality and marketing programmes for the apparel industry. Its 'Style' product has been ranked top amongst others in the mid-market segment, according to AMR Research in 1997.

Following continual decline in ERP sales in the late 1990s, SAP, Oracle Corp, PeopleSoft, JBA International and other major ERP vendors have all moved into front office operation, by targeting newer applications such as customer relationship management and e-commerce. In particular, e-commerce is among the hottest development projects for larger ERP vendors.

Time based competition is also an important potential strategy in today's business world, as there is always an urgent need for faster implementation of ERP systems. Under virtually no circumstance can companies afford the luxury of taking a few years to implement technology solutions. Fastart implementations, considered by many to be an essential component of competitive advantage (Gibson *et al.*, 1999), are required for companies of any size and nature. From a vendor's standpoint, lengthy implementation leaves a 'window of opportunity' for other competitors to take over valuable market share.

From a customer's perspective, risk is a further potential strategic parameter associated with purchased software. Many of the risks relate to the vendor's stability, and the impact of mergers, acquisitions and poor performance. Organisational issues such as software modifications, training requirements, budgeting considerations and conformance with installation standards can also raise significant risk factors.

Other challenges associated with implementing ERP systems are diverse and complex, depending upon the particular situation but generally reflecting issues such as the size of the user population and the functions, features, and degree of customisation required. More specifically, these include the following:

- Functional complexity, which comes from deployment of a huge number of modules and the inclusion of front-office applications in a 'big bang' approach. In general, front-office applications such as 'Cognos PowerPlay' and mobile data capture tools are third party software that require some sort of interfacing and exhaustive levels of testing before they can be secured in place with confidence.
- Managing people: this is particularly difficult when individuals with different expectations are involved in the implementation.
- Multiple sites across multiple countries: this is fairly common in ERP implementations. More people are involved and more technical and cultural problems are likely to arise. Hence, appropriate infrastructure often needs to be put in place to help drive the project forward to success.

- Over-customisation: many companies underestimate the downstream impacts of this. If there is a lot of customisation work, upgrading the software becomes costly and even risky. For example, synchronisation of standard and custom programs presents one such risk.

3.5. Particular Issues with implementing ERP systems in China

With a particular reference to implementing ERP systems for joint ventures in China, there are many challenges facing any ERP vendor. These arise from differences in basic infrastructure conditions, labour availability and quality of life considerations, government policy flexibility, economic law and the associated legal system, market potential and supportive service facilities. All of these have significant impacts on joint venture development in China (Yang & Lee, 2002).

Chinese and Western behavioural differences in the areas of communication practices, initiative taking, respect for authority and treatment of information also represent major hurdles to the ERP implementation (O'Keefe and O'Keefe, 1997). These factors are elaborated on, in sequence as follows.

With regard to communication practices, the Chinese tend to be passive and polite. However, the communication process can then become very one-way and occasionally, Westerners may become upset when they realise that they have been misled by a false sense of progress. Conversely, in many cases, Westerners, although seeing themselves as effective communicators, 'straight dealers' and quick to the point, may appear to the Chinese, in the context of work and performance issues, as offensive and abrasive in their directness.

On initiative taking, Chinese tend to be negative. They believe that it is better to live with the known status quo, rather than initiate a new and possibly disconcerting situation. While they view themselves as actively maintaining harmony and peace, Westerners may see them as being inattentive and disposed towards the avoidance of

responsibility. Furthermore, they often view the Chinese as behaving in a reactive manner: failing to think ahead in order to anticipate, and thereby avoid, problems. When dealing with authority figures, the Chinese generally fulfil their obligations to authority by being obedient. They see themselves as following the correct protocol and demonstrating the correct behaviour in ways that have been clearly proscribed by Confucian principles. Westerners, on the other hand, see their Chinese co-workers as being over-dependent on authority figures and unable to function as individuals. Moreover, they can sometimes become frustrated when they realise that they themselves are seen as the ultimate authority on a particular issue.

With respect to the treatment of information, Westerners typically accept information as input to the decision-making process and seek to verify its validity independently before applying it. Conversely, the Chinese tend to accept information uncritically, even if it is invalid. As a result, the Chinese are sometimes viewed as making poor decisions, especially in 'soft' areas such as marketing.

Motivating employees also presents some particular challenges in China, since the cultural values are different from those of Western countries (Jackson & Bak, 1998). Child (1994) believes that the way Chinese enterprises motivate employees can be understood within Katz and Kahn's (1978) model comprising 'rule enforcement', 'external rewards' and 'internalised motivation'.

The cultural dimension is therefore deemed to be critical and has a significant impact to the ERP implementation given China and the western countries are in much difference regarding the ways they do things. This critical issue will be further discussed in the Case Study chapter.

Rule enforcement includes responsibility, goal setting and appraisal, pressure, punishment and praise. External rewards refer to money, bonuses and welfare packages. Internalised motivation consists of identification with the company, training, setting a good example and participation in staff outings. Hence, Jackson and Bak (1998) argue that organisational rules and procedures should be well documented and communicated in order to reduce risk and ambiguity. Informing

employees of expected rules of conduct and structural reward systems should also be deployed in a way that promotes loyalty and inculcates belongingness whilst simultaneously reflecting the role of seniority.

Furthermore, a strong corporate identify should be fostered by the development of effective induction programmes which draw the new employee closer to the company. Subsequent training programmes should also reflect the way things are done in the organisation. Finally, it is particularly important to provide employees in China with personal development programmes that help them to develop specific attributes such as soft skills and a sense of integrity.

Implementing ERP systems always requires a good level of communication among groups of participants and a high degree of proactiveness, while most of the native Chinese labour market in the mid-level working class still do not have these kinds of skills.

3.6. Benefits and Pitfalls of ERP Systems

It is often claimed that ERP is a 'must-have' solution within organisations, especially where there is a dominant trend towards adopting a 'buy, not build' philosophy. Among the greatest value that vendors proclaim is the integration of individual applications across the enterprise. Obviously, implementing ERP was considered particularly promising for addressing the year 2000 issue in the late 1990s, and this transpired to be a very lucrative market at that time for ERP vendors. ERP promised reduced maintenance costs underpinning radical change to business models, but many have subsequently been less favourably impressed with their new systems than they might have hoped (Appleton, 1997).

As ERP systems have continued to evolve and expand, mirroring intensified business demands, it has become evident that there are many more areas in which ERP can positively contribute, due to its capability to:

- Facilitate company-wide, integrated information systems covering all functional areas,
- Perform core corporate activities and increase customer service, thereby augmenting the corporate image,
- Help close the information gap across the organisation,
- Provide solutions for better project management,
- Enable automatic introduction of the latest technologies,
- Eliminate many business problems such as poor stock control (inaccurate stock levels) and duplication of customer records,
- Address current business requirements whilst simultaneously providing an opportunity to continually improve and refine business processes,
- Provide business intelligence tools such as decision support systems, executive information system, and data mining to enable better decision-making.

Although ERP's emphasis has traditionally been on transaction handling, it has also been suggested that a major potential strength of enterprise systems is their ability to support individual and multi-participant decision-making (Holsapple and Sena, 1999). For example, Holsapple and Whinston (1996) identify some potential decision support benefits, as outlined below:

- Extending the decision maker's ability to process information and knowledge;
- Extending the decision maker's ability to tackle large scale, time consuming and complex problems;
- Shortening the time associated with making a decision;
- Improving the reliability of a decision process or outcome;
- Encouraging exploration or discovery on the part of the decision maker;
- Revealing or stimulating new approaches to thinking about a problem space or decision context;
- Generating new evidence in support of a decision or confirmation of existing assumptions;

- Creating a strategic or competitive advantage over competing organisations.

In addition, other major benefits include enhancing communication among participants involved in joint decision-making (Udo and Guimares, 1994), improving co-ordination of tasks performed by participants in jointly making a decision (DeSanctis and Gallupe, 1987) and improving satisfaction with decision processes and outcomes (Udo and Guimares, 1994).

While the claimed benefits of ERP include improvement of competitiveness, reduction of decision costs and the ability to make decisions more quickly, Holsapple and Sena (2001) suggest that managers perceive ERP systems as having a particularly positive impact on competitiveness. They also list the top three decision-support benefits as improving the processing of knowledge, improving the reliability of decision making and facilitating the gathering of evidence in support of their decisions.

The aforementioned benefits can potentially be achieved by all types of decision support systems, regardless of whether the decision-maker is an individual or a group of persons. Indeed, there are limitations to using ERP systems for decision support. Major concerns that have been identified include the inability to align with system objectives, insufficient capabilities or performance of software or hardware, resistance to change, unwillingness to share knowledge or collaborate, and incompatibility with rules, regulations, policies or organisational procedures. Clearly, most of the critical concerns are human-related, while the remaining problems can easily be resolved with additional hardware and procedural changes. Hence, Holsapple and Sena (2001) conclude that human issues are viewed as a significant potential obstacle to ERP implementation.

For example, in 1999, Deloitte & Touche published the results of in-depth interviews with 164 individuals at 62 Fortune 500 companies (Chen, 2001), reporting that human obstacles constituted 62% of the failures identified. Conversely, information technology issues contributed only 12% of problems, of which only about 5% were

associated with software functionality (these obstacles appearing both before and after going live).

In parallel with the benefits appearing under the decision support category, ERP systems have delivered a number of other benefits, according to companies like Nike, DHL, Tektronix, Fujitsu and Sun Microsystems (Falkowski, Pedigo, Smith and Swanson, 1998), some of which include:

- Facilitating accounts payable personnel with increased control of invoicing and payment processing, resulting in a productivity boost and the elimination of excessive reliance on the human factor in these operations.
- Reduced paper documentation due to the provision of on-line formats on screen,
- Improved timeliness of information by permitting real-time posting of transactions,
- Improved cost control,
- Faster response and better follow up on customers,
- More efficient cash collection,
- Better monitoring and quicker resolution of queries,
- Quicker response to change in business operations and market conditions,
- Delivery of competitive advantage by improving business processes,
- Improved supply-demand linkage with remote locations and branches in different countries,
- Provision of a unified customer database usable by all applications,
- Improved international operations due to provision of support in a variety of tax structures, multiple currencies, multiple period accounting and languages,
- Improved information access and management throughout the enterprise,
- Provision of solutions for one-off problems such as Y2K and the introduction of Euro currency.

In contrast to these claims, it has also been observed, with respect to software selections, that when purchasing an integrated package, companies should be aware that many products are functionally 'a mile wide, but an inch deep', (Hecht, 1997).

This implies that not many ERP packages can be easily interfaced with other legacy or third party systems, even though they claim to be rich in functionality. In addition, Dobrin (1999) spells out that choosing the right package is not easy, while choosing the wrong one can prove to be a costly disaster. In particular, he warns 'Don't buy a make-to-stock [ERP package] if you're in the build-to-order business'.

In conclusion, ERP systems positively contribute to solving business problems as long as they are properly selected and implemented. However, the reality is that not everyone using ERP systems really understands what they are doing. Implementing an integrated solution requires an unprecedented degree of teamwork, process expertise and business knowledge, as all of these may, to some degree, be missing or inadequate in many enterprises.

3.7. Critical Success Factors When Implementing ERP Systems

Given the perceived benefits of ERP systems, in the early 1990s, thousands of companies jumped into implementation with the common goal of improving business processes and addressing Y2K compliance issues. Since then, many negative stories have followed, with ERP vendors being the most frequent targets for blame. Although there have been some success stories, (for example, Cisco Systems managed to implement its ERP system for about USD$30 million in a timeframe of 9 months), specialist magazines such as Datamation and Information Week have consistently documented several other project failures (Cotteller *et al.*, 1998).

According to Trunick (1999) 40 percent of all ERP installations only achieve partial implementation and another 20 percent of attempted ERP adoptions are scrapped as total failures. Other studies have also suggested that the ERP failure rate may even be greater than 50 percent (Escalle *et al.*, 1999). Furthermore, according to a 2001 Gartner report, 40 percent of enterprises deploying ERP systems through 2004 will exceed their original time and cost estimates by at least 50 percent (Axam and Jerome, 2003). Hence it is clear that many enterprises have suffered disappointment and even

spectacular project failures due to unplanned or under-planned implementation projects.

From this literature review, it appears that from a technical point of view, many ERP projects have problems that fall into general categories as typified below:

- Non-robust and incomplete ERP packages,
- Complex and undefined ERP to legacy system interfaces,
- Middleware technology bugs,
- Poor customisation,
- Poor system performance,

However, perhaps surprisingly, technical challenges appear relatively insignificant. The biggest problems with implementing ERP systems appear to be business-related. In many cases, companies fail to align the use of ERP systems with business strategies. The failed implementations are thereby directly related back to management failures in planning and adapting to the running of complex ERP projects

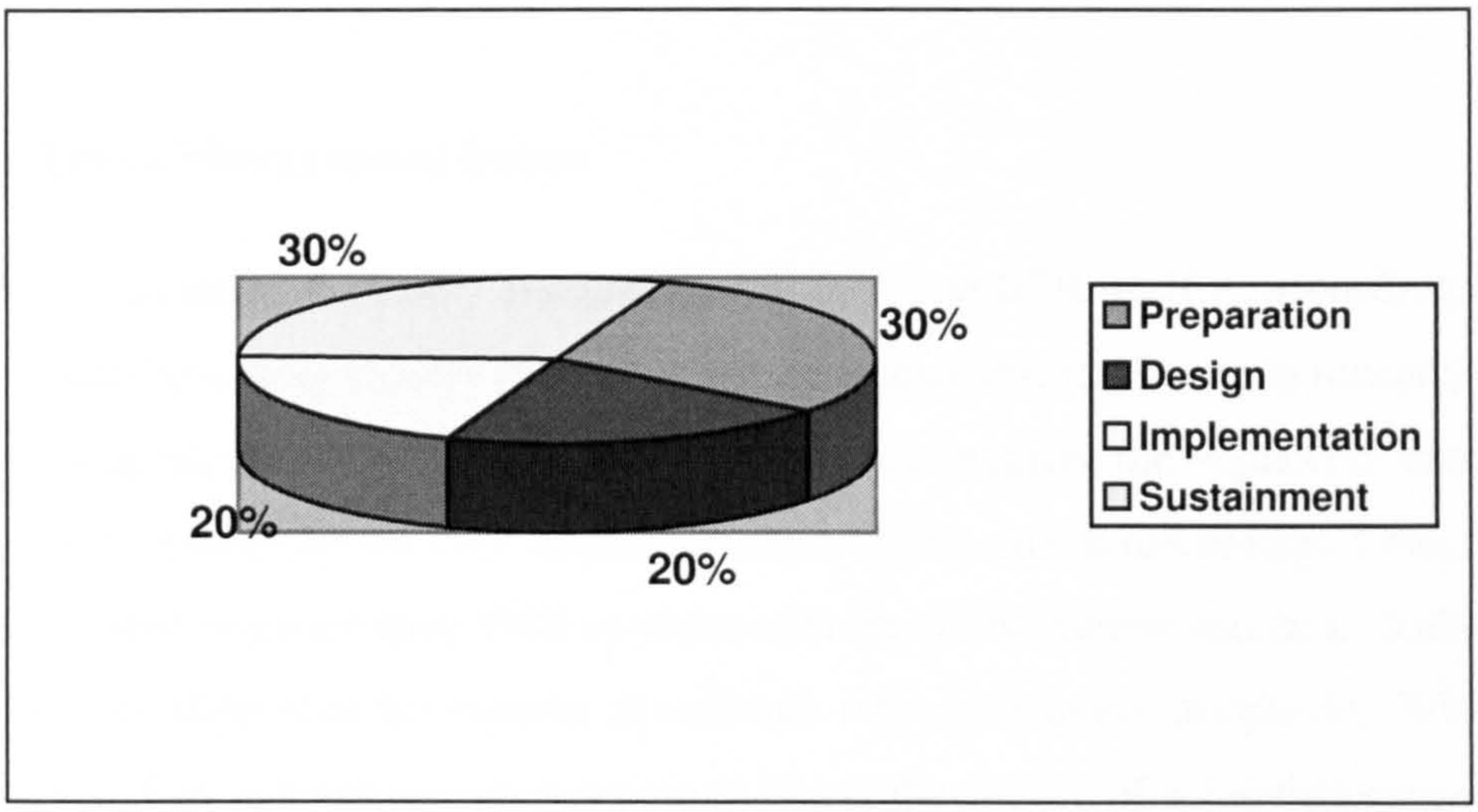
3.7.1. ERP Project Management Issues

Since ERP systems are massive, complex and very expensive, ranging from USD$2 million to USD$130 million, implementing an ERP package may take months to years to complete. Implementation is therefore most sensibly approached through a number of stages, as depicted in Figure 3.2. This shows that during a typical project cycle, up to 30% of the duration is dedicated to the Preparation stage, with 20% devoted to Design, 20% to Implementation and 30% to Sustainment. Preparation includes observation and examination of the problem area and is vital before moving forward to the Design of Solution stage. Implementation is concerned with putting the agreed solution in place, while Sustainment represents the maintenance of the system following implementation.

Breaking the implementation into phases also appears less risky and more realistic. This guarantees deliverables and milestones. Ensuring that each deliverable has a clear financial impact is a clear prerequisite to success. For example, General Motors successfully implemented SAP R/3 for USD$80 million over a period of three years by breaking the implementation down into smaller phases (Gibson, Holland and Light, 1999).

It is also important to note that many ERP systems are expensive to implement. According to AMR Research, ERP implementation usually takes nine to 12 months for small companies, 12-24 months for mid sized businesses, and three years or more for large, multidivisional organisations (Romeo, 2001). Additionally, achieving full integration with legacy systems and third party software is usually amongst the most costly aspects during the ERP implementation cycle.

Figure 3.2 Typical Project Cycle



Source: ComputerWorld (1999)

Hence, the importance of sound project management techniques is readily apparent. The steps involved in a typical implementation cycle following the project 'kick-off' meeting include:

- Project planning,

- Business and operational analysis,
- Business process reengineering,
- Installation and configuration,
- Project team training,
- Business requirement mapping,
- Module configuration,
- Design of system interfaces,
- Data conversion,
- Customisation,
- Acceptance testing,
- End user training,
- Post implementation audit and support.

In general, 'go live' is taken to represent the completion of the project. However, this is not necessarily apparent when looked at from other angles. In fact, it is all too common to find that following the ERP system's 'go-live', it will simply pass into yet another phase of difficulty, that of 'post-implementation improvements'.

3.7.2. Change Management Issues

ERP implementation is closely associated with BPR and BPR itself is, according to many researchers, very closely related to change management. Hence, in recent years, an increasing number of researchers have attempted to explore the impacts of change management techniques on ERP implementation. From this, it has emerged that there is no doubt that implementing ERP systems calls for subtle human touches. Software itself does not determine the success of software implementation; people do. Without a structured change management program in place, the chance of achieving success from an ERP implementation is significantly reduced (Hooks, 2002).

According to Koch's (2001) studies in Denmark, the central element of a BPR change program is the focus on realising crosscutting business processes. He attempts to relate BPR and ERP by defining BPR as a contextualised change program and claims that ERP can support BPR in three areas: scope, configurability and integrativeness. Drawing on a large sample, Koch shows that BPR is often followed by ERP, meaning

that this is the particular form of information technology that is deployed as the enabler for a process vision. Finally he concludes that BPR and ERP, although not necessarily complementary, can be designed to support each other.

It is certainly not uncommon for mid level Management to sometimes resist the process changes that an ERP system requires or introduces. Process standardisation is a key design decision and business reengineering is considered a must for improving efficiency. However, midlevel employees, in particular, are often reluctant to make or accept changes in their jobs, since decentralisation of information poses a threat to the midlevel decision makers. Managing resistance as well as change is therefore crucial to successful ERP implementation.

Change Management Defined

Generally speaking, change management is defined as a structured process that will enable proposed changes to be implemented, thereby ensuring technical and business readiness for required developments. This should be conducted in a consistent manner that can be either relaxed or tightened to adjust to business needs and experiences.

Dunleavy *et al.* (1998) define change management as a programme of effort taken to manage people through the emotional ups and downs that inevitably occur when an organisation is undergoing massive change. Alternatively, change may be understood as a process of negotiation coupled to a combination of a change programme and a coalition building process (Dunleavy *et al*, 1998).

Change usually involves the introduction of new procedures, people or ways of working which have a direct impact on various stakeholders within an organisation. Nah *et al.* (2001) concur with Falkowski *et al.* (1998) that enterprise-wide cultural and structural change should be actively managed. A culture that supports shared values and common aims is conducive to success. Cultural change is therefore important to those organisations aimed at successful implementation of ERP systems. They need to be open to change.

Kotter (1996) further proposes that changing an organisation's culture can be viewed as an eight-step process:

- Creating a sense of urgency,
- Establishing the guiding coalition,
- Developing a vision and strategy,
- Communicating with employees to build broad-based action,
- Generating short-term wins,
- Consolidating gains and producing more change, and
- Anchoring new approaches in the prevailing culture.

Change Management in Action

In addition to changing the organisation's culture, resistance can be dealt with through good planning and education, which has also been considered as a priority in the context of project management. Implementing ERP systems requires extremely careful planning. For example, Donovan (1999) identifies five reasons accounting for poor results, all linked to the planning issue:

- The operating strategy did not drive business process design and deployment,
- The implementation took much longer than expected,
- Pre-implementation preparation activities were done poorly, if at all,
- People were not well prepared to accept and operate the new system,
- The cost to implement was much greater than anticipated.

Suresh (2001) also suggested ways of dealing with changes or resistance by first breaking down the business into several categories, followed by applying specific questions to each of these categorised areas. He also refers to Gary Hamel's (1996) eight steps for a bottom-up revolution to deal with the resistance issue. Some of the steps thereby identified include writing a manifesto, creating a coalition, finding a translator and winning small and early successes.

Moreover, Stratman and Roth (1999) reveal that many implementation projects fail because of workers' resistance. Especially when implementing an ERP system, people are forced to change the way they do things.

Aladwani (2001) therefore suggests that appropriate change management strategies play an important role in supporting the effective implementation of ERP system. These strategies are broken down into phases that include knowledge formulation, strategy implementation and project status evaluation, each of which is considered in further detail as follows.

Knowledge formulation is concerned with identifying who the resisting individuals are, what their needs are, what benefits and values they have, and what their interests are. Strategy implementation involves overcoming resistance by setting up a communication strategy that gives a general description of how the implemented ERP system will work. This communication strategy also needs to be supported by the top management, who can then create more effective awareness of the ERP system by communicating its benefits to the workers.

It was also suggested that teaching each of the various user groups how the ERP system works is important in creating awareness (Stratman and Roth, 1999). Therefore, training, that offers a good opportunity to help users adjust to the change that has been introduced by the ERP system, becomes a key part of the implementation strategy.

Hence, it is seen that project failure is partly due to a lack of sound preparation of process and people. ERP systems are nothing magical, and prior to rolling out an implementation, everyone in the organisation should be informed of the reasons behind the implementation of the new system. Proper and appropriate training is therefore crucial to encouraging project success. For example, Intel's training program is massive and its budget exceeds $15 million. Similarly, experts at the Gartner Group of Stamford and the International Data Corporation of Framingham agree that at least 15% of an ERP implementation budget should be allocated to training people (Jacobi, 1996). The literature suggests that allocation of around 20%

of the budget to training is likely to guarantee success, while companies that spend 15% of their budgets are only slightly more likely to avoid failure.

Bingi *et al.* (1999) and Holland *et al.* (1999) also contend that users should be involved in the design and implementation of business processes and the ERP system. They insist that formal education and training should be provided throughout the ERP implementation as part of the change management program. Employees need adequate training to understand how the system will change the business process and affect the organisation. Failure to ensure that people understand what they should be doing almost certainly leads to ineffective implementation. In addition to training, Wee (2000) suggests that the provision of an effective support organisation is also critical to meeting user needs after installation.

Since almost every ERP project is associated with changing the business processes, Clarke (1999) carried out a survey to identify key success factors in the project management of change. She identified four critical success factors, which are:

- Communication throughout the project:
  Pardu (1996) cites lack of communication as having been the biggest reason for the failure of many change projects relative to their expectations. Lanfer *et al.* (1997) suggest that successful communication needs to be emphasised in order to manage uncertainty.
- Clear objectives and scope:
  Randolph and Pesner (1994) suggest that scope and objectives are the guiding principles that direct the efforts of the project team. This is strongly supported by Ward (1995), who agrees that they would ultimately determine a project's success or failure.
- Breaking the project into bite sized chunks:
  Breaking large projects into sub-projects or work packages is regarded as one of most important tasks in any IT project. It facilitates delegation of responsibilities and monitoring against objectives, communication of project progress, identification of problems up-front and the making of necessary modifications to the project.

- Using project plans as working documents:
  Project requirements may change throughout the project life cycle, and this is particularly true for change projects. To ensure that a project is completed on budget and on time, project plans need to be updated regularly. Updating project plans is always time-consuming, and therefore Clarke (1999) suggests that keeping the plan simple, with the right level of detail, encourages the easy and regularly review of projects.

In Clarke's research, she also attempted to illustrate, with examples, how the key success factors can be applied to solving the following problems in the context of project management:

- Striving for unrealistic standardisation,
- Perceived return from project management is poor,
- Project management is regarded as a corporate reporting tool,
- Inadequate formal completion of change projects,
- Project overload syndrome,
- Cultural and individual issues,
- Motivation.

From Clarke's point of view, clear objectives and scope conform to the importance of defining the project scope. This argument is well supported by many other claims; for example, Allen (1999) suggests that a well-structured implementation methodology should give enough priority to the definition of project scope.

Clearly, successful ERP implementation requires a structured methodology that is strategy, people and process focused. Donovan, for example, provides a methodology that appears to cover all the basics. Notably, he strongly recommends that an evaluation of the company's business strategy and ERP plan should take place before committing to the software ordering and installation.

Ensuring a Business Perspective

Equally as important as being perceived as strategy, people and process focused, ERP implementation should also be viewed as a business initiative rather than as a purely technical project. The engagement of senior executives within the process of education represents an effective way to ensure their commitment. Articulating expectation before implementation is equally important in convincing the stakeholders. A change document that includes a communication strategy and core business principles of the company gives managers an understanding of the reasons behind making changes. Encouraging users to change their job roles can be achieved through developing incentive programs and linking them into performance reviews. However, wherever possible, changes should be introduced incrementally and not too much at once.

This process must start at the top. As long as ERP systems remain similar in terms of functions provided, Typanski (1999) suggests that certain priorities may be identified for senior executives. First, they must understand their information environments, not in detail, not at a technological level, and certainly not from a vendor perspective, but in a strategic sense. Hence, they must have a level of understanding that emphasises information resource management in the context of the fundamental objectives and responsibilities for their information environments.

It must also be remembered that people are the organisation's most important resource. For an information environment to be truly effective, its resources must be managed so that they are in synchronisation with the overall organisational goals and strategies. Careful decisions must be pursued concerning adoption and use of new information technology and applications. Establishing the right information environment increases the likelihood of success and profitability. However, in many large corporations, there are separate and fragmented information services that introduce inefficiencies, especially at the functional boundaries. The goals and objectives of all information services within a company should therefore be in agreement with each other, especially where corporate information flow is concerned.

Again, proper planning regarding ERP's mission within the company, identification of the major resources of the information environment and determination of which ones are truly important to the company, all need to be integral parts of the change management process.

In summary, with the creation of a responsive, effective company information environment, certain critical success factors must be addressed:

- Know your company's business environment,
- Determine what kinds of information service are needed,
- Identify required information resources such as business activities and computing facilities,
- Make it easy for information personnel to be successful by developing an appropriate planning and working environment,
- Make available the data modelling frameworks and data directories in relation to the company business processes and functions,
- Determine whether to build or buy information systems,
- Determine appropriate use of technologies,
- Create a highly intelligent information environment where companies have to strive to support the higher intelligence levels of deduction and judgement.

Again, change can never be accomplished without commitment and involvement from the company leaders. However, it is more important to recognise that resistance, as previously elaborated upon, is the most complex entity that directly affects the outcomes of change. People fear change, but change, and to an extent the resistance that is often associated with it, can present an opportunity to improve and do more business. Hence ironically resistance may actually help implement appropriate change if it is well managed. For instance, if people can be encouraged to speak up and participate in developing new ways of doing things then human creativity may be released and resistance is half-way to being eliminated. This is particularly obvious in China, where resistance to change and lack of active participation are among the major risk factors.

3.7.3. Other Critical Success Factors to Observe

In addition to the above academic reviews, Benesh, (cited in Martin and Sara, 2001), a principal consultant with Omega Point Consulting, summarised, from her own observations, five critical failure conditions associated with ERP implementation:

- Lack of understanding of what integration means,
- Inability to effectively manage communication,
- Ineffective managers failing to understand the decision making process,
- Lack of capability to test and manage the infrastructure,
- Inappropriate ways of 'living with' the ERP system.

Similarly, Shupe Consulting (2000) produced a list of critical success factors for ERP implementation summarised as:

- Plan, prepare and plan some more,
- Add time to the implementation cycle when major business process change is part of the project,
- Create a project war room containing work stations, web access, documentation, training material, white boards etc., where all project work is done,
- Assess the corporate culture and review the previous projects, implementing project management procedures, as necessary, to deal with any negative cultural elements,
- Put the right people, who have leadership abilities, learn quickly, and are willing to work hard, on the project team,
- Ensure that the project has upper management support.

3.7.4. Adopting an Holistic Approach

Conversely, according to King (1996), none of the key success factors described above is uniquely responsible for ensuring a project's success; in fact, they are all inter-dependent and a holistic approach is required. Similarly, Clarke (1999) concludes that the success factors should not be considered independently of one

another. For example, failing to communicate is often cited as a reason for failure, but good communication systems depend on whether adequate and proper training is given and whether people are willing to take on further responsibility and roles. Clearly holism also implies that there is a chain of impacts if one key success factor is not properly managed.

3.7.5. Risk Management Considerations

While most critical success factors are related to the emergence and management of change, as illustrated above, risk management is usually associated with change management. Hence, all functional managers should own the project and speculate on any possible risks as well as their impacts to the project's success. It is also important that they should be credited for the project's success or blamed for its failure. A number of general points may be enumerated as follows, in order to avoid potential risks on a project:

- Identify the benefits that will result from the project; then make sure that all project-related activities are directed towards achieving those benefits,
- Set realistic dates and do not change them,
- Keep the project under control in regard to schedule,
- Designate a single project leader,
- Seek long-term support from the software provider,
- Keep functional managers accountable,
- Make business objectives the primary drivers of the project,
- Make sure that system users totally understand what is being explained,
- Avoid over-modifications.

Addressing the Inflexibility Issue: Customisation

Another major risk associated with the ERP implementation is software customisation. Following on from the introduction of MRPII in 1979, which in turn had evolved from the emergence of MRP in 1965 (Chen, 2001), ERP is now extremely rich in terms of capabilities. However, we have still not arrived at a situation where ERP

systems are flexible enough to cover everything that may be required. Although tremendous effort has been directed towards this problem, customisation is still not generally recommended. However, a certain level of customisation is still necessary to allow ERP systems to deliver better value, given that business processes cannot always be changed to align with 'industry best practice' as envisioned by ERP vendors, and subsequently embedded in their software.

A 'One size fits all' ERP system is the 'drum that has been banged' for some time by the big Tier 1 ERP providers. The theory behind this is based on the Tier 1 vendor concept of a top-down system build – 'We have all of these modules and together we will choose the ones that your business needs' (Frame, 2004). However, there are actually several on-going debates and arguments against this top down approach to implementation. The 'one size fits all' approach is rather unfavourable for today's business models and requires some degree of adaptation, due to cultural, structural and strategy difference (Shenhar, 2004). Unless the ERP software itself is therefore highly configurable or customisable, adoption of a 'one size fits all' approach may result in failure.

It therefore appears that while the evolution of an industry best practice does not intend to resolve all the problems, it serves as a starter kit for the implementation of ERP systems on the condition that either there is no such practice in place within the organisation and nothing else similar is available, or a tremendous change of operation is being sought (Otey, 2001).

Although the ability to readily configure systems in order to be able to make changes on an 'as-needed and when needed basis' is likely to be the future direction in which ERP systems will evolve, software should, nevertheless, still only be modified when such modification is considered inevitable. Rosario (2000) suggests that modifications should be avoided in order to reduce errors and avoid inhibiting capability to take advantage of newer versions and releases. Similarly Holland *et al.* (1999) and Roberts and Barrar (1992) endorse the view that organisations should be willing to change their businesses to fit the software, thereby ensuring only minimal customisation to

the latter. Holland *et al.* (1999) further suggest that avoidance of such software change is made possible with contemporary process modelling tools.

Other Risk Factors to Consider

Schneider (1999) summarises, the issues that need to be considered in order to reduce risks when planning for ERP implementation as follows:

- Which processes are most important now and why?
- Does this system meet our needs or go beyond them?
- Who will be the change champion?
- Who are the stakeholders?
- What is the business culture at our company and what are its strengths?
- What subcultures do we have and what are their strengths?
- How can we apply those strengths to business change?
- What cultural attributes are weak and how will we address them?
- Who will be responsible for change management?

Similarly, Bryan (1999) attempts to put together a checklist of major errors to avoid during ERP implementation:

- Insufficient change management and user training,
- Inappropriate decisions on Business Process Reengineering initiatives,
- Poor project planning,
- Underestimating IT skills requirements,
- Poor project management,
- Failure to recognise the tremendous effort involved in customisation and integration of other software packages,
- Low level of executive buy-in,
- Underestimating resources required,
- Insufficient software evaluation.

Selling Change

From the above, change management is certainly a recurrent challenge that needs to be addressed in any case. A tactical area concerning change management is how to sell change. People need to be adequately convinced of the need to accept changes, especially if introducing new ways of doing business is considered part of the ERP implementation. Hammer (2001) suggests six steps to marketing success as follows:

- There is no such thing as over-communication,
- When dealing with employees, remember and apply 'the rule of fifties' which says that the first 50 times you tell people something, they don't hear; the second 50 times, they don't believe or understand it, only during the third 50 times you tell them do they begin to learn,
- Benefits sell, features don't,
- Make your pitch distinctive and vivid,
- Segment your markets,
- Never, ever lie; not even a little.

He also emphasises that educating employees is indispensable to selling change, as people cannot support what they do not comprehend. Hence training is mostly concerned with helping people develop the skills to perform their jobs in the aftermath of the change. Romeo (2001) also advises that high quality training is a top priority. For him, the key word is high quality. He suggests that IT staff must be trained in the technical aspects of the software and how it will interface with other modules.

3.7.6. Preparation and Readiness for Change

Along with risk management, company readiness is equally important to the successful implementation of ERP. It has already been emphasised that a company needs to be ready in order to advance the ERP implementation project. It is also important that we should always try to consider 'company readiness' as an integral part of the change management programme which largely facilitates ERP

implementation, although attempts to achieve company readiness might also cause resistance to the execution of changes. While change management is an on-going exercise throughout the entire implementation cycle, making sure the company is ready for the ERP implementation is a crucial part of the initial preparation. Preparation can make or break the success of an ERP implementation.

Donovan (2001) summarises implementation failure as falling into one of three categories: loss of user confidence due to inaccurate data records, delays and frustrations due to poorly educated and trained users and inappropriate assumptions that application of ERP-based information technology will correct fundamental flaws in underlying business processes. If ERP is not correctly implemented, the results can be painful, costly and embarrassing.

Regardless of the implementation methodology adopted, people are always the most critical success factor for the ERP implementation. In general, lack of organisational readiness to change, insufficient sponsorship, weak project teams, inadequate user involvement and confusion over job responsibilities are common examples of non-technical reasons for ERP system implementation failure. Furthermore, it is notable that all of these are human related. While Romeo (2001) promotes the idea of 'Be prepared' to mark the opening steps for implementation, Donovan (2001) also reveals that most ERP system implementations have failed predominantly due to a lack of preparation of the process and people.

As identified above, the design and execution of high-quality training constitutes a significant part of the process of achieving readiness for change. The quality of training is even more important than the comprehensiveness of the training material. Training must be user friendly and must clearly show users the positive benefits and the impacts of the ERP implementation. Without proper and well-managed training, the likelihood of project success is low. Hence, the success of change management is closely related to the quality of the education and training programmes that are put in place. Rather than providing simple training, users should be trained in a wider sense. For example, training sessions should provide a valuable opportunity for people to communicate and influence each other.

Defining a vision for ERP is also critically important, this being the primary responsibility of the sponsor and steering committee. Once agreed, this vision has to be cascaded down throughout the entire organisation. The most contributive value of a project team is to establish a framework where they define the business requirements in support of the company strategic goals, rather than just collecting the user requirements for software customisation. Beyond establishing sponsorship, identifying core and extended support team members is necessary before education can be effectively arranged.

With respect to the preparation for ERP implementation, Murrin (2000) summaries the critical success factors in general as strong sponsorship, agreeable project vision, presentation of a relevant business case, excellent project leadership, adequate process focus, sound project management, ample change readiness, effective communication, comprehensive education and appropriate training. Among these success factors, Murrin rates change leadership as being of the highest importance, given the expectation that BPR will introduce major changes, thereby giving rise to resistance as ERP is introduced. Murrin (2000) also suggests change leadership actions that include establishing thorough and consistent communication mechanisms, conducting education and training in a cascaded approach, managing resistance, establishing feedback mechanisms and creating power users or mentors. Again, the role of the project sponsor is strongly emphasised: he or she must be committed and involved and should be prepared take up an active role in support of these changes.

Additionally, for utmost effectiveness, gaining the endorsement and support of influential individuals and opinion leaders is critical to successful implementation. Convincing group leaders to participate effectively in the implementation process and making them feel that they are key players will ensure their valuable commitment. Status evaluation procedures can be used to provide feedback information to top management, but it must be recognised that this feedback needs to be timely, accurate and systematic if the implementation is not to become ineffective or worse, a complete failure.

3.7.7. Concluding Remarks on The Identified CSFs

In conclusion, with reference to the academic review and industry analysis, it is apparent that a good portion of our critical success factors are concerned with people and how they are managed in order to ensure that they all strive for a common goal. Hence, this research is largely concerned with the preparation of people and process in a holistic sense. Admittedly, it is hard to incorporate every human issue into any methodology. However, the implementation methodology can at least be designed with the objective of guiding people through an implementation cycle that has the necessary change management components effectively embedded within it. Essentially, cultural influences, communication effectiveness and process change therefore emerge as key subject matter for this particular research.

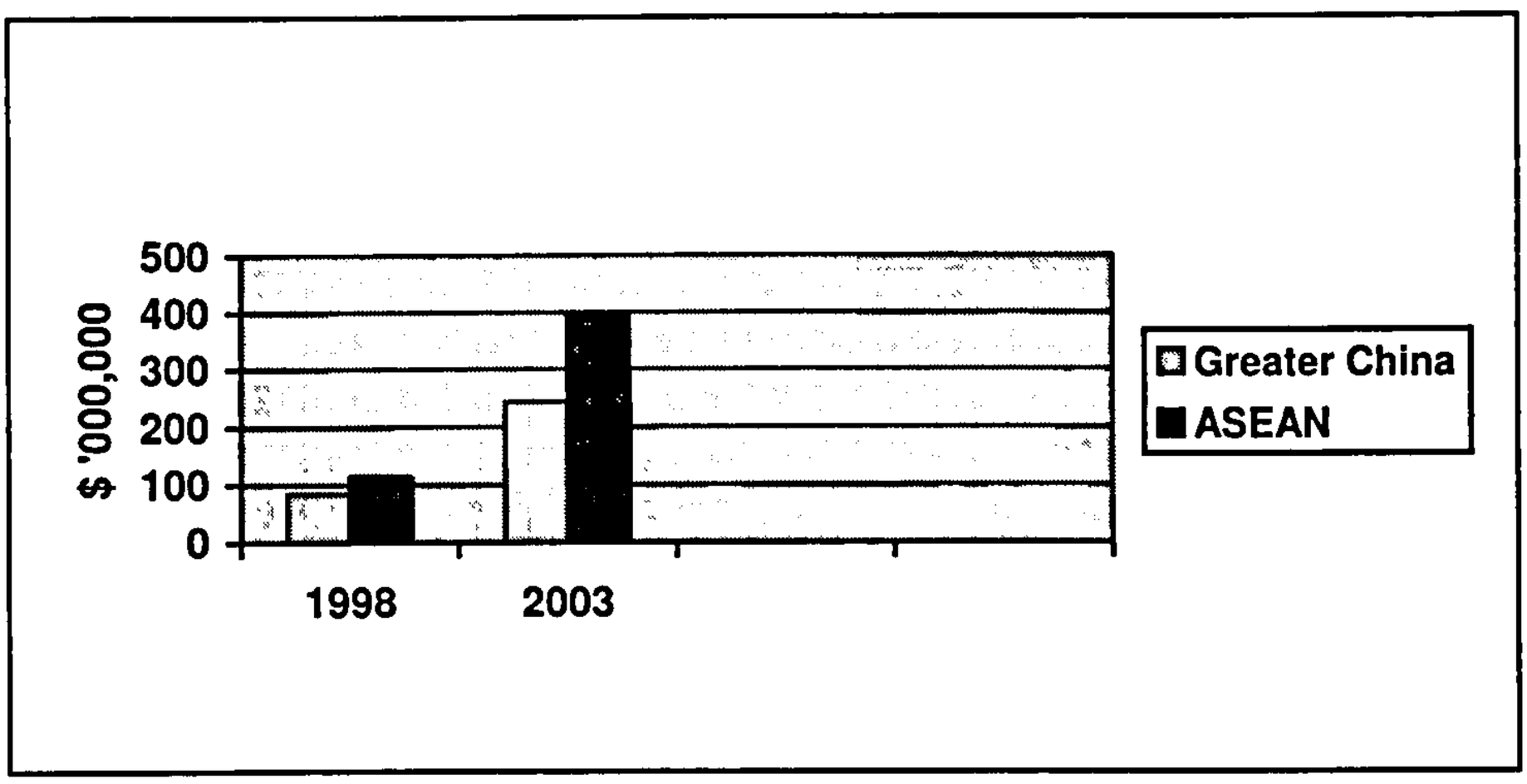
3.8. Historical and Expected Future Trends for ERP

Early in 1999, AMR research forecasted that ERP sales would stabilise as companies wrapped up their Y2K bug fixes. However, the 2000 fourth quarter results from SAP AG and PeopleSoft, backed up by reports from JD Edwards and Oracle Corp., indicated that the market was on its way back up.

According to International Data Corp. Asia Pacific (Legard, 1999), despite an overall global decline in ERP vendor performance, Asia would take a significant growth in

the sales of ERP solutions. As depicted in Figure 3.3, growth trend sales of ERP software in ASEAN were predicted to grow at an annual rate of 21.2%, up from USD$115 million in 1998 to USD$393 million by 2003. In Asia, the fastest growing region for ERP software sales was seen to be Greater China, comprising Mainland China, Hong Kong and Taiwan, which was predicted to grow at an annual rate of 24.2%, up from USD$84.5 million in 1998 to USD$243.3 million by 2003. South Korea and India only contributed sales of USD$27.7 million and USD$42.9 million in 1997 and 1998 respectively. The projected growth fell off in reality as the global economy slowed down from 1999 onwards following the collapse of US stocks in the New York Stock Exchange.

Figure 3.3 ERP Predicted Future Trends



Source: International Data Corporation (1999)

More recently, with respect to ERP enabling hardware, the Gartner Group (Onag, 2000) predicted that IBM's AS/400 would remain a core strategic platform through 2004, with 10% to 20% of revenue coming from new customers over the next five years. Furthermore, according to IBM, 70% of the markets in China are new customers, for whom scalability is strategically important as a factor in convincing them that they should buy an AS/400 system (Onag, 2000).

In terms of functionality, ERP systems are already rich, although software vendors continue to develop new modules to meet increasing customer expectations. However,

automation of back office operations is still on the priority list. According to AMR Research (Bingi, 1999) 70% of the Fortune 1000 companies had either begun implementing ERP systems or planned to do so in the coming years to fulfil back office requirements. Not until the back office system is in place is it possible to move on to front office automation. However, increasing demands for front-office applications such as SCM pose threats to the integration with back office applications as software and technology compatibility, and the availability of Middleware for integration are major concerns.

Among the front-office applications, CRM (Customer Relationship Management) is rapidly becoming one of the hottest areas in enterprise applications, and will continue to spur significant mergers and acquisitions (Menconi, 1999). According to AMR Research, the total aggregate revenue of the CRM market was expected to grow from USD$1.2 billion in 1997 to USD$11.5 billion in 2002 (Dilger, 1999). The CRM market includes technology-assisted selling and customer service and field service software. AMR Research predicts that mid-market sales will continue to accelerate as smaller companies adopt CRM business practices and more vendors offer cost-effective products for price conscious mid-sized companies.

3.9. Web Based Collaboration

In addition, ERP systems will inevitably become web-enabled. Shankarnarayanan (1999) predicted that the Internet would represent the next major technological enabler, which would allow rapid supply chain management between multiple operations and trading partners.

With the advent and general availability of Internet technology, most ERP suppliers, such as SAP and PeopleSoft, have already launched Internet versions of their ERP solutions to facilitate the so-called web-enabled collaboration function. These implementations can also be executed collaboratively with the strategic view of improving communication and hence reducing the chance of implementation failure. Unfortunately, there is little research available on adopting a collaborative approach

for implementing ERP systems (an issue that is addressed in more detail later in this research). The next release of ERP systems is therefore believed to be aimed at extending the coverage of new functional areas such as collaborative workflow management, finite scheduling and visual product configuration.

Collaboration occurs only when companies work together for mutual benefit. Poor governance results in disjointed selection, deployment and use of collaborative infrastructure, which in turn leads to diminishing IT investment returns. Cain (1999) asserts that organisations must examine human capital management needs, core operational process requirements and project and cross business boundary activities in order to help identify repeatable patterns under which various collaborative services can best be exploited. Above all, Hammer (2000) recapitulates that collaborating companies leverage each other on an operational basis so that they perform better together than they did separately. He also suggests that the power of the Internet lets companies readily transact with each other and access each other's information, thereby making collaboration a reality.

Gary (1989) further defines collaboration as 'a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible'.
Moreover, Borden and Perkins (1999) reiterate that many scholars have suggested that there are certain key features involved in the collaborative process. For instance, Ash (1989) emphasises the idea of specific factors and underpinning characteristics of inter-organisational relations. Others (e.g. Caplan, 1988; DelPizzo, 1990; Kull *et al.*, 1991) focus on central features or salient themes of partnership arrangements. Still others outline strategies that can assist collaborators when facing challenges and difficulties (Gomez, 1990; Otterburg & Timpane, 1986).

Establishing a sense of knowledge sharing, learning and community across members with shared interests and behaviours represents another focus. This helps towards cross-team/workgroup, and cross-process / cross-business boundary interaction.
In short, collaboration, by its nature, focuses on individuals, teams, and workgroups. It is also concerned with communication, media and a user environment that is

steadily becoming connected and intelligent. Its aims are the streamlining of tasks for efficiency gains and improved effectiveness of decision-making.

Key Challenges Faced in Collaboration

Implementation of ERP systems shares much with other types of project. However, its impact applies to the entire organisation and is thus very widespread. Sharing common beliefs and goals is commonly perceived as a pre-requisite to a successful and effective implementation. Since the whole process of implementation is concerned with people, the project should therefore be human-centric. A careful selection of portal technology for improved communication paves the way toward success, whilst shortfalls in control and monitoring are amongst the biggest problems that jeopardise implementation. Other challenges include people's limited understanding and ability to adapt to the concept of collaboration. There also remain technical constraints in applying complete collaboration to certain industries and working environments. Examples of technical constraints include limited availability of geographical networks, restricted speed of communications and insecure data transmission. This 'collaboration gap' is significant, in that it leads to considerable difficulty in sharing best practices.

Many companies recognise that face-to-face meetings will always be essential for community building and relationships and will never be completely replaced. Klein (1996) restates that face-to-face communication has a greater impact than any other single medium. One of the chief advantages of such a communication strategy is the ability of the participants to pick up non-verbal cues as the interaction unfolds. Rather than replace all face-to-face meetings, Cain *et al.* (2001) therefore proposes that collaboration technologies will need to provide additional interaction mechanisms that enrich existing distance-communication technologies. In time, these may selectively replace a subset of current in-person interactions.

Finally, the hardest part of making collaboration work, as Hammer (2000) illustrates, revolves around cultural values and attitudes. Traditionally, people within companies often view outsiders with hostility and suspicion. That has to change, in the view of

Gotta (2001), who suggests that productivity strategies should now automatically include external parties in the search for more strategic impact. Inevitably, in today's world of collaboration, for any particular company-wide project, members are increasingly likely to come from different companies.

3.10. The Changing Requirements of Implementing ERP Systems

ERP in China began its journey in the late 1980's showing remarkable market growth from approximately US$70 million in 2000 to US$106 million in 2001. The Chinese ERP market was expected to show an additional annual growth rate of 25% from 2002 to 2005 (Xue et al. 2004). Despite the global reputations of several providers only two foreign ERP vendors, SAP and Oracle, ranked in the top eight ERP vendors in China, these holding between them only 24.4% of the Chinese market as compared to their world market share of almost 70% (Liang et al., 2004).

Currently there are basically two kinds of ERP vendors in China. Some are international giants such as SAP, ORACLE. Others are national vendors e.g. UFSoft and Kingdee. While international giants like SAP dominated only 30% market share with some 300 clients in China to date, the local vendors continued to gain good level of market share. Hence, since it appears that the foreign ERP vendors have not been able to capitalize on their financial strengths, expertise, advanced technology and experience to implement their ERP solutions in China, domestic ERP vendors like UFSoft and Kingdee continue to dominate the Chinese ERP market.

Nearly 1000 companies in China have implemented MRP, MRPII or ERP systems since 1980 and the successful implementation rate is extremely low at only 10% (Zhu and Ma, 1999). Some common characteristics of ERP failure in China were identified by Martinsons, (2004). Firstly, ERP projects in China almost invariably failed to be completed within the scheduled time frame, although only rarely did they exceed the planned budget. Secondly, ERP projects rarely improved cycle times and customer satisfaction. The main focus remained reducing the unit labour costs and inventory levels. Finally, ERP projects led by general management are judged to be much more

successful than those led by IT managers. Other major failure reasons included inadequate management of business process change during the ERP implementation, lack of top management support and user involvement, inadequate level of education and training and oversight of cultural factors (Zhang et al., 2005).

In particular, culture has always been an issue that needs to be properly addressed during system implementation. Culture is defined as a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and therefore to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein,1992). The impact of cultural issues on ERP implementation has attracted considerable attention from IS researchers (Davison, 2002 and Soh et al., 2000). Different beliefs in providing access to information, miscommunication due to homonyms in the Chinese language and difficulties in reengineering organizational processes are typical of the cultural issues observed, in practice (Davison, 2002). Incompatibilities in data format, processing procedures and presentation format are also critical (Soh et at., 2000). Language barriers, the way business processes are redesigned, operational differences, customer support and the competency of the consulting companies are also considered as challenges when dealing with the issue of culture (Liang et al., 2004).

Clearly their widespread uptake suggests that there are many benefits associated with implementing MRP/MRPII/ERP systems. Evolving from an initial primary aim of reducing stock and inventory levels, these systems developed to focus on achieving faster delivery time and a better control over the entire business. ERP continued to extend to cover more business functions such as accounting, cost control, order entry and processing, sales and distribution, service management, human resource management and production planning. The emphasis was achievement of a higher level of interoperability and a modern way of doing business in a collaborative commercial environment. Improved customer service was also considered as an important emerging requirement. Information became more transparent and accessible by company's employees and trading partners.

Hence although the evolution paths for western countries and China are somewhat different, the objectives are very similar, these being effectiveness and standardisation. Similarly, most of the critical success factors identified in western countries, such as top management support, software suitability, ERP vendor quality, effective project management, reengineering business processes are equally applicable in a China context. However, culture is also an important and unique factor when implementing ERP system in Chinese firms.

3.11. Summary

From a vendor's perspective, managing people is the hardest aspect throughout the implementation of ERP systems. Other concerns, such as resource availability and ability to adapt, are comparatively less painful. It has been suggested that human obstacles constitute 62% of the root causes of project failure (Deloitte & Touche, 1999). Realising the challenges faced by major ERP vendors, the development of an understanding of the common reasons for project failure has therefore been seen as a core objective of this literature review.

Poor customisation, Middleware technology bugs, incomplete interfacing with legacy systems, and poor performance are, in general, the major technical problems associated with ERP implementation. However, these are generally of less significance than the social factors, as during such implementations, human resistance to change is a primary and recurring source of failure. Managing resistance through extensive communication and training is therefore seen as essential to the reduction or elimination of risk in project execution.

According to the META group (Romeo, 2001), it takes an average of 23 months to fully implement a typical ERP project cycle. However, the longer the cycle, the greater is the risk of failure. Breaking the implementation into phases is therefore deemed essential in the search to secure success.

The avoidance of massive modification is also key to retaining efficient implementation. Hence, most researchers have concurred that the planning phase is critical to moving forward towards successful implementation. Poor project planning (Bryan, 1999) is therefore claimed as a common failure factor and extremely careful planning is identified as a core requirement to help minimise the risk of failure (Donovan, 1999). Without an adequate level of planning, customisation may take place in an uncontrolled manner and intended benefits will be only partially realised. Planning should therefore begin as soon as the software purchase contract has been signed and it should cover every stage of the implementation cycle. However, the evidence suggests that many or most of the pre-implementation activities are often either neglected or not properly planned.

Turning to the issue of business focus and leadership, there is no doubt that support from senior executives and 'management buy-in' (Typanski, 1999) are also crucial to the implementations as a whole. Furthermore, the communication process must be more specific. Communication throughout the project with clear, upfront objective and scope definition is vital to securing successful implementation (Clarke, 1999). In this context, project management is seen rather as a corporate reporting tool.

In association with communication, training is also deemed to be critical. The Gartner Group (Donovan, 2001) has indicated that at least 15% of an ERP implementation budget should be allocated to training people. Without an appropriate level of training in place, it is difficult to keep the functional managers informed of the objectives and accountable for the responsibility assigned. Proper and organised training will also help promote team spirit with which synergy and implementation effectiveness can be realised.

Furthermore, the consensus appears to be that a common mistake is to assume that 'go live' represents a full stop to an ERP project. Instead, this needs to be seen as just the commencement of another 'difficult time', namely that of 'post-implementation improvements'. A typical implementation cycle should therefore be anticipated as spanning the entire cycle from the project planning stage through to the post-

implementation support and audit stages. However, it appears that to date, relatively few researchers have paid adequate attention to this particular area.

Above all, many former researches on ERP implementation in China failed to attend to the cultural impacts and this has been identified as a gap jeopardizing successful implementation of ERP systems in China. Hence, this stage of the research has focused on the issue of critical success factors with reciprocal interaction to the cultural dimension that are relevant to the implementation of ERP systems in China. This lays the foundation for the case study of Pepsi which is subsequently presented, but more importantly, the literature review establishes the basis upon which JBA Advantage can be analysed and improved as an implementation methodology.

4. EVALUATION OF SELECTED METHODOLOGIES

In this chapter, several common ERP implementation methodologies are discussed including SAP AcceleratedSAP, PeopleSoft Express and Oracle AIM Advantage. These are then compared with the JBA's product: JBA Advantage, and its associated methodology for implementing ERP systems.

Apparently, there is no perfect implementation methodology in the market. Given the large market share of SAP, PeopleSoft and Oracle, their methodologies were therefore obvious candidates for selection and evaluation against JBA Advantage. This evaluation process will give an understanding of not only the characteristics of each implementation methodology but also the similarities and differences amongst them. It will also provide a general understanding of a typical implementation cycle for ERP systems. Above all, the ultimate purpose of this evaluation is to facilitate the redesign of JBA Advantage which in turn aims at improving the process of implementation in terms of efficiency, effectiveness, control and governance.

4.1. SAP AcceleratedSAP

In the past, many would consider that SAP was not only deemed to be too complicated, but its implementation was also seen as being too lengthy and costly. In the autumn of 1996 at SAP's Sapphire conference, AcceleratedSAP (ASAP) was first announced, and initially targeted U.S. enterprises. ASAP aims at helping to shorten the implementation time.

Later, SAP released Global ASAP, a version of ASAP, which targeted large multinational companies deploying SAP R/3. The primary goal is to equip ASAP with steps and tools that are of use to global organisations. The underlying principle is that a suitable use of templates and tools in association with many of the project's steps will improve the likelihood of successful implementation. According to the Aberdeen Group (SAP, 1999), a study of 15 ASAP implementations in 1999 indicated that the average implementation time was 6.94 months whereas a traditional SAP

implementation may take 4-5 years. There are several reasons that contribute to the successful adoption of this newly introduced methodology. For example, implementation project schedules are extremely predictable, with the project studied being only seven working days off schedule, and this noticeably reduces the implementation cost. Also, the Aberdeen Group reported that the ratio of services-to-license-fee was closer to 2 to 1 in terms of expenditure.

This new release of methodology aims at reducing the implementation time by foregoing extensive business process reengineering, sticking to a deployment roadmap, and leveraging internally developed tools and accelerators. In lieu of relying heavily on detailed design, emphasis is placed on the rapid development of a blueprint for the system.

Structurally, ASAP has five major stages – (1) project preparation, (2) development of a business blueprint, (3) realisation phase as SAP R/3 is configured to meet specific business needs, (4) final preparation and testing, and finally (5) go-live and ongoing support. These are discussed in more detail below.

ASAP also provides an adjustable project schedule, checklists, spreadsheets, questionnaires and documentation templates to help the implementation consultants and project managers do their jobs in a more efficient manner.

As part of the Accelerated SAP offering, SAP Release/3 or R/3 is shipped with pre-configured hardware and a database for itself. It uses reference models to closely configure R/3 to fit a particular manufacturing industry, such as consumer goods manufacturing. According to Gary James of Team 21 (SAP, 1999):

"Historically, where organisations have gotten in trouble with R/3 implementations it is because they didn't understand all the steps, and have bitten off more than they can chew ... ASAP aids the understanding of all the bits and pieces involved in an R/3 implementation",

ASAP is different to a traditional implementation in that it is more focused on the business process reengineering aspect. This means that BPR is totally behind the project scope.

The SAP R/3 now becomes much less flexible in terms of carrying out process redesign by setting switches. Hence, according to Dilzer (1999), the very nature of ASAP's fifth step – go live & support - is a recognition that a system is never completely implemented. Unfortunately, the ASAP roadmap is not sufficiently self-contained, since the concept behind it is to break it down into pieces such as the upgrade roadmap and the euro roadmap.

According to SAP, in 1999 the average implementation time was 7.5 months with over 1000 projects adopting AcceleratedSAP (ASAP) as their implementation methodology. The success of ASAP lies in its design, which allows optimisation of time, quality and efficient use of resources during implementation.

In terms of resources, ASAP has major elements as follows: Roadmap, Tools, Service and Training, Knowledge Management, and accelerators such as checklists, templates and cut-over plans that are interconnected to leverage a total solution to the implementation. These are elaborated on as follows:

- Roadmap – this is a methodology and project plan with detailed descriptions of individual project activities. It consists of five phases: Project Preparation, Business Blueprint, Realisation, Final Preparation, Go Live and Continuous Change,
- Tools –ASAP-includes specific tools to support project management along with questionnaires to help define the business process requirements,
- Service and Training – comprises all consulting, education and support activities,
- Knowledge Management – allows user-defined documents to be attached to the Knowledge Base. This also provides pre-defined documentation templates.

The Five Stage ASAP Roadmap

The five phases as shown in Figure 4.1 govern the successful delivery of R/3, as follows (SAP AG, 2000):

Figure 4.1 SAP AcceleratedSAP

Phase	Description	Activities
1	Project Preparation	● Plan the organisational readiness. ● Change the company culture. ● Provide level 1 training.
2	Business Blueprint	● Document new way of doing business using Business Engineer.
3	Realisation	● Execute the blueprint. ● Provide level 3 training.
4	Final Preparation	● Perform stress and integration tests on the newly defined model. ● Perform preventive checks.
5	Go Live and Support	● Establish proper procedures and measurements. ● Provide round-the-clock technical and remote consulting support services. ● Perform regular checking on the system.

Source: SAP AG (2000)

Phase 1 - 'Project Preparation' is concerned with gathering resources and making sure there is proper planning and organisational readiness in place prior to moving forward with the implementation. It requires a full agreement in terms of acceptance from the decision-makers plus a clear project objective and the definition of an efficient decision-making process. More importantly, a company's culture may have to alter to accept changes arising due to the implementation of new processes and procedures.

With the use of ASAP's 'Project Estimator', a series of predefined questions can be used to help understand the managers' expectations of R/3.

Quality assurance is also important and a quality assurance check is therefore introduced to help make sure the implementation remains under control. During this phase, Level 1 training is required to help review the SAP's structure for service and support, and the SAP-specific terminology.

Phase 2 - 'Business Blueprint' helps to document the new way of doing business. A specific tool called Business Engineer, which delivers a complete toolkit of predefined business processes, is strategically used to help derive new processes. Basically, this is the business process re-engineering phase. During this phase, a great deal of discussion and the completion of a series of questionnaires take place. The most significant deliverable to come out of this phase is a document that outlines the future vision of the reengineered business model.

Phase 3 - 'Realisation' represents an execution of the business blueprint. With the aid of SAP consultants the project team can quickly set up a baseline system based on the blueprint developed, and can then fine-tune the system to meet all the business requirements documented. Likewise, a SAP specific tool called Implementation Assistant is used to help group and configure related business processes. Level 3 training with much focus on conducting workshops is also strongly encouraged during the Realisation phase. Through the advanced training, the project team will develop the proficiency they will need to run the system.

Phase 4 - 'Final Preparation' involves running rigorous testing on the developed model and takes the end-users through a series of comprehensive training. The reason for running system testing procedures against the fine-tuned business models aims at optimising the operational performance. Volume and stress tests as well as integration tests are carried out. Preventive maintenance checks are included as prerequisites to ensuring optimal performance.

SAP maintains that the train-the-trainer method is still considered the most effective way to ensure acceptance, although the key to the project success is getting end-users up to speed. In order to move on to the next phase for 'Go Live and Support', support team, service helpdesk and audit procedures must also be properly in place.

Phase 5 - 'Go Live and Support' requires the establishment of procedures and measurements to review the benefits of the investment on an on-going basis. SAP offers its customers the product and maintenance services 24 hours a day, 365 days a year. SAP believes that responsive support is the key to preserving the quality of services. A number of support services are available at SAP. The Online Service System aims to provide SAP's customers with a vehicle for forwarding problems or questions and tracking the progress towards resolution. The Remote Consulting Services enable SAP consultants to log onto customer sites via remote connections in order to investigate and solve problems. After 'Go Live', another tool, EarlyWatch, helps to proactively diagnose the system with the intention of recognising and resolving potential problems.

In summary, AcceleratedSAP is dominant among the proven solutions for implementing R/3. Adopting best business practices as well as providing user tools and support is the reason behind the success of this method of accelerating implementation. Pre-defined processes, templates and checklists are its key features. In addition to emphasising company readiness for enterprise-wide implementation, ASAP is extended to take into account the after-go-live support by introducing a number of services to assure optimal performance. It also places an emphasis on preparation, from the project kick-off up to the project completion.

Project success depends upon how well the preparatory work is done. Psychologically, it is more convincing for customers' support and acceptance if a less complicated methodology is in place. Nobody wants a cumbersome solution. What is required is a clear and understandable method.

With five simple phases, AcceleratedSAP covers a wide range of activities from preparation work through into after-go-live support and services. However, there is no doubt that support remains an on-going issue. There is always an argument that 'go-live' does not mean that the project is complete. From experience, it can be summarised that until a good level of support is in place, customers will always blame the software and the work that consultants have done as long as they are suffering from difficulties with the software.

4.2. PeopleSoft Express

Based in California, PeopleSoft Inc. employs more than 7,000 people and had revenues of $1.4 billion in 1999 (PeopleSoft, 2000). PeopleSoft's enterprise software provides a wide range of applications such as human resource management, financials, and logistics, manufacturing and supply chain management.

Like other ERP suppliers, PeopleSoft has its own implementation methodology, called Express, which is powered by its Rapid Implementation Toolkit called PeopleSoft Advantage Toolkit, for streamlining the entire implementation process. PeopleSoft's Express puts an emphasis on hands-on training and also on the provision of best practices and standardised workflow. The implementation methodology offers a number of implementation options within a defined set of procedures. The stated objectives of introducing Express is to get a faster return on investment, cut the cost of ownership, and generate the competitive edge possible with a better system. While PeopleSoft's Express Methodology provides enough guidance to achieve rapid results and the freedom of structured choice to make strategic changes, PeopleSoft's Advantage Toolkit contains a set of best business practice procedures, tools and guidelines developed over hundreds of implementations for organisations of all sizes.

In pursuit of optimal acceleration, the PeopleSoft Advantage Toolkit must be fully integrated with the Express Methodology. The toolkit is still important after the implementation go-live, as it continues to provide guidance for system enhancements, performance tune-ups and upgrades.

As exhibited in Figure 4.2, it has four implementation phases within PeopleSoft Express – structure, prototyping, transition and deployment. 'Structure' represents a starting point from which to move forward. It starts with launching an exhaustive fact finding operation and then precisely describing the legacy systems, core business practices and organisational readiness to help define the scope and direction of the implementation. The output from this phase is the construction of a hardware and software backbone that will be used throughout the entire implementation.

Moving into the 'Prototyping' phase means running the old and new systems in parallel. The newly derived model is first prototyped using RapidTyping and then tested against different scenarios. By definition, RapidTyping was originally designed to provide customers with classroom instruction followed immediately by hands-on application of the new system. In this respect, it resembles JD Edwards' conference room pilot. During the prototyping phase, the implementation team can help with interface design and setup as well as data conversion to the PeopleSoft system. Essential customisations deemed to be critical to the company's competitive edge are included.

Figure 4.2 PeopleSoft Express

Phase	Description	Activities
1	Structure	• Fact finding on existing legacy systems. • Define scope and direction of the project.
2	Prototyping	• Define future model, data conversion programs and other interfaces. • Define custom programs.
3	Transition	• Design user training. • Develop training materials. • Conduct training.
4	Deployment	• Provide phone-based technical support after go-live. • Provide remote consulting services.

Source: PeopleSoft Co. (1999)

'Transition' is concerned with final preparation before going live. Designing a curriculum of specific end user training is the priority in this phase. Ensuring adequate training is extremely important to the success of a project. Training materials must be well prepared and the training must be carried out in a logical sequence whereby an individual audience could manage to understand the new way of doing business.

The 'Deployment' phase represents moving across into 'go-live'. When it comes to going live, PeopleSoft provides the implementation consultants with tools to troubleshoot and solve problems. Issues associated with after 'Go Live' support also fall into the 'Deploy' phase. Online phone-based technical and application support is available in addition to the onsite and remote consulting services. Since rapid implementation is conditional, assessment is required to take place to determine whether the company has acquired the necessary resource and processes.

4.3. Oracle Accelerators and AIM Advantage

With headquarters in California and annual revenue of $9.7 billion in 1999, Oracle Corporation is famous for providing a wide range of enterprise business solutions. Founded in 1977, Oracle employed 43,000 staff world-wide in 1999.

Figure 4.3 Oracle AIM Advantage

Phase	Description	Activities
1	Definition	● Identify business and system requirements, propose the future business model, and propose the application and information technology architecture. ● Organise & orient project team. ● Develop learning plans to ensure team members receive enough training and support necessary to do the jobs.
2	Operational Analysis	● Collect management, technical and end user business process requirements. ● Develop business scenarios for assessing the level of fit between the detailed business requirements and standard application functionality. ● Create a model for the application structure. ● Develop prototypes of business processes.
3	Solution Design	● Create the optimal business process solution to meet the future business requirements. ● Design application configuration options and detailed business procedure documentation. ● Design custom extension, interfaces and data conversion process. ● Identify process and organisational changes required for implementation.

Phase	Description	Activities
4	Build	• Develop custom extensions including enhancements, conversions, and interfaces. • Execute performance, integration and business system tests.
5	Transition	• Deploy the finished application into the organisation. • Fully test the business system. • Execute data conversion. • Use developed documentation to train end users and support staff. • Conduct readiness checks.
6	Production	• Present cutover and beginning of the system support cycle. • Carry out refinement and measurement activities. • Provide on-going support to the organisation for the remaining life of the system. • Begin regular system maintenance.

Source: Oracle Corp. (2000)

As an ERP solution, Oracle Applications is Oracle's flagship product. Oracle also provides AIM Advantage, as depicted in Figure 4.3, which identifies and summarises the key phases in terms of descriptions and associated activities. Figure 4.3 Oracle AIM Advantage, This is a proven, comprehensive method and toolkit to guide the implementation of Oracle Applications. The product integrates with FastForward (a fixed scope offering for implementing Oracle Applications in the middle market), Oracle Business Models and Oracle Tutor. With pre-defined templates, process workflows and project work plans, AIM Advantage streamlines the implementation process to save time and money when deploying Oracle Applications.

AIM Advantage was first developed with the aim of providing the following key features:

- Flexibility – AIM Advantage either uses a pre-packaged approach or develops a tailored approach based upon the size and complexity of the proposed implementation and the organisation's unique requirements;

- Scalability – AIM Advantage was designed to fit a wide range of situations, from the largest, multi-national, multi-site, multi-entity projects, through to the smallest, limited size, constrained scope projects;
- Structured Framework – AIM Advantage uses project phasing to include quality and control checkpoints and allow co-ordination of project activities throughout the implementation. More specifically, AIM Advantage is rolled out in a flexible six-phased approach that helps map the business processes to the Oracle Applications, with full capabilities for management review and changes along the way;
- Leading Edge Technology – AIM Advantage is web-deployed and self-updating. All documentation is on-line and users can drill down to a specific project task and open the deliverable template to begin work.

For carrying out business reengineering, Oracle AIM Advantage utilises business process realignment techniques known as PERM (Packaged Enable Re-engineering). PERM offers a consistent framework for the business process realignment efforts. Easy-to-customise documentation templates are used to help get the project started in the fast track. In terms of technical requirements, AIM Advantage requires some other PC software to be installed.

- Microsoft Windows 2000 or Windows XP,
- Microsoft Office,
- Microsoft Project,
- Microsoft Internet Explorer,
- Oracle Business Models (OBM),
- Microsoft Visio.

As a recap, Oracle AIM Advantage, a comprehensive method for implementing Oracle Applications, is part of Oracle Accelerator's suite of methods, tools and enablers. The incorporation of industry best practices into FastFoward helps further accelerate the implementation. FastForward is Oracle's offering, designed to address the unique cost and timeframe requirements of growing companies. It provides rapid time to market, enabling companies to quickly implement comprehensive e-business solutions at predictable costs.

By executing the six phases of implementation – Definition, Operational Analysis, Solution Design, Build, Transition and Production, the intention is that Oracle Applications should be able to go live with optimal efficiency. Each phase consists of several project activities. Unlike other methodologies, each project activity, which contributes to the success of implementing ERP in a resource constrained environment, is mandatory and therefore is not avoidable. For example, AIM Advantage uses prototyping to illustrate the design of future business processes. Creating an appropriate project environment whereby a project team is formed and team members can be trained is an important prelude to the implementation. Notably there is no so-called 'conference room pilot' in place. The prototyping is therefore a process whereby analysis of existing processes and design of new processes take place. Custom programs as well as conversion methods are designed based upon the prototyping process.

The methodology is intended to be straightforward and easy to understand. Nonetheless, it is sophisticated in terms of the tools available to help the acceleration. Prototyping presents a more interactive approach to understanding and solving the problems, as well as defining solutions to the future business model. However, the validity of a prototype model is a challenge and the process is time-consuming.

The prototype becomes the most important vehicle for developing a blueprint. In short, activities ranging from business process reengineering through to customised development are all included in the AIM Advantage package. Throughout the implementation, Oracle accelerators such as standard workflow and conversion plans are used selectively. As a result, the project can be undertaken quickly, in a fairly short period of time, while the quality of work remains highly acceptable.

4.4. JBA Advantage

Since JBA believes that every customer is different and in most cases the customer dictates the sequence of events, it came up with an initiative of reinventing its proprietary implementation methodology – JBA Advantage. The second generation of JBA Advantage, as proposed in the later chapter is deemed to be more sophisticated, in terms of scalability and flexibility, than any other implementation methodologies previously described.

The concept behind JBA Advantage is to embrace risk management, the sales handover process and customer ownership into the methodology. The Risk Management dimension is concerned with accommodating the assessment and review of the processes necessary to support this methodology in the pre-sales phase. The Sales Handover Phase aims at clarifying roles and responsibilities with the ultimate purpose of improving working practices for the transition period where the customer solution is handed over to the customer consulting services. The Customer Ownership Phase helps clarify the escalation process for prospects and customers and minimises potential conflicts by accurately mapping the implementation process and defining the responsibilities. For each of the three embraced processes just explained above, good communication is the most significant recipe for achieving success. The methodology is divided into phases, activities and tasks in the form of a hierarchical structure. Some activities can be flagged as optional, depending on the scale of the project and the budget constraints. Each activity can be seen as a checkpoint, a planning activity or a process.

JBA Advantage may be considered as a framework that has evolved to empower sales, pre-sales and customer services professionals to deliver the highest standard of customer service for the selection and implementation of System 21. For customer service professionals, it provides a roadmap that sets out a series of activities through which services can be delivered.

Figure 4.4 JBA Advantage

Phase	Description	Activities
1	Pre-Sales	● Prospect Review ● Campaign Set Up ● Campaign Planning ● Establish Customer Requirements ● Define the solution ● Hardware and Communications Planning ● Internal Campaign Review ● Campaign Review with Customer ● Risk Assessment ● Risk Management Review ● Secure Contract ● Handover to Foundation Phase
2	Foundation	● Internal Project Briefing ● Customer Project Briefing ● Project Planning ● Contingency Planning ● Software Planning ● Project Launch Sign-off ● Plan Business Process Workshop ● Business Process Review with Customer ● Sign off Business Models ● Hardware and Software Delivery ● Foundation Phase Sign-off
3	Familiarisation	● Education Planning ● Deliver Education ● Review Education ● Education Sign-off ● Familiarisation Planning ● Familiarisation Preparation ● Conduct Familiarisation Sessions ● Review Familiarisation Sessions ● Customer Sign-off Familiarisation ● Develop Software Modifications ● Plan Data Load ● Familiarisation Phase Sign-off ● Customer Executive Update
4	Simulation	● Plan Simulation ● Conduct Simulation Sessions ● Review Simulation Sessions ● Customer Executive Update ● Sign-off Simulation
5	Implementation	● Implementation Planning ● Contingency Planning ● Live Environment Set-up ● Develop Conversion Programs ● Technical Implementation ● Train End Users ● Verification of Live Environment Set-up ● Data Conversion/Data Entry ● Verify Data Conversion/Load ● User Set-up ● Readiness Review/Go Live Meeting ● Review 'Go Live' Support Plan ● Full Project Sign-off
6	Project Conclusion	● Customer Handover Briefing ● Handover to Support Desk ● Handover Completion ● Project Closure

(*Source: JBA Advantage, 2000*)

JBA Advantage pays much attention to three areas: business processes, continuity of vision, process and people, and the advanced technical underpinning. This methodology embraces the concept of scalability that suits any size of System 21 project from the smallest single site to the largest international project. Scalability means that the activities involved may be the same across small and large projects, but the time allocated to complete each activity may vary.

The methodology is rolled out in six phases, as illustrated in Figure 4.4, namely the Pre-Sales Phase, Foundation Phase, Familiarisation Phase, Simulation Phase, Implementation Phase, and Project Conclusion Phase.

The Pre-sales Phase is included in the new methodology for the primary reason of achieving continuity through using a project folder and baton carrier by which people can follow through the project activities as planned. It is important to underpin the message that the customer's project starts before they start the implementation. In the Pre-sales phase, customer requirements and the level of involvement of the baton carrier are defined.

The Foundation Phase sets the implementation 'terms of reference' and provides the customer with an opportunity to give the project a high profile within their organisation. This phase involves conducting project briefings, moving forward with project planning, contingency planning and software installation, signing off project and business models, reviewing the business processes using JBA proprietary business modeler namely @ctive Modeler which can also be extensively used to understand and re-engineer the customers' business model during the Pre-Sales Phase.

In general, the methodology is less rigid than ASAP, yet it still provides flexibility in terms of allowing customisation to meet with the requirements of an individual environment. It represents a guide to the level of resources required. In many cases, this methodology can be further tailored to meet specific requirements.

There are several implementation models to choose from, depending on the scale of implementation and customer requirements. The simplest model supports Fastart

implementations. No matter which model is adopted, emphasis is placed on continuity, and related activities and tasks are organised in a logical sequence. JBA Advantage defines a number of roles to be assigned to the project. Typically, it requires a 'baton carrier' to be appointed, who will take on responsibility for ensuring continuity. However, it does not clearly describe the relationship between the project role and the functional role of individual project team members. This would allow an individual to accept multiple roles within a project.

In conclusion, according to Allen (1999), a new organisation must have the capability to be profitable, to deliver referenceable customers, and to train and motivate its staff. Such an initiative led to JBA Advantage being re-invented to support the vision and future needs of JBA, and more importantly the needs of customers. Ultimately, this improved version of JBA Advantage is therefore expected to bring into the organisation a competitive edge in competing with other ERP methodologies as far as implementation is concerned.

4.5. Analysis

There is no doubt that none of the ERP implementation methodologies is found to be perfect. This is also applicable to JBA Advantage. First of all, although the methodology is primarily designed to be scaleable and flexible, it will potentially take a tremendous amount of time to complete all the compulsory activities and tasks even for a relatively small-scale project, particularly when there is a tight implementation schedule in place. Few SMEs could afford not to opt for a quick implementation. In such situations the Fastart or quick implementation is therefore generally accepted, as it involves fewer activities.

Secondly, there is a pre-requisite to put in place a so-called baton carrier or managing consultant who will work throughout the sales cycle until the end of the project to ensure continuity. From an operational perspective, this might not be feasible, for two reasons. Firstly, there is an issue of availability of enough experienced consultants to take on the responsibility especially when there is only a small team of professionals.

Secondly, there is a question of who will pay for the consultants' time, since none of the prospects would ever expect to absorb any of the time cost designated to such pre-sales activities.

Finally, the overall project management cost is inflated when there are so many activities to cover and manage. For small projects in particular, customers do not expect to incur a huge amount of cost for project management. The result can be that Project managers end up 'stuck in the middle', hardly moving backward or forward.

In relation to other major implementation methodologies selected for comparison, JBA is unsurpassed in the areas of scalability and activity coverage. Prototyping or blueprint sketching is commonly used in all the implementation methodologies under evaluation. While Oracle's AIM Advantage is more sophisticated in offering a wide range of templates and tools to help define the user requirements and implement the ERP application, JBA Advantage is comparatively weak in providing consultants with such tools to accelerate the implementation process. In addition, JBA Advantage is also vulnerable in terms of incorporating appropriate and adequate tools into any particular implementation. For example, it pays very limited attention to data conversion, which requires extended consideration, including attention to the type of data to be converted and the cost of conversion.

Unlike the other three methodologies, JBA Advantage is limited in terms of promoting best practices by providing standard workflow, templates and data conversion plans, although it supports 'Fast' implementation where project activities can be selectively applied. Over-customisation of the system may result. However, in regard to comprehensiveness, a large number of pre-sales and project conclusion activities are included.

Also, the idea of emphasising 'continuity' and appointing a 'baton carrier' is unique. Ownership is therefore explicitly underlined for a successful ERP implementation. Furthermore, JBA Advantage is like ASAP in terms of recognising the need to prepare the entire organisation before moving into the ERP implementation. Both implementation methodologies place serious emphasis on the 'after go-live' support,

which PeopleSoft Express and Oracle AIM Advantage are found to neglect. Accentuating regular and, more importantly, frequent reviews through the implementation process is one of the characteristics that JBA Advantage is seen to provide exceptionally well. This represents the spirit of JBA Advantage and this step-by-step approach appears to be the most effective way of securing the success of implementation.

Finally, regardless of the implementation methodology, the key lesson learned is that implementation methodology and strategy are always interrelated. This accounts for the cohesive relationship between the implementation methodology and its associated tools.

5. CASE STUDY: PEPSI COLA

This case study aims at presenting description and analysis based on observations spanning ERP projects carried out simultaneously at three Pepsi Cola pilot sites in China. Although these are treated as three separate implementations they all came under a single company initiative in that they had identical intentions and implementation strategies and the same group of consultants was involved. This implies that they can be considered as being linked for the comparison purpose. However, the management styles and degree of dedication involved at these three sites, were notably different.

The author's role in all three projects was to oversee the implementations on behalf of JBA with the consultants reporting directly to himself on a regular basis. The author had also worked closely with the BU project managers, at the planning stage. This meant that full access to data was afforded, thereby providing an ideal opportunity to monitor and evaluate progress on the respective projects. Multiple sources of data including company documents, customer profiles, interview records and customer project review reports regarding the Pepsi implementations as well as market research data and survey results from within JBA International were all possible and available for the research purpose with customer's authorisation and company's approval respectively. Customer interviews as part of the project review mostly took place on-site. The BU advisory project manager and the site project owner/sponsor were involved in every customer interview. Project management issues were discussed as core part of the customer review. There were 4 planned reviews at each implementation site and only 2 were carried out finally in Changchun Pepsi because of the accelerated implementation. Guangzhou Pepsi and Shenzhen Pepsi participated into all planned review sessions. Feedback was analysed and in particular the cultural issues were presented in Figure 5.2 of section 5.8.

The sections below begin with some general background information on Pepsi's operation in China, including an introduction to the function of its China Business Unit (CBU). An explanation of the organisational structure of the Department of Information Technology at CBU follows alongside an account of the ways in which

various departments reacted in terms of selecting software appropriate to their ERP needs.

The individual cases are then explored in more detail focusing on issues such as the inter-relationship between Pepsi BU and JBA International and the degree of support offered by the respective parties. This leads to an analysis of why failures occurred and conclusions about what would have been done differently, with the benefit of hindsight and the reflective learning that has taken place.

Case Study: Pepsi Cola

5.1. Company Profile

Like many other multinational corporations in Asia, Pepsi Cola Inc. (or PepsiCo) established its regional office in Hong Kong. Geographically, PepsiCo is divided into ten business units world-wide. The Hong Kong office is the headquarters for two BUs – Asia-Pacific and China - with a combined workforce of about 120 staff, many of whom are Hong Kong based. Amongst these are some corporate employees who work on auditing, treasury and legal functions.

The primary business objective of the BUs is to foster the business growth of its joint ventures (JVs) across the Asia-Pacific region and China. This implies the provision of a wide range of administrative support and consulting services in various functional areas such as finance and accounting, IT, logistics and purchasing. In some JVs, PepsiCo holds a majority of the shares and exerts a stronger influence than the local partners, over management decision making. Some JV locations, such as Shanghai and Guangzhou, are of significant strategic importance whilst others are much smaller in operation and importance.

At the time of the research, the company had continued to declare operating losses over a period of years and several of its IT-related projects were still underway. Some of these had histories stretching back as early as 1997, when PepsiCo had implemented a JD Edwards ERP package to automate the accounting function for its office in Hong Kong. Since its completion, the company had planned the selection and deployment of additional Enterprise Software systems to help run the finance, sales and distribution functions in its various JVs.

In April 1998, PepsiCo selected JBA System 21 Drinks suite and implementation of this solution commenced shortly afterwards.

5.2. Organisation Structure

The Department of Information Technology was to play an important role in leveraging the information technologies into Pepsi's business operations. A new post,

Director of Information Technology, was first created in 1994, representing a solid commitment to increasing the regional capability in the use of information systems and technologies. Apart from formulating strategic directions, the Director was charged with wider responsibility, covering IT issues in both Asia-Pacific and China. This was a corporate management decision which included letting the IT department deploy appropriate information systems for the BUs.

In early 1998, the management of the China Business Unit (CBU) agreed to the IT Director's proposal to roll out JBA System 21 Drinks suite at its strategic JVs in the next 2-3 years. Geographically, these joint ventures (twenty of them, at the time) were located in widely dispersed parts of Mainland China. The initially selected locations for the implementation of ERP systems included Guangzhou, Shenzhen, Chongqing, Changchun, Beijing, Nanjing, Shanghai and Wuhan.

Within CBU, the departmental structure was flattened and divided into at most two levels within which supporting analysts directly reported to their respective IT managers at a higher level. The internal resource was very limited. IT managers were expected to take on a project management role and report to the IT Director. For the ERP implementations, they had to make full and effective use of external consulting resources. Each IT manager was assigned responsibility for an equal number of projects across China. However, none of them was delegated with decision-making power over and above that of the JV management.

Unlike the two IT managers who were essentially working between the implementation consultants and the user departments, the Director himself worked closely with the management of the joint ventures, focusing upon the determination and selection of ERP systems.

5.3. Selection of Software Package

One of the likely reasons behind the selection JBA System 21, in favour of other enterprise software, was that PepsiCo valued the vision of JBA International as well as the functionality of its software package. In terms of strategic focus on niche

markets, JBA International was one of the few ERP vendors in the market providing multinational corporations, as well as medium sized enterprises, with specialised solutions for the beverage industry.

Although there had been a strategic decision in principle to adopt JBA System 21 as a preferred ERP solution for all the JVs located in China, individual Pepsi locations were still allowed to make their own choices on the final selection and implementation of ERP systems. Consequently some JVs chose to ignore the internal recommendation for a number of economic, political and technical reasons with the result that JBA International did not secure a monopoly within all PepsiCo's joint ventures.

5.4. Pilot Projects

In the two years prior to the commencement of the research reported here, Guangzhou Pepsi Cola Beverage Co. (or Guangzhou Pepsi) and Shenzhen Pepsi Cola Beverage Co. (or Shenzhen Pepsi) signed the first and second contracts with JBA International for the product licence and implementation support of the JBA System 21 Drinks Suite. Subsequently, additional user licences were bought. At Guangzhou Pepsi, 15 user licences were initially purchased, but this quickly moved up to 55 by early 2000. At the time of writing, the company planned to add another 20, with new modules, such as Transport Planning, being added to the original suite. Also, notably, Guangzhou Pepsi relied substantially on JBA International to supply other support including professional services, since they had an increasing numbers of registered ERP users and a more complicated business operation.

Around the same time, Shenzhen Pepsi started their ERP implementation with an initial focus on its Finance modules. In late 1998, Changchun Pepsi, located in north-east China, decided to proceed with the implementation of the sales modules, following an initial purchase of 15 user licences. Among these three locations, Changchun Pepsi had the simplest form of operations. However, even they were still unable to complete the implementation of the selected modules within an expected

timeframe, primarily due to a lack of communication among the implementation teams and a lot of rework on the implementation tasks.

Since the first two contracts, with Guangzhou Pepsi and Shenzhen Pepsi, were signed at the same time, it was believed that resource conflicts could hardly be avoided unless the implementations could be arranged to take place in a set sequence. It was therefore agreed that the financial modules for Shenzhen Pepsi and the distribution modules for Guangzhou Pepsi would be implemented simultaneously during the first half year. Then resources would be swapped around to continue the implementation of the remaining modules. The local management of these two joint ventures finally agreed to this idea and the implementation took place, in parallel, as scheduled.

During the first few months of the Guangzhou Pepsi project it was notable that JBA International failed to complete its work for on time, and a number of reasons can be offered to explain this failure. Essentially, the implementation consultants, who were new to the company, committed several acknowledged mistakes in setting up the system. The mistakes included inappropriate installation of software, improper configuration of the system parameters, and incorrect set up of the master data files. Considerable free work was therefore carried out, in an attempt to rebuild confidence. Unfortunately, the situation continued to get worse. As a result, JBA International was blamed for falling short on its obligation to lead the projects forward and due to the existence of an expectation gap, both parties came to experience considerable frustration. The project managers on the customer side (i.e. Pepsi BU) expected JBA International to take on every responsibility and communicate directly with end-users on every decision. Conversely, consultants from JBA International had a common understanding that Pepsi BU was supposed to lead the implementation. This contradiction carried on right up to the latest stage of implementation, since there was no ownership taking and no mechanism in place for detecting the occurrence of miscommunication and misunderstanding.

Other reasons why the project proved to be so difficult at Guangzhou Pepsi, was that the consultants were rather inexperienced and the users were particularly demanding. Due to the need for a large number of reworks, the quality of service was frequently questioned in the review meetings. It was generally accepted that a lack of confidence

on the part of the customer was one of the underlying reasons for failure as it had been evident, since the beginning of the project, that Guangzhou Pepsi was concerned about the consultants' ability and experience. Neither trust nor synergy was evident throughout the implementation. This was partly due to the fact that no accurate understanding of the business operations was communicated beforehand to facilitate the implementation. Instead, there was an unrealistic expectation that implementing an ERP solution could automatically help improve the business process. Several operational and procedural changes were subsequently commissioned but these changes were not adequately managed either. As a result, the implementation was badly affected with considerable additional cost and service and time being incurred.

Even though confidence was eventually regained as the learning cycle matured and more resources were allocated, the project still overran. Disagreements endured in regard to the way that business operation should be reengineered and the expectation gap failed to be satisfactorily closed towards the project closure.

At Shenzhen Pepsi, one of the most influential obstacles preventing the implementation from moving forward was the human issue. The Chief Financial Officer was given the sponsorship and assigned responsibility to arrange necessary resources for the implementation. Unfortunately, there was no clear indication or directive from the top management to emphasise the importance of the implementation. Consequently, the accounting staff at Shenzhen Pepsi continually refused to work in accordance with the agreed schedule using a claim of 'lack of resource', as an excuse. Conversely, the implementation consultants, lacking sufficient understanding of the users' requirements, introduced several errors into the configuration settings. For example, incorrect interpretation of the requirements was evident as the consultants attempted to formulate these without adhering to strict governance whereby the validity of the requirement could be ascertained. Also, the consultants failed to demonstrate adequately an ability to accurately set up the chart of accounts. As a result, user confidence was even further diminished.

The project delays at both Shenzhen and Guangzhou were clearly related to improper alignment with user expectations. Particularly in the case of Shenzhen Pepsi, neither the project sponsor nor the end-users were particularly enthusiastic about leaping into

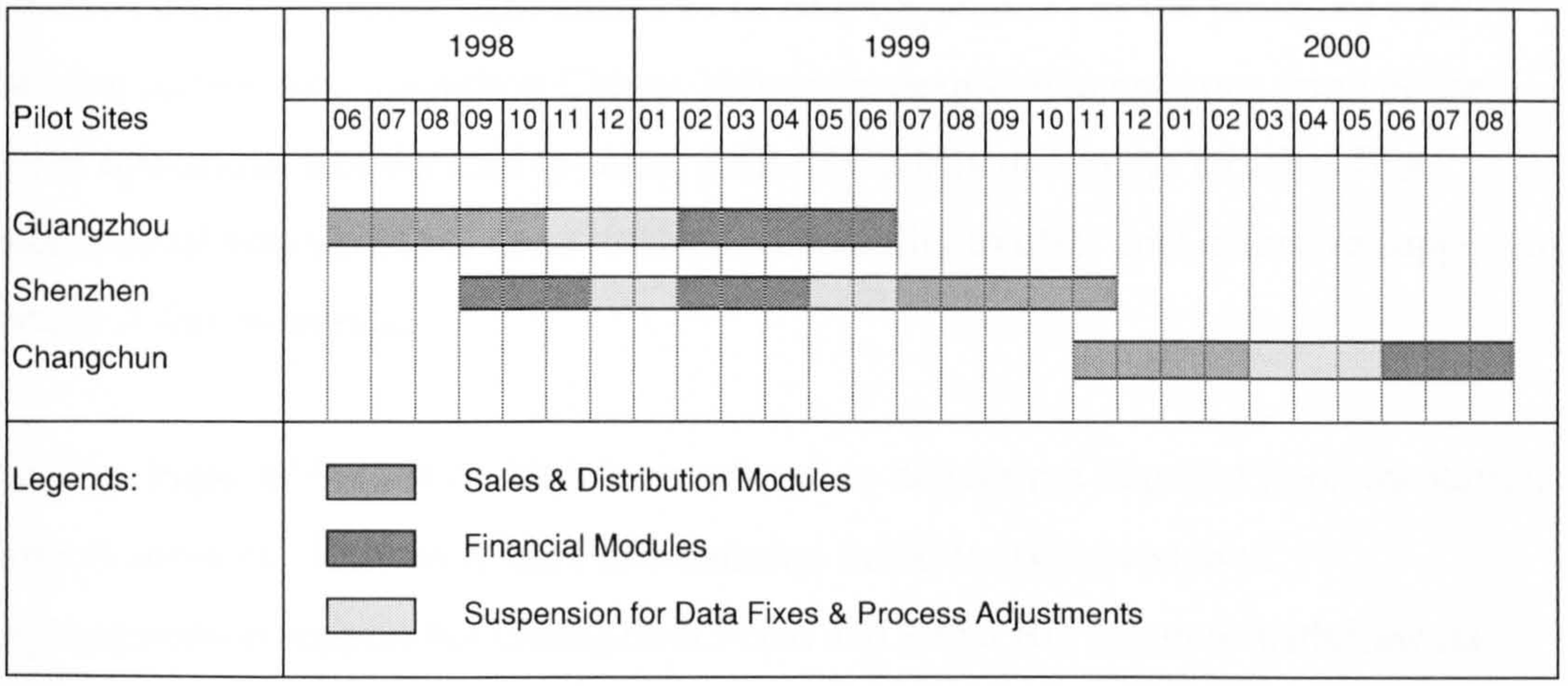
a new system to improve efficiency. The only directive or incentive offered was simply to select and implement Y2K compliant accounting software as an upgrade to the current system. However, the end-users, mostly accounting staff, kept presenting various excuses to avoid moving the project forward. In particular, they found the new ERP solution more complicated than the PC-based accounting system that they had been using for years. Furthermore, from a user's point of view, JBA System 21 appeared to have no advantage over the system that it was replacing. Furthermore, in absence of official approval from the local Tax Bureau, System 21 was prohibited from being used as an authorised tool for reporting the company's P&L accounts.

As a contingency plan, Shenzhen Pepsi eventually bought a copy of a millennium-compliant version of their existing PC-based accounting software, and it was not until January 2000, that a final decision was confirmed that the existing PC-based accounting system would be replaced with System 21. From that point onwards, the implementation was again resumed. Then, quite suddenly, a lot of outstanding issues emerged, demanding immediate solutions. Most of the issues were related to system integration. Hence, it became evident that the company was never ready to implement the ERP solution.

The third of the case studies concerned the project with Changchun Pepsi which had originally started in late 1998. The work that was initially carried out was very similar to that at Guangzhou Pepsi i.e., implementation of the Sales and Distribution modules initially. In terms of the project environment, the project size of Changchun Pepsi was more or less similar to that of Guangzhou Pepsi and Shenzhen Pepsi and the original implementation schedules, as illustrated in Figure 5.1 were largely overlapping.

It was also agreed to adopt a 'fastart' implementation with a very limited number of visits to Changchun Pepsi during the first three months. By February 1999, the first phase was declared complete. There were two reasons for such a fast implementation. First, the consultants had learned enough from the first two implementations with Pepsi Cola. Second, Changchun Pepsi was also able to assign internal resources to work closely with the implementation consultants during intensive training and implementation programs.

Figure 5.1 Implementation Timeline



(Source: JBA International, 2000)

Following completion of Phase 1, the project was suspended until June 2000. The suspension was partly due to the massive data validation and fixing process that had to be carried out following the consultants' work on data conversion. The project resumed in a better shape and the financial module was implemented in three months, thereby according to the local requirements. However, some discrepancies were found, due to incompatible interfaces, as the charts of accounts defined for Guangzhou Pepsi and Changchun Pepsi were inconsistent.

From here on, another round of data fixing and customisation took place and the problems were finally resolved. However, the project completion was delayed and Changchun Pepsi was forced to undertake additional customisation since the embedded business model, as initially developed for Guangzhou Pepsi, was not deemed to be completely applicable.

5.5. Customer Interaction

Following their experiences, as outlined above, the project managers from both Pepsi and JBA International eventually moved closer together and presented a more concerted joint effort in terms of moving the ERP project forward. Both companies essentially agreed to value and promote the concept of effective partnership. A

mutual agreement was reached whereby the BU project managers should actively work towards persuading individual JVs to adopt System 21 as the preferred ERP solution across Asia, including China. However, despite this pressure some of the Asian operations still decided to select SAP R/3, partly due to the fact that JBA International was unable to demonstrate its capability to offer cost-effective support in certain Asian countries.

Initially, Pepsi BU relied on JBA International to deliver the required implementation support services. However, JBA International failed in its provision of implementation support for Guangzhou Pepsi and Pepsi BU began to withdraw its direct support for JBA International. As a consequence, the strategic partnership virtually broke down.

5.6. Support Issues

Depending on the scale of operations, some Pepsi locations were not able to sustain the necessary resources for IT support. It is likely that they were expecting as much assistance as possible from Pepsi BU to manage the ERP projects. In addition to project management, software development support was also necessary and critical. Sharing the corporate resources and support was therefore a strategic decision for Pepsi. However, this brought about situations where simultaneous implementations were difficult to implement as a result of conflicting calls on resources. To help out, project managers from Pepsi BU worked on behalf of the joint ventures to implement the ERP systems alongside the consultants from JBA International but in any particular timeframe, there were still always two implementation projects underway.

In terms of roles enacted, it was mutually agreed that the consultants from JBA International would conduct all user training and workshop provision, while Pepsi BU would take care of all remaining activities involved in subsequent implementations. The agreed plan, emerging from the contract negotiation, was to make good use of Pepsi BU's project managers to manage and lead future projects, leading to a substantial reduction in the support provided by JBA International.

Support for the remote locations involved also proved to be difficult since dial-up access to the remote hosts proved to be a somewhat inefficient and unreliable method of providing support, largely due to the inferior network infrastructure that was in place at this time. Either the connection could not be established, or it was suddenly lost, resulting in only a partial update to the database. On-site support was therefore preferred. However, such an arrangement in China could only be partly justified. Guangzhou and Shenzhen are geographically, relatively close to Hong Kong with daily scheduled intercity through trains linking the two locations (typically about two hours). Conversely, Changchun is some 2,500 miles away. Consequently, it took a day or two to get there in order to provide on-site support. For remote fixing, as noted above, the data link needed to be more reliable.

In order to enable a more efficient support facility, a mutual understanding was reached that someone from within each implementation location would be assigned to work with the consultants in providing user support. Nevertheless, the outcome was not as satisfactory as expected since in practice, it was found that the assignees proved incapable of learning well enough to assist the consultants. They were either not interested or not capable of understanding the work that was being carried out during the implementation. Language was one of the key issues since all displayed text was in English and the user manual was also written in English. Another difficulty arose due to hostility and failure to recognise the new systems. In general, at this time, the concept of ERP was still quite new to most local businesses in China and it inevitably proved necessary to count on repeated training to help individuals appreciate its use. Even then many individuals appeared to remain ignorant about why ERP systems were needed. As a result, no significant improvement was made in terms of helping the implementation and very often, the entire effort was in vain.

5.7. Analysis of Failure

Implementing an ERP system is like managing any other project that requires collaborative planning and effective resource allocation. Contingency planning is always mandatory. More importantly, user expectation needs to be carefully managed,

particularly since the impact of project failure is so widespread and severe, given that the whole organisation is likely to suffer.

An exhaustive degree of preparatory work is vital to ensuring a company's readiness to proceed with ERP implementation. The ideal situation is where everyone from the organisation is motivated to support the implementation. However, this rarely happens in real life. For example, only a small group of people from Shenzhen Pepsi was really dedicated to supporting the implementation. Even the involvement of the project sponsor was minimal, as he, himself, was brought onto the project without having been properly briefed about the objectives and predictable potential downsides of the implementation.

Furthermore, leadership was absent and nobody appeared to respect the consultants or the implementation services that they provided. This appeared to reflect Shupe's (1999) view that one of the critical factors for successful ERP implementation is to put the right people in place, who have leadership abilities. Similarly, according to Allen (1999), designating a single leader is vitally important for avoiding risks.

Detailed knowledge of the company business environment is another acknowledged key to success but observations in this case revealed that on PepsiCo's projects implementation consultants rarely got to know enough about the business processes involved. For example, upon signing the contract for the pilot implementation, PepsiCo was full of confidence that Guangzhou Pepsi would become a showcase for other Pepsi managed bottlers across China. Initially, everything appeared to be going well, apart from some complaints about the availability of resources. However, shortly afterwards, an expectation gap became starkly evident in terms of the project deliverables. From this point onwards, the working relationship between PepsiCo and JBA International began to deteriorate noticeably. Partially as a result of miscommunications between the parties, during the Pre-Sales stage, Guangzhou Pepsi continued to express their frustrations with the consultants' perceived inability to deliver on commitments.

The issue of software customisation was also a significant issue here. It is widely recognised that customising ERP software packages, in order to interface with legacy

systems, is always a challenge and is not recommended unless there is strong justification and a definite scope of work can be clearly defined and agreed. In general, the avoidance of customisation is usually favoured, since customisation work is always risky and, in the worst case, may even kill the entire project.

Support and maintenance of such customised programs is also an issue. Particularly in Hong Kong, it is quite common for people to change jobs very frequently. According to Trepper (1999), staffing was ranked the second most important management problem facing ERP project leaders and managers. Good people are hard to retain, partly because they tend to be continuously looking out for, and subject to, improved offers in terms of salary remuneration, title upgrades and job satisfaction. Smart, young talent is even harder to keep. Most such people are energetic, innovative and competitive. Therefore, for those IT firms that look for a progressive business growth and who want to remain competitive, a key management issue is the keeping of people who are well versed and effective in the latest technologies. With a frequent turnover of personnel, quality of work is not easy to guarantee; nor is there sufficient expertise to deliver the required service. For example, at Pepsi, a lot of customisation work was carried out as a result of the consultants lacking competence and/or the experience needed in order to be able to suggest alternatives to meet user expectations.

Reflections on experiences in these cases suggest strongly that incompetence in managing user expectations and participant relationships was a key factor underpinning project failure. This appears to concur with Roberts (1997) conclusion that inappropriate set up of the project organisation. Preserving a good user relationship requires an extended level of care and attention. For example, Guangzhou Pepsi exemplifies a situation where collaboration and expectation was badly managed, and poor alignment of work was clearly evident. Here, the finance manager assumed responsibility for co-ordinating the resources needed for the implementation, while JBA International took the role of project manager. However, all that the finance manager expected to have to do was to express her new ideas for of the improvement of logistics operations, and this would then be implemented automatically as a feature of the ERP implementation. Unfortunately, the new ways of doing business that

descended from this directive, introduced several requests for changes to the software, which in turn led to several difficulties of the type discussed above.

Clearly, the management of customer expectations requires careful planning and mutual understanding among the team members and this constitutes an integral part of any ERP implementation. For example, Guangzhou Pepsi continuously requested customisation that was barely achievable, as it would have taken a lot of time and significant resource allocation for the development work to be completed. As it transpired, Guangzhou Pepsi committed up to twice the budgeted cost to the implementation while JBA International, on their part, donated many hours of free work as part of their compensation for acknowledged rework and inefficiency. Quite clearly, this represented a compromise between the both parties since the user requirements were not completely spelled out and accurately interpreted. Fortunately, the finance manager at Guangzhou was so dedicated to the project that she was prepared to work very closely with the implementation consultants to make sure that Guangzhou Pepsi would obtain the intended benefits from implementing System 21, and the project was eventually completed. However, it could hardly have been counted a complete success, by conventional project management standards.

In the second case considered here, Shenzhen Pepsi also experienced their own set of difficulties when implementing the financial modules from System 21. According to Allen (1999), successful implementation depends substantially on the extent to which functional managers remain accountable for project delivery. However, in this case, no one was ever assigned ownership of either success or failure. The financial controller who was assigned the role of project sponsor was found to be limited in his ability to push for the implementation due to the fact that in practice, he was fully preoccupied with the routine operations on which his KPIs were defined while the JBA project manager could offer only limited help in turning this failure into a success. Consequently, the whole project slipped six months behind schedule, and the financial chart of accounts was changed several times with lots of rework being involved during its implementation.

The third case considered here was that of Changchun Pepsi. Some six months after the implementation work started at Shenzhen Pepsi, Changchun Pepsi also requested

an implementation of the sales modules in order to kick off their ERP project. Consultants were sent to Changchun in late October of the same year to start a 'quick implementation'. Based on the customised model that Guangzhou Pepsi had implemented, Changchun Pepsi managed to successfully roll out their sales order processing application, and then their accounts receivable module, over a period of three months. However, in the succeeding few months, the operations started to suffer. This could be attributed to the fact that Changchun had their own requirements that where different from those that had been formulated at Guangzhou Pepsi, so the system as adopted was not necessarily a best fit.

The ultimate reason for the failure was that all of those concerned, had assumed that ERP would be able to achieve whatever had been planned for it to achieve, without first attempting to exchange ideas about strategic priorities for the implementations across the respective Pepsi facilities. For example, Guangzhou Pepsi aimed at reengineering their business processes while implementing System 21. However, other Pepsi facilities did not have such requirements.

As of December 1999, Pepsi had come to operate some 16-20 facilities in China. Although each facility had a similar business model; unfortunately, each of these operations varied slightly since PepsiCo's control over local management was very limited.

It also needs to be recognised that the ways in which IT projects are managed in Asia is very different to the way it is done in the western countries from which ERP emerged. This is particularly so in China, where it has become a common but daunting challenge for project managers to build co-operative structures amongst individuals who lack experience in sharing responsibility on the implementation of ERP systems. For example, at Shenzhen Pepsi, there were frequent examples of failure to meet schedules, largely owing to senior managers being unable to commit enough time to the project. As a consequence, there was little momentum in place to drive the project forward.

Additionally, as already elaborated upon in earlier sections, managing user expectations is an acknowledged key to success, but this demands full collaboration

from senior executives. However, these senior executives must firstly understand their information environments, as explained by Typanski (1999) and endorsed by Bryan (1999). This analysis suggests that lack of executive buy-in was instrumental in these failures.

At Guangzhou Pepsi, the financial controller who was appointed as the project sponsor during the project kick off, apparently expected the consultants from JBA International to provide full support on any implementation issue arising. However, with respect to the provision of resources, it had apparently never occurred to the company that it should supply more analysts to work with JBA on the implementation. Conversely, the consultants from JBA erroneously assumed that Pepsi would be assigning technical staff to learn how to implement System 21. Hence the user expectation, as finally understood, was different to that which was originally communicated during the sales contract negotiation. Pre-sales consultants came up with a proposal based on an understanding that Pepsi would be allocating the necessary resources and would be working closely with the consultants during the implementation. As suggested by Allen (1999), involved managers should collectively own the project. However, the split of responsibility was neither clearly defined in the proposal nor well communicated to senior management, including the project sponsors. Notably, it was supposed to be Pepsi BU's responsibility to close the communication gap between Pepsi JVs and JBA International but this failed to materialise.

Finally, there was evidently some misunderstanding among the respective inter-working groups – Pepsi BU, Pepsi JVs and JBA. While Pepsi BU was unable to manage the alignment of their plan with that of JBA International, Guangzhou Pepsi and Shenzhen Pepsi blamed JBA International for badly managed support. This implies that there was not always a well-organised team structure with proper sharing of responsibility. For Guangzhou Pepsi, the team structure was agreed during the initial planning session. However, Pepsi BU was omitted from the structure and this confused people about what kind of support they would be providing during the implementation.

From half way through the implementation onwards, individual Pepsi JVs started to deal with JBA International directly. However, disputes resulted, due to several serious misunderstandings about job arrangements and the sharing of responsibility. Again, what people were interested in was how quickly the reported faults could be resolved. Nobody appeared to have thought of the validity of the team structure. No formal discussions or meetings were scheduled to define the information flow and problem handling at a strategic level and it is concluded that the organisation was simply not ready to implement an ERP system. Pre-implementation preparation activities therefore needed to be properly arranged for, as Donovan (1999) suggested, if people are not well prepared to accept and operate within the new environment, implementation is highly unlikely to succeed. While key changes are needed, education is the best way to influence peoples and develop their mindset to accept changes, as Dey (1999) suggested.

5.8. Reflections

Summarising, these case studies have explored a number of surrounding issues such as support from within Pepsi BU, difficulty in sharing resources and difficulties encountered in providing on-site support from JBA International. From this, it must be concluded that generally, there was a notable lack of significant accomplishment in terms of budget overspends and project overruns throughout these implementations. However, it was also noted that these failures produced rather different degrees of impact on the respective businesses involved.

These problems occurred despite key representatives from within Pepsi BU working alongside staff from within the individual joint ventures and consultants from JBA International. Hence in principle, collaboration was present but in practice this occurred in a totally disorganised manner. Expectation gaps, ownership taking and resources conflicts were left unresolved. In general, it appeared that the joint ventures assumed that System 21 would prove to be a tool for changing their operations and business processes with minimal human intervention. Consequently, support for the implementation from within Pepsi was seen to be minimal. Conversely the consultants were left with unreasonable liabilities throughout and were faced with unachievable

timeframes for service delivery. As a result, none of the implementation projects was deemed to be a success. Indeed, it was concluded that part of the reason behind the implementation failures was a lack of trust and confidence between these partners.

The case studies also show that the company (Pepsi) was apparently not ready to adapt to the changes introduced by implementing an ERP solution. The cases also indicate that no matter how successful the work is, leading up to the go-live situation, support for the post 'go-live' period must not be underestimated.

It is therefore concluded that the failures observed in these studies were usually due to a lack of collaboration among teams from the respective stakeholder organisations, rather than simply inability on the part of the consultants, in managing users' expectations. As a result, a lot of unexpected extra work was necessary and, to certain extent, this further complicated the implementation. Among the various reasons for failure, miscommunication and misinterpretation, specifically at the initial stage of implementation, had a particularly significant impact on the entire project. Early consultation was not present, nor was there any corrective action towards the end of the project. Furthermore the initiative, aiming to improve the business processes, introduced substantial customisation work, which dragged the entire project into deep trouble.

Poor implementation support, partly due to the inaccessibility of technology, represented another contributive factor in the failures. This seriously impaired the consultants' ability to deliver the expected level of service. As a result, the project's momentum was lost and the BU became politically reluctant to further engage with the implementation.

More importantly, the case studies have illustrated a general need to adequately prepare organisations for ERP implementation through consistent communication of a clear vision in a cascaded approach backed by appropriate training, as needed. The benefits of implementing an ERP system also need to be fully communicated since if these benefits are clearly recognised, a substantial degree of support can result.

Figure 5.2 Factors Affecting ERP Implementation Failures

	Case 1 Guangzhou	Case 2 Shenzhen	Case 3 Changchun
Language		✓	✓
Business process re-engineering	✓	✓	
Report & table	✓	✓	✓
Partnership	✓	✓	✓
Price issue (cost & benefit)	✓		✓
Lack of focus and user participation		✓	✓
Lack of management support		✓	
Data communications		✓	✓
Availability of consultants			✓
Project management	✓	✓	✓

Source: Author's Field Study Data

Implementing foreign ERP systems like JBA System 21 in China is always difficult largely because of the cultural difference coupled with other environmental factors. Addressing cultural issues hence became the centre of this research. In regard to the factors affecting the ERP implementation failures across the 3 pilot sites at Pepsi as illustrated in Figure 5.2, culture includes language, the way of re-engineering business processes, localized report formats and partnership with local people in delivering services. Apparently, the report formats, project management and partnership are seen to be the common issues jeopardising the implementation while management support and availability of consultants are deemed to be more specific to individual cases.

From the case studies carried out at Pepsi in China, cultural issues are deemed to have significant influences to the success of ERP implementation. Significant localization on forms and reports took place given the statutory regulations applied. Communication was always an issue especially in northern China. This was mainly associated with the language for communications. Geographically, China is huge and the ways of communication in different parts of China are different. In all three cases, consultants were not able to correctly interpret and translate the requirements posed locally. Moreover, pricing issue is also an important consideration and mostly cost

can no longer be justified given the change of benefit throughout the implementation process. Project control is absolute critical in all three cases. Lack of trust and confidence with the consultants happened simply because these consultants were unable to fully appreciate the cultural gaps behind. Resource control was rather weak since the PMO was structured in such a way that effective communication between consultants and users was not facilitated. Addressing individual issues one by one did not seem to be effective and rewarding. Instead, all these issues needed to be tackled in a collaborative environment. Again, this formed the baseline for moving forward the research.

6. DEFINITION OF HYPOTHETICAL MODEL

Essentially, the hypothetical model is defined in a two-fold manner. Both macro and micro improvements are offered as a means towards securing successful ERP implementations. The improvements that were derived, and offered for validation, were grounded in the observations and reflections when reviewing the ERP literature on commonly used implementation methodologies. However, these were substantially elaborated upon, following examination and reflections on the case study experiences with PepsiCo's ERP implementation projects.

From a micro-focused perspective, it was evident that the JBA Advantage implementation methodology would need to be substantially improved. With respect to the macro-focused perspective, the new, hypothetical model embraces the newer version of JBA Advantage (as Tier 1 task force) with unavoidable course of actions included in interaction with a number of selective strategies (as Tier 2 task force) to form a proposed framework with which ERP implementation should become more secure. In other words, the micro-focused change represents the Tier 1 task force while the macro-focused model takes into account both the micro-focused change and the additional strategies (i.e., Tier 2 task force) which are considered selectively depending on the applicability.

6.1. The Macro-Focused Hypothetical Model

The macro-focused hypothetical model features the development of an integrated environment whereby implementation strategies and JBA Advantage interact collaboratively. There is no single implementation strategy that can guarantee successful ERP implementation. However, the seven strategies as recommended in Figure 6.1 do provide a contribution considered to be specific, flexible and, more importantly, 'adaptable' to the implementation methodology.

Definition Of Hypothetical Model

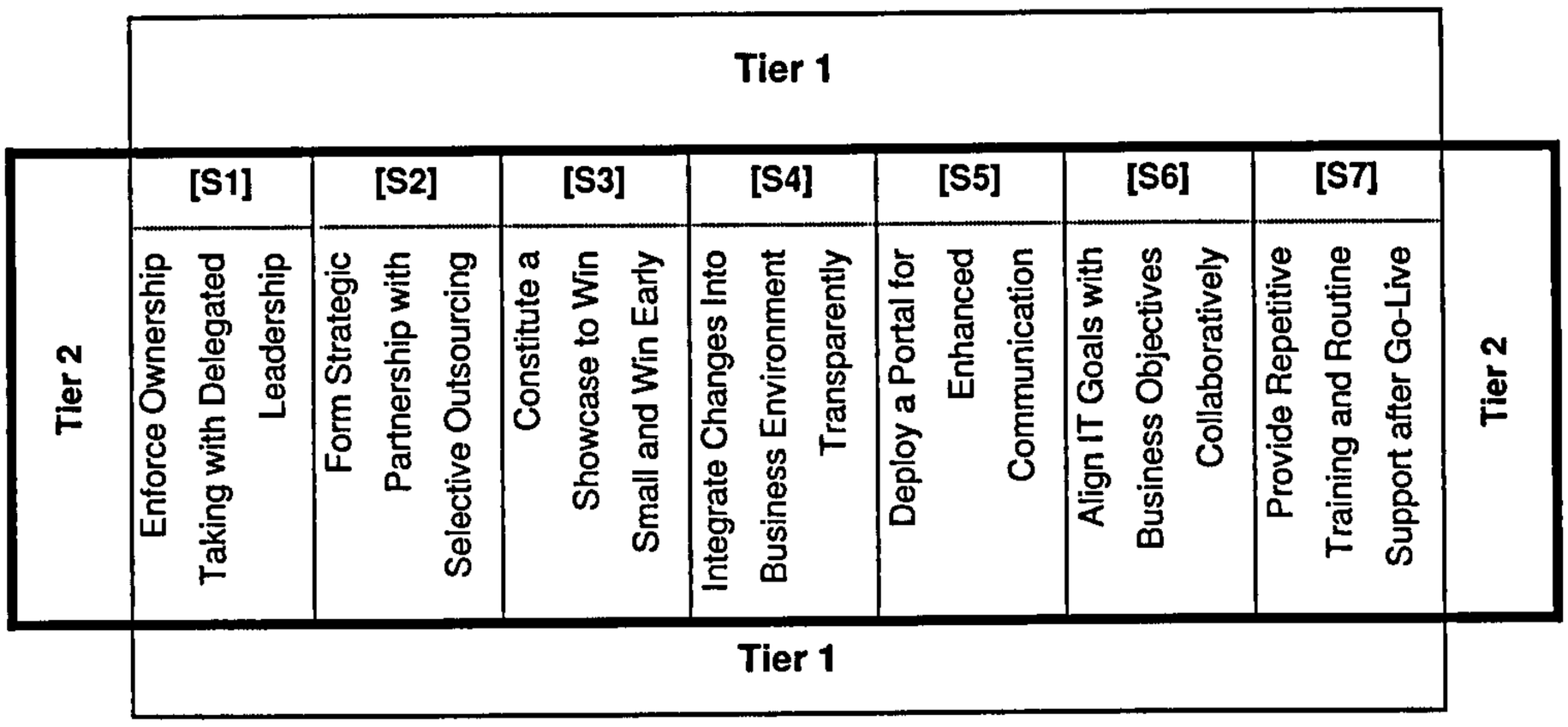


Figure 6.1 Hypothetical Two-tier Adaptive Strategy Model

Each of the strategies is explained as follows:

[S1] Ownership taking is key to making sure that every piece of project work contributes positively to success. However, ownership cannot be exercised effectively until a clear vision is defined and communicated (Kotter, 1996; Clarke, 1999 and Murrin, 2001). Given that executive buy-in (Typanski, 1999 and Bryan, 1999) can lead directly to sponsorship of effective ownership taking, executives must be encouraged to clearly understand the information environment. This is a prerequisite that will enable them to contribute directly to the implementation process rather than simply pushing hard from above, for results. Executive staff involvement therefore represents a vital aspect of leadership, from which momentum is imparted. Effective delegation is also of key importance especially during the lead up to the implementation.

[S2] Structured teaming needs to be present in order to ensure that the individuals concerned are able to contribute positively to the project as expected. Logically, teams are made up of internal and external resources. Internal resources include the functional managers, project managers, supporting staff and of course the end-users. External resource issues include the strategic use of partners and selective outsourcing. Additionally, it can be useful to have a 'mediator' or a 'translator' (Hamel, 1996) sit in the middle, assuming the responsibility for closing the expectation gasp and resolving any issues and disputes that

potentially inhibit the project from moving forward. Teamwork is therefore imperative. Leadership (Murrin, 2001) is also an essential part of this role, and becomes a necessity in terms of enabling effective teamwork. To a certain extent, synergy is expected as a result of effective leadership. As important as leadership, a supportive organisational structure is also needed as Wee (2000) suggested.

[S3] Managing user expectations is a major task that the project team should address. This should begin with a thorough understanding of the company's culture and business strategy (Donovan, 1999). Furthermore, for effective implementation of the ERP system, a clear objective must be communicated (Clarke, 1999). Subsequently, user involvement and training (Holland *et al.*, 1999) should be encouraged and provided respectively. Over-customisation should be avoided and a 'win-small-win-early' approach, in concert with a 'showcase' should be adopted to ensure that user confidence can be expanded (Kotter, 1996 and Hamel, 1996).

[S4] Changing the way that people do business through implementing an ERP system represents a logical approach towards introducing best practice. However, resistance should be expected. Insufficient attention to 'change management tactics' can kill the project (Bryan, 1999) and this, in turn. It is unlikely to be effective unless an appropriate training scheme is integrated (Stratman and Roth, 1999). Procedural and technological changes should therefore be incorporated transparently into the business environment. But this calls for an evaluation of the business environment and the company's culture, from which a strategy for preparing the organisation for implementation of ERP systems can be developed.

[S5] Throughout the implementation, communication is vital (Randolph, 1994; Ward, 1995; Kotter, 1996; Lanfer, 1997 and Hammer, 2001). Consistent communication helps keep the project on track and helps to eliminate misunderstanding and misinterpretation in the area of change management. Alongside the communication channels, effective collaborative tools need to be

available. Ideally, the communication tools should be web-enabled so that relevant information can be obtained, exchanged and updated more frequently. Portal technology, in the era of Internet communication, should therefore be embedded to enable more effective and efficient communication.

[S6] Business/IT alignment is always important in terms of making an ERP project meaningful. Information technology by itself is not the driving force behind success, unless business processes are changed accordingly to improve the operational efficiency and/or financial performance. The good side of implementing an ERP system is that it changes the way people do things. However, a lack of BPR experience (Huang & Palvia, 2001) can also contribute to failure in ERP implementations. Therefore, managing BPR constitutes an integral part of the hypothetical model and in many cases IT objectives and business goals are forced to compromise.

[S7] Quality assurance is concerned with making sure an ERP implementation runs smoothly in a healthy environment and ends with adequate 'post-go-live' support. Training (Donovan, 1999; Bryan, 1999 and Holland *at el.*, 1999) is generally seen as an irreplaceable tool for conveying a project's vision, objectives and working instructions throughout the ERP implementation, and needs to be provided repeatedly, with contents being modified as needed. Hence at the core of this hypothetical model is the principle that 'go-live' represents but one milestone towards the completion of a project.

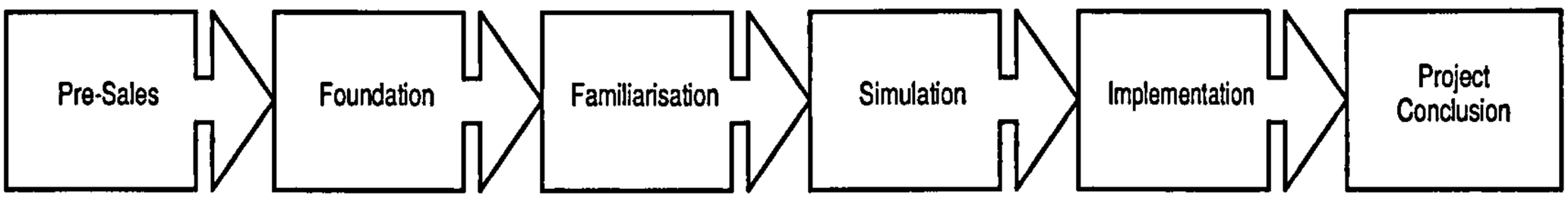
6.2. The Micro-Focused Hypothetical Model

The micro-focused perspective, JBA Advantage, is depicted schematically in Figure 6.2, which represents a direct replacement of SIP. This appears to be a promising methodology for the implementation of System 21 due to its sophistication and scalability. 'Fastart' implementation is fully supported. In the context of functional coverage, JBA Advantage can be claimed to be superior to other implementation methodologies in the following areas:

- Pre-Sales activity is included as part of the implementation,
- Sales campaign and risk assessment are covered,
- Internal and customer project briefings are conducted prior to reviewing the project plan,
- A graphical tool, '@ctive Modeler', is used to help develop a business model,
- Customer executive updates are done in a shorter interval,
- Formal sign-off is adapted to secure completion of milestones.

On the other hand, JBA Advantage falls short in some areas. For examples, it is somewhat weak on critical considerations such as accurate definition of the scope, BPR alignment, evaluation of company readiness, gap analysis, sharing of ownership, and appropriate use of tools for functionality mapping and status reporting. Also, development of change programs and post implementation support is limited.

Figure 6.2 Current Model of JBA Advantage



Source: JBA International

The ultimate success of the project very much depends on how effectively the next generation of JBA Advantage can help to drive ERP implementation processes. A key research objective is therefore to develop an upgraded version of JBA Advantage with the ultimate goal of increasing the likelihood of success in closing deals as well as in the implementation of ERP systems.

By addressing the project failures at PepsiCo, a hypothetical model of refinement or the next generation of JBA Advantage, as depicted in Figure 6.3, is thereby defined, which includes the incorporation of additional components integrated into its original JBA Advantage model.

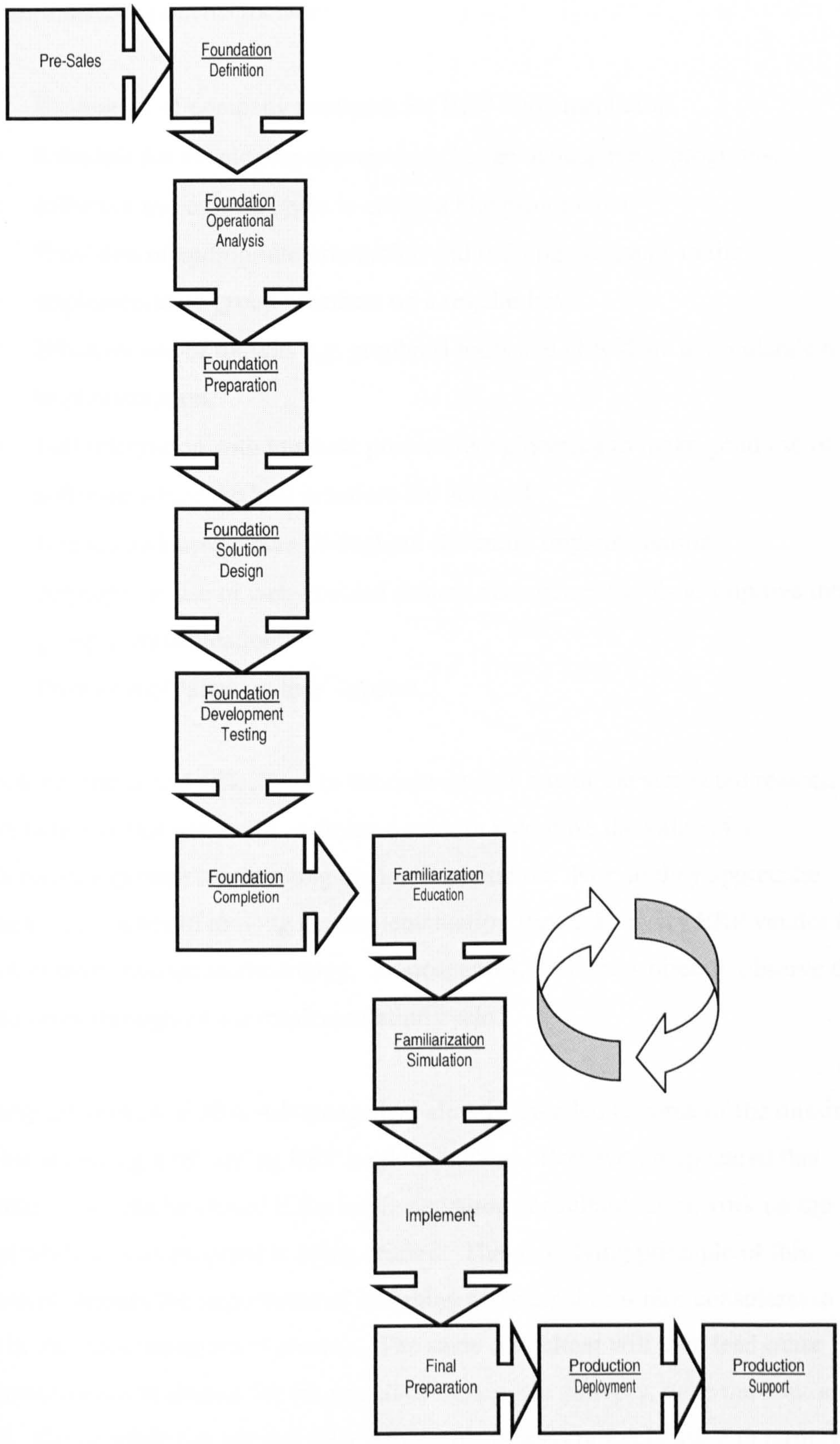


Figure 6.3 Hypothetical Implementation Methodology

The additional components include:

- Evaluation of company readiness for ERP implementation.
- Schedule for developing appropriate change management programs.
- Effective use of prototypes to create a blueprint model.
- Provision of appropriate orientation and training programs to the implementation group members on a regular basis.
- Effective use of toolkits e.g. graphical tools and checklists to accelerate the implementation.
- Full integration with business process reengineering to make good use of the software where the best practices are adopted.
- Regular risk assessment throughout the entire implementation.
- Appropriate use of web-enabled project management tools to improve the group communication.
- Provision of 'after go-live' support.

From observations and reflections in the case-studies one of the suspected reasons for project failure is that generally, customers seldom recognise the value of a collaborative approach to managing the implementation. Nor do they appreciate structural approaches to moving the implementation forward. Every ERP vendor has its own implementation methodology. In most cases, customers directly observe the methodology throughout the implementation cycle.

The original version of JBA Advantage had already attended to some of the missing links for achieving a rewarding ERP implementation. However, it appeared that expectation gap can be closed if the implementation consultants start work on the project while a sales proposal is being drafted. The underlying principle of this refinement stresses the importance of assigning a principal or senior consultant to assist in the sales engagement process. The same consultant will then lead other implementation consultants for the period of the service delivery, once the contract is signed. Hence while the original JBA Advantage is less comprehensive in terms of solution design and testing, user communication, process control, definition of roles

and post- implementation support coverage, the newer version consists of six phases, as follows:

1. Pre-Sales,
2. Foundation,
3. Familiarisation,
4. Implementation,
5. Final Preparation and
6. Production.

Major changes in relation to the original model include the insertion of new activities into the Pre-Sales and Foundation Phase and the rearrangement of activities in the Familiarisation and Production Phase. Examples include the management of users' expectations from the outset, the making available of custom programs for the simulation session and the arrangement of 'after go-live' support.

The new version of JBA Advantage was to be extended to include full coverage of the implementation cycle from pre-sales through to support after go-live. It also pays attention to the repetitive process of ensuring organisational readiness and validating the fitness of the prototype. In addition, it focuses on improving the communication process. Finally, it requires that prior to implementing an agreed solution, adequate testing should be carried out to make sure that the design of the solution is appropriate.

With respect to the implementation cycle, it was considered from the previous phases of research that none of the common methodologies seemed to cover all of the expected project activities. For example, some methodologies emphasise simplicity, while some are keen on providing flexibility of options but none of the approaches is perfect.

In contrast with other methodologies, the spirit of JBA Advantage lies with securing contracts by introducing a Pre-Sales phase in which the initial planning of software configuration is covered and an appropriate internal campaign is established, followed by risk assessment and drafting of an implementation plan. Also, the original JBA

Advantage arguably paid limited attention to the support issues after the system goes live, and it was concluded that this should be remedied in the new version.

In summary, the refined model attempts to identify the missing links to the project success, and then redefines and redevelops the project activities to increase the effectiveness of executing JBA Advantage. Proposed changes, most of which are improvements, have been incorporated into the next generation of JBA Advantage, as summarised below (from A to Q):

A. Evaluating the company's readiness to adopt the ERP system.
B. Minimising the change of business processes to fit the proper and efficient use of the software (i.e. support to BPR through gap analysis).
C. Incorporating more toolkits to expedite the project activities.
D. Using a proprietary prototyping tool – @ctive Modeler to develop an optimal business process model.
E. Separating education into the Level 1 (fundamental) and Level 2 (extended) training phases.
F. Extending the Foundation Phase to cover the development and delivery of custom extensions and programs.
G. Installing custom extensions prior to conducting Level 2 training.
H. Providing on-going orientations throughout the implementation cycle.
I. Incorporating a Simulation Phase into the Familiarisation Phase.
J. Ensuring that the Familiarisation Phase itself is repeatable until the project members are 100% confident of implementing the ERP system.
K. Providing for the business model and use of the ERP system to be presented by the key users, who are also the project members, during the Simulation sessions.
L. Splitting up the Project Conclusion Phase into Final Preparation and Deployment Stages of Production.
M. Introducing the Production Phase that extends the Project Conclusion Phase to cover the deployment of customised functions and address the support issues beyond the system go live date.

N. Adopting a parallel run in lieu of a direct changeover for non-Fastart implementations.
O. Assessing the impact of deployment on the enterprise and developing measures to secure smooth implementation.
P. Introducing a web-based project management tool to improve group communication and inspire collaboration.
Q. Developing change programs upon completion of risk assessment for every defined milestone.

6.3. Formulation of Hypothesis

It is postulated that incorporation of the above changes into the current version of JBA Advantage, should lead to an improved generation of the product. The central hypothesis is therefore defined as follows: Properly managing customers' expectation will lead to a total project success, right through to the post go-live stage.

Rather than simply explaining and advocating the suitability of the changes for improving the effectiveness of JBA Advantage, a hypothetical set of subordinate project activities are defined and tested. In the work that follows, the activities, as defined below, are therefore closely related to the changes proposed above. For example, the better we understand the customer expectation, the less difficult it will be to find out about organisational readiness.

1. Managing customer's expectation is made easier if a senior consultant is assigned, at a senior level, to the Pre-Sales support team (in relation to point A, above).
2. Accurate definition of the scope of work depends on whether customers' expectations can be well managed (in relation to point D above).
3. Business process reengineering facilitates organisational readiness for the ERP implementation (in relation to point B).

4. Success in Development of a To-be Model (i.e. a final model) will be conditional on key users being given the ownership of the solution design process (in relation to point K).
5. Prototyping secures validity when developing the final model and also aids the familiarisation process (in relation to points C-D-F-J).
6. Simulation, using the final model, contributes further to familiarisation and success in achieving user education (in relation to points E-F-G-H).
7. A final check on the readiness for going live, in addition to verification of software configuration, is vital in the final stages of implementation (in relation to points L-M-O).
8. Inferior support during the period following implementation is a likely cause of ultimate project failure (in relation to points N-P-Q).

These project activities constitute a chain of actions that if validated, will support the proposed refinements to the current version of JBA Advantage. However, any breakdown in the chain would indicate the probability of failure following its adoption. In summary, the refinement aims to provide a more robust model with additional activities and checkpoints integrated into it.

7. STAKEHOLDER SURVEY

The Case studies discussed above in Chapter 5 provided valuable qualitative data of a rich and detailed nature concerning experiences of ERP implementation within the Pepsi group. However, for the purposes of this research, it was clear that it would also be useful to obtain data pertaining to a wider sphere of stakeholders with interests in the issues of concern identified so far. In particular, there was a need to further evaluate the hypotheses outlined above in Chapter 6. It was therefore decided to explore the views of selected individuals within the industry more generally.

The process started with an interview with a marketing officer from JBA International. His advice was instrumental when identifying contact companies within the selected industries; these being computer peripherals, electronics, garments and beverages. This same marketing officer was also responsible for the maintenance of JBA's customer databases which provided useful contact details for prominent 'market players' in the selected industries. As of July 2000, this database contained some 2,100 records of companies in the garments, electronics and beverages industries. Information from here was routinely distributed, on a regular schedule, to various sales executives and managers to assist them in formulating appropriate sales related actions.

Initial contact information was also acquired from Dun & Bradstreet. Further statistical information about the companies was subsequently obtained from the Directory of the Hong Kong Productivity Council. The Trade Development Council of Hong Kong and the General Chamber of Commerce of Hong Kong were also regularly approached for information updates before the final compilation of the list of companies to which the survey questionnaires would be sent.

Bearing in mind that System 21 had been initially developed as a mid-range ERP system, and making the assumption that small companies would be unlikely to consider implementing mid-range ERP systems, it was decided that the research would give absolute priority to mid-size enterprises. Consequently, the companies eventually selected for the survey were either multinational corporations or Hong

Kong based firms with manufacturing as well as distribution operations across China and Hong Kong. None of these companies was subject to making final business decisions outside Hong Kong. Above all, they all bore similar economic characteristics and cultural influences, although there were also some differences with respect to their economic, human rights and state of technological developments.

7.1. Questionnaire Design

At the core of this stakeholder survey was a questionnaire (see Appendix 1). This was developed to facilitate the collection of opinions from selected companies with general experience or intent of implementing ERP systems, regardless of the technological platforms selected. A five-point Likert scale was deployed so that statistical analysis could be carried out based on the scores attributed, thereby assuming interval data (equal intervals between the numbers on the scale). The questionnaire was designed to help validate the hypothetical model that had previously emerged from the observations in the literature on various implementation projects, backed up by the in-depth case studies at Pepsi Cola.

Essentially, the questionnaire was divided into five sections. Section 1 (questions 1-9) was designed to help understand the company background and explore issues such as business scope, manpower capacity and office location. Section 2 (questions 10-21) aimed to identify the particular characteristics of the ERP systems within the selected companies. Section 3 (questions 22-52) attempted to understand in more detail the concerns experienced with the implementation methodologies used. Section 4-1 (questions 53-63) examined customers' expectations of ERP vendors while Section 4-2 (questions 64-78) examined ERP vendor' expectations of customers. Finally, Section 5 contained questions that were more open-ended, descriptive and optional (questions 79-63). This was used to collect further information and comments from those completing the questionnaire.

Copies of the questionnaire were initially sent through normal mail and subsequently via electronic mail to the selected companies. In regard to hypotheses testing,

Pearson's correlation coefficient was used to measure the relationship among different hypotheses.

7.2. Data Collection

The search for suitable companies drew upon two sources; the Internet version of the Trade Development Council of Hong Kong's company database (URL: http://www.tdclink.com) and the directory of China's General Chamber of Commerce (URL: http://www.hkgcc.org.hk). Of these, the Trade Development Council's directory proved particularly useful, providing one of the most exhaustive sources for obtaining suitable company contact information at the time of undertaking the research.

The selected companies fell into four major vertical clusters, namely Beverages, Footwear and Garments, Electronic and Electrical Components, and Computer Peripherals. For each of these categories, companies having manufacturing facilities in China, and a minimum of 500 workers, were randomly selected.

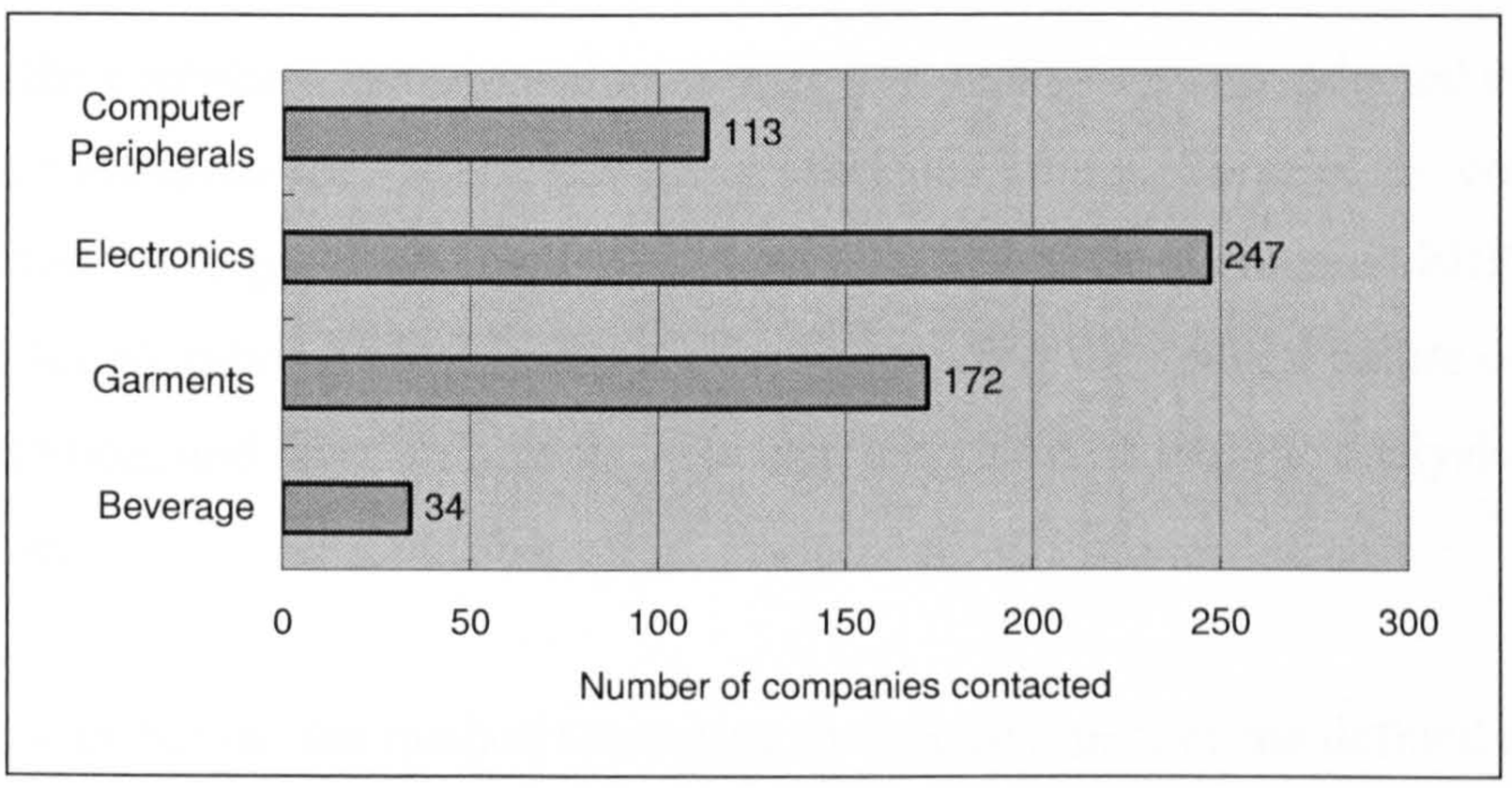
During the first round of this random selection process, nearly 1,000 companies were identified spanning the four selected categories (notably the majority, 600 or so, were engaged in electronic manufacturing). From the initial 1000, a total of 566 fitted the selection criteria. The main criterion was that they were in the right sector but they also had to be large enough to qualify (all had a labour force of more than 1000 workers). There was no requirement for the selected companies to be listed on the stock markets.

Figure 7.1 summarises the clusters of companies finally selected. Only 34 were from the Beverage industry; the totals for the remaining sectors being Computer Peripherals (113), Electronic-Electrical Components (247) and the Garments industry (172). For each of these, either the marketing manager or the managing director was contacted with a request to participate in the survey. It was accepted that although they might not be the most appropriate persons to actually fill out the questionnaire,

they would be the most obvious candidates to initiate such action. Out of the 89 returned questionnaires, 62 (representing 69%) captured the name/position of the person who actually filled in the survey questionnaire. Around 90% (55 questionnaires) were completed by IT function while the remaining ones were mostly tackled by other management staff.

A total of 566 copies of the directions to the questionnaire were sent via electronic mail to the selected companies. Of these, the first batch of 80 was sent by normal mail. This first batch consisted entirely of companies from the beverage industry and also some companies from the electronics industry, while the second batch consisted of companies from the other selected industries.

Figure 7.1 Selected Industries for Research Study



Source: Author's Research Survey

Sending questionnaires via electronic mail was found to be more efficient, since control and follow-up could be made more easily. For the first batch of questionnaire sent by normal mail, a total of 22 companies responded. Follow-up letters were sent to the remaining 58 companies, but this only led to another 12 questionnaires being returned. No more beverage companies responded to the subsequent distribution of the questionnaire by electronic mail. Among the other industrial groups, the electronics companies produced the largest response.

Of the 566 questionnaires sent out, a total of 77 companies (14%), were unattainable. A further 89 companies responded positively (16% gross response rate). Another 50 companies (8%), responded indicating no interest in further involvement and the remaining 350 companies (62%) did not respond at all.

Out of the 89 respondents who completed the questionnaire, 22 declared that they had never implemented or had no plans to implement ERP systems, while the remaining 67 attempted to complete the questionnaire (12% response rate). From these returns, only 46 were complete and therefore useable and further analysis, as reported below, was based on these results, only (representing an 8% net response rate).

7.3. Data Presentation and Analysis

Based on the completed questionnaires, a statistical analysis was conducted using Pearson's correlation coefficient, this being presented below. Some of the comments derived from the respondents, including those who had not implemented ERP yet, were also found to be valuable in terms of understanding the general nature of ERP implementation, and these comments were also incorporated into the analysis, where appropriate.

In the sections below, the method for testing the cohesiveness of the defined activities (i.e., variables) is first explained, followed by presentation of the statistical results. This aims to illustrate that 'continuity' is the key to success. It is also intended to demonstrate from the survey results that inferior 'after-go-live' support is a prominent cause of project failure.

There are collectively eight corresponding survey questions associated with the activities (H_1-H_8) defined in a chain for the new model. It is postulated that a close relationship will be evident between each pair of adjacent activities. Pearson's correlation coefficient is primarily used for testing the cohesiveness of adjacent variables.

In the sections that follow, the statistical results from the survey are further explored with an emphasis on customer's expectation of the vendor's capabilities and activities as well as the vendor's expectation of the customer's co-operation. Initial thoughts about closing the expectation gap between the customer and the software supplier are also offered.

The remaining sections exhibit other research findings from the questionnaire survey and the case study combined, in terms of how expectation gap, limited awareness of the implementation methodology, miscommunication, absence of change management programs and mistreatment of parallel testing can impact the implementation and lead to project failure.

Raw results for the questions pertaining to these issues are included in Appendices 2 through 5. Appendix 2 contains questions about the company and project in general. Appendix 3 contains questions pertaining to the respective research hypotheses and also to issues of a more general nature. Appendix 4 contains the raw results of questions pertaining to the issue of customer expectations while Appendix 5 contains the results for corresponding questions on the issue of vendor expectations.

7.4. Statistical Principles

Descriptive statistics are essentially used in this research to validate the hypothetical implementation methodology developed in previous sections on the basis of case study analysis and comparison of JBA Advantage with other major implementation methodologies, currently in the marketplace.

Using accepted statistical conventions the sample mean (μ or M), and standard deviation ( ) are calculated respectively for each of the research hypotheses of core importance.

$$\sigma = \sqrt{\frac{\sum (X - M)^2}{N - 1}}$$

where X = individual rating on hypothesis
M = mean of rating
N = number of respondents

Evaluation of improvements to the implementation methodology is thus carried out, principally based on the case study of Pepsi Cola's implementation of ERP systems and the analysis of descriptive statistics from the survey. The Pearson correlation coefficient, which was originally introduced by the English statistician, Karl Pearson, is central to the inferential statistical analysis of the research data and by definition it measures the strength of the linear relationship between two variables.

As a recap, Pearson's correlation coefficient of X and Y is computed by using the following formula:

$$r = \frac{\text{the degree to which X and Y vary together}}{\text{the degree to which X and Y vary separately}}$$

$$r = \frac{\text{co - variability of X and Y}}{\text{variability of X and Y separately}}$$

Again, the coefficient of determination is essentially used to measure the degree of association between two adjacent independent hypothetical variables. For example, if it was found that two variables had a correlation of 0.8, then $r^2 = 0.64$ which implies that 64% of the variation in the *y* variable is explained or accounted for by variation in the *x* variable. The remaining 36% of the variation is unaccounted for. This would therefore demonstrate a fairly strong cohesive link between the two variables. Similarly, if this value of 'r' applied to the link between two adjacent variables, it would again demonstrate a fairly strong cohesive link between them.

7.5. Research Test Results

A summary of the key results pertaining to the set of original hypotheses outlined in section 6.3, is presented in Table 7.1. The original research variables were H_1, H_2 ...

$H_{8.}$ From these, a number of research questions were defined and set out on a 5-point Likert scale in the questionnaire (see Appendix 1). Responses to these questions are shown in questions 30, 32-34, 42, 44, 47 and 50 in Appendix 3. These results were taken to encapsulate the respondents' level of acceptance with each of the respective variables.

Table 7.1 Survey Results on Defined Activities

Respondent ID	Scores Given (Range -2 to +2)								Average Score
	H_1	H_2	H_3	H_4	H_5	H_6	H_7	H_8	
1	0	1	0	0	1	0	0	2	0.500
2	2	1	0	0	1	0	2	1	0.875
3	1	1	0	1	0	0	0	1	0.500
4	0	2	0	0	0	2	0	1	0.625
5	-1	0	1	0	0	1	1	1	0.375
6	2	2	1	0	0	0	1	1	0.875
7	1	1	1	0	0	1	0	0	0.500
8	1	1	0	0	0	1	0	0	0.375
9	1	1	0	0	1	1	0	1	0.625
10	0	1	0	2	-1	0	0	0	0.250
11	1	0	1	1	0	-1	1	2	0.625
12	0	0	0	1	0	0	0	1	0.250
13	2	1	2	0	0	1	2	1	1.125
14	0	0	1	0	1	1	1	1	0.625
15	1	1	1	0	1	0	1	0	0.625
16	-1	1	1	1	1	1	0	0	0.500
17	0	2	0	0	2	-1	-1	0	0.250
18	1	0	0	1	0	0	0	0	0.250
19	-1	0	0	1	0	0	0	1	0.125
20	1	0	1	1	0	0	0	0	0.375
21	2	0	0	0	0	1	0	1	0.500
22	0	0	0	2	0	0	0	0	0.250
23	2	0	0	0	0	0	0	0	0.250
24	0	1	1	0	1	0	0	2	0.625
25	0	1	2	1	0	0	1	1	0.750
26	-1	0	2	0	1	0	0	1	0.375
27	1	1	1	1	1	0	0	1	0.750
28	1	2	0	2	2	0	0	-1	0.750
29	1	-1	1	0	2	0	0	0	0.375
30	2	0	0	0	2	0	0	0	0.500
31	1	2	-1	0	0	0	1	0	0.375
32	1	2	1	-2	1	0	2	0	0.625
33	1	1	1	1	1	0	0	1	0.750
34	0	-1	-1	0	1	1	0	1	0.125
35	0	0	0	0	1	1	0	0	0.250
36	1	1	0	1	-1	0	1	0	0.375
37	1	-1	2	1	0	2	2	2	1.125
38	1	0	0	0	0	1	1	1	0.500
39	0	1	1	2	0	-1	1	0	0.500
40	2	2	-2	1	-1	1	0	0	0.375
41	-2	0	1	0	0	1	0	0	0.000
42	0	0	1	0	1	0	-1	1	0.250
43	1	0	0	1	1	0	0	1	0.500
44	1	1	-1	0	1	0	-1	2	0.375
45	0	1	0	0	1	1	0	0	0.375
46	1	0	0	-1	0	1	0	0	0.125

Source: Author's Field Study

For a more meaningful analysis, the Likert scale answers were rearranged as two tailed interval data (mid point 0 = no opinion, 1 = agree, 2 = strongly agree, -1 = disagree, -2 = strongly disagree). The raw results from each of the respondents are summarised and presented in Table 7.1.

From the raw data presented in Table 7.1, descriptive statistics were compiled, using the Excel spreadsheet facility, as presented in Table 7.2. This shows the means scores obtained (centred around the neutral answer which scores zero) and the associated standard deviation, maximum, minimum, mode and median. The number of positive, negative and neutral scores is also recorded in each case.

Table 7.2 Descriptive Statistics and T-Tests Summary of Survey Results

Statistic	Defined Project Activities							
	H_1	H_2	H_3	H_4	H_5	H_6	H_7	H_8
Mean Difference	0.61	0.63	0.41	0.41	0.48	0.35	0.33	0.61
Standard Deviation	0.93	0.83	0.83	0.78	0.75	0.67	0.73	0.71
Max	2	2	2	2	2	2	2	2
Min	-2	-1	-2	-2	-1	-1	-1	-1
Range	4	3	4	4	3	3	3	3
Mode	1	1	0	0	0	0	0	0
Median	1	1	0	0	0	0	0	1
Positive Scores Count	27	25	20	19	21	17	15	24
Negative Scores Count	5	3	4	2	3	3	3	1
Neutral Scores Count	14	18	22	25	22	26	29	21
T-test 95% Confidence Interval of the Difference – Lower	0.33	0.39	0.17	0.18	0.25	0.15	0.11	0.40
T-test 95% Confidence Interval of the Difference – Upper	0.89	0.88	0.66	0.64	0.70	0.55	0.54	0.82
T Statistic	19.02	5.18	3.37	3.61	4.31	3.5	3.02	5.78
T Critical (two tail)	2.01	2.01	2.01	2.01	2.01	2.01	2.01	2.01

Source: Author's Field Study

Table 7.2 also shows the results of the confidence interval analysis (from the T-tests performed) to test the significance of the results for the average scores calculated above (the null hypothesis being that respondents express neither agreement nor

disagreement, with the propositions made). These results demonstrate that in all cases the test results are deemed to be significant (at the 5% level) given that the mean difference in each case falls within the corresponding 95% upper confidence interval of the difference.

The results show the mean scores for the defined variables lying in the range of 0.33 to 0.63 inclusive. Bearing in mind that an average weighted score of 1 would correspond qualitatively to a response of 'agree' then it is possible to gain, from these figures, an appreciation of the level of agreement expressed, with respect to each of the respective research variables. Overall the average score is 0.48 which might be taken as an expression of a moderate degree of acceptance of the research variables in general.

Viewed alternatively, relatively few respondents disagreed with the defined activities (note the high percentage of positive scores as contrasted to negative ones, in Tables 7.1 and 7.2). In total, there are 168 positive scores and only 24 negatives. However, there are also 177 neutral scores.

Based on the average scores from Table 7.2, the ranking of defined activities is also possible, as illustrated in Table 7.3. This shows that activity H2, (accurate definition of the scope of work depends on whether customers' expectations can well be managed) ranks as the issue with greatest priority (0.63). At the other end of the spectrum is H7 (i.e., a final check on the readiness for go live) with a score of only 0.33.

The survey also reveals that project delay is moderately associated with inappropriate adoption of implementation methodology (see line 31 of Appendix 3). Also, the majority (59%) of respondents shared the view that the implementation methodologies offered by the ERP vendors are largely impractical for their implementation projects and virtually always need to be improved to suit the implementation's needs (see line 4 of Appendix 3).

Table 7.3 Acceptance on Defined Activities with Ranking

	Defined Project Activities	Weighted Average Score	Rank
H_2	Accurate definition of the scope of work depends on whether customers' expectations can well be managed.	0.63	1
H_1	Managing customer's expectation is made easier if a senior consultant is assigned, at a senior level, to the Pre-Sales support team.	0.61	2
H_8	Inferior support, during the period following implementation, is a likely cause of ultimate project failure.	061	2
H_5	Prototyping secures validity when developing the final model and also aids the familiarisation process.	0.48	3
H_3	Business process reengineering facilitates organisational readiness for the ERP implementation.	0.41	4
H_4	Success in development of a To-be Model (i.e. a final model) will be conditional on key users being given the ownership of the solution design process.	0.41	4
H_6	Simulation using the final model, contributes further to familiarisation and success in achieving user education.	0.35	5
H_7	A final check on the readiness for going live, in addition to verification of software configuration is vital in the final stages of implementation.	0.33	6

Source: Author's Field Study Data

Scalability of implementation methodology is also important since project size and complexity deviate considerably from one project to another. This is especially true when ERP vendors target different market segments and sizes of company. Consequently, 85% of the respondents shared the view that implementation methodology should be scalable and flexible (see line 5 of Appendix 3).

7.6. Correlations Between the Defined Activities

The proposed strategy for effective implementation of ERP systems is based on the chain of actions originally defined in the theoretical model, as discussed in chapter 6. Since it is postulated that ideally, there should be no breakdown in the chain of association, between the stages as characterised by the respective activities, statistical tests were also conducted to determine whether there were any clear associations (i.e.,

correlations) among the activities (designated H_1 through H_8). Pearson's correlation coefficient was used in this context, the results being presented in Table 7.4.

Table 7.4 Correlation Analysis for Inductive Model

Correlation	Independent Variable 1 (*x*)	Independent Variable 2 (*y*)	Pearson's Coefficient R_{XY}	Variation of Percent between *x* & *y* (r^2)
1	H_1	H_2	+0.184	3%
2	H_2	H_3	-0.193	3%
3	H_3	H_4	-0.030	0%
4	H_4	H_5	+0.269	7%
5	H_5	H_6	+0.204	4%
6	H_6	H_7	+0.125	1%
7	H_7	H_8	+0.122	1%

Source: Author's Field Study Data

Within this context the research was concerned with demonstrating a chain effect for the hypothetical variables (i.e., H_1 through H_8), in the chronological order shown in Table 7.4. To this end the coefficient of determination (r^2) was calculated for each pair of hypothetical variables (the results being illustrated in Table 7.4). However, the r^2 for H_1 and H_2 was 0.03, suggesting that only 3% of the factors accounting for variability were common to both variables. The other coefficients were similarly low, the highest being only 7%. Hence none of the Pearson's correlation coefficients, depicted here, was found to indicate a significant level of correlation. Each pair of adjacent activities was seen to display only a very modest correlation and in some cases, these were even marginally negative. For example, the survey result indicated that the strength of association between H_4 and H_5 was highest ($r = 0.269$).

7.7. Reliability and Validity of the Data

Out of the 31 survey original questions, that were concerned with the ERP implementation in general, a unique total of 23 questions were selected to build a set of 4 distinct constructs which were seen, in collaboration, as a base to develop a two-tier adaptive approach to securing EPR implementation. These constructs were defined in association with 4 different groups of research interest namely the scalability and adaptability of implementation methodology (questions 23, 25-26 and 28-29), co-working with managing consultant to achieve precise definition of project scope and management of customer expectation (questions 30-32), key user involvement and accountability (questions 33 and 38-39) and finally the course of actions for mitigating the adverse implication due to change of business processes (questions 22, 30-31,34-37, 39, 41 and 45-50).

Table 7.5 summarises these major constructs and presents the corresponding Cronbach alpha scores obtained. The engagement of managing consultant received a Cronbach's alpha value of above 0.7, thereby indicating that the data was deemed to be significantly reliable. The Cronbach's alpha values of the remaining three constructs were seen to be marginal, mostly above 0.5 (Nunnally, 1978).

Table 7.5 Data Reliability of Defined Constructs

	Construct	N of Items	Cronbach's Alpha
1	Scalability of implementation methodology	5	.662
2	Engagement of managing consultant	3	.707
3	Key user involvement and ownership taking	3	.327
4	Mitigation of change implication	15	.511

Source: Author's Field Study Data

Out of the 4 constructs defined, scalability of implementation methodology and engagement of a managing consultant throughout the implementation cycle, to help in managing user expectation and securing project success, emerged as the two

foundation concepts behind the new operation model, as suggested in this research. Mitigation of change implications was also critical to the new model, although its associated Cronbach's alpha value was not significantly high.

However, the validity of the data was less good, largely due the relatively small size of sample available (given the relatively low response rate). Also, in retrospect, the survey questions may not have been arranged in an optimal way such that the respondents could not easily distinguish and/or relate the survey questions wherever there was certain degree of association and uniqueness.

7.8. Analysis of other Aspects of the Data

The following sections focus on interpreting other aspects of the stakeholder survey data which is concerned with the respective issues of expectation gap, selective outsourcing, recognition of implementation methodology, ownership taking, change management, system prototyping and extended support after implementation. These issues will be cohesively and technically addressed in the new implementation model being developed as a significant contribution to this research.

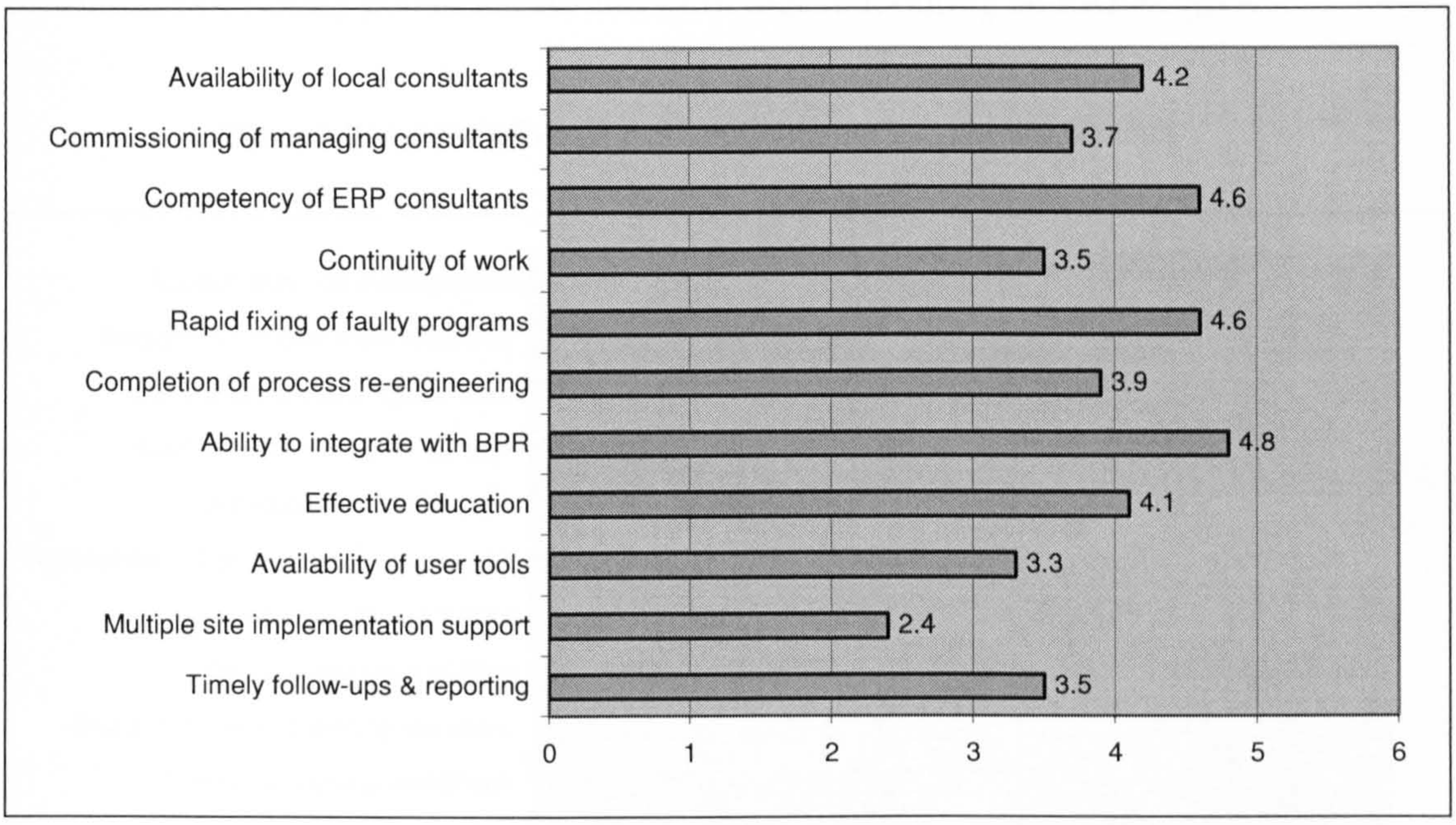
7.8.1. Customer and Vendor Expectation Gaps

According to the field study, customers have high expectations that ERP vendors will ensure the competency and availability of implementation consultants, the quality of work and the ability to fix faulty programs. Figure 7.2 is produced using data from Appendix 4 and shows the mean scores obtained for the respective questions on Customer expectations, as recorded using the original Lickert scale.

The ability to introduce new ways of doing business along with the implementation of ERP system is of the highest importance. However, in general, achievement of successful ERP implementation relies very much on the successful reengineering of the operational procedures and processes for efficiency improvements. Careful planning and execution of the process reengineering is therefore critical to reducing

the time required to implement an ERP system. The survey indicates that nearly 54% of the respondents tended to agree that BPR should be carried out before ERP implementation (see line 14 of Appendix 3).

Figure 7.2 Customer's Expectation on Vendor's Capabilities



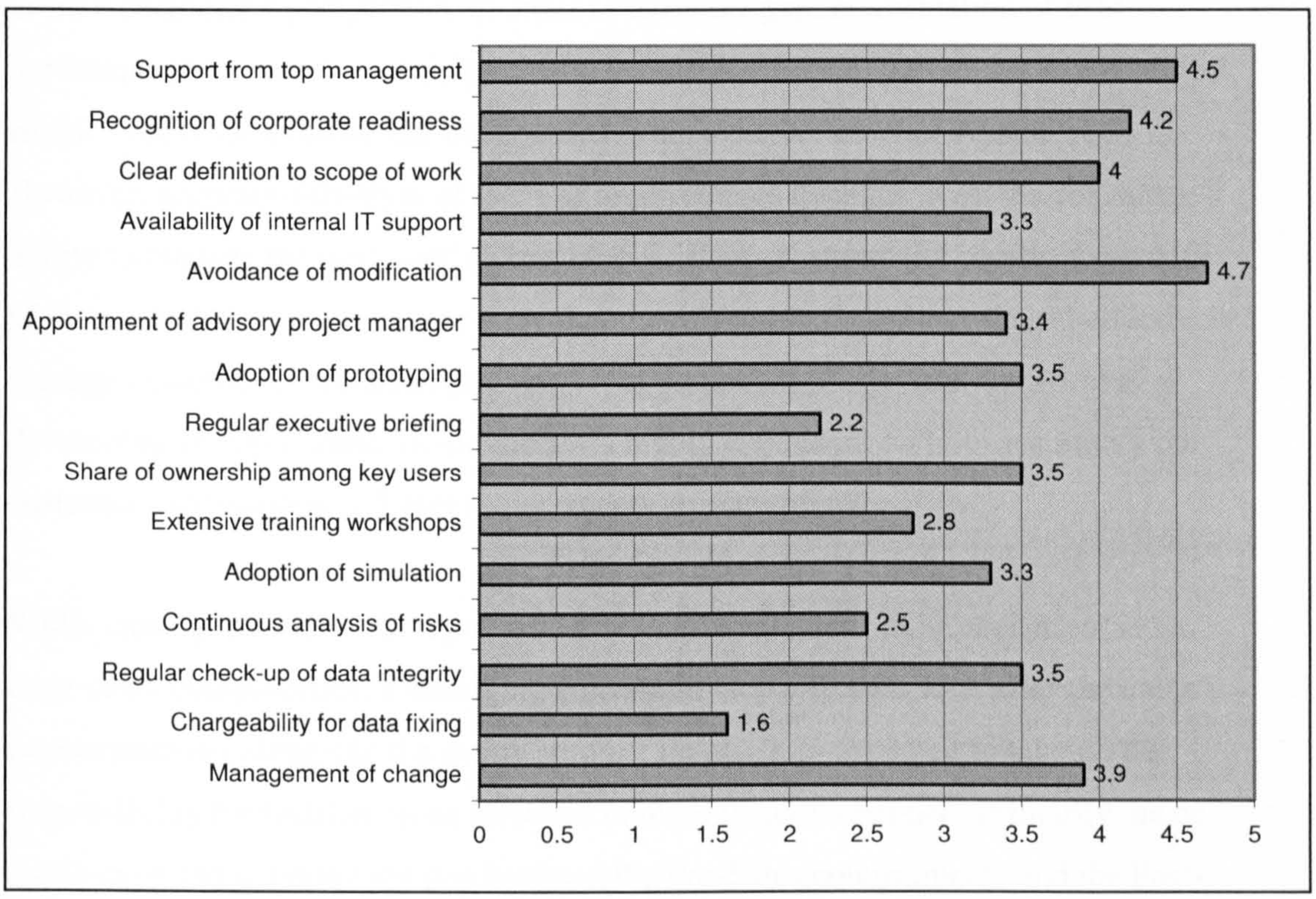
Source: Author's Field Study

However, it is also argued that the implementation of ERP system should not come immediately after the completion of the BPR project (see line 20 of Appendix 3); otherwise, the blame for any problems will tend to fall on the ERP system. The remaining respondents, in contrast, held the opposite viewpoint: that implementing ERP system should fit into the BPR project, with a view to adopting the best practices to ultimately help improve the operational efficiency.

The survey also unveils that a major change to the business processes, to fit the proper use of ERP software, is not generally preferred. Only 43% of the respondents agreed that changing the business processes to fit the environment represents the best way to accelerate the implementation of ERP systems (see line 16 of Appendix 3).

On the contrary, approximately 72% of the respondents asserted that external consultants with solid change management experience should be introduced to manage the BPR project and drive its success (see line 15 of Appendix 3). This indicates a contradicting view on the running of BPR/ERP projects. Nevertheless, this also implies that there ought to be a channel or a mechanism in place whereby the consultants can freely communicate and work together, during an ERP project.

Figure 7.3 Vendor's Expectation on Customer's Co-operativeness



Source: Author's Field Study

Likewise, ERP vendors have certain expectations of their customers. Figure 7.3 is produced using data from Appendix 5 and indicates the mean scores obtained for the respective questions, again recorded using the original Lickert scale. Avoidance of modifications is among their top concerns (see line 5 of Appendix 5; average score = 1.72), while the support from top management comes next (see line 1 of Appendix 5; average score=1.5). A full recognition of corporate wide readiness is also deemed to be one of the critical factors (see line 2 of Appendix 5; average score = 1.15).

Stakeholder Survey

From a vendor's perspective, an executable yet effective methodology needs to be developed, based on achievable objectives to ensure the stability of the implementation process. In a business environment, nobody wants surprises. For a successful implementation, the scope of work again always needs to be specific and adaptable to the customer's expectations (also see line 3 of Appendix 5). In most cases, including Pepsi, customer dissatisfaction is usually seen as a result of misinterpreting customer expectations.

From a customer's perspective, in order to close the gap, confirmation of user requirements by a senior consultant, who should continue to participate in the project, should take place even before the contract is signed (see line 9 of Appendix 3). However, accurate definition of the user requirements depends upon the consultant's ability to manage the customer's expectations. The questionnaire results show 61% of respondents sharing the same view that the managing consultant should effectively manage customer expectation (see line 10 of Appendix 3). In turn, the success of developing an appropriate To-Be model is highly dependent on how accurately the customer expectations and user requirements are interpreted.

While closing the expectation gap tends to require adequate communication and in most cases compromises, a managing consultant who will then look after the entire implementation alongside the overall project manager, is expected to take on the responsibility for facilitating an effective communication channel. Primarily, he or she is expected to bridge the gap between the Pre-Sales commitments and the Post-Sales capability to deliver the commitments. In the absence of such a modulator, misunderstanding and unnecessary disputes are likely to arise. In order to achieve the utmost effectiveness, this managing consultant should continue to work with an overall project manager and a mediator from the user side throughout the entire implementation. An overall project manager should also be nominated from within the customer's executive office and be given the responsibility to report to the steering committee on the project's progress as the survey result suggested (see line 6 of Appendix 5).

7.8.2. Increasing Acceptance of Selective Outsourcing

According to the survey, all 46 respondents were found to have implemented off-the-shelf ERP packages, regardless of their respective operating environments (see line 10 of Appendix 2). Slightly more than half of these 46 companies were multinational firms that were not self-dependent on IT support. It is fairly common for mid-sized companies in Hong Kong to adopt an outsourcing approach to IT support, given the assumption that staff turnover and cost effectiveness are two major driving forces.

However, full-scale outsourcing is rarely seen, as selective outsourcing generally proves to be much more cost effective. For example, in Hong Kong, application development is already largely outsourced, while outsourcing to external parties for system implementation is also increasingly popular, since it is apparently seen as a strategic way to reduce IT operating costs. The survey indicated that 6 out of the 46 companies were already hiring external consultants for ERP implementation (line 17 of Appendix 2).

7.8.3. Inadequate Recognition of Implementation Methodology

Every ERP vendor has its own implementation methodology, which is also used as a strategic selling tool to help close sales deals. However, only 33% of the respondents fully appreciate or recognise the philosophy behind the implementation methodology in place (see line 3 of Appendix 3). The majority of respondents seldom oppose the straight adoption of the methodology as supplied. Nor could they identify any activities from the implementation cycle that the methodology would need to address.

It was also found that up to 59% of the implementation projects required simplification or alteration to the implementation methodology as originally provided (see line 4 of Appendix 3 again), while as few as 7% of the respondents reported that they would prefer to have a generic methodology (see line 8 of Appendix 3). This again implies that the implementation methodology needs to be scalable (see line 5 of Appendix 3).

It is perhaps hardly surprising that in most cases, end users are not properly trained on the implementation methodology prior to the ERP implementation. However, this could be one of the possible reasons behind the high rate of implementation failure. According to the survey, it was found that some 68% of the respondents did not understand the implementation methodology in terms of its importance, applicability, flexibility to change and completeness (see line 2 of Appendix 3). Repetitive orientation sessions are also recommended for accelerating an ERP implementation, and strategically this should be conducted for everyone who impacts on, or contributes to, the ERP implementation, at any stage (see line 17 of Appendix 3).

According to the survey, all 46 companies reported experiencing certain level of delays from three to six months and even more (see line 21 of Appendix 2). Furthermore, nearly two-thirds of these 46 implementations were large in operation involving expenditure of, on average, half a million dollars for any single implementation, this being deployed over an interval of six to twelve months (see line 18 of Appendix 2). Typically, most project delays involve associated budget overruns, since they are likely to incur more consultancy time than originally expected. Although delays were reported and further follow-ups were conducted, none of these companies declared unsuccessful implementation stories.

7.8.4. Absence of Ownership Taking and Repetitive Communication

Some 63% of the respondents agreed that key users should share project ownership (see line 18 of Appendix 3). However, with the improved JBA Advantage model, key users will be provided with various opportunities to formulate and present their ideas for the areas that they are representing. Alternatively, they might hire external consultants to deliver the required services although reluctance to share ownership implies certain risks to the implementation of the project.

The survey revealed that more than 89% of the respondents agreed that key users should receive their repeated orientation or training sessions, in phases, on a regular basis, with the intention of closing the expectation gap between implementation consultants and end users (see line 17 of Appendix 3). This implies a full

acknowledgement that continuous orientation is important to ensuring that the project stays on track and that everyone involved is clearly aware of what has been accomplished and what needs to be done in future.

It is thereby envisioned that the expectation gap can be gradually closed by the continuous feeding of information and improved communication. Simply increasing the number of communication channels may not, in itself, help improve communication efficiency and effectiveness and if mishandled may actually lead to confusion instead. Communication channels should thus be restricted and properly managed in order to facilitate effective communication. For instance, the initial success of implementing System 21 at Changchun Pepsi was due largely thanks to restricting the communication channels. Hence the improved methodology adopts an interactive approach whereby a collaborative relationship is established through an extended level of interaction between the customer and the software supplier. This communication continued to be effective up to the point where other business priorities prevailed and people started shifting their focus away from the implementation project.

7.8.5. Need for Effective Change Management Programmes

In association with hypothesis H_3, 43% of respondents agreed that company preparedness was vital for an effective ERP implementation (see line 13 of Appendix 3). It is like a walkthrough of the existing organisational behaviour, with the ultimate goal of making sure that the entire organisation is aware of the dramatic changes that may be required to support an effective implementation. The more the company adapts to the changes that the business process improvement project introduces, the less difficult it will be to implement ERP systems. This also explains why a study of business process reengineering needs to be carried out in advance of the ERP implementation. By being involved with the feasibility study, which may lead to some process changes, company staff should feel more comfortable with adapting to additional changes and new initiatives.

According to the field study, development of such change management programmes as are needed should take place ahead of the ERP implementation (see line 20 of Appendix 3). Moreover, change management programs will need to be customised to some degree as the implementation project moves towards successful completion (see line 15 of Appendix 5).

7.8.6. Ineffective Prototyping

The survey revealed that effective use of prototyping helps to accelerate the implementation of ERP systems (see line 24 of Appendix 3). Embedding the custom programs within the future model of business operation, in compliance with best practice standards, for commencing user acceptance testing was found to be the most effective use of prototyping. However, with the current model of JBA Advantage, simulation is done ahead of any changes needing to be embedded for the future model of business operations. Neither are the best practices included in the simulation process.

According to the field study, only 11% of the respondents disagreed with the use of prototyping as a means of accelerating the ERP implementation (see line 24 of Appendix 3; average score = 4.37). Prototyping is commonly used in most of the major implementation methodologies, as previously described. However, there are tools available to explicitly reduce the implementation time. For example, standard templates and best practices are embedded in Oracle Advantage as core tools for achieving such an objective.

Furthermore, prototyping is fairly easy to justify when there is a relatively strong coherence between the standard and custom programs. Given the assumption that key users are concerned with the success or failure of the project, adoption of prototyping represents a secure method of constructing a future model of business operation. Obviously, all major implementation methodologies, including AcceleratedSAP, PeopleSoft Express, Oracle Advantage and JBA Advantage, are in full support of this inspiration.

Simulation appears to work alongside prototyping, since it helps to validate the prototype. The conference room pilot of JD Edwards is a specific example of this, while 'Familiarisation' provides the parallel process in the case of JBA Advantage. Supported by the field study as one of the hypotheses H_6, simulation facilitates effective workshop (also see line 23 of Appendix 3). However, the fundamental concept beyond this familiarisation emphasises the application of standard functions instead of testing out the prototypes. A complete understanding of the future operational model by staff at all levels depends on whether the simulation can be carried out effectively. In short, well-organised education programs facilitate the successful deployment of commercial or non-commercial systems, while simulation is specifically used to validate the applicability of the To-Be model.

7.8.7. Parallel Testing and Risk Assessment

Most implementation methodologies, including AcceleratedSAP, seldom give emphasis to the execution of parallel testing. Instead, direct changeover is normally used as a means of deployment. However, parallel testing is imperative for the deployment of complex systems. Eliminating parallel testing therefore increases the likelihood of failure. The survey unveils that over 61% of the 46 respondents strongly agreed that parallel testing is inevitable (see line 27 of Appendix 3). Depending on the outcome of parallel testing, contingency plans may or may not be executed. Furthermore, the survey indicates that a regular review and updating of the contingency plan is needed, as it helps to secure a smooth transition into the final success of the ERP implementation (see line 28 of Appendix 3).

Parallel testing represents a conservative approach to securing a final success. Risk assessment is also essential for decision-making about the time needed for carrying out the parallel testing. More than 74% of the respondents shared a common view that iterative risk assessment is needed on a regular basis throughout the entire implementation (also see line 25 of Appendix 3). Parallel testing is highly recommended for any large-scale ERP project, although it will increase the cost of implementation to an extent that depends upon the duration of the exercise.

The concept behind ERP development can easily be understood, but the actual deployment can become complicated, since it requires collaborative work among groups of people inside and outside the organisation. Successful implementation of ERP systems depends on a complete understanding of the functional aspects of the system and how the system reacts in various situations. Simply carrying out trial testing, which is like a miniature version of parallel testing, is not considered adequate and is rather risky. Functional and operational integration must be tested in parallel if a minimal interruption is expected.

The survey indicates that some 61% of the respondents agreed that the execution of parallel testing would largely increase the chance of final success (see line 27 of Appendix 3). Typically, it may take two to three months to carry out the parallel testing. Normally, additional effort is also likely to be required from time to time, to rectify operational flaws as needed and to remedy any faulty programs that may arise. The ultimate value of carrying out parallel testing lies in the opportunity it brings to perform a final check of the company's readiness to achieve an effective changeover.

7.8.8. Need for Extended Support after Implementation

Many companies apparently believe that following completion of the ERP implementation phase of the project, all implementation activities can be expected to be over (Kirchmer, 1998). However, such companies continue to require improvements to their software based business processes wherever possible, and this implies that continuous re-engineering is necessary in order to achieve or retain a competitive advantage.

The support issue is always a tough agenda item between the customer and the service provider. From the service vendor's perspective, the implementation is deemed to be over when the user acceptance testing is complete. However, this is not true from the customer's standpoint. Even with a warranty period of, say, 60 days, customers might not necessarily feel comfortable if, for example, they continue to experience data corruption.

Nearly 98% of the respondents strongly or moderately agreed that 'after go-live support' should become an integral part of the implementation process, and therefore that the implementation methodology should take into account the availability of such a necessary service for a more rewarding implementation (see line 30 of Appendix 3).

7.9. Reflections

While a majority of clients tend to have high hopes of the ERP software vendors with respect to the availability of local consultants, competency of implementation consultants, responsiveness on fixing faulty programs, availability of user tools for data take-on and third party software integration, software vendors also have expectations of their customers. Precise definition of the scope of work, availability of internal technical support, avoidance of modifications, commissioning of a client-side project manager and the evaluation of company readiness for ERP software implementation are typical desires of an ERP implementation service provider.

In short, most of the ERP projects failed primarily due to an inaccurate interpretation of the scope of work, inadequate awareness of implementation methodology, inability to recognise the importance of ownership taking and regular communication, inadequate change management, misuse of prototyping in relation to process simulation and a lack of post-implementation support. These causes of failure represent only the major implementation challenges and the missing capabilities that are worth a detailed study. Also, these factors are interrelated, and therefore they should not be treated separately when solutions are developed in attempts to achieve successful implementation. In the following chapter, these challenging factors will be discussed in more details.

Above all, from a more strategic point of view, these challenges are all related to the ineffective management of the expectation gap and therefore a mechanism needs to be in place to help eliminate the gap and hence govern the entire implementation process. This mechanism will be the implementation model yet to be developed as a refinement of JBA Advantage (i.e., one of the major deliverables of this research).

8. DISCUSSION

8.1. Developing A New Generation of Methodology

The implementation methodology currently available to the selective customers of JBA International, including Pepsi Cola in China, is called JBA Advantage. This is the second generation of methodology produced by JBA International. When compared with its predecessor, this improved implementation methodology is deemed to be more sophisticated and scalable. Even so, there are several areas that still need to be improved so that more effective implementation of System 21 can be facilitated.

A newer version of JBA Advantage, as depicted in Figure 8.1 has been developed as a result of analysing the case study of Pepsi Cola and the descriptive survey carried out in Hong Kong. Essentially, this version attempts to strengthen the project foundation for people readiness, improve the effectiveness of the familiarisation process by embracing customised programs into the simulation sub-process, emphasize the importance of final check to minimise risks and finally incorporate additional toolkits and processes into the existing version of JBA Advantage (as depicted in Figure 8.2) to help expedite the overall ERP implementation. In brief, improvements in terms of re-organising and expanding the existing implementation processes are recommended. Above all, Figure 8.2 underlines that each implementation process should be owned and managed separately.

8.1.1. Strengthening the Project Foundation

The scope of work, as defined in the 'Foundation Phase' of the new model, extends to cover the design and development of custom program extensions, since project failure was seen in the case study of Pepsi, when customisation was really needed and was not properly managed. The Foundation Phase is now more exhaustive, as it is reformed to embrace a new structure of project stages as follows: Definition, Operational Analysis, Preparation, Solution Design, Development Testing and Completion. This new structure is concluded to be more sensible in terms of fostering

Figure 8.1 Building Blocks of New JBA Advantage

Stage	Sub-stage	A P	Tasks	FS	Owners	Tools Req'd
Pre-Sales	None		Conduct initial meeting; Present software functionality & capabilities; Appoint senior lead consultant to conduct Pre-Sales study & recommend solutions; Manage/align customer's expectations; Decide appropriate proposal; Write up proposal; Draft contract with executive approval; Get contract signed; Allocate overall project manager; Arrange internal kick off meeting; Arrange external kick off meeting with customer; Update project plan & costing.		Sales Rep	✓ ✓ ✓
Foundation	Definition		Define scope of work; Design workflows; Define administrative procedures; Conduct executive briefing and updates; Schedule and conduct project planning session; Evaluate organisational readiness; Develop change programs; Develop infrastructure and installation plans; Define organisation & communication channels; Assign ownership and responsibilities; Develop orientation plan for project members; Develop knowledge transfer plan; Develop quality control plan; Develop contingency plans; Update project plan & costing.		Client Proj Mgr	✓ ✓ ✓ ✓ ✓
	Operational Analysis		Get familiar with the business flows; Review As-Is model; Collect operational & technical requirements; Perform GAP analysis.		Key Users – Functional Heads	✓ ✓ ✓
	Preparation		Install technical infrastructure; Arrange software & hardware delivery; Conduct initial orientation for project members; Nominate client project managers; Activate vendor's local support resources; Establish communication & reporting channels; Update project plan & costing.		Client Proj Mgr	 ✓
	Solution Design		Create optimal business solution to meet future business requirements; Propose the To-Be Model; (Prototyping) Document adopted business processes; Design data conversion, custom extension, reports; Identify process and organisational changes; Review the To-Be Model; Update project plan & costing.		Key Users – Functional Heads	✓ ✓ ✓ ✓
	Development Testing		Develop custom extensions, application enhancements, data conversion and interfaces; Execute stress and integration tests.		Client Proj Mgr	✓ ✓
	Completion		Review development of To-Be Model; Notify acceptance of To-Be Model.		Client Proj Mgr	
Familiarisation	Education		Plan, deliver and review education.		Proj Mgr	✓
	Simulation		Plan, conduct and review simulation sessions.		Proj Mgr	✓
Implementation	Preparation		Review implementation plan; Review contingency plan; Set up and verify live environments;		Client Proj Mgr	✓ ✓
	Training		Design user training by consultants & key users; Develop training materials; Train end users by key users.		Client Proj Mgr	✓
	Data Load		Perform "Go-Live" readiness check; Perform data entry/conversion; Verify data conversion.		Client Proj Mgr	✓ ✓
	Review		Review project progress; Conduct "Go-Live" meeting; Review support plan; Update project plan & costing.		Client Proj Mgr	✓ ✓ ✓
Production	Deployment		Perform a final quality control check; Handover documentation; Conduct pre-production briefing; Obtain client's sign off; Arrange public release with parallel runs; Initiate service warranty; Update project plan & costing.		Client Proj Mgr	✓ ✓
	Support		Provide a fast route for quick fixes. Conduct user surveys; Monitor and analyse problem log; Review and adjust support quality; Review change requests & arrange development; Declare closure of the project.		Client Proj Mgr	 ✓ ✓

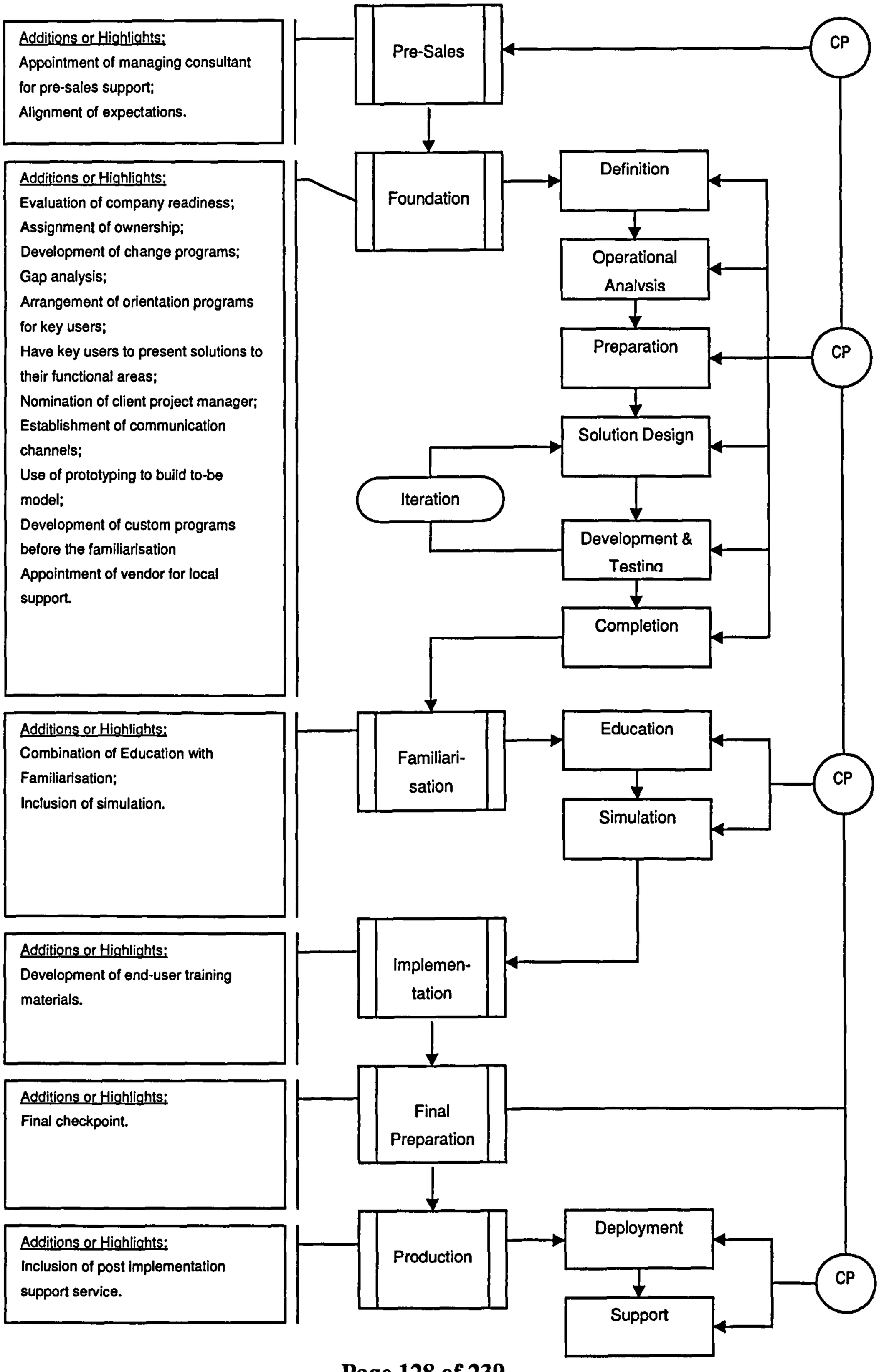
the momentum needed for a successful ERP implementation. However, the prerequisite for achieving such success is the presence of company-wide preparedness, in which users will be trained and concerns will be addressed through regular communication.

An essential point is that key users must be provided with 'Level 1' training, so that appropriate ERP configurations can be developed and introduced to end users. The key users are normally functional heads, while the end users are those who will ultimately benefit from using the ERP systems. As part of the change management efforts, the key users must be involved in the design of business processes and the implementation of ERP systems. Key users' involvement in the solution design suggests that a more suitable prototype could be constructed. However, formal education and training should be provided to help them do so (Bingi *et al.*, 1999; Holland *et al.*, 1999). Therefore, the Foundation Phase can never be avoided under any circumstances, since it should trigger some critical processes through which the key users can be oriented to recognise the value of their contributed effort into the ERP project.

Given the understanding that enterprise wide cultural and structural change should be managed (Falkowski *et al.*, 1998), continuous system orientation, for the key users is imperative. This is facilitated by level 1 and level 2 workshops for the key users is imperative, to ensure that everyone involved is fully oriented towards accomplishing the project's goals. Unlike a project briefing, orientation, this is defined as an interactive and repetitive process to help foster an effective channel for communication. This is not necessarily delivered in a top down manner that provides every single member with instruction to move on during the implementation. Instead, it should be an exercise in bi-directional communication, carried at out every stage of the implementation, thereby forming a significant part of the preparedness program.

For effective progress reporting, there must be a mechanism by which every individual can be informed of what other people are doing. Unless everyone is fully aware of what other people are actually doing, the implementation will be inevitably

Figure 8.2 Process Flow and Check Points



risky. Specific workshops, aimed at assisting individuals in tackling various management issues, should be conducted at various stages. Within these workshops, key users must first be orientated to align their expectations with the project goals, during the initial stage of implementation. The alignment of expectations should then be exercised repeatedly in order to sustain the momentum and continue moving towards the successful completion of the project.

The Preparation sub-stage is a new addition to the Foundation Phase. The critical tasks as defined in the Preparation Stage include the achievement of orientation for all key members, the appointment of client project managers and the selection of local vendors to arrange customer implementation services. It is thus essential to create and maintain effective communication channels, as depicted in Figure 8.2, since solution design is a core activity that carries a great deal of information that requires to be exchanged and propagated.

Significantly, the survey results suggested that prototyping should be adopted to help reduce the expectation gap. In most cases, the future model, emerging from the solution design process, is likely to require a certain degree of customisation. The development of suitable custom program extensions can be possible if there is adequate and accurate communication. With regard to the workflow design, gap analysis is therefore unavoidable, since most ERP systems, including System 21, are unable to meet every single business requirement. Once again, the adoption of prototyping is seen as favourable, as it allows the requirements of custom program extensions to be precisely defined and mutually agreed.

Instead of creating a prototype for the entire solution, what is actually needed is a prototype for the custom programs. Therefore, strategic use of prototyping can help to close the expectation gap quickly and improve customer satisfaction. However, among the ERP vendors, none appears to have adopted this kind of prototyping as part of their implementation methodologies.

8.1.2. Enforcing Ownership Taking

In addition to strengthening the project foundation, ownership taking does help avoid confusion and hence improve the smoothness of the overall ERP implementation. It is also with regard to the hypothetical strategy [S1], ownership taking is key to facilitating project management in a more effective manner, as project ownership and project management are equally important but should be handled separately. By general definition, project management involves optimising the use of scare resources and managing various forms of risk to meet stakeholder expectations. In other words, it should be used to optimise outputs relative to inputs while factoring in both risks and expectations. Most people duly perceive that project management ensures accountability or the linking of people to project tasks and deliverables. However, project management can never compensate for people who lack discipline (Spafford, 2003). While the policies and procedures should remain essential to cultivating discipline, ownership taking is always imperative to ensuring that ERP projects can be effectively managed. In particular regard to the adaptive approach, project ownership can be split and even transferred, given that there is a readily available mechanism to make sure that the ownership continues to be sustained through to the end of the project.

As in the Pre-Sales Phase, it is the sales manager, rather than anyone else, who must take on the initial ownership of the project until it is securely handed over. While many other articles emphasise the role of the project manager, key users are the focus of this research model. The key users are generally department heads, who should help to determine the final architecture and decide on the schedule within which the ERP system should be adopted. More importantly, key users are also supposed to take on the 'ownership' of the operational analysis as well as solution design. In other words, they are required to share the implementation's success or failure. As a logical consequence, they are motivated or forced to participate significantly at a decision-making level in a specific definition of the project's scope and deliverables, gap analysis, development of change programs, review of the contingency plan and finally a construction of the 'To-Be' model.

During the early stage of the Foundation Phase, key users' involvement in overall project planning is always obligatory, since it is of prime importance that they must play a leading role in the subsequent stages. For notable implementation effectiveness, key users working in collaboration with the implementation consultants are required to come up with appropriate resolutions to the problem areas for which they have been given ownership. Until the key users become extensively involved with developing the solutions, no real commitment towards success can be evidenced.

Delegation of ownership is also considered as a significant contributor to increasing the likelihood of overall success, while individuals are still given responsibility to accomplish specific tasks. A proper ownership structure will largely facilitate a collaborative working environment where successful ERP implementation can be fostered.

8.1.3. Embracing Customised Programs Into the Simulation

Instead of scheduling a series of education programs on how to use the standard package, it would be better if customised programs could be integrated into the future model for pilot testing. Education then becomes a key part of the Familiarisation process. This serves as a pre-requisite to carrying out the process simulation. With such an arrangement, key users could find the Familiarisation Phase more useful, since they are now able to try out the operation of the future model. This also gives the key users enough confidence to carry out end-user training by themselves.

The 'Familiarisation Phase' has a repeated process in which key users are given the opportunity to carry out a process simulation for the future operation of the model, as developed in the Foundation Phase. Custom program extensions, which are additional programs developed through recognising requirements that cannot be fulfilled with the current ERP functionality, are now integrated into the process simulation (thus allowing validation of prototype). As a result, key users can thus understand what exactly they will be getting out of the simulation and will be able to assess how comfortable they are with the customisation. Although over-customisation needs to be avoided to reduce errors and to retain the capability to take

advantage of newer versions and releases (Rosario, 2000) and core programs should not be modified at all (Sumner, 1999), custom program extensions are seldom avoidable, and to a certain extent, can be added and operated side by side with or around the core programs to enhance functional compatibility. Fine tuning a prototype is an iterative process which also represents an innovative improvement to JBA Advantage.

8.1.4. Emphasising Final Readiness Check

The Implementation Phase is characterised by having a final readiness check, implemented ahead of full deployment when working towards project completion. Assembly of live environments, initial data load and user training are critical activities as far as the readiness check is concerned. Final Preparation itself is essentially a major checkpoint for ensuring that everything is ready for an official launch of the system. Since most ERP projects take a relatively long time to implement, risks arise at different stages. These need to be addressed as a matter of priority. In this new version of JBA Advantage it is suggested that quality assurance, risk assessment and contingency planning should be organised so that checkpoints can be defined to help secure the success of implementation.

It is also advised that checkpoints need to be integrated into the quality assurance process to ensure a secure move from one stage to the next. As a result, contingency plans would need to be reviewed and changed as necessary at the end of each stage. Contingency planning is crucial to reducing the risk of failure by incorporating more time to react and to pursue other options in situations where a specific action does not produce the expected deliverables. The larger the scale of an implementation project, the more important is the contingency planning. Above all, project failure is often a direct consequence of not being able to live with the contingency plan. However, developing contingency plan is always neglected by many other ERP implementation methodologies.

Furthermore, the Implementation Phase should never take place until key users are confident enough to train end-users on new ways of doing business. To achieve

implementation success, the key users must be given the responsibility to develop a plan for user training and they must conduct the training accordingly. As in the case of Pepsi, the BU acting as advisory project manager had to actively support the training process, as effective project management should be disciplined, and should include co-ordinated training (Falkowski *et al.*, 1998).

8.1.5. Expediting Implementation with Tools and Processes

Apart from the competency of the individuals involved, the availability of effective communication channels and the degree of compromise among the individuals or groups involved, are vitally important. Moreover, the effectiveness of improved methodology is also dependent on how well the pre-implementation work can be accomplished. The availability of data take-on and fixing tools is found to be useful in accelerating the implementation process. For example, Scheer and Habermann (2000) argue that modelling methods, architecture and tools are critical while Rosario (2000) suggests that proper tools, techniques and skill in using these tools will offer considerable aid towards successful ERP implementation. Therefore, different tools and processes are necessary to improve the likelihood of implementation success. As depicted in Figure 8.3, implementation processes and tools are therefore suggested as key features in the improvement of JBA Advantage.

Figure 8.3 Processes and Tools for ERP Implementation

Processes	Toolkits
• Business Process Reengineering • Gap Analysis • Prototyping • Continuous Orientation • Ownership Taking (Key Users) • Quality Assurance • Parallel Run • Customer Relationship Management • Supplier Relationship Management • Integrated Support (Pre- & Post- Sales) • Extended Contingency Plan • Change Management • After Go-live Support	• Scope Checklist • Functionality Wish List • Risk List • User Profiling Tool • Affinity Diagram Tool • Workflow Tool e.g. @ctive Modeler • Web-based Project Management Tool • Data Capturing Tool • Data Verification Tool • Data Fixing Tool • User Surveys

Source: Author's Field Study

Lastly, as delivering early measures of success is important (Wee, 2000), measures and controls are implicitly addressed in the new version of JBA Advantage. Continuous assessments of risks, regular update on resources, schedules and milestone achievements, regular orientation for key users, and finally, regular reviews of the contingency plan are embedded into its methodology.

However, implementation success is still unlikely if tools and processes are not used effectively, since it is found that most of the issues affecting success are human-centric. Therefore, the new version of JBA Advantage emphasises and requires a solid foundation building so that implementation can be effectively facilitated. Regardless of the implementation methodology available, scalability, flexibility and collaboration, leading to a secure platform, are vital to securing successful implementation.

8.2. Linking Up the Two Tiers: The Methodology and Strategies

The survey results reveal that companies with ERP implementation experience mostly agree that an extended degree of flexibility is always needed because of various changes that arise during the course of implementation. While only a few implementation methodologies are scalable and flexible, most are rigid and require a lot of attention. In most cases, ERP vendors recognise the common situation that a vanilla version of implementation methodologies can be marginally enforced. However, if this flexibility is abused and the changes are not properly managed, any further attempt to stay on the implementation methodology seems a waste of time and the implementation is likely to be out of control.

Control and flexibility are inherently contradictory. Implementation methodology attempts to put in place some kind of control, while a real life implementation always requires flexibility to various degrees. Therefore, this dilemma needs to be resolved before it turns into a barrier to the project's success. Ideally, the implementation methodology should be positioned strategically and customised as needed so that the implementation strategy can be suitably supported. However, for most

implementation projects, it is hard to decide on the methodology until an overall strategy is formulated. Unlike implementation methodology, which is deemed to be less adaptable, a good strategy incorporates a certain degree of flexibility. With regard to change management, the implementation strategy also appears to be more significant than the methodology. Therefore, a company-wide implementation strategy should always be formulated prior to implementing any ERP system.

Figure 8.4 Comparison of Strategy and Methodology

Strategy	Methodology
• Specific • Managerial concern • Customer driven • Flexible • Environment dependent • Non-Procedural	• Generic • Operational concern • Vendor driven • Rigid • Environment independent • Procedural

Source: Author's Field Study

In general, strategy and methodology, as depicted in Figure 8.4 are both generic and specific respectively. However, in the ERP world, their positions are sometimes reversed. A methodology has to be generic, since confusion might result if numerous variations are developed. On the contrary, to be effective a strategy needs to be specific to the organisation's culture and working environment. Implementing an ERP system without a defined strategy is rather risky. No two organisations are exactly the same. Due to the fact that the business world is so complex, it is not usually justifiable to develop a new methodology for a specific organisation. To a certain extent, therefore, a strategy represents a fix to a methodology. Alternatively, a methodology can also be considered as a baseline for developing an appropriate strategy.

In terms of user involvement, senior executives must always be involved in formulating an appropriate strategy for effective ERP implementation. This strategy

should address various managerial issues, including the economic justification for the project, financial arrangements, communication channels, reporting schedule, resource allocation and commitment, rollout support and timeframe, the change management and system integration approach, etc. Only when these managerial issues are resolved can operational staff focus on the execution aspect of implementation and reap the benefits of the implementation methodology. The collaboration issues regarding how communication can be better facilitated will be discussed in the following section.

Hence with respect to the ERP projects, both implementation strategy and methodology are equally important. However, their target audiences, sources of initiative and degree of flexibility are somehow different. Despite their differences, they also have similarities. For example, neither implementation strategy nor methodology can solely secure a successful implementation without top management support. Both the implementation strategy and the methodology require regular reviews and, more importantly, adaptations so that implementation can be truly supported. Changes must also be documented while the implementation is moving forward.

In terms of process reengineering, methodology is more applicable, since a structured approach needs to be adopted for the execution of new or changed rules and processes. For example, employees at Pepsi were expecting some sort of guidelines and instructions to help them through the exercise, although, at the same time, they tended to exhibit resistance to the process change. In practice, the process of BPR transitioning requires a development of operational strategy since a methodology is rather reactive with regard to inspiring people to perform. Successful adoption of an implementation methodology relies on people's understanding of the corporate objective in respect to the ERP implementation and how well the users' expectations can be managed. Details of the BPR issues and the management of user expectation will be discussed further in the following sections.

With respect to change management, it is imperative to formulate a strategy at a broader level that is aimed at facilitating a methodology and rectifying any

unexpected results of the implementation. Process reengineering is always accompanied by changes and usually resistance too. Strategic and tactical measures need to be developed to combat this resistance. Hence until a change management strategy is well developed and tested, any tactical measures are likely to be in vain. The latter section will attempt to address the change management in the context of this research.

Above all and again, company readiness represents another pivotal requirement for achieving successful ERP implementation. Introducing changes through BPR, as well as managing these changes, is a major part of the preparation process. An ERP implementation strategy is more valuable if it can support implementing BPR project initiatives. In general, formulating a strategy is vital to preparing the entire company for the implementation of an ERP system. An educational programme geared towards achieving company readiness, with special attention to change management and BPR transition needs to be developed and executed accordingly. However, such a programme cannot be successful until it can cope with the company's objectives with regard to ERP implementation, organisational culture, and employee attitude towards implementation and the availability of resources.

In short, implementation strategy and methodology are not only complementary but also supplementary. In the process of formulation, an adaptive strategy should be developed to compensate for inadequacies in the methodology, since ERP vendors are unlikely to customise their implementation methodologies for a specific organisation's setting. Indeed, according to the research survey, implementation methodologies are seldom changeable. Even though some methodologies are scalable, companies still find it difficult to exactly follow the vendors' approach when implementing ERP systems. This implies that chief executives as well as operational staff must be well educated on the implementation methodology as soon as the implementation begins. From this point onwards, a relevant strategy can then be formulated.

8.2.1. A Showcase Approach

Being increasingly accepted as a generic strategy toward the effective implementation of ERP systems, a showcase approach, in close relation with the deployment of a hypothetical strategy [S3], significantly contributes to multiple site implementations. As a fulfilment of the 'Win small Win early' element defined in the hypothetical model, this particular section aims to illustrate a strategic use of the showcase approach using comparative examples from two multinational companies, namely Pepsi Cola (Pepsi) and Chubb Security (Chubb). Depending on the organisational circumstances, a showcase can be either of a top-down or participative mode.

Of these, the latter is considered more difficult to cope with. Preserving low staff turnover rates and reducing change resistance is a challenge for those multinational companies who intend to implement ERP systems for their operations in China. Examples, with reference to a strategic use of Key Performance Indicators (KPIs), are cited to illustrate how resistance can be effectively managed. KPIs, as the term itself suggests, are not an exact measure of achievement but rather provide an indication of performance, with a focus on effectiveness and efficiency. Furthermore, KPIs exhibit certain characteristics that include appropriateness, relevance, accuracy, timeliness, completeness and finally comprehensiveness to facilitate an assessment of individual as well as group performance.

Like most multinational companies in which a strategic use of ERP system is critical to reducing costs and improving efficiency, Chubb had attempted to implement PeopleSoft as a business solution. In this case each global business project was given an identity. For example, the implementation of the PeopleSoft ERP solution at Chubb was known as Project Atlas. Establishing an identity is just a kind of branding. Brands are inherently strategic and leave footprints wherever they go (Crawford, 2001). In comparison with other critical projects, Atlas was very powerful in terms of the time and resources the company needed to commit. The sales contract for the software licences was originally signed in the UK between Chubb Plc and PeopleSoft Inc. as a global deal. From the companies short-listed for support and services, IBM Global Consulting Services (formerly PriceWaterhouseCoopers Consulting) was

chosen and given a designated role as sole global implementation partner, while PeopleSoft provided only the software licences and classroom training.

With reference to an informal survey of experienced ERP project managers from various corporate IT departments and the Big Five consulting companies, staffing (including turnover) was ranked the second out of ten project management headaches, whereas resistance to change was comparatively easier to tackle (Trepper, 1999).

Dealing with employees is deemed to be the first priority in the successful implementation of changes. At Chubb, there was a common belief that employees with the required skills and experience could make a significant contribution to the effectiveness of the implementation. As a result, selected employees were invited to join the core team as key members and work full time on the project. A project office was established in Sydney shortly after the project was initiated. The office consisted of around fifty individuals, of whom half were the core members elected from their respective business operating units, the remainder being external consultants. As it is generally accepted that an effective project requires group as well as individual commitment to succeed, the full attention of these core members was seen as key to moving forward the implementation.

The core members representing individual countries were sent to Sydney to define a global to-be model. In the meantime, a change management team was formed. While the contract was signed globally for the entire Chubb, implementation firstly kicked off in Asia Pacific with extended IT support from Australia. Singapore had been identified as a showcase location where a prototype would be implemented. Upon acceptance of the showcase, multiple site implementations would, in future, take place across the Asia Pacific. The general manager of IT for Asia Pacific was initially appointed as global project manager for Project Atlas and worked full time on the project.

In any software implementation project, resistance to change is virtually unavoidable. However, it may be beneficial to implement the correct change which would lead to an opportunity to do more business (Suresh, 2001). Perceived risk and habit are two

fundamental sources of innovation resistance (Sheth, 1981). Resistance can often be reduced through adopting an early consultation process (Fowler and Walsh, 1999). This was also recognised to be an effective vehicle at Chubb, encouraging user acceptance, especially at the operations level. Indeed, involving the end users from the start is seen as a 'magic key to success' (Salopek, 2001). Successful attempts to involve and consult with the end-users as soon as the software selection begins forms an essential part of this company's readiness as part of its approach towards successful implementation of ERP. Early consultation is seen as a selling process through which management can be convinced, as long as the showcase is properly demonstrated. After all, 'seeing is believing'. However, it is also apparent that if a showcase falls short, the entire implementation process could be seriously and adversely affected.

Both Chubb and Pepsi opted for a showcase approach. In Pepsi's case, the intention was to construct a showcase at one of the pilot sites where strong resistance at the operations level threatened to defeat the project. A showcase is more than just a user prototype, as it requires thorough planning and proper execution. Full attention to the preparation of a single showcase is crucial, while an immediate attempt to simultaneously implement the ERP system at several locations is rather risky. In retrospect, the initial failure at Pepsi was a direct result of a lack of groundwork before moving forward. The implementation consultants were found to lack the experience required to identify the user needs, while the internal support staff also failed to make any appreciable effort to close the expectation gap within the organisation. Inadequate involvement and technical support from the internal support staff left the end users to rely excessively on the external consultants, who were also found to be incapable of providing the expected technical solutions. Inability to manage users' expectations thereby sustained resistance, while inferior control over resources produced additional blocks against winning users' confidence.

Conversely it was observed that Chubb was more efficient in terms of resource allocation. For example, it was recognised that core team members needed to be assessed and that they were allowed to work full time for the project. Closing the expectation gap was also seen as being within the duty of the core team. In addition,

the pursuit of management buy-in was also an immense task that the core team had to work on, since it was important to determine from the outset, how the management could be influenced.

A showcase is likely to be more successful when a suitable execution mode is adhered to. A top-down or directive mode is favourable if the gap only exists at the management level and a strict control over the operations unit is being exercised. Conversely a bottom up or participative mode is more appropriate if effective delegation is being practiced comfortably at the organisational level.

With respect to the top-down mode, management executives need to be convinced of the benefits that the implementation will bring. If the management is listening to the operations departments, then the challenge is more to do with persuading the operations staff at an early stage. No matter which mode of execution is employed, continual support from company management is again critical to every stage of the implementation process. Furthermore, management should also have a strong commitment to using the system for achieving business aims (Roberts and Barrar, 1992). Contracting staff and hiring contingent resources are good examples of the 'commitment' that Pepsi had extensively adopted to accelerate its ERP implementation.

With respect to the participative mode, every attempt to relate KPIs with the work that employees are doing for the project, should positively contribute to the project's success. In some cases, the real challenge of ERP is not so much gaining buy-in but helping employees to cope with job makeovers (Schneider, 1999). In many US corporations, employees are required to develop their own KPIs that will in turn form a baseline to help decide how they should be rewarded for satisfactory performance. Inspiring individuals to react is key to this strategic approach. In practice, operations staff members need to get involved. Indeed, lack of full commitment at the operations level goes a considerable way to explaining why the implementation projects at Pepsi failed.

Discussion

Thanks to the rapid growth of the economy in the last couple of years, the workforce community in China is now adjusting itself towards efficiency and adaptation to change. People at work are becoming more open-minded, as a result of an increasing threat of competition. However, the relative immaturity of IT in China's industries, with regard to a lack of long-term MIS strategy and project experience, is still considered to be a major obstacle to effective implementation of ERP systems (Huang & Palvia, 2001). Informal planning, process modelling and interdependent social relationships and attitudes toward organisational changes all limit process innovation efforts (Martinsons, 1998). A complete attitude change is still a long way off in China.

Further to the showcase approach, teamwork is also critical to pursuing effective ERP implementation. Implementing teamwork calls for paths of change (Fox & Howe, 1997). In Mainland China, motivation is among the most difficult of paths to work with. Forming a KPI team to define key result areas, report KPIs frequently and finally identify hierarchical KPIs is key to managing the motivation (Parmenter, 2001). However, the concept of KPIs is reasonably new to workforce management in China and it will probably take some time for Chinese industries to embrace this innovative concept of performance evaluation.

Additionally, implementing ERP systems inevitably calls for overtime work, yet this is not acceptable as a general practice in Mainland China. If employees are already overworked, eliminating any non-essential tasks from the system may require the development of incentive programs to motivate change and incorporation of these programs into performance reviews (Schneider, 1999).

Rewarding performance appropriately can foster motivation. However, without avoiding people from shifting to do different jobs from time to time, any further attempts to improving work efficiency are unlikely to be successful. For rewards to be powerful, they must be visible (Kerr, 2000). To facilitate a successful ERP implementation in China through improved motivation, giving away a mixed reward of tangible gains is currently believed to be effective in terms of cultivating the employees' motivation to work more effectively. Monetary reward is generally

considered to be the most effective motivator, albeit with a short period of validity, since there is a common phenomenon whereby individuals with reasonable incomes tend to compare themselves with others in terms of tangible gains.

With radical changes and improvements to the economic condition in China, an increasing number of people consider moving from one job to another even if this involves only a modest pay rise. As a result, overall productivity is affected, and this indirect benefit should be transformed into a more meaningful driving force. Extending sabbatical vacations or giving away days' subsidy in exchange for more communications and effective implementation work, for instance, was quite commonly experienced during the implementation of System 21 at Mitsushita China, an original manufacturer of the 'Panasonic' brand. Also, since good technical staff with ERP experience are extremely hard to find and keep, especially in state-owned enterprises, a project manager should therefore develop a performance recognition program that helps with staff retention.

In conclusion, no matter what implementation methodology is adopted, a successful attempt to prepare a showcase represents a sound strategic approach toward implementing an ERP system, as it helps to break down change resistance and also closes the expectation gap through the extended participation of operations staff. Hence a showcase is more like a prototype, yet it calls for more attention in planning and execution. The aim of demonstrating a showcase is to stimulate expectations from other parts of the organisation. This implies that it will foster effective communication and increase people's excitement and motivation to move forward with the project. Adopting a showcase approach to get the implementation going smoothly can help reduce fear as well as risk of change. Similarly correlating KPIs with tangible rewards can go a long way towards eliminating resistance and staff turnover, hence helping to increase productivity. Again, support from top executives as well as operations staff is equally important. However, it is acknowledged that it is not usually easy to gain full support at the operations level, where more human related issues are involved. For this reason a participative approach is far more appropriate when dealing with the operations staff, since they need to be cultivated to perform in a controlled environment.

8.3. Cultivating Change and Managing User Expectation

In a complex business world, managing resistance has been considered a key challenge for ERP implementation. People resist changes for different reasons. Fear of changing the way people do things is rather easy to handle. Some other people, particularly those in supporting roles, are reluctant to change simply because in many cases they are not properly asked or are pressured to make any changes. Young people tend to be more adaptable as long as they can recognise the real benefits of the changes. Among the various reasons for resistance, anxiety about being retrenched is the most pressing concern, especially in an economic slump. Increasingly, employees are forced to make certain changes when, for instance, reducing overhead costs turns out to be the organisation's concern. This generally results in sacking direct labour and re-arranging the workload of existing employees. However, the entire organisation's morale would be affected if employees were not suitably convinced to accept the changes. Therefore, changes have to be clearly defined and communicated with everyone affected in a structured way.

Instead of introducing changes with a top-down approach, it is deemed to be more effective to let employees voice their needs for changes. Pushing for change acceptance inevitably induces resistance. Although intended changes can be implemented, there are still concerns about whether these changes are flexible enough to continue to be effective. Once an excuse can be found to avoid exercising the new practices, people might fall back on the old ways of accomplishing tasks. Therefore, people must be proactively persuaded to accept new changes in order to establish a collaborative environment that in turn fosters change initiatives from within the user groups, on the condition that top management support can be sustained for a successful implementation of changes while the change initiatives envisaged from within the user groups constitute the operational success.

Below are the steps suggested for establishing a collaborative environment that transparently stimulates initiatives for changes:

1. Appoint, as facilitator, a senior executive, preferably from the board of directors, who understands the good and bad sides of the business.

2. Form a change management committee composed of representatives, preferably senior managers, from various functional departments with the responsibility for defining the company's change-related goals as well as encouraging their subordinates to participate in the design of new way of doing business.

3. Sell the benefits of best practices which form the benchmark for comparison of efficiency to the functional managers.

4. Relate the best practices to the key performance index (KPI) and communicate clearly with the managers about how this KPI will affect their survival within the organisation.

5. Cascade the message that process changes are just as important as technological changes, with examples to illustrate the inter-relationship between the two changes.

6. Schedule brainstorming sessions, with extended support from the facilitator, for individual functional departments to help generate agreeable initiatives for achieving the goals of process change.

7. Consolidate initiatives with the values added, if any, by for effective changes, develop an action plan and obtain approval.

8. Set aside sufficient budget to facilitate the training and purchase of necessary equipment for the changes.

9. Develop a strategic education plan for different levels of staff as a priority from the beginning of the project and revise the plan on a regular basis.

10. Establish an effective communication plan for people to give comments, suggestions, complaints and feedback.

11. Reward and make known to other people in the organisation the party that successfully implemented the changes.

Establishing a collaborative environment allows employees to take part in stimulating change initiatives As a result, change initiatives and customer expectation should both come to be relatively easily managed. Effectively customer expectations should be managed with reference to the hypothetical model strategy stage [S3], right from the point where customers are first approached with the offer of an ERP solution. This should be the case even although there is the possibility of a conflict of interest between the salespeople and the system implementation consultants. Again, an early adoption of the 'Win Small Win Early' approach is favoured for managing customer expectations, as mutual confidence and trust can more readily be accumulated.

It is also imperative that the managing consultant must lead the implementation whereby the implementation consultants are guided in how to move forward during the ERP implementation. Moreover, he or she must act as a mediator to effectively close any gap emerging between the sales persons and the system implementation consultants, when conflicts arise. Since the managing consultant comes from within the post-sales organisation and is involved in the solution selling process, commitments made during the product demonstration are believed to be much more practical and achievable. In addition, misinterpretation and misrepresentation, often associated with traditional practices for handing over implementations of the project, can be avoided. By these means, expectation gaps can also be effectively minimised.

The efficiency of implementation also depends on the managing consultant's ability to understand the capability of the implementation consultants. User expectations can most easily be set with least effort, if this is done during the initial stage of implementation. Situations often arise whereby compromise can no longer be made once the project has got into deep trouble. Setting user expectations is therefore a critical function that the managing consultant has to assume throughout the implementation process.

Like any disaster recovery plan for any business organisation, the successful implementation of an ERP system requires the full collaboration of the workforce across all levels of organisation. Most survey respondents and ERP vendors share a common view that ERP implementation should be considered as a business undertaking rather than just an IT project. From this perspective, management approval of a project initiative alone, does not necessarily guarantee an implementation's success. This requires other parts of the organisation to contribute to the implementation with a high level of co-operation. According to the survey, it is recognised by participants that functional managers, who are supposed to lead the implementation at the operational level, are often either insufficiently trained or not properly assigned a share of ownership of the project's outcome.

8.3.1. Confusion and Circular Dependence

In the course of ERP implementation, individuals or functional departments are always given specific responsibility. Unfortunately, a formal collaborative workflow scheme is seldom precisely defined. This might result in certain degree of confusion, especially when people are working in groups. In the worst case, confusion about responsibility might turn into arguments, increased levels of discomfort and finally unexpected delays to the implementation schedule. Clarification of assigned responsibility with reference to a defined goal is necessary and a clear explanation of collaboration is also required to prevent a circular dependence from causing significant project delays.

Circular dependence comes about when, for instance, IT staff members rely on users to carry out user acceptance testing while the users continue to expect IT staff to organise the testing and provide extended support in validating the testing results. Furthermore, it takes much more time to complete even a trivial job when ownership is not clearly defined and assigned. For instance, at Chubb, even though a regular progress review meeting is held between IT staff and users, to discuss various implementation issues, the outcome is usually disappointing since their procedures lack a suitable method for ensuring effective communication. The methodology has

to be encouraging and reliable. Staff members need to be stimulated and encouraged to contribute their ideas.

Given that project executives are concerned with the timeframe and budget considerations whilst operations staff members are more concerned with the resource availability and, even more importantly whether they can get things done with minimal disruption to their day-to-day jobs, a closed communication loop is important. This should aim at ensuring group awareness not only of progress but also of any concerns and potential risks since if serious enough, such risks might quietly kill the project altogether. However, avoiding discussion on (future) risks is fairly common, especially in the Asian community, especially if individuals think that such avoidance can help them to deliver the results, on time.

In practice, regular reviews may help resolve some, but not all, of these problems. In particular, in a general review meeting, people might avoid raising new initiatives and hence causing chances of failure. Some critical issues might therefore be hidden from the agenda. This explains why so many implementations still fail.

8.3.2. Language Barriers and Cultural Difference

Whilst cultural difference, as already illustrated, can directly affect implementation, language barriers can also play a pivotal role in reducing the effectiveness of communication. Most international firms in Hong Kong still have expatriates hired for various managerial positions, although less have been employed since 1997, when the sovereignty of Hong Kong was returned to China. It is quite common for expatriates to take up leadership roles in driving change. However, local staff-members can often respond rather reactively in accepting modern technologies and new ways of doing business, introduced in this way. For example, at Chubb, supporting staff, even at a senior level, tend to be operationally focused and less proactive in communicating with the upper management during process improvement initiatives. Also the Asian community, and in particularly the Chinese, tend to be naturally reticent in expressing their concerns or going into detail during meetings

with the foreign community primarily because of the language barrier. Effective communication is therefore adversely affected.

8.3.3. Closing the Loop

Both illustrated scenarios, to a certain extent, cause failures in ERP implementation. Clarifying the degree of involvement is crucial to making sure that individuals are resource-capable to complete designated tasks. In day-to-day operations, ad-hoc assignments prevail with a higher degree of urgency and the implementation work is therefore inevitably postponed. While this situation continues, the entire implementation can be seriously affected. Therefore, involvement needs to be clearly defined and constantly reviewed with a view to reducing conflicts of interest.

At the operational level, full-time involvement is preferred, yet rarely achievable, and thus operations staff end up having to put in extra effort to avoid dealing with routine activities. This requires commitment at the operational level because the operations staff members are the people who understand the business at their fingertips and they are the ones who are capable of facilitating the implementation. Functional managers will also need to make sure that their staff members are adequately motivated and available for the implementation. For example, during the course of System 21 implementation at Aiwa Hong Kong, where project delay was minimal and the functional managers were fully committed to the implementation, operational commitment proved to be a key factor in the project's success.

For improved effectiveness, it is also recommended that small, specific, task force groups should be formed where individuals are given designated responsibilities with clear objectives and well-defined deliverables to complete some specific tasks. The aim of this is to achieve implementation efficiency by creating synergy. For instance, with respect to the calculation of wages, the HR staff will be familiar with the pay rules yet technically incapable of validating the calculation results. Conversely, IT staff are well positioned to be able to review the technical competency of the calculation formulas and hence come up with a test plan for validating the testing results.

During the course of implementation, more than one specific task force group (Tier-1 grouping) can be formed and, in due course, dismissed. Each group should be further split into two identical workgroups (Tier-2 grouping) with similar capabilities and resources assigned. Each workgroup should have no more than three people, ideally one with operation experience and two with technical skills. These two small workgroups will be assigned to do the same task separately and learn from one another.

In conclusion, operational commitment is probably vital for the successful implementation of an ERP system. Without leveraging mutual understanding and true collaboration, confusion due to a circular dependence, can easily result, and develop into a major barrier to implementation. Cultural differences have an impact on the implementation, and therefore, staff members need to be motivated to communicate freely and effectively. Functional managers also need to make their staff available most of the time by avoiding routine and ad-hoc job assignments. Defensiveness at the operations level presents another challenge to progress on ERP implementation. Operational commitment is therefore an effective instrument to eliminate the risks and hence promote the most effective way to close the expectation gap.

8.4. Improving the Communication Mechanism

For many ERP implementations, project teams are often given the task of chasing a series of fluid requirements, but are not provided with a process for managing changes to the project scope. Hence there is often a false belief that technology alone will prevail. As organisations embark on ERP initiatives, many key issues, such as the integration of client, implementer, and software vendor plans and the constant management of project scope, cannot be easily addressed until a project management office is well established. Hence keeping up a project office to perform its functions throughout the implementation is just another challenge. A project management office assumes a leadership function in defining the combination of process, technology and standards to meet strategic and tactical project management needs. This improves the project management processes based on the provision of

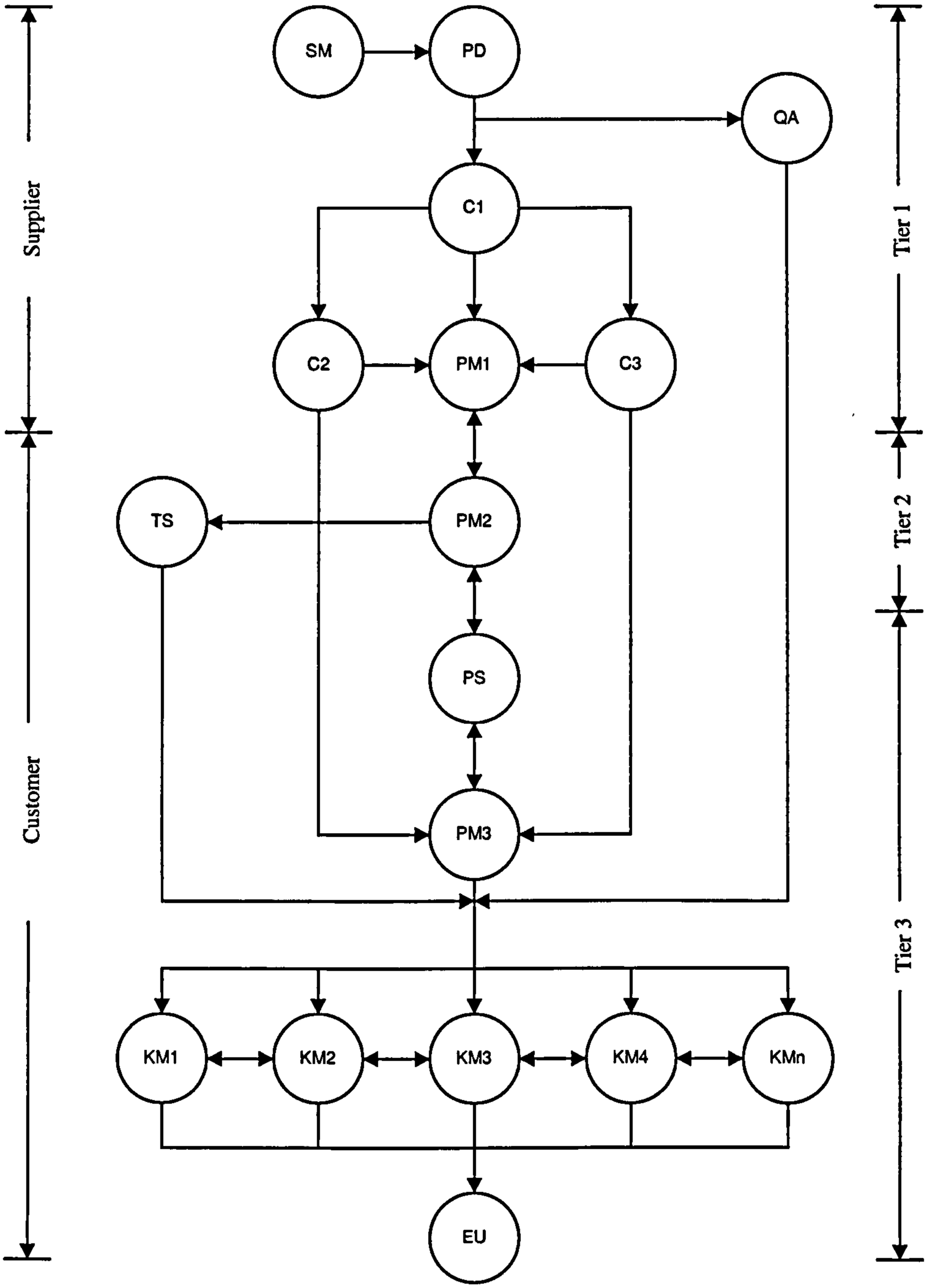
organisational feedback, and roles such as mentor, facilitator and knowledge broker, so that senior executives can manage a portfolio of projects including customers and initiatives (Axam and Jerome, 2003). A properly organised project office, with at least a full time project manager and key users of three categories – middle managers, customers and the ERP consultants - can therefore prove both strategic and critical to ensuring project success.

Conversely, inferior communication within the project office always lengthens the development cycle and prevents the implementation success. A strategic project office role can be a key success factor for avoiding this pitfall by assuming an organisational leadership role and providing structure and discipline as needed. Given appropriate governance it can also improve communication, establish an enterprise standard for project management and help reduce the disastrous effect of failed development projects on enterprise effectiveness and productivity. Based on the fact that communication caused severe delays in Pepsi's projects, an improved communication flow, as illustrated in Figure 8.5 was therefore suggested, aiming at a more effective implementation of ERP systems.

With reference to applying the suggested communication flow to Pepsi's implementation projects, the customer and supplier (Pepsi and JBA International respectively) communicated in a three-tier model accordingly. Tier 1 and Tier 3 refer to internal communication in a detached environment at supplier and customer side respectively. Tier 2 is an interface between Tier 1 and Tier 3.

These two groups of people, each with different roles, come to own several designated functions and processes. Inter-group communication then takes place within these three tiers. In seek of continuity, a managing consultant was initially appointed to take over the project from a sales manager and work with the overall project manager on a regular basis, reporting to the project director who was the managing director of JBA International. The sales manager who reported to the project director was therefore closely bound with the project, so that while he was free to work on other customer deals, he was still responsible for this core project.

Figure 8.5 Proposed Communication Flow



Supplier:

SM	= Sales Manager
PD	= Project Director
QA	= Quality Assurance Specialist
PM1	= Overall Project Manager
C1	= Managing Consultant

Customer:

PS	= Project Sponsor
PM2	= BU Advisory Project Manager
PM3	= Client Project Manager
TS	= Technical Support
KM1..n	= Key Members (Functional Heads)

In this collaborative working model, the managing consultant was empowered to give direct instructions to both non-JBA and JBA implementation consultants. All consultants were required to surrender their utmost support to the overall project manager from JBA International. Being treated as a facilitator, the client BU project manager, who was also given explicit technical support, was required to work with the overall project manager. From time to time, the client project sponsor was required to work hand-in-hand with the BU's advisory project manager to determine the scope and schedule of work while the client side project manager had a reporting line to the client project sponsor. Key users from within the customer side of the relationship were the major players, since they owned their business, and to a certain extent might resist changes within them.

In terms of quality assurance, a specialist from JBA International was assigned to the project office. This QA specialist, who reports directly to the project director, was actually the owner for executing the checkpoints and validations. With the above structure, it was likely that splitting up the project ownership was an added value to the success of running the implementation program.

In general, everyone in the project office must first be educated on the concept of emerging software and the associated implementation cycle in general. For effective communication, orientation workshops, preferably iterative in nature, also need to be carefully planned and executed. Above all and again, it is imperative that top management should continue to grant their genuine support to the implementation.

While top management support is crucial, functional managers, normally representing the middle management tier, and who act as key users, must also share the ownership of the project. For this to work a hierarchical structure is necessary to help the team understand how they should contribute to the implementation.

To further promote collaborative work, everyone involved should be subject either to applause or blame for the project success and failure respectively as in the absence of dedicated support from middle management, implementation is unlikely to succeed. This can be validated with reference to the ERP implementation at Shenzhen Pepsi,

where the CFO was assigned to the client project manager's role. Unfortunately, no real achievements were made, since he was not adequately facilitated to perform his function well. Frustrations resulted and the project slipped.

In conclusion, it can be seen that unwillingness to share responsibility is a significant cause of failure. This also explains why a structured project organisation, along with phased orientations throughout the implementation, is also key to a project's success. The newer version of JBA Advantage therefore puts much more emphasis on forming and orientating project organisation.

8.4.1. A Collaborative Approach

With the recent developments in ERP systems, a hypothetical requirement for a collaborative working model can now be met on the condition that a secure and reliable Internet connection is available. Technically, when a full speed 56K connection can be established, accessing enterprise applications on a designated server over the Internet is no longer a difficulty. Furthermore Broadband connection is getting cheaper and becoming more reliable as a consequence of continuous improvements in data communications over the last decade. Many companies can now afford to acquire a 3MB/512KB connection for a small monthly fee. Although this collaborative model represents the next generation of the client-server model, the architecture is based on the Internet technology, which provides a revolutionary change to the security control and user interface.

However, although the technology is undoubtedly there, it is being under-utilised, primarily due to inadequate training and a poorly organised structure for the implementation of the collaborative model. No matter how rich the functionality an ERP system can provide, it is still only a tool, and as such, it needs to be properly managed. The problem is that some employees consider this collaborative model ineffective, since it affects the way they do their businesses and also takes times to successfully transform the model into a practice. Different groups of employees have their own concerns about adopting this model of operation. For example, sales persons may see it as a selling tool to differentiate the service from that of other

competitors while finance analysts will find it an amazing tool to share financial information among the members of management. On the contrary, operations staff members are typically among the most resistant groups within an organisation, possibly because ERP will immediately disclose inefficiency in their working methods. Although the benefits of adopting a collaborative model can easily be recognised, it still requires a frequent and mutual understanding across all departments at a company level.

Initially, there are challenges to implementing a collaborative working model, since:

- People, in general, fear being closely monitored.
- Technical people working off-site have limited access to the Internet for information exchange.
- External members of staff (e.g. suppliers and contractors) may have already used other similar software packages for operating a collaborative model.
- Incomplete and inaccurate information associated with the model fails to facilitate accurate decision-making.

Based on the assumption that a collaborative model is more applicable to a situation where a fairly large group of people are involved and the communication process is therefore complex, full collaboration at work can hardly be achievable unless the following conditions can be met and properly managed:

- The model, by its nature, should add a competitive edge to the business that is unlikely to be provided in any other way.
- A senior executive needs to be involved in sponsoring and configuring the model.
- The members of staff have to be well informed of the objectives and procedures attached to the collaborative model.
- An infrastructure must be ready to facilitate remote update of information.
- The information has to be accurate, complete and up to date.

- A guideline or procedure for operating the model needs to be developed with classroom training provided.

Throughout the implementation, customers not only require attention, but they also need to be well informed, on a regular basis, about the progress of the project. Transparency reduces confusion and misunderstanding based on the assumption that nobody wants surprises, and everyone involved should be regularly updated. Without this, momentum can too easily be lost. As an implementation strategy specified in the hypothetical model, a web-based project update and reporting tool should be available as part of the communication portal with which individuals can report progress and exchange information over the Internet. The project update function should also be automated and alert messages should be provided if something goes seriously wrong. By doing this, individuals can be cultivated to work on the project more efficiently. Nevertheless, key users, consultants and contractors still need to get together on a regular basis to review the project status, although the exchange of information is made easier by the web-based tool.

Under virtually no circumstances does the technology itself determine the success of a technological implementation. The successful adoption of new technology depends on a change management strategy that guarantees staff support. This relates closely to the hypothetical strategy [S6]. As Tenefrancia (2002) affirms, for the implementation to succeed, the structure of business has to be changed to meet the new ways of doing business by redesigning the company, realigning resources, monitoring achievements and providing training. More importantly, staff commitment to change needs to be recognised and honoured. In addition, a crystal clear vision must also be articulated, stakeholder concerns must be properly answered and internal support for change has to be assembled.

Commitment building is therefore important to moving a technology project on towards success. However, the commitment building activities need to be adequately planned and carefully managed. Above all, while attempting to avoid giving too much detail, line staff involved the details of who, what, when, where and how, and a

holistic approach should be taken to assist in realising the project's anticipated outcomes.

8.4.2. The Process Defined

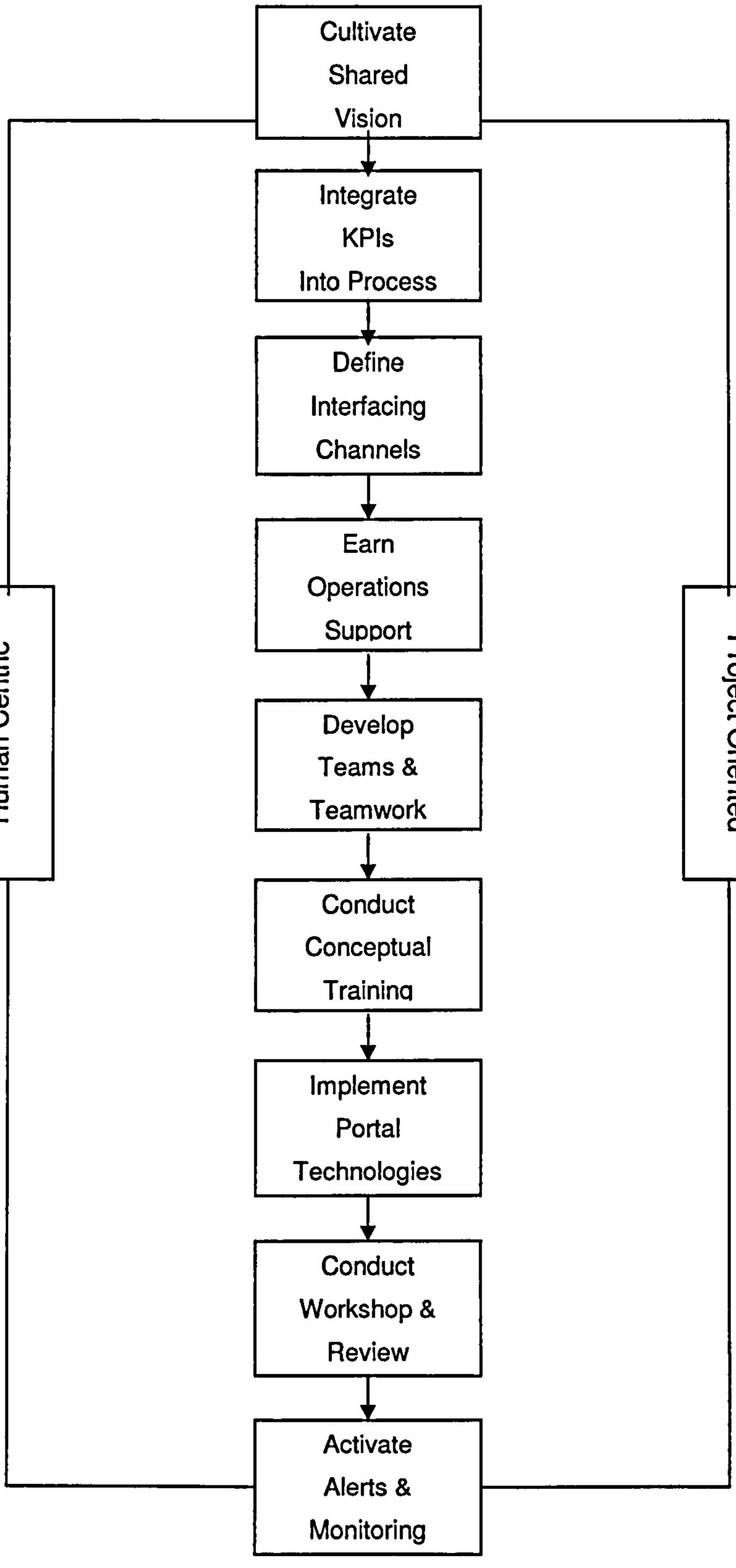
A large number of empirical studies have revealed that it is rather a matter of 'People and Preparation' that determines a truly successful implementation of an ERP solution; a human centric and project oriented collaboration process is therefore suggested, as shown in Figure 8.6. By developing common goals, down to activating monitoring tools to secure the continuity and healthy of the entire implementation process, coherent acceptance of one stage determines a vigorous move towards the next.

Step 1. Cultivate Shared Vision

> Change will only come about if employees believe it is what management at every level in the organisation wants. In a grounded approach for modelling team structure, as Teare *et al.* (1999) illustrated, the senior management team must examine themselves, their organisation and their management style and plan actions that clearly indicate that they are prepared to support everyone through the process of change.

One of the key factors that can jeopardise an effective ERP implementation is a lack of regular, effective communication. Prior to establishing (an) effective communication channel(s), a creed will need to be conceived, agreed and supported. This is especially important at the operations level. Especially when a collaborative model is adopted, operations staff will be heavily involved. By nature, an ERP project requires the most dedicated effort from those individuals who are the most concerned with the project's progress. Without a common interest, individuals will sooner or later lose track of what they have committed to.

Figure 8.6 Proposed Cultivation Change Process



Shared vision needs to be included in this creed because it relates to conviction, commitment and clarity of intent that generates a need for learning and the collective will to learn. Senge (1990) contends that shared vision is an integral part of the framework for learning. This means that shared vision is highly cohesive to team learning.

At Chubb Security, cultivating shared vision has been fully supported as a valuable repositioning towards an effective readiness for the implementation of PeopleSoft. However, it took more than half a year for the general manager of IT Asia Pacific and a selected group of business analysts to plan, organise and implement a readiness program for the entire Asia Pacific region. Eventually, thanks to a collaborative team structure whereby senior managers from major business units were able to envision the implementation in the same way, the implementation came to be seen, from the management point of view, as a half-success.

Step 2. Integrate Key Performance Indicators into the Process

In terms of process definition, Gotta (2001) describes collaboration as focusing on structural improvements across a collection of tasks and a series of activities with the aim of producing a definable business output. The most appropriate solution is therefore to improve the overall business performance by targeting both efficiency and effectiveness at the process level, requiring optimisation and sub-optimisation of activities and tasks around the Key Performance Indicators (KPIs). This implies an integration of KPIs into the collaboration process.

Levitt (2002) adds that integration is not only important for connecting and embedding application functionality and contents, but that it should also increase employee productivity rather than just improving scalability or easing administrative burdens.

Notably Key Performance Indicators or KPIs have always been used and have been persistently advocated within Chubb as a standard procedure for the measurement of individual and group performance. From experience, KPIs have proved extremely useful at Chubb in terms of helping individuals to set their goals and define criteria for validating the performance.

Step 3. Establish Interfacing Channels

The most difficult issues during improvement initiatives involve people, in the sense of persuading individuals to accept proposed changes, especially if this involves the possibly of a reduction in headcount. Hence the effectiveness of improvement programs is frequently governed by the effectiveness of the communication process.

Communication is important as changes are planned and carried forth and the communications strategy is obviously the most important of vehicles for conveying messages pertaining to organisational change. Many difficulties often associated with significant change, can be dealt with more easily if there is strategic thinking about what and how to communicate.

Establishing effective communication channels is absolutely crucial to the implementation success, but the technological interface is just as important as the human interface. Levitt (2002) explains that technology must not only be used, but must be used appropriately, to achieve the best results. End users must therefore select the most appropriate interface for particular tasks and must be able to rely on back-end systems to seamlessly provide the necessary supporting content and functionality. Collaboration is, again, concerned with structured interactions between partner/supplier entities. This means that it focuses on data exchange and process integration across business boundaries. The addition of video to audio-based communication can also result in improved decision-making when compared to other collaborative technologies (Barker, 2002).

Step 4. Strive to Earn Support from the Operational Workforce

In a research study carried out by the Meta Group, internal pressure was found to be an effective driver for persuading the adoption of collaboration within most organisations. The results showed that overall, 60% of the survey respondents had been pressured from inside their organisations to offer collaborative capabilities.

Kiesier and Mirson (1975) suggest that line authority has a greater communications impact because it carries more organisational muscle than staff positions.

Publicising success stories is especially important during the changing stage of the change process. This was strategically adopted at Chubb and JBA International as an effective tool to inspire all team members and hence mobilise future success. Klein (1996) claims that it is equally important to develop a means of rectifying problems through feedback and adjustment.

Step 5. Develop Teams and Teamwork

Developing teams and teamwork is crucial to the survival of most organisations. Effective and efficient teamwork reduces operating cost and improves productivity. Maier (1967) developed a classic listing of benefits that a team can contribute:

- Teams produce a greater quantity of ideas and information than individuals acting alone,
- Teams improve understanding and acceptance among individuals involved in the process,
- Teams create higher motivation and performance levels than individuals acting alone,
- Teams offset personal biases and blind spots that hinder the decision process,
- Teams sponsor more innovative and risk taking decision-making.

To improve the performance of teams, team members have to have authority to make decisions on the spot, providing instant responses to customer needs. Empowering teams is therefore a significant consideration when moving towards the achievement of effectiveness. Brower (1995) presents the four essential A's: *a*uthority, *a*ccountability, *a*lignment of direction, and *a*bleness. He also argues that empowering teams to succeed requires information, supportive functions and systems, and leadership at four levels. Cross training among members also helps to make possible the balancing of workload and makes the team members more valuable. Furthermore, while Stough *et al.* (2000) place extra emphasis on education and training concerning the use of teaming throughout the internal organisations, Teare *et al.* (1999) suggest that any effective education process should address the following three main areas:

- Generating an awareness of the need for continuous improvement and the changes in attitudes that are necessary to achieve this,
- Developing the ability of everyone in the organisation to utilise problem-solving and quality tools and techniques so that they can analyse problems, identify their root causes and develop effective solutions,
- Establishing the skills necessary, at all levels, to work together in teams and to sustain the improvement programme.

To keep up their morale, teams also need to be recognised and rewarded. Further to this, Teare *et al.* (1999) argues that an organisation must develop an equitable method for recognising the contribution made by its people through publicising successful implementation projects and assessing the performance of managers in terms of the support they give to their teams and their projects. To this, Stough *et al.* (2000) add the suggestion of giving away 'small wins' to motivate the teams to strive.

Brower (1995) contends that empowering teams also requires leadership at four discrete levels, namely, leadership of the team, distributed leadership within the team, middle managers as leaders and executive leadership. Finally, he proposes that every team should have a single designated overall leader and

that important processes need to be identified whereby one team member can assume accountability for each one, for a given period of time.

To be successful, the virtual team itself must also become an organisational tool for speeding up most processes. In return, virtual teaming capitalises on existing experts within, or across, organisations. More strategically, a set of directions (e.g. mission and vision) and criteria for measuring virtual teaming effectiveness must be prepared and used consistently. Above all, for this to work well, education and training concerning the use of virtual teaming must be conducted throughout the organisation.

Step 6. Conduct Conceptual Training

Teams must be trained to understand how they should perform and provide their services with greater value. Therefore, understanding the whole rather than just the fractional parts of behaviour is more important. Senge (1990) refers to this as 'systems thinking'.

It is evident that conceptual training is desirable to facilitate a shared vision. Major audiences for such events are the operations staff, rather than the senior managers. Their support will give the implementation a foundation from which to move forward.

The conceptual training will be much more contributive if it takes a top-down approach. For example, the conceptual training was conducted at Chubb through which the global marketing staff from the UK office and the IT analysts in Australia constantly communicated with the senior managers of every business unit for the purpose of encouraging mind-set changes. During the implementation process, other forms of communication such as email updates, management briefing notes and monthly newsletters were also employed to make sure everyone involved is sufficiently informed.

Step 7. Implement Portal Technologies

A key to success with modern teams involves the continual use of information technology to support team activities such as setting clear goals, co-ordinating and negotiating with others, planning and managing work processes and gaining decision-making skills.

There are several commonly used types of GroupWare to facilitate communication among teams, such as e-mail, PC-based conferencing systems and collaborative writing/programming/drawing packages. Workgroup database management systems, workflow automation systems and workgroup scheduling systems are examples of effective means of information storage and retrieval. Some other GroupWare is available for supporting decision-making. Portal technology is increasingly familiar to those who rely on various sources of information to do business. It is particularly useful for enhancing group communication. Its popularity is primarily due to the ease of access through commonly used browser software, such as Internet Explorer. Portals allow people to store and retrieve information in multimedia formats. No matter how remarkable these new technologies are, the key point is that simply getting on with these emerging technologies without a plan for implementing the change will be a waste of time; only an appropriate use of portal technologies can support virtual teaming in reality.

For the implementation of PeopleSoft at Chubb, Microsoft SharePoint Portal Server is being used to support the effective sharing of information within the company. External consultants and third parties to the company with appropriate authority can also gain access to the Portal. SharePoint Portal was selected as a strategic product to help with Chubb's communication and has been found to be very effective in providing both the core and extended members of the PeopleSoft implementation team with an excellent communication channel.

In particular, extended members are working part-time on the implementation and they also need to be well informed of the progress in an efficient and effective manner; otherwise their contribution to the project will be minimal.

Step 8. Conduct Workshop

With a shared vision clearly defined, conceptual training can be conducted in a more effective manner. While training will not totally guarantee ultimate success, a workshop will give individuals a chance to practice their collaboration and hence lead to a greater possibility of success. The workshop representing group collaboration in action must be relevant and effective in terms of making sure that individuals get the maximum benefits out of it. By attending the workshop, individuals should be able to increase their comfort-level in the context of collaborative working. During the workshop at Chubb, IBM Global Consulting Services (formerly PwC Consulting) acts as facilitator while Chubb IT is heavily involved in working collaboratively with the representatives from different business units. Depending on the scale of the business one, or a group of, IT business analysts is dedicated to coaching one business unit throughout the implementation process. In total, there are twenty-nine business units involved in Project Atlas.

Step 9. Activate Alerts and Monitoring

Further to the workshop, core team members should be capable of working collaboratively to achieve unequivocal effectiveness during the project implementation. However, this process needs to be monitored to make sure that collaboration is present and effectively managed through to the project completion. Hence some kind of monitoring tool needs to be deployed for monitoring purposes. Many commercial products are available, such as Microsoft's Team Manager, Lotus Notes, and Microsoft Exchange. These products can be used to monitor and report on the project progress data by employee, project or time period, but above all, effective monitoring depends

on whether objectives are set beforehand. Managers must develop a balanced scorecard of measures to enable them to drive forward their improvement programs. Teare *et al.* (1999) contend that these measures represent the key success drivers for the organisation. KPIs are once again involved here and appear to close the loop in this collaboration model.

In conclusion, collaboration is a relatively difficult aspect, as proper planning on resource co-ordination across different levels of an organisation is required to make it an effective cue for the project implementation. Adequate groundwork is also crucial to the effective implementing of an ERP solution. This implies defining a shared vision in association with KPIs followed up by establishing interfacing channels and developing teams. A truly collaborative working model in association with the hypothetical strategy [S5] is now viable through the power of the Internet, and this model is now part of many advanced ERP solutions. However, different people might have different views on its effectiveness and any satisfactory deployment ultimately relies on how well the changes associated with the model can be managed. This working model could bring in as much as business values, since management decision can now drive the technology to help transform business changes. However, infrastructure, training, management involvement and timely provision of information are also key to achieving this collaborative model a success.

8.5. Moving into ERP Implementation with Process Re-engineering

In general, implementing an ERP system can be seen as just another change to the organisation and a BPR project may possibly contain a certain number of ERP implementation projects. BPR must be clearly defined in the context of objectives, schedules and interactions, mutually agreed and fully communicated. Obviously, a top-down approach is more suitable for the implementation of such enterprise-wide solutions, since inherent support from within top management can be assumed.

Depending on the management objectives, BPR is mostly integrated with ERP implementation. There are several ways in which the system integration can be

interpreted, given that both BPR and ERP projects are strategic and business oriented. Essentially, it can be summarised from the research that there are two distinctive perspectives underlying a seamless integration between BPR and ERP projects. A more common view of this integration comes about in a situation where BPR should always be considered as a separate management exercise ahead of the ERP implementation and therefore widely accepted as a precondition to the successful implementation of ERP systems. Alternatively, ERP implementation may be seen purely as a means to support the smooth execution of a BPR project, and this implies that the BPR project embraces the implementation of the ERP system.

For those who believe that integration represents a continuity of project implementation, a distinct initiative for the execution of business process reengineering should be communicated and executed at all levels of the organisation. It is therefore recommended that external consultants, preferably from a reputable IT consulting firm, should be invited to plan for the BPR project, given that they could manage to introduce and implement the best practices that most renowned ERP systems, including but not limited to System 21, are able to support.

Business process reengineering should provide momentum to change the mentality of company employees so that changes can be adapted and the organisational culture can be transformed. The more successful the reengineering of business processes, the more efficiently and effectively the implementation of the ERP system can be carried out. The Foundation Phase can also be simplified, as the organisation is well prepared for adapting to the changes. Notwithstanding, the organisation must prepare its change management programs, as too many changes in a short period of time might lead to confusion and frustration. Continuity is a key component that helps move the implementation forwards. If the ERP implementation is widely accepted as an extension to the BPR project, no one in the organisation should get confused. Once the objective is made clear, implementation work should go smoothly and efficiently.

With reference to the case study, the project failure at Guangzhou Pepsi was actually due to the fact that employees were confused about the implementation of the ERP system, and therefore they did not manage to prepare themselves to adopt an

integrated ERP solution as a replacement for their legacy systems. It was the management's intent to change the ways people did things. However, the implementation approach was not well communicated, and resistance occurred as a result. No one was actually informed of the organisational impact that was likely to arise from implementing System 21. Nor was there a plan in place for managing the resistance that emerged in practice. Communication is also important for achieving seamless integration, since it is quite common for external BPR consultants to fail to communicate with ERP consultants. The likely outcome is that the momentum for adapting to change will not be successful until every employee is confidently oriented to the implementation approach and effective communication can be sustained throughout the implementation process.

To avoid confusion and interruption, it has been argued that ERP implementation should be kept separate from any other enterprise projects. For example, the implementation of System 21 at Aiwa Hong Kong was found to be successful since no customisation was done at all. Although the implementation project was over-stretched in terms of the resources and support services available, it was ultimately successful, with the installed applications up and running on schedule. From the very beginning of the implementation, the managing director as well as some other senior managers at Aiwa had demonstrated their full support for the implementation. In no more than three months, the implementation project was complete.

As a result, Aiwa quickly decided on a similar implementation for their Thailand operation. Software installation and implementation support were both granted to JBA International. Obviously, one of the underlying reasons for this particular success was the separation of the ERP implementation from other projects. On the other hand, reengineering existing business operations and processes was assumed to be part of the ERP implementation for Pepsi Guangzhou. Different facility locations have their own ways of doing business. As a result, a lot of customisation work was carried out and severe confusion was caused. This therefore implies that any attempt to relate BPR to ERP or vice versa deserves serious consideration.

Moreover, since BPR is a more focused exercise, it should not be restricted by the functionality of an ERP system. For the sake of effective collaboration, external ERP consultants should be involved in the BPR project. Business process reengineering consultants, however, should never be provided by the ERP vendors. Instead, they should be business analysts possessing in-depth knowledge of the ERP industry and a sophisticated understanding of how they should work hand in hand with the ERP consultants. Confusion needs to be eliminated and a clear objective should be communicated. Above all, the company's readiness is important to achieving a successful ERP implementation. An appropriate change of mindset across the whole organisation is considered essential and this can only be done through a BPR project.

Process reengineering has a direct impact on ERP implementation, although they are always considered to be separate projects. Design and execution of changes should be viewed as a significant aspect of company readiness for ERP implementation. The intent to implement an ERP system is to facilitate the adoption of new processes that are already defined in the BPR project. In some cases, defined processes are poorly implemented with the vanilla or base version of the selected ERP system and therefore these new processes, even if already been agreed before, need to be further customised to fit the ERP system.

It is beneficial to highlight the value of adopting an ERP system to everyone concerned in the organisation and explain how it will make life easier. For example, when certain processes are identified as needing to be changed, a comparison of manual and automated ways of accomplishing the job needs to be adequately communicated to those who are responsible for making these changes happen. The tactic suggested is therefore, to first make the users aware that changes are inevitable anyway, with the new procedures that are being put into place, and then to introduce the automation of these procedures using the selected ERP system. In such a way, people are more easily convinced of the need to adopt the new system. The drawback is that it will take longer to obtain acceptance. However, if this strategy is employed, good results can be more likely.

While many companies in Hong Kong have already implemented ERP solutions, some enterprises are still running legacy systems. These systems are often inaccurate, unreliable, inflexible, slow in response, non-user friendly, hard to modify, difficult to interface with other systems, and cumbersome at retrieving data for analysis. For those companies intending to implement ERP systems, employees generally expect that the new systems will overcome all existing difficulties with the current systems. However, the reality is often not that simple.

As already discussed in previous sections, customer expectation has a considerable impact on the readiness for implementation. In many cases, employees do not know exactly what will happen and how much it is worth sacrificing in order to get the required benefits out of the ERP system. The new system will probably bring hope to the people who have been suffering from the operational inefficiency but some employees' expectations will be too high, while others will expect only relatively minor changes. This reflects the observation that people do not always to see the same thing from the same angle. If people understand the goals of implementing a new system and if they perceive in what ways the new system can assist them in doing business more effectively and efficiently, the likelihood of successful implementation is much higher. However, if users of the legacy systems expect some kind of automatic process enhancement as a direct consequence of the ERP implementation, this can become dangerous. In practice, improper changes to the business processes will certainly cause the implementation of ERP to fail. To conclude, a successful ERP implementation mostly depends on whether a single common view can be established in which ERP is considered as part of the BPR project, in which case a collaborative alignment of IT/business goals, as defined by the hypothetical model, should prove viable.

8.6. Other Implementation Considerations

8.6.1. Choosing Right Partners

Unlike QAD and other ERP vendors, JBA International has never run its consulting services with channel partners in Hong Kong. Nor has it formed any strategic

alliances with other technological providers such as IBM for developing the local markets. As part of its corporate strategy, customers of JBA International are all provided with direct support and services from its nearest local presence. For Pepsi, the implementation service and technical support for its customer branches in China is provided from Hong Kong.

Developing business in China is somewhat risky, and this explains why multinational companies tend to set up partnerships with local firms that understand the region, the people and the market needs. Because of the cultural difference, JBA International experienced difficulties early on, at the stage when the sales contracts were being negotiated for Changchun Pepsi. Although JBA International was recommended as a preferred ERP provider, a separate sales agreement is still needed for each individual Pepsi location.

Communicating with local people in China requires certain interpersonal skills and a good understanding of social and cultural systems and one of the challenges facing JBA International was the availability of local support during and after the implementation. Although consultants from JBA can work out of Hong Kong and provide on-site implementation support at remote locations, this is not financially viable or practically feasible as some Pepsi locations are too far away from Hong Kong. Dial-up connection for remote access was available, but only to a limited extent, and its dubious reliability was always an obstacle to the consultants' aim of providing responsive support for Pepsi. Due to unexpected line drops, remote data rescue was sometimes rendered impossible.

For effective and responsive data recovery, on-site diagnosis and fixing is always the preferred option, since looking into root causes demands a great deal of user interaction. From a user's perspective, responsive support is usually considered as a determinant in choosing a solution provider. Developing local presence represents a strategic approach to offering a responsive service. Given that support via remote connection is presently deemed to be unrealistic in China, establishing strategic partnership with local firms is therefore considered as the most suitable option for minimising the risk of customer dissatisfaction. Furthermore, the operating cost of

such an arrangement could be minimal, since skilled labour is increasingly available in the modern cities of China while the average direct labour cost is only one-third of that of Hong Kong.

In short, 'strategic partnership' is considered to be the preferred implementation strategy for Pepsi, as well as for any other companies that need to implement ERP systems in China. The hypothetical strategy [S2] in respect of adopting strategic partnership is therefore likely to be supported.

8.6.2. Re-thinking Selective Outsourcing

Being viewed as an extended aspect of strategic partnership, outsourcing is becoming very popular in Asia, including Hong Kong, but not necessarily in other parts of China. Those companies that consider outsourcing are largely concerned with tremendous demands for IT support service year after year. Scaling down their spending on IT services is a common initiative thriving outsourcing. In fact, the concept of outsourcing is quite new to China. Effective outsourcing depends on the availability of expertise and quality work, and it has always been a consideration for many foreign companies in China. Labour is rather cheap, which explains why most of the large corporations in China, especially the state-owned companies, prefer to employ their own resources in-house for their development work as well as providing maintenance support.

Uncertainty concerning the availability of network infrastructure is another area of concern. Reliable information exchange and data access calls for a certain degree of technological competency. Without a reliable infrastructure in place, outsourcing is rather limited. The quality of outsourcing becomes a particular concern when the required skill is not evenly spread across the country.

Outsourcing could have been made available for Pepsi provided that a mutually agreeable plan could be put in place ahead of the implementation. It was the original intent of Pepsi BU to make good use of its own resources to help individual Pepsi locations implement their own versions of ERP systems, along with minimal support

from JBA International. In return, these Pepsi locations would have to pay the BU a lump sum as a management fee, depending on the level of services rendered. The real problem with Pepsi BU was that there was only one implementation officer travelling around various places to work with the consultants from JBA International. This shortage of resources became obvious when simultaneous implementation projects were started in more than one Pepsi Joint Venture (JV) facility. Additionally, the implementation officer was not well trained prior to working with the consultants.

The likelihood of outsourcing the project to Pepsi BU rather than employing local firms to work with the consultants from JBA International on the implementation should have worked, as long as the Pepsi BU was willing to take on the ownership of the project and its resource accordingly. With regard to acquiring the technical know-how for rolling out the ERP systems, consultants from JBA International could arrange to provide the BU implementation officers with relevant training. This means that an advisory project manager from Pepsi BU would need to be appointed to bridge the gap between individual Pepsi locations and JBA International. Under such circumstances, Pepsi facilities could be helped to deal with their concerns about the availability of their own resources and the cost associated with hiring and retaining a group of ERP specialists to provide the post implementation support. It would be quite efficient for Pepsi BU to take up a supporting role, as it would become less expensive and more cost effective for Pepsi facilities to run the ERP systems.

Economies of scale could also be achieved. From a management perspective, it would be more reliable for a dedicated team of people to carry out similar support duties across various Pepsi facility locations. Skill transfer should become easier if consultants from JBA International could always work with the same small group of technical people from Pepsi. For effective outsourcing, it is therefore recommended that Pepsi BU should hire a couple of systems analysts to work closely with the consultants from JBA International to make sure that the continuity and consistency of support can be provided. As a consequence, the implementation team has to be properly structured so that effective communication and hence implementation can be supported.

8.6.3. Ensuring Quality Throughout the Implementation Process

Thorough planning of support is extremely important for the preservation of customers' favour. Non-responsive and insufficient support could spoil the implementation regardless of how much effort has already been contributed. The concept of having an ERP system implemented for improving the efficiency of the new processes, first introduced by the business process reengineering, should be made known to all levels throughout the organisation. Prior to the final deployment, key users must make sure that everyone in the organisation understands the ways in which the ERP system will fit with the new processes and how it will help everyone to perform more efficiently.

From a user's standpoint, post-implementation support is not only a concern but also a consideration for selecting the software vendor. No matter how flexible and scalable the software is, the quality of implementation support will inevitably influence the acceptance of the ERP system. An example that illustrates this point is Changchun Pepsi. In this case, consultants were sent to offer on-site implementation support and the implementation was completed on schedule. However, a few weeks after the official launch, users started to report data corruption. Fixing was arranged and done ineffectively; since consultants did not arrive in Changchun until a week after the fault report was logged. It then took more than a week to look into the problem and get it fixed.

As part of the standard procedure, a service report was required to be handed in together with the invoice for the service rendered. It was therefore recognised that the fault was partly due to improper set-up of the software and database. Consequently, the executives of Changchun Pepsi refused to pay for the service. In other words, quality of work was certainly an issue as it would weaken user confidence on the collaboration and hence delay the project completion.

Post implementation support is considered to be an ad-hoc service chargeable to the customers while the customer's expectation is that the implementation will not be declared successful until the entire system is operational, and not just functional. Therefore, quality control is deemed to be essential in terms of making sure that the

implementation is a success. In the new approach, the final preparation is considered more as a checkpoint for ensuring that the configuration is correct and reliable. From there, a post implementation support plan can be developed. The quality assurance specialist who reports to the project director is responsible for assisting the project manager in making sure that every checkpoint is securely validated and the required quality standard is achieved. The hypothetical strategy [S7] as defined to the two-tier adaptive model is therefore validated, due to the fact that post implementation support is deemed to be necessary and non-removable from the ERP implementation process.

9. IMPLICATIONS FOR PRACTICE

9.1. A Final Solution

Of the identified critical factors underlying implementation success, company readiness remains central. Moreover, the ability to correlate the paybacks from the ERP implementation with company and departmental objectives is important for fostering a supportive organisation, which is key to project success.

Based on the research, five general approaches towards the effective implementation of ERP systems are defined with respect to different environments. Implementing ERP systems under differentiated circumstances requires at least one or more of the implementation approaches to secure a greater chance of success. Each implementation approach carries its own characteristics and values with respect to successful ERP implementation. For example, within an autocratic organisation structure and a top down approach appears to be suitable, whereas in a democratic environment, a human-centric approach holds more appeal. In a highly collaborative environment, a project management approach is more easily to be adopted. However, a cohesive approach is commonly used in situations where resistance to change is a significant issue preventing the implementation from moving forward.

9.1.1. Top-down Approach

According to most of the ERP research literature and the results of this research survey, it is firmly concluded that management commitment is key to achieving success in ERP implementation, and a directive and assertive management style is deemed to be essential in delivering a significant contribution to the success of an ERP implementation.

Being a traditional approach to making things happen, it calls for outstanding leadership and effective empowerment to make sure that full commitment at all levels is sustained until the end of the project. Particularly in China where workers in state-owned enterprises generally have to follow top-down instructions to do things, this

approach works quite effectively. However, the success of deploying a top-down approach in Hong Kong is much dependent on the organisation cultural where autocratic management is adopted. Since the communication is top-down and the resistance is minimal, implementing an ERP system in a big bang approach is therefore quite likely to be a success. Change management is relatively unimportant for this approach since changes can be implemented without too much resistance. This therefore indicates that the top-down approach requires a relatively small effort to implement and manage changes to the way of doing business.

In short, implementing an ERP system with a top-down approach is achievable only when the management commitment is assertive and sustainable throughout the implementation cycle. Leadership and empowerment are also considered essential to implementing an ERP system in a more effective manner.

9.1.2. Cohesive Approach

By nature, this is a variant of the top-down approach. It looks into creating dependence in addition to creating an association among the ERP implementation and other major business initiatives with which employees are more concerned.

This approach can take place at one of two levels. At company level, one or more existing operations, ideally the KPIs, risk assessment and the reward scheme, can be associated with the ERP implementation in terms of functional and operational dependency. From there, employee contribution is measured by how effectively they have achieved the system integration and eventually how much they help to implement the ERP system. As a result, a situation emerges where employees are not deemed to be successful until they manage to contribute at a level that is defined at the initial stage of the implementation process.

At departmental level, a direct association with the implementation of an ERP system is built upon one or more existing departmental systems, such as the Dispute Management System from within the department of Finance. This approach would

favour a modular implementation of the ERP system in which functional departments are individually contacted at different periods of time.

9.1.3. People-centric Approach

This approach starts with the belief that employees are among the company's most valuable assets, especially in a service industry environment, whereby effective communication is extremely important when implementing an ERP system. People are obviously harder to manage than technology. Organisational readiness, end user preparation, communication strategy, commitment, sponsorship, teamwork, cross-culture training, strategic partnership and reward-based strategies are the key components characterising a people centric approach. A number of workshops and training events throughout the implementation cycle, on managing the collaborative work aimed at creating mutual trust and motivating teamwork, are among the predominant factors to achieving project success.

In parallel with full sponsorship from senior executives, leadership is inevitable for making effective use of the available resources. Talents are always there, but they need to be pinpointed and given an adequate level of training. Finally, they are organised in such a way that utmost efficiency can be achieved. The most effective leadership emerges at the senior management level. A senior member of staff with assertive characteristic and adequate leadership skills must be appointed to take charge of the implementation project. In many cases, some of the project members may appear to be rather reactive in terms of making strategic moves towards effective collaboration. Therefore, they need to be trained as well as being led to perform.

Partnering with appropriate service providers is strategically important to the ultimate success of an ERP project. Flexibility should be extended to make sure that each major supplier is performing in a win-win situation. However, external consultants see things differently and often bring with them new concepts and ideas that can be applicable to the ERP implementation.

9.1.4. Project Management Approach

Once a realistic scope, articulated milestones and clear deliverables have been defined and a formal method is available for measuring group and individual performance, a project management approach may be characterised. This is actually a variant of the people centric approach. This particular approach also favours a modular implementation, since it looks for small wins and immediate ROI. From a project management viewpoint, control and monitoring is key to securing project success. However, the experience and ability of the project manager is also critical. as is effective use of portal technology since an extended degree of collaboration is expected.

The existence of a Strategic Project Office (SPO) is core to this approach. It manages all the resources and user expectations from a single point of contact. This approach is also sympathetic when a global or big bang implementation strategy is assumed. Again, alongside the enterprise portal, communication can be adequately controlled and hence more accurate and consistent messages can be conveyed.

Project management is key to the successful implementation of an ERP project (Trepper, 2001). As part of effective project management, user expectations will need to be properly managed with a demonstration of the intended benefits of the implementation. As a consequence, a Strategic Project Office (SPO) should be formed with the primary function of managing the implementation towards satisfactory delivery of project results. Implicitly, the SPO has the role of resolving resource conflicts, change resistance and the organisational politics as far as the recognition of benefits is concerned. The SPO also plays a significant role in meeting the project's milestones and measuring performance. These milestones should serve as KPIs to help evaluate the project's success, justify its continuation and redirect it as necessary. In other words, measurement of progress is a continual concern for the entire implementation and is therefore considered as one of the most critical success factors. Explicitly, it has to be connected with the ROI as far as the top-level executives are concerned. The ROI from one project will, to a certain extent, help to drive the business case and justify investments in the next phase of the strategic vision.

In the absence of a solid commitment from top executives, an SPO can hardly perform effectively. The commitment is inevitably necessary in terms of defining the key performance indicators (KPIs) for those who are heavily involved in the project implementation. Strategically, the SPO aims at effectively managing and assuring collaboration throughout the project, as suggested in Figure 9.1.

Managing change is another of the SPO's primary functions. Depending on the level of collaboration, change programs will need to be suitably designed to make sure that conflicts and any negative impacts generated from within the collaboration process can be properly addressed. Successful change programs should aim to generate short-term wins. For example, customers seem to want to spend no more than four to six weeks figuring out what needs to be done; how to do it, and what the ultimate return will be (Ravi and Torto, 2002). To avoid deviating from the project's objectives, smaller-phased projects with immediate ROI are worthwhile and suitable change programs will also need to be regularly reviewed and modified as necessary.

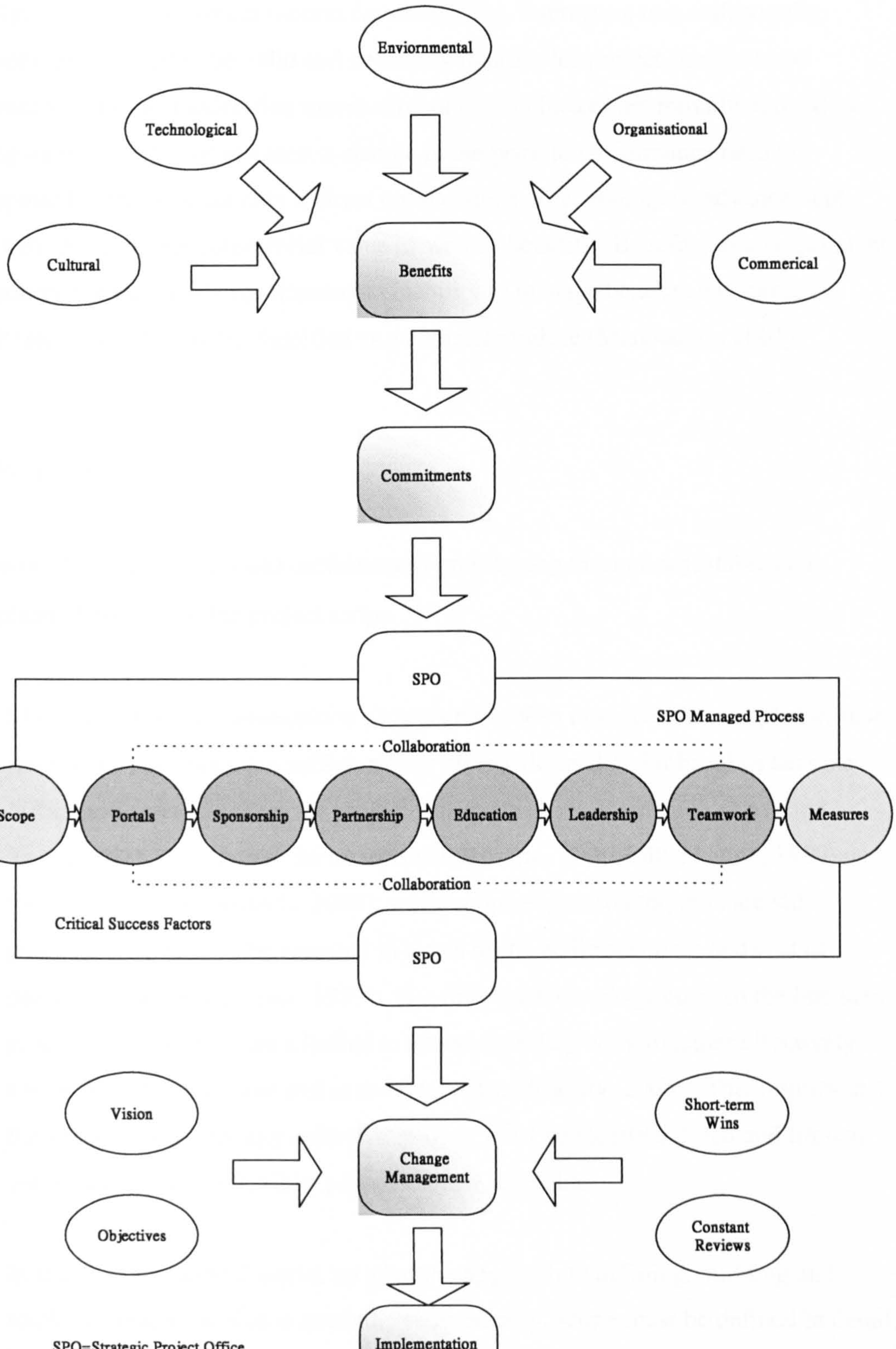
9.1.5. Benefit-driven Approach

Technology-driven projects are diminishing in number as business needs initiate technology-based projects including the ERP implementation. Through realising the intended benefits derived from the ERP system, functional requirements can be developed. In other words, an ERP project has to deliver some kind of benefit.

Benefits therefore determine the implementation strategy of an ERP system. Regular reviews should be conducted for the purpose of identifying what benefits are needed.

A showcase approach can be effectively incorporated as a management tool to improve user's confidence level by illustrating the experience of success, as well as to determine the expected benefits to be gained from the implementation. The ability to obtain consensus and live with the evolving changes is key to this approach. The communication flows upwards and the user involvement is vitally needed during the process of determining the benefits.

Figure 9.1 A Benefit Driven, SPO Managed Model



Specifically, a Benefit-driven-SPO-managed model is constructed and summarised as in Figure 9.1, where critical success factors (CSFs), interacting in a collaborative manner, are deemed to be valid and necessary in order for project success to be guaranteed. In this model, five macro-environmental factors are initially defined as being inter-related. For instance, a change in the price to performance ratio of computer hardware is not only a direct consequence of technological advancement, but will also generate commercial value as well as benefits. Benefits, to a large extent, determine the business's requirements. Inability to manage benefits will cause an ERP implementation to be classified as a complete failure (Manoeuvre, 2001).

CSF-1 [Scope]

Improve the effectiveness and usefulness of prototyping through adjustable and adaptable definition to the project scope.

Many long ERP implementation projects have been unsuccessful, simply because milestones have not been sufficiently or clearly defined and it has thus become difficult to assess whether the project was meeting its stated goals (Ravi and Torto, 2002). Scope must be established (Rosario, 200; Holland *et al.*, 1999) and strictly controlled (Rosario, 2000); while scope expansion requests are still possible, they need to be assessed in terms of the additional time and cost of proposed changes (Sumner, 1999). Not only the technology but also the business processes will need to be adjusted to ensure that they work together effectively and efficiently, both now and in the future (Ramankutty, 2003). This implies that the scope of work for any enterprise project must be clearly defined and limited; yet it should also be flexible, adjustable and adaptable.

In today's commercial world, an adaptive approach to defining, building and implementing a solution is needed. Theoretically, scope must be defined in detail, yet remain realistic (Hendrickson, 2001) and there will be inevitable and sometimes even drastic change, on the condition that organisational benefits can be recognised. People have to cope with sudden changes in the scope of work.

However, changes must be managed cautiously. Ideally, frequent change to the scope of work needs to be avoided, but constructive changes should be adopted. More importantly, the potential costs and benefits to the company must be considered, instead of simply refusing any variation to the scope of work. This explains why a regular review of the benefits is important.

In order to effectively achieve a collaborative implementation process, a serviceable scope of work inevitably needs to be clearly defined, agreed and communicated, although it might be expanded or changed at a later stage. However, the scope has to be adaptive to change, due to the fact that business decisions often impose a need to redefine the scope of work.

The 'Big Bang' approach is very unlikely to be successful with regard to implementing a company-wide solution in any large corporation involving hundreds of employees. It is therefore a rather risky option. The impact is so significant because this approach essentially involves changing everything in a day or two. For a successful changeover, a lot of groundwork will need to be sketched and carried out beforehand. No organisation can actually afford to take this risk. Instead, smaller-phased projects with immediate ROI (Ravi & Torto, 2002) can help eliminate the risk, and this implies that a small win can help to secure the implementation. Defining an 'as-is' model helps to determine which business functions benefit most from an ERP solution (Martin & Sara, 2001). Apparently, for Pepsi and Chubb, prototyping proved to be a consistently useful tool for establishing user consensus when defining an 'as-is' model as well as for developing a future model. Therefore, in the search for a further secure way to carry out implementation, prototyping must always be included as part of the implementation process.

CSF-2 [Portals]

Make strategic use of portal technology for more effective project management and information exchange.

Effective communication is critical to ERP implementation (Falkowski *et al.*, 1998). Legitimate inputs such as user requirements, comments, reactions and approval should be validated and managed (Rosario, 2000). Employees must be informed of the objective, scope, activities and updates in advance, and acknowledge and accept that change will occur (Sumner, 1999). Clear communication is therefore needed, as it eliminates ambiguity and more importantly secures an initial commitment from the stakeholders. Communication via 'portal' is becoming more popular and can be very useful as long as cost-effective infrastructure is available. It should also be seen as an innovative tool to facilitate virtual teams to work collaboratively. No matter how effective the communication process; success in an ERP project cannot be guaranteed until a well-fitted workflow management system is also exercised. In terms of technology delivery, major ERP suppliers such as SAP, PeopleSoft and Oracle have recently revamped their software. Although this variant of Internet technology can help implement the ERP systems, a person must be assigned to administer the portal and a small group of individuals should be given the responsibility to mobilise such a technology within the company. The portal itself only carries the information and the people are key to making strategic use of this emerging technology for effective communication.

Effective project management is also supported by portal technology, through which individuals can be informed of the project's progress and strategies for greater efficiency. An individual or a small group of individuals must be given the responsibility to drive success from a project management perspective (Rosario, 2000). Effective project management should be disciplined with co-ordinated training and the active involvement of the human resource department (Falkowski *et al.*, 1998). Portal technology helps to facilitate co-ordination. Beyond communication and project management, a customer process should be developed

through implementing an ERP system (Rao, 2000), which means that a successful implementation of an ERP system relies on meeting the business's needs with technology.

CSF-3 [Sponsorship]

Inspire and reward stakeholders to work collaboratively and develop change programs as needed.

Throughout the implementation process, constant support from top management is needed. Direct and genuine support from the operations staff is equally important. Until the operations staff can be truly convinced to recognise the benefits they are getting from the implementation, they will never be able to get on with the collaborative working model and move towards a successful ERP implementation. This new practice of doing business calls for a sketch of change programs aimed at coaching individuals toward adapting to an electronic platform of collaboration. In other words, specific workshops and training will need to be organised, especially when a large number of employees are involved, at the operations level.

For example, Chubb Hong Kong, have developed a program to administer security services. However, the trial run result was extremely disappointing due to the fact that most of the security guards were not adequately informed of the changes beforehand. The system itself was reliable and was demonstrated to be free of flaws, but it was found that it was the 'people dimension', that was an obstacle preventing successful implementation.

Stakeholders need to be involved in up-front in consultation to identify their needs and concerns (Ravi and Torto, 2002). They also need to participate in developing suitable change management programs within which new systems can easily be adopted. Finally, they need to be trained on how to make use of the new systems and apply the new processes to do their business. For example, at Chubb, thousands of guards were impacted by the new system and the processes implemented. The manager's involvement was deemed to be adequate since

control and monitoring was made simple. However, the implementation nearly failed due to the pressure it placed on the guards, to adopt new ways of reporting their attendance. The system failed to demonstrate any immediate benefits and no attempt was made to solicit the guards' interests, in a way that would have encouraged them to drop their resistance. In retrospect it is clear that representatives from the guards should have been nominated and given some responsibility as well as rewards to assist with the implementation.

CSF-4 [Partnership]

Exercise agile partnership with external parties to cope with changing expectations and limited resources.

It is necessary to define and re-define expectations on a regular basis, as the environment continually changes the requirements and the recognition of benefits. In many cases, implementation involves external consultants, such as the Big Four accounting firms, and the users' expectation regarding the project's benefits could potentially go unrecognised an unfulfilled due to inadequate involvement with the external parties. Partnership represents a different kind of capital to an organisation (Gutzman, 2001) and it can bestow a strategic advantage. However, it does bring risks with it, and these external risks are more difficult to manage than any internal constraints.

Partnering with external parties needs to be flexible to effectively facilitate a collaborative working model. For example, at Chubb, for the global implementation of PeopleSoft, the company decided to form a partnership with IBM Global Services (formerly known as PwC Consulting) and PeopleSoft. This allows Chubb to be freed up from the delivery of a limited scope of work due to insufficient product knowledge. A partnership will become ineffective if it is not seen as a primary vehicle to create a true collaboration platform.

CSF-5 [Education]

Incorporate collaboration into the corporate culture through orientations and repetitive training.

As part of the change management efforts, users must be involved in the design as well as the implementation of business processes and the ERP system. Formal education and training should be provided to help them do so (Bingi *et al.*, 1999; Holland *et al.*, 1999). More importantly, education should be a priority from the beginning of the project, and money and time should be spent on various forms of education and training (Roberts and Barrar, 1992).

There is no magic in ERP software, and its success lies in the preparation of the process and the people involved (Donovan, 1999). Benefits are the direct result of effective preparation and implementation, and the appropriate use of the system once it is in place. Therefore, training is key to an effective implementation for any organisation. However, training may vary depending on the size of the group to be trained. Under no circumstances can education be omitted or avoided as part of the implementation. Pertinent training throughout the implementation cycle needs to be repeated as necessary to ensure that the individuals involved are still on track. Effective education is not attainable until the users are able to realise the competitive edge that it brings, so that they become eager to be trained. Partners need to be included too, since they are actually part of the virtual team and will have to communicate effectively within the team. One of the key items on the agenda, during the education phase, is to address the issue of collaboration among the operations staff. Expectations on how the operations staff should be involved in the implementation of ERP systems needs to be clearly expressed.

It is imperative that both IT and business considerations account for technical decisions and everyone should understand the impact of those further down the road (Marer, 2002). Collaboration should also start from within an organisation and slowly expand to encompass customers and suppliers. However, the collaboration must first become a reality at the business level before it can

effectively begin to radiate out to customers or suppliers. Again, an online portal should be built to help facilitate the collaboration. More importantly, collaboration is built upon trust; therefore, workshops and training should be tailored to help everyone concerned to realise the synergy of collaboration through creating trust among individuals and groups.

Creating a strategic culture is therefore an important element of training. Culture is generally defined as the combined effect of behaviours, values, heritage, thinking and relationships and the way they manifest themselves in an organisation. When this manifestation is strategic, these cultural features are deployed to ensure strategic coherence, consistency and success (Freedman, 2002). Freedman also summarises the following key drivers to help foster a strategic culture within an organisation:

- Universal and measurable belief and values,
- Cross-functional and future oriented strategic and open minded thinking,
- Clearly designed organisation structure,
- Management processes and systems in support of human performance system,
- Education, training and development,
- Goal setting and appraisals,
- Reward systems,
- Myths, stories, legends and symbols,
- External manifestations such as advertising, branding, image creation,
- Different kinds of information and knowledge,
- Visionary and risk-taking behaviours,
- Effective communication.

Therefore, an effective continual training program should be developed to address the above concerns. It should also place its primary emphasis on people. Fundamentally, major success in business depends on the alignment of corporate culture with the business objectives and a full adoption of the systematic processes, but again, it is the people who make the difference. Apart from a need to

understand the business in a factual and rational manner, IT should be trained to think in terms of 'holding up a mirror' to gain an understanding of whether they are acting in a collaborative manner internally and across the business.

In conclusion, continual education and training itself should be justified as a responsive and on-going process whereby employees are surveyed to see if they continue to perform effectively and whether the benefit expected throughout the implementation process, are actually arriving.

CSF-6 [Leadership]

Mobilise the united power of empowerment and leadership during the change management and system implementation.

As with rewarding customer service, successful ERP implementation requires a high degree of devotion and dedication. Empowering teams has always been seen as an effective way to maintain the level of service. Brower (1995) suggests in his model of empowerment that team members have to have the authority to make decisions on the spot, provide instant responses to customer needs and account for their performance to customers. Further to Brower's model, empowerment also calls for alignment of direction and ability that includes knowledge, skills and a well-developed identity. Empowering decision-makers to look across the entire enterprise is a key prerequisite for the development of inter-enterprise collaboration (Ravi and Torto, 2002).

Executive leadership is certainly needed to cultivate an effective empowerment model. Leadership is therefore complementary to empowering teams and the leadership within a team, or so-called distributed leadership, is equally important. One of the most comprehensive leadership theories is the theory of transformational and transactional leadership. Burns (1978) first developed the ideas of transformational and transactional leadership in a political context and

Bass (1985) further refined them and introduced them into the organisational context.

Transactional leadership develops from an exchange process between leaders and subordinates wherein the leader provides rewards in exchange for subordinates' performance. Transformational leadership behaviours go beyond transactional leadership and motivate followers to identify with the leader's vision and sacrifice their self-interest for that of the group or the organisation.

Change requires leaders and organisations to embrace paradox and process, ambiguity and opportunity (Fleming, 2001). Effective leaders should strive to create this type of change environment. Weiss (1999) has identified three leadership competencies: diagnosing, communicating and adapting, and Fleming (2001) argues that narrative can be used to sharpen each of these three competencies. Seizing the teachable moment is critical in capturing the power of narrative as a tool for communicating vision and meaning. Leaders can therefore communicate through narrative in two ways: by listening to stories and by effectively interpreting these stories to the organisation.

While change management depends on leadership being enacted, leadership is also a key to an effective collaboration. Borden and Perkins (1999) identified leadership as one of the major components to be assessed at a company level in order to determine if collaboration can be effectively achieved. Sharing common goals and adoption of a new work relationship can sometimes be a major issue in organisational change. Markus and Tanis (2000) point out that even when organisational leadership accepts the need for change, the process of implementing ERP systems can go further than is initially contemplated. This means that it might involve considerable change in a number of aspects affecting the people of the organisation, such as job design, work sequencing and training. Previous research has linked change management with the capabilities of transformational leadership required to enact change successfully (Stefanou, 2001). A transformational leadership, committed to the continuous effort needed for the successful implementation of ERP systems, must resolve conflicts and

properly manage resistance not only to new technology but also to new work relationships.

CSF-7 [Teamwork]

Promote a dynamic practice of teamwork through enhanced communication and reward program.

Teamwork and team-composition has been widely conceived as one of the most important success factors for an ERP implementation (Buckhout *et al.*, 1999; Bingi *et al.*, 1999; Falkowski *et al.*, 1998; Holland *et al.*, 1999; Rosario, 2000; Wee, 2000). As part of the project kick-off agenda, individual roles must be clearly defined. More importantly, adequate communication thereafter should be encouraged and regularly reviewed. Teamwork and communication skills are important issues in ERP implementation. Also, as most ERP implementations are business driven, cross-functional project teams are usually formed. Gibson *et al.* (1999) point out that implementation can fail if decision taking times are excessive. Teamwork, sincere work relationships and adequate communication skills can sometimes, to a large extent, resolve technical issues (Stefanou, 2001).

An effective team should understand customer requirements as well as processes and seek to improve communications between departments and improve morale and support the development of individuals (Munro-Faure *et al.*, 1998). In such a way, conflicts can therefore be reduced and a chance of achieving collaboration is more likely.

To be successful, teams must understand what they are trying to achieve, and therefore they must be trained to work together to analyse processes and resolve problems. Again, teams can benefit from being educated. Munro-Faure *et al.* (1999) argue that the education process should address three main areas: (1) generating awareness of a need for continuous improvement and changes in attitudes; (2) developing the abilities of everyone in the organisation to utilise

problem solving and quality tools and techniques so that they can analyse problems, identify their root causes and develop effective solutions, and (3) establishing the skills necessary, at all levels, to work together in teams and to sustain improvements. As individuals grow in competence and confidence, they become able to take on more responsibility and become increasingly involved in making day-to-day decisions.

Further to securing success, teams need to be assigned full time to the implementation, and they should be given compensation and incentives for successfully implementing the system on time and within the assigned budget (Wee, 2000). In addition, teams need to have sense of ownership and be aware of the consequences of failure.

CSF-8 [Measures]

Utilise a balanced scorecard and continual review of KPIs to ensure and validate performance.

While project objectives and KPIs, once set and mutually agreed, should not be neglected under any circumstances. Project reviews should always be conducted to assess whether the objectives are being met and whether the KPIs defined for performance measurement, are being achieved. The change programmess also need to be reviewed to make sure that they are still adequate and appropriate. Strategic use of KPIs can help inspire individual as well as improve group performance.

Not only is the Balanced Scorecard widely accepted as a management tool that enables organisations to clarify vision and strategy and transform them into action; it also provides feedback around both internal business processes and external outcomes in a way that continuously improves strategic performance and results. Before an organisation can start implementing a balanced scorecard, it needs a clear understanding of its vision and strategy. Much more importantly, it

is the management's responsibility to define the vision, formulate the strategy and set strategic goals, regardless of a balanced scorecard being implemented.

9.2. Gateway to Implementation Effectiveness

Changes are unavoidable in any ERP implementation, and the change management as illustrated in Figure 8.7, representing a gateway into implementation effectiveness, is therefore vitally important, since it facilitates a smooth transition into a new way of doing business. Communicating change from the inside out will reduce resistance to change. Companies no longer see internal information as a 'need to know' entity. The more the employees can understand the company, the more easily they can align themselves with the values and culture the company has adopted.

To succeed, the content and impact of the change must first be understood and communicated (Barry, 2001). Implementing ERP system will give the change process a chance to achieve improved operational efficiency. Furthermore, business process re-engineering should always accompany the ERP implementation in one form or another, depending on the particular company environment. To avoid falling into a trap of confusion, it is therefore recommended that extensive test-runs of the changes are defined, mutually agreed and prototyped before they are incorporated into the ERP implementation. With an organised team structure whereby both senior management executives and business representatives are involved, change can be easily and effectively communicated upward and downward. This therefore implies that preparation in advance can make the integration with the business process improvement much easier, whereas teaming is important to the management of change.

Continuous improvement with ERP-enabled processes is considered important, since more and more companies today are recognising that going live with ERP is just the beginning of a much more rewarding journey and thus have already begun to undertake actions that can help achieve the full capabilities and benefits of ERP-enabled processes (Chen, 2001). The more organisations learn about new business processes and enterprise systems, the more likely they will recognise that the

behavioural changes needed to support the new way of doing business are the most critical factor in providing ERP firms with unprecedented competencies.

9.3. Implementation of Action Research

The value of enhancing JBA Advantage lay in increasing the users' awareness of, and dedication to, the collaboration perspective, although this enhancement was not officially accepted as a final blueprint for the next version of JBA Advantage. User awareness and dedication were improved due to the requirement of sharing the ownership among key participants with the implementation of key performance indicators. The expansion of the Foundation Phase was operationally justified. Embedding custom programs into the simulation process proved to be effective as a direct result of reducing disputes and achieving perception alignment on the system delivery.

As mentioned in earlier chapters, process reengineering was a focus in Guangzhou Pepsi where the managing consultant and other implementation consultants were assigned, and finally managed, to present a prototype with all necessary custom programs embedded. As a result, it took less than the expected time to obtain alignment between Pepsi and JBA International on how the future business operations should be defined.

Again, some interactive tools, such as Microsoft Project and reusable data conversion programs, as recommended for more effective information exchange, were successfully incorporated. Since Microsoft Project was insufficient to share project information in real time, a web-based version of its kind (i.e., Microsoft Project Server 2000) was about to be launched. There was a need and also a plan to make the project's progress visible to authorised participants from anywhere, at any time. Apart from being introduced to a portal technology, within which Microsoft Project was incorporated, key participants were also trained to make effective use of the communication tool. All these arrangements were applied to Shenzhen Pepsi and Changchun Pepsi during the second phase of implementation. It was also recognised that improvement was made in terms of user acceptance and project progress as a

result of more accurate and dynamic management of user expectations during the Foundation Phase of implementation.

With the establishment of a Strategic Project Office, where enhanced information flow was embraced, the system architect, key implementers and those operational managers who had been assigned leadership capability, were able to communicate with one another and perform project activities in a more organised manner. Again, Microsoft Project was a primary tool for effective communication within this context.

Being adopted initially as a preferred approach to implementing ERP systems, the showcase remained a strategic means of minimising the resistance to changes as necessary. Small wins, in terms of first dividing the entire project into smaller but meaningful job activities and then declaring to the public that the job was complete, proved very beneficial in attaining management buy-in and user acceptance. The proposed three-tier communication flow also facilitated the collaboration process by clarifying individual roles in terms of expected contribution to the project.

With regard to the strategy perspective, choosing a right implementation partner could also help improve the customer's responsiveness. Transforming the existing customer-supplier relationship into a project-based affiliation resolved the issue of conflict of interests between Pepsi and JBA International. Based upon a mutual understanding of the win-win approach, Pepsi BU acted as an implementation partner of JBA International, since they knew more about the consultants than anyone else at Pepsi. A virtual implementation support team was formed within Pepsi, with second tier application support from JBA consultants. User confidence was therefore strengthened and the implementation time was shortened. An improved negotiation process was facilitated and conflict of interest was also minimised. Also, support was no longer an issue preventing the system from being effectively implemented. In most cases, after go-live support was provided by the implementation support team from Pepsi BU, out of Hong Kong.

Resistance to change was managed with improved teamwork and mutual understanding of the need for collaboration through continuous and repetitive training

on the recognition of project objective, operational procedures and working instructions. Direct and dedicated participation in the solution design allowed users to easily commit themselves to the project. In the early stage of implementation, ERP was well perceived as a tool to implement changes, but unfortunately it failed, as nobody in Pepsi actually recognised the benefits of implementing the ERP system.

A benefit-driven, SPO-managed model was conceptually impressive and practically executable. It was generally accepted by the management team of Pepsi Changchun, and the model was therefore implemented. Communication was improved, as was the relationship with the customer. Due to the fact that a lot more compromises were made and less customisation work was initiated, the conflict was therefore relaxed. Further to the new model, ERP implementation was considered as an integral part of the BPR project. In other words, BPR represented a master program at Pepsi where ERP implementation was totally embraced.

Any changes due to the emergence of the BPR project and ERP implementation were integrated and managed by the Strategic Project Office. Finally, the SPO was also responsible for quality management as far as the implementation support was concerned. The quality of work was improved as a consequence of eliminating direct support from JBA consultants and replacing it with a two-tier support model where KPIs were embedded and linked with ownership taking.

9.4. Summary

In summary, the critical success factors (CSFs), in conjunction with a highly collaborative management from a Strategic Project Office as suggested in the Benefit-driven-SPO-managed model, emerged from an intent to secure the stakeholders' commitment to the ERP implementation through demonstrating the benefits of operating an ERP system. As time progresses, some benefits might become irrelevant while new ones will come into the picture. A regular review of benefits creates a platform for developing change programmes as needed.

Implications for Practice

The Strategic Project Office is core to an effective ERP implementation. It manages the entire process of collaboration. The elements that exist in the collaboration process are sequentially interrelated, as exhibited in Figure 8.7. Both the scope and measures, along with other significant elements, represent the critical success factors which foster an effective collaborative process.

Apart from a need for a vigorous commitment from senior executives, a truly collaborative involvement from the operations staff is also imperative. While miscommunication is invariably a cause of failure, an enterprise portal is of great help in closing the communication gap with an assumption that adequate 'soft skills' training could be provided. Nevertheless, effective training cannot be conducted until corporate learning is well perceived as a culture. Internet-based project scheduling software such as Microsoft Project 2002 should be incorporated into the portal to improve the communication process. Alongside this, change management and seamless integration with business process improvement helps to reduce resistance. Furthermore, a determined leadership, continual empowerment, flexible partnership, effective teamwork and constant reviews are supplemental yet essential to securing implementation success.

10. CONCLUSION

In conclusion, this research initially examined the ERP project failure at Pepsi, and attempts were made to identify the missing components as well as the disadvantages of JBA Advantage. From this point, the next generation of the implementation methodology was developed, in conjunction with the formulation of an overall implementation strategy.

10.1. Lesson Learned

At its upper level, the research pinpoints the observation that solely adjusting the implementation methodology is unlikely to improve the chance of project success unless an overall implementation strategy can be formulated to facilitate the methodology. It is therefore concluded that an implementation strategy and methodology representing tier-1 and tier-2 considerations respectively in the proposed model should always be arranged and executed side-by-side. Above all, adaptability and continuity are, in general, two major characteristics that feature in successful implementations.

In terms of Pepsi's specific implementation of System 21, as an ERP solution, the non-structural approach with which JBA Advantage is embedded needs to be radically adjusted with respect to the following areas: readiness checks, integration with BPR, teaming structure (including the method of communication, strategic partnership and the presence of a strategic project office), project orientation and training, ownership taking, appropriate use of toolkits and prototyping, recognition of parallel testing, effective management of customer expectations, change and resistance management and finally strategic use of local servicing partners for pre- and post-implementation support.

Furthermore, prior to implementing an ERP system, everyone involved in the project must demonstrate that they have clearly understood the objectives and the impacts, for the organisation, of implementing the change. Change management is crucial to securing ERP success. Replacing a legacy or manual system with a completely new

enterprise system requires conscientious planning and, preferably, non-radical execution of the change management programme, since the impacts on current operational practice are likely to be substantial. Instead of being considered simply as a tool for changing the business processes, ERP implementation should, therefore, be wholly integrated with the BPR project with which it is associated, if momentum is to be maintained. Again, it is important that appropriate change programs need to be gradually introduced to the implementation cycle so that resistance to change can be mitigated.

Establishing a structured project organisation is also recognised as essential in evaluating the organisation's readiness to replace its legacy system. In Pepsi's case, the BU, rather than JBA International, should take on the ownership of the project and work closely with the consultants to define and design the implementation cycle. Therefore, each Pepsi location should rely, not only on the BU for advice and support, but should also attempt to work with the BU actively on the planning of the project.

Ownership taking is also significant for achieving success. Participating individuals should be either encouraged or forced to take on their ownership as agreed during the planning meeting. In particular reference to the case study of Pepsi, managing changes should become part of the advisory project manager's responsibility while JBA International as an external party who did not appear to understand adequately the company culture was hardly possible in leading the changes.

Breaking the ownership into levels with controls is considered a strategic move towards success. Apart from a clear definition of the ownership of defined tasks, individuals must take on the responsibility for making sure that the assigned work can be complete and integrated with other interrelated work. A three-tier approach (i.e. software vendor, middleman and software users) can obviously improve the chance of achieving success in implementing ERP systems. The effectiveness can be recognised with its rationalisation, for example, in Pepsi's case, whereby the first tier or software vendor is JBA International, Pepsi BU represents the second tier or middleman, and tier-three or Pepsi facilities are the software users. Each tier has its own responsibility and is supported by other groups of people.

Conclusion

Unlike other ERP vendors who adopt channel sales and support, JBA International used to support its product through its own consultants and resources. However, such distant support tends to create customer dissatisfaction and it is somewhat inefficient and costly to send consultants a thousand miles to provide implementation support. Also, in respect to the implementation projects with Pepsi, it is extremely difficult for ERP consultants from Hong Kong to stay in China for a prolonged period. As a result, the turnover rate at JBA International was becoming problematic, as its consultants were intolerant of the relatively poor living environment. Partnering with local servicing companies, especially to arrange the post-implementation support, is a more practicable approach. However, this approach becomes less competitive if support is unavailable within a short distance.

Ideally, the consultants or engineers who provide the support should know the people and understand the working environment. Setting up in-house offices for support is hardly cost justified since the associated overheads could be huge. Strategic alliance is therefore an option for providing effective support services. From Pepsi's point of view outsourcing internally, across to the BU, should therefore become a reality, since external consultants are less influential in driving the changes required. This combination can make the implementation more manageable and effective.

With respect to technical competency, ERP vendors should provide their customers with tools and interfaces to facilitate a more efficient deployment of their ERP systems. For example, SAP has a Business Connector to facilitate data exchange with other third party systems. During the implementation planning, there are always concerns regarding how the master data can be loaded into the new database. For instance, JBA International itself does not provide any form of solution for this. This explains why the consultants did not appear to be particularly efficient when they were on-site providing implementation support. Data conversion is generally part of the on-site implementation support process. However, referring to the implementation at Changchun, for example, consultants could neither produce an interface for capturing the master data nor help make sure that the data conversion was complete in a three-week period. As a remedy to this technical constraint, third party tools need to be introduced and properly integrated to provide a real solution.

Further down the road towards a project's success, the methodology should take into consideration a complete integration of checkpoints and quality assurance procedures. Firstly, the client project sponsor must make sure that the organisation is ready to adapt to new technological changes and operations that are compliant with the requirements arising from the Business Process Reengineering project. Secondly, the key users have to be constantly oriented to continuously drive others towards achieving the project goals, with which the corporate objectives are synchronised. Thirdly, prototyping and parallel running should be made compulsory, as implementation checkpoints, to ensure that key users are confident of moving the project forward. Finally, the schedule for after go-live support must be integrated into the methodology to help ensure that the entire implementation is taking place in a reliable environment.

In short, the implementation methodology that JBA International had originally adopted was deemed to be impractical, primarily because of improper use of methods, tools, structure and resources. A new framework has therefore been developed in an attempt to address the implementation issues under investigation. This entails a revised model of JBA Advantage in which the validated hypotheses and expectations of improvements are incorporated, aiming at more effective ERP implementation.

First, the new team structure, along with the communication flow, encourages management support by demonstrating the ability to facilitate an accurate interpretation of user requirements, a clear definition of the scope of work and hence a better management of the customer's expectations. Second, the ownership-taking approach, alongside constant orientation, makes the design of a To-Be model more applicable and the implementation less risky. Third, the use of prototyping helps to reduce the expectation gap. Fourth, selective outsourcing through partnering with local vendors resolves the issue of limited availability of IT support and improves the implementation support process (e.g. continuity of work and multiple site implementation). It also supports and improves the after-implementation service (e.g. rapid fixing of faulty programs). Fifth, the use of implementation tools facilitates the evaluation of readiness, continuous analysis of risks, timely reporting and regular

executive briefing. And finally, the adoption of industry best practice helps to largely avoid subsequent modifications, hence minimising the risk of failure.

10.2. Contributions of The Current Work

Since the boom in the demand for ERP systems in the late 1990s, primarily due to the millennium issue, a large number of articles and other pieces of research have been published with similar aims of identifying the critical success factors for ERP implementation. For example, hundreds of case studies have been produced to illustrate these issues. It is thereby noted, for example, that some success factors are common in many scenarios where people are often seen to constitute a primary obstacle to effectively implementing ERP systems. This works represents a continuation from such studies identifying, among the critical success factors, sponsorship and effective communication regardless of the implementation strategies, as remaining the most important ingredients throughout the implementation cycle. However, depending on the particular implementation scenarios, other critical success factor should also be considered, and distinctive implementation approaches and strategies should be adopted accordingly.

A key contribution in this work was the validation of the linkage between strategy and methodology; this being deemed to be not only complementary but also essential. Being more specific, an implementation methodology must have been communicated before an appropriate strategy can be formulated to work alongside the implementation methodology.

The research also suggests the adoption of a showcase approach for the ERP implementation since fear and resistance to change can be significantly reduced, by this means. However, although a showcase is similar to a prototype, it calls for more attention in planning and execution. Effective management of communication to get a smooth adoption of the showcase is also important.

Also, it is not usually easy to gain full support, at the operations level, even if a showcase is successfully demonstrated, in situations where problematic human related

issues are involved. Inferior communication always lengthens the implementation cycle and needs to be adequately addressed. Furthermore, a participative approach is deemed to be far more appropriate when dealing with the operations staff, since they need to be cultivated to perform in a controlled environment. Above all, this highlights again that critical success factors are interlinked and need to be considered at the same time.

Cultivating change and managing user expectation are the key areas to be addressed before the implementation takes place, during the course of implementation and even after the system goes live. Therefore, establishing a collaborative environment is important so that employees can take part in simulating change initiatives and work together toward adopting the changes. Specific steps for doing so were suggested. It was also recommended that an early adoption of the 'Win Small Win Early' approach was favoured for managing customer expectations, as mutual confidence and trust could more readily be accumulated. Finally, a 7-step collaborative process embracing change management was developed and illustrated.

Of the identified critical factors underlying implementation success, company readiness remains central. Based on the research, five general approaches to the effective implementation of ERP systems were defined. These were top-down approach, cohesive approach, people-centric approach, project management approach and finally benefit-driven approach. Each approach carried its own characteristics and values to the implementation of ERP systems. For example, within an autocratic organisation structure a top down approach appears to be suitable, whereas in a democratic environment, a human-centric approach holds more appeal. In a highly collaborative environment, a project management approach can be more easily adopted. However, a cohesive approach is commonly used in situations where resistance to change is a significant issue preventing the implementation from moving forward. Implementing ERP systems under differentiated circumstances requires at least one or more of these implementation approaches in order to create a greater chance of success.

However, it was further suggested that the benefit-driven approach represented by a benefit driven SPO managed model was among the most practical approach given the Pepsi's environment. Specifically, a Benefit-driven-SPO-managed model was therefore constructed in which critical success factors (CSFs), interacting in a collaborative manner, were deemed to be both valid and necessary to secure the likelihood of project success. In this model, five macro-environmental factors were initially defined as being inter-related. For instance, a change in the price to performance ratio of computer hardware is not only a direct consequence of technological advancement, but will also generate commercial value as well as benefits which, to a large extent, determine the business's requirements. Conversely, inability to manage benefits will cause an ERP implementation to be classified as a complete failure (Manoeuvre, 2001).

Finally, reflections on the Action Research at Pepsi was that the Benefit-driven, SPO-managed model was conceptually acceptable and practically executable. It was generally accepted by the management team of Pepsi Changchun, and the model was therefore implemented. As a result, communication was improved, as was the relationship with the customer. Due to the fact that a lot more compromises were made and less customisation work was initiated, the conflict was therefore relaxed.

Furthermore, in the new model, ERP implementation was considered as an integral part of the BPR project. In other words, BPR represented a master program at Pepsi, inside which ERP implementation was totally embraced. Any changes due to the emergence of the BPR project and ERP implementation were integrated and managed by the Strategic Project Office.

Finally, the SPO was also responsible for quality management as far as the implementation support was concerned. The quality of work was improved as a consequence of eliminating direct support from JBA consultants and replacing this with a two-tier support model where KPIs were embedded and linked with ownership taking.

Conclusion

Given the situation in which many ERP implementation projects have been completed over the last two decades, many critical success factors have been named. However, some are more important than others, and vice versa, depending on the implementation environment. There appears little doubt that one single ERP system can fit all requirements. Neither does any single implementation methodology. Many implementation projects may be judged to have failed and in every project there was always an implementation methodology recommended by a single ERP vendor. However, it is suggested here these implementation methodologies might not necessarily have provided an adequate fit with the company's culture or corporate strategy of their customers. Simply adopting the vendor's implementation methodology, without any adjustment or alignment to the company setting, might easily spoil the project.

A top-down approach in formulating an appropriate way to do the implementation is therefore important in helping eliminate the risks of project failure. The Benefit-driven model, as recommended in this research, represented one such way of doing the implementation in a better way. Technically, more rigid and interlinking checkpoints were built into the model to help prevent the implementation from going off track.

In terms of the value of this paper and who should benefit from this research, I shall say whoever involves in ERP implementation should make a good use of it. In particular, there is an exceptional value to the ERP vendors and consultants who can take this chance to look at their implementation methodologies and determine how they should be altered to fit the customer environment. Companies who intend to implement ERP systems should first look at the overall strategy which should also embrace the preparedness for the implementation. Another derivable key contribution is a need for implementing or strengthening the governance within any implementation model.

10.3. Limitation of the Study

Inevitably, upon reflection, there were some limitations identified within this research. Firstly, it was solely focused on improving one single methodology; namely the latest version of JBA Advantage. Hence other ERP vendors might not be able to fully benefit from this research. In fact the research did not set out to formulate a generic set of critical success factors as this was seen as less contributive given the many previous attempts, by other researchers, and also taking account of the complexity of real world scenarios.

Secondly, there could still be a vendor's bias present when interpreting the course of actions as reported in the research since the research was taking place from a vendor's perspective.

Thirdly, there were no references to similar ERP implementation projects for other Pepsi facilities and foreign companies in China which could, potentially, jeopardize the wider validity of the research.

Fourthly, the stakeholder survey might not correctly and adequately validate the hypotheses formulated in this research since most of the companies returning the questionnaires were manufacturing organizations, whereas the focus of the research was a beverage company. Also, although every attempt was made to acquire a substantial source of survey data, the overall response rate was rather low at 8%. Similarly, although the internal data reliability of the constructs as defined in the stakeholder survey was fairly acceptable, the validity of the data may still be in question due to the relatively small sample size. There is also some potential concern that the survey questions might not have been optimally arranged, in the questionnaire.

Finally, JBA International was acquired during the period of the research with the result that many of the people involved, mostly consultants, were moving about. As a result the people working on the research also changed and this could slightly affect the adoption of the newly developed model in reality.

10.4. Future Research

While the implementation strategy can only represent a guideline, and the implementation methodology needs to be scalable, the entire implementation process does requires a certain level of control. The SPO was formed to assume this control function. However, a set of governance standards needs to be formulated and further study is recommended aimed at achieving this, including even more efficient tracking so that implementation risks can further be reduced. Future research should therefore aim at understanding what kinds of governance should be built into the implementation methodology to further improve the likelihood of project success.

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12. APPENDICES

Appendix 1

ONLINE SURVEY QUESTIONNAIRE

The research aims at exploring the implementation of ERP systems in China. It attempts to find out how to improve the effectiveness of the implementation. This represents the first study of its kind and it is expected that the research will help companies in Hong Kong understand the issues which have immediate impact on the ERP implementation process leading to implementation success.

Please spend a few minutes to complete the following questionnaire. Your co-operation will be highly appreciated. Just tick the choice that best describes what you think or feel. There is no correct answer, and a quick response generally reflects what you think and feel best. All answers will be treated confidentially. We shall use the data in aggregate form and only for the purpose of research. Should you have any query in respect of completing the questionnaire, you are welcome to let me know. My email address is S.C.Hui@ncl.ac.uk.

Section 1. Please tick in the space provided to describe your company business, office locations and available information technology resources.

1.	Your company's industry sector.	Automotive	[ ] 1
		Chemicals	[ ] 2
		Electrical/Electronics Products	[ ] 3
		Food & Beverage	[ ] 4
		Services	[ ] 5
		Style & Apparel Products	[ ] 6
		None of the above	[ ] 7
2.	Your company's core business nature for this office location.	Logistics	[ ] 1
		Manufacturing	[ ] 2
		Sales & Marketing	[ ] 3
		Services	[ ] 4
		Sourcing	[ ] 5
		Trading	[ ] 6
		None of the above	[ ] 7
3.	This office location.	Hong Kong	[ ] 1
		Rest of China	[ ] 2
		None of the above	[ ] 3
4.	This office location a regional/corporate office.	Yes	[ ] 1
		No	[ ] 2
5.	Other rep/branch office location(s).	South China (inc. Shanghai Area)	[ ] 1
		North China	[ ] 2
		Hong Kong	[ ] 3
		Macau	[ ] 4
		None of the above	[ ] 5
6.	Production location(s).	South China (inc. Shanghai Area)	[ ] 1
		North China	[ ] 2
		Hong Kong	[ ] 3
		Macau	[ ] 4
		None of the above	[ ] 5
7.	Number of employees in this office.	Below 10	[ ] 1
		Below 20	[ ] 2
		Below 50	[ ] 3
		Below 100	[ ] 4
		Above 100	[ ] 5
8.	Number of IT staff for this office.	None	[ ] 1
		Below 5	[ ] 2

	Below 10	[ ] 3
	Below 20	[ ] 4
	Above 20	[ ] 5
9. Support mode of IT function for this office.	None	[ ] 1
	In-house - Corporate	[ ] 2
	In-house - Local	[ ] 3
	Outsource	[ ] 4

Section 2. Please tick as appropriate in the space provided to describe your experience of the implementation of ERP systems.

10. Source of your ERP system.	Home-grown	[ ] 1
	Purchased - Package	[ ] 2
	Purchased - Custom	[ ] 3
	Rental	[ ] 4
11. If purchase, give the name of ERP system.	SAP R/3	[ ] 1
	Oracle Applications	[ ] 2
	BaanERP	[ ] 3
	PeopleSoft	[ ] 4
	JD Edwards World/OneWorld	[ ] 5
	JBA System 21	[ ] 6
	SSA BPCS	[ ] 7
	QAD MFG/Pro	[ ] 8
	None of the above	[ ] 9
12. Operating environment(s).	Mainframe	[ ] 1
	Midrange e.g. IBM AS/400	[ ] 2
	Microsoft Windows NT Server	[ ] 3
	Unix based machine	[ ] 4
	None of the above	[ ] 5
13. Source of execution.	Overseas	[ ] 1
	Local	[ ] 2
14. Remote accesses from other countries.	Yes	[ ] 1
	No	[ ] 2
15. Number of licensed users.	Below 10	[ ] 1
	Below 20	[ ] 2
	Below 50	[ ] 3
	Below 100	[ ] 4
	Over 100	[ ] 5
16. Purchased/developed applications.	Manufacturing	[ ] 1
	Customer Services & Logistics	[ ] 2
	Financials	[ ] 3
	Human Resources	[ ] 4
17. Purchase of consultants' time for implementation support.	Yes	[ ] 1
	No	[ ] 2
18. Cost of the project.	Less than HK$300K	[ ] 1
	Less than HK$0.5 Million	[ ] 2
	Equal or more than HK$0.5 Million	[ ] 3
	More than HK$1 Million	[ ] 4
	More than HK$2 Million	[ ] 5
19. Budget overrun.	Yes	[ ] 1
	No	[ ] 2

20. Expected duration of the project.	Less than 6 months	[ ] 1
	Less than 12 months	[ ] 2
	Less than 18 months	[ ] 3
	Less than 24 months	[ ] 4
	More than 24 months	[ ] 5
21. Project delays (if any).	Less than 3 months	[ ] 1
	Less than 6 months	[ ] 2
	Less than 9 months	[ ] 3
	Less than 12 months	[ ] 4
	More than 12 months	[ ] 5

Section 3. Please choose a number between 1 and 5 that best reflects your level of agreement with the following statements.

	Strongly Disagree				Strongly Agree
22. A specific methodology should be introduced at the early stage of implementation.	1	2	3	4	5
23. Generally, every project member appreciates having a methodology in place.	1	2	3	4	5
24. The implementation methodology given by your ERP supplier is suitable for your project.	1	2	3	4	5
25. There is always a need to modify or simplify the methodology to fit the requirements.	1	2	3	4	5
26. The implementation methodology should be more scalable and flexible.	1	2	3	4	5
27. Some critical project activities are missing from the methodology.	1	2	3	4	5
28. A good methodology should always consider the pre-sales activities as an integral part of it.	1	2	3	4	5
29. A generic methodology should be used irrespective of the type of ERP project.	1	2	3	4	5
30. An experienced managing consultant from within the implementation team should come to do the pre-sales study before the contract is signed.	1	2	3	4	5
31. It is important that the managing consultant should effectively manage the customer expectation.	1	2	3	4	5
32. An accurate definition of the scope of work is a vital part of the managing consultant's job.	1	2	3	4	5
33. Successful definition of an operational model depends on key users' acceptance of ownership.	1	2	3	4	5
34. Recognition of company readiness is required as a prerequisite to implementing ERP systems.	1	2	3	4	5

35. The execution of BPR should be done separately, ahead of implementing the ERP systems.	1	2	3	4	5
36. Non-ERP business consultants should lead the BPR project.	1	2	3	4	5
37. A change to the business processes to fit the proper use of software should be adopted for the easy implementation of the ERP system.	1	2	3	4	5
38. Key users should receive orientation by phases.	1	2	3	4	5
39. Key users should be given the ownership of solution design.	1	2	3	4	5
40. 'Guanxi' or connection with government officials makes easy the implementation of ERP systems in China.	1	2	3	4	5
41. Change management programs for altering the company culture should precede implementation of the ERP system.	1	2	3	4	5
42. Prototyping secures accurate definition of the final model.	1	2	3	4	5
43. The final model should be embedded into a simulation for effective familiarisation.	1	2	3	4	5
44. Simulation facilitates effective workshop.	1	2	3	4	5
45. Effective use of prototyping accelerates the implementation of ERP systems.	1	2	3	4	5
46. Iterative risk assessment eliminates the chance of project failure.	1	2	3	4	5
47. Final check represents a vital step to secure the deployment.	1	2	3	4	5
48. A parallel run must take place as an essential part of deployment.	1	2	3	4	5
49. Constant review of the contingency plan helps achieve a smooth transition to the adaptation of ERP systems.	1	2	3	4	5
50. Inferior support during the warranty period fails the project.	1	2	3	4	5
51. Failure of ERP projects is largely due to poor arrangement of the post implementation support.	1	2	3	4	5
52. Delay of project completion is associated with improper adoption of implementation methodology.	1	2	3	4	5

Section 4-1. Please choose a number between 1 and 5 that best reflects your level of agreement with the following statements regarding the customer's expectations on vendor's services. Customers expect vendors to provide:

	Very Low				Very High
53. Availability of local consultants	1	2	3	4	5
54. Commissioning of managing consultants	1	2	3	4	5
55. Competency of ERP consultants	1	2	3	4	5
56. Continuity of work	1	2	3	4	5
57. Rapid fixing of faulty programs	1	2	3	4	5
58. Completion of process re-engineering	1	2	3	4	5
59. Ability to integrate with process re-engineering	1	2	3	4	5
60. Effective education	1	2	3	4	5
61. Availability of user tools	1	2	3	4	5
62. Multiple site support on implementation	1	2	3	4	5
63. Timely follow-ups & reporting	1	2	3	4	5

Section 4-2. Please choose a number between 1 and 5 that best reflects your level of agreement with the following statements regarding the vendor's expectations on customer's cooperation. The vendor expects customers to provide:

	Strongly Disagree				Strongly Agree
64. Support from top management	1	2	3	4	5
65. Recognition of corporate readiness	1	2	3	4	5
66. Scope of work in accurate & clear definition	1	2	3	4	5
67. Availability of internal IT support	1	2	3	4	5
68. Avoidance of modification	1	2	3	4	5
69. Appointment of an advisory project manager	1	2	3	4	5
70. Adoption of prototyping	1	2	3	4	5
71. Regular executive briefing	1	2	3	4	5
72. Share of ownership among the key users	1	2	3	4	5
73. Extensive training workshops	1	2	3	4	5
74. Adoption of simulation	1	2	3	4	5

75. Continuous analysis of risks	1	2	3	4	5
76. Regular check-up of data integrity	1	2	3	4	5
77. Chargeability for data fixing	1	2	3	4	5
78. Management of changes	1	2	3	4	5

Section 5. Please state any optional comments in the following spaces.

79. What is your company name? What is your name, your job title and contact detail?

_____

_____

80. Have you found any missing components from any methodology that you have ever used? If yes, what are they?

_____

_____

_____

81. Do you have any preferred methodology for implementing ERP systems? If yes, what is it?

_____

_____

82. In what ways do you think the implementation methodology can be improved?

_____

_____

83. Any other comments?

_____

_____

-- End --

Appendix 2

Data Collected From Questionnaire (Company Background, Q1-21)

Line	Ques No	Company Background Survey Question	Cat	Respondent Numbers and Scores Recorded 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	Mode
1	1	Your company's industry sector.	Gen	3	3	5	5	7	3	5	5	4	5	5	5	4	5	3	3	7	7	3	3	3	5	5	5	7	5	7	3	3	5	3	5	5	3	7	7	5	3	6	4	3	3	5	5	5	7	
2	2	Your company's core business nature for this office location.	Gen	3	3	5	5	3	3	5	5	3	5	5	5	3	5	4	3	3	3	3	4	4	5	5	5	3	5	4	4	4	5	3	5	5	3	3	4	4	4	3	3	4	4	5	5	5	4	
3	3	This office location.	Gen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
4	4	This office location is a regional office.	Gen	1	1	1	2	1	2	1	2	1	2	1	1	1	2	2	1	1	1	2	1	1	1	1	2	2	1	2	2	2	1	1	1	1	2	2	1	2	1	2	2	2	1	1	2	2	2	
5	5	Other rep/branch office locations.	Gen	1	1	1	5	1	1	5	5	5	1	5	5	5	5	1	1	5	1	1	1	1	1	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	1	5	5	5	5	5	5	5	5	
6	6	Production location(s)	Gen	1	1	5	5	5	1	5	5	5	5	5	5	5	5	1	1	5	5	5	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5	
7	7	Number of employees in your office.	Gen	2	2	3	3	3	4	2	2	2	3	3	2	2	3	4	4	2	2	2	2	4	2	1	1	1	2	1	1	1	2	2	2	2	3	2	2	2	1	5	2	1	2	1	2	2	1	
8	8	Number of IT staff for this office.	Gen	2	2	2	1	1	2	1	2	2	2	2	2	1	2	3	3	2	2	2	2	2	2	1	1	2	1	2	1	2	2	2	1	1	3	2	2	2	2	3	2	2	2	2	1	2	2	
9	9	Support mode of IT function for this office.	Gen	3	3	3	4	4	3	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	4	4	3	4	3	4	3	3	3	4	4	3	3	3	3	3	3	3	3	3	4	3	3		
10	10	Source of your ERP system.	Gen	3	3	3	2	2	3	2	2	3	3	3	3	2	3	3	3	3	3	3	3	3	3	2	2	3	2	3	2	3	3	2	2	2	3	3	3	3	3	3	3	2	2	2	2	2		
11	11	If purchase, give the name of ERP system.	Gen	9	7	5	9	5	7	8	8	9	5	5	9	5	3	9	9	9	9	9	9	9	9	5	5	2	9	9	9	9	9	9	9	3	9	9	9	9	2	9	2	6	9	9	9	9	9	
12	12	Operating environment(s)	Gen	3	4	3	4	2	3	3	3	3	2	3	4	3	3	3	3	4	4	3	4	4	4	3	2	3	3	3	4	3	3	4	4	3	3	3	4	4	3	3	3	3	3	3	3	3	3	
13	13	Source of execution.	Gen	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
14	14	Remote access from other countries.	Gen	1	1	2	2	2	1	2	2	2	2	2	2	2	2	1	1	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	
15	15	Number of licensed users.	Gen	2	3	2	2	2	4	2	2	2	2	2	2	2	2	4	3	1	2	2	2	3	2	1	1	1	1	1	1	2	2	2	2	3	2	2	2	1	4	2	1	1	1	1	2	1		
16	16	Purchased/developed applications.	Gen	1	1	3	3	3	1	3	3	3	3	3	3	3	3	1	1	3	3	3	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	3	3	3	3	3	3	3		
17	17	Purchase of consultants' time for implementation.	Gen	2	2	2	2	2	2	1	2	2	2	2	2	1	2	2	1	2	2	2	2	2	1	2	2	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2		
18	18	Cost of the project.	Gen	1	4	3	1	3	4	3	2	1	3	3	2	3	3	4	4	3	2	2	4	1	1	3	3	3	3	3	3	1	2	1	3	3	2	1	1	1	3	4	3	3	1	1	1	3	3	
19	19	Budget overrun.	Gen	1	1	1	2	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	2	1	2	1	1	1	2	2	1	1	2	1	1	1	2	2	2	1	1	1	1	
20	20	Expected duration of the project.	Gen	2	2	2	3	2	3	2	2	2	2	2	2	2	2	3	3	2	2	2	3	3	3	2	2	1	2	2	1	2	2	3	2	1	2	2	2	2	1	3	2	2	3	2	2	2	2	
21	21	Project delays (if any).	Gen	2	2	2	2	2	3	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	3	3	2	3	3	2	2	2	2	2	2	2	2	2	3	2	2	3	2	2	2		

Appendix 3

Data Collected From Questionnaire (ERP System Characteristics, Q22-52)

		ERP System Characteristics		Respondent Numbers and Scores Recorded on Scales of Agreement Between -2 and +2																																															Agreed	
Line	Ques No	Survey Question	Cat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	Mean Score	No of +ves	Percent +ves
1	22	A specific methodology should be introduced at the early stage implementation.	Gen	1	1	1	1	0	0	1	1	2	1	2	2	2	0	1	1	2	2	2	0	0	1	1	2	2	2	0	2	1	2	0	0	0	1	1	1	2	1	1	2	2	0	1	1	2	1	1.13	36	78%
2	23	Generally, every project member appreciates having a methodology in place.	Gen	0	1	0	0	0	0	0	0	0	2	0	2	0	1	0	1	2	0	1	0	0	2	0	0	2	0	0	-1	0	1	-1	2	1	0	0	0	-1	-1	0	0	2	0	1	1	0	0	0.39	15	33%
3	24	The implementation methodology given by your ERP supplier is suitable for your project.	Gen	-1	-1	1	0	1	0	0	1	-1	-1	-1	0	1	0	1	-1	-1	-1	0	-1	0	0	0	0	1	1	0	0	1	1	1	1	1	-1	-1	-1	1	1	1	0	0	0	0	0	0	-1	0.04	15	33%
4	25	There is always a need to modify or simplify the methodology to fit the requirements.	Gen	1	1	1	1	0	0	1	0	0	2	0	2	2	1	1	-1	2	1	1	1	2	2	0	1	2	1	0	0	0	0	0	1	1	0	1	0	-1	0	1	0	2	0	2	2	0	1	0.76	27	59%
5	26	The implementation methodology should be more scalable and flexible.	Gen	1	2	2	1	1	0	0	1	1	1	1	2	1	1	1	0	1	1	1	1	2	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	1	1	1	1	2	2	1	1	0.98	39	85%
6	27	Some critical project activities are missing from the methodology.	Gen	0	-1	0	1	1	-1	0	1	1	1	0	0	0	-1	0	0	0	-1	1	1	0	0	0	-1	0	1	1	0	0	1	1	1	1	1	0	1	1	-1	-1	0	0	1	0	1	0	0	0.24	18	39%
7	28	A good methodology should always consider the pre-sales activities as part of it.	Gen	1	1	1	0	1	1	2	1	2	2	1	1	0	1	1	1	2	0	1	2	2	1	0	0	1	0	1	1	1	0	1	1	0	1	0	1	0	0	1	1	1	1	1	2	1	2	0.93	35	76%
8	29	A generic methodology should be used irrespective of the type of ERP project.	Gen	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	0	-1	0	0	-1	-1	-1	-1	-1	-1	0	0	0	1	-1	-1	-1	0	-1	-1	1	0	-1	0	0	0	-2	0	0	1	-1	0	-1	-2	-1	-0.59	3	7%
9	30	An experienced managing consultant from within the implementation team should come to do the pre-sales study before the contract is signed.	H_1	0	2	1	0	-1	2	1	1	1	0	1	0	2	0	1	-1	0	1	-1	1	2	0	2	0	0	-1	1	1	1	2	1	1	1	0	0	1	1	1	0	2	-2	0	1	1	0	1	0.61	27	59%
10	31	It is important that the managing consultant should effectively manage the customer expectation.	Gen	0	2	1	0	-1	2	1	1	1	0	1	0	2	0	1	-1	0	1	-1	2	2	0	2	0	0	0	2	1	1	2	2	1	0	0	1	1	1	1	0	2	-2	0	1	2	1	1	0.74	28	61%
11	32	An accurate definition of the scope of work is a vital part of the managing consultant's job.	H_2	1	1	1	2	0	2	1	1	1	1	0	0	1	0	1	1	2	0	0	0	0	0	0	1	1	0	1	2	-1	0	2	2	1	-1	0	1	-1	0	1	2	0	0	0	1	1	0	0.63	25	54%

Appendix 3

Data Collected From Questionnaire (ERP System Characteristics, Q22-52)

Line	Ques No	ERP System Characteristics — Survey Question	Cat	Respondent Numbers and Scores Recorded on Scales of Agreement Between -2 and +2: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	Mean Score	Agreed: No of +ves	Agreed: Percent +ves
12	33	Successful definition of operational model depends on key users' acceptance of ownership.	H_4	0	0	1	0	0	0	0	0	0	2	1	1	0	0	0	1	0	1	1	1	0	2	0	0	1	0	1	2	0	0	0	-2	1	0	0	1	1	0	2	1	0	0	1	0	0	-1	0.41	18	39%
13	34	Recognition of company readiness is required as a prerequisite to implementing ERP systems.	H_3	0	0	0	0	1	1	1	0	0	0	1	0	2	1	1	1	0	0	0	1	0	0	0	1	2	2	1	0	1	0	-1	1	1	-1	0	0	2	0	1	-2	1	1	0	-1	0	0	0.41	20	43%
14	35	The execution of BPR should be done separately ahead of implementing the ERP systems.	Gen	0	0	-1	0	2	2	1	0	1	0	0	1	2	0	0	0	1	0	0	1	2	2	1	0	0	1	1	1	1	0	2	2	2	0	2	1	1	1	0	0	0	0	1	0	1	1	0.72	25	54%
15	36	Non-ERP business consultants should lead the BPR project.	Gen	0	1	1	1	1	1	0	1	2	1	1	0	1	1	0	1	1	1	1	1	2	1	1	0	1	-1	1	1	2	0	1	1	1	1	0	1	1	1	1	0	0	1	1	0	0	0	0.76	33	72%
16	37	A change to the business processes to fit the proper use of software should be adopted for the easy implementation of the ERP system.	Gen	0	0	0	0	1	1	1	0	0	0	1	0	2	1	1	1	0	0	0	1	0	0	0	1	2	2	1	0	1	0	-1	1	1	-1	0	0	2	0	1	-2	1	1	0	-1	0	0	0.41	20	43%
17	38	Key users should receive orientation by phases.	Gen	1	1	1	0	2	0	2	2	1	2	1	2	2	2	1	1	2	2	1	1	2	2	2	2	1	1	1	0	2	2	2	1	2	1	2	2	1	0	1	2	1	2	2	1	1	0	1.37	41	89%
18	39	Key users should be given the ownership of solution design.	Gen	0	1	0	1	1	0	1	1	1	0	1	1	1	2	1	1	0	1	1	0	1	1	1	1	1	0	0	1	1	0	0	1	1	1	1	1	-1	-1	2	0	1	0	1	0	0	0	0.63	29	63%
19	40	'Guanxi' or connection with government officials makes easy the implementation of ERP systems in China.	Gen	1	1	1	1	2	2	0	1	1	0	1	0	0	0	2	2	2	2	0	1	1	1	2	2	2	1	2	1	1	1	0	0	2	1	1	2	0	1	1	0	0	0	1	0	2	1	1.00	33	72%
20	41	Change management programs for altering the company culture should precede implementation of the ERP system.	Gen	1	0	0	2	1	1	1	1	2	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	-1	-1	1	1	1	2	1	0	0	1	2	1	0	2	0	1	1	1	1	1	1	0.76	32	70%
21	42	Prototyping secures accurate definition of the final model.	H_5	1	1	0	0	0	0	0	0	1	-1	0	0	0	1	1	1	2	0	0	0	0	0	0	1	0	1	1	2	2	2	0	1	1	1	1	-1	0	0	0	-1	0	1	1	1	1	0	0.48	21	46%
22	43	Final model should be embedded into the simulation for effective familiarisation.	Gen	1	1	1	1	0	1	0	2	1	2	1	0	1	1	0	0	0	-1	2	1	1	2	1	2	0	1	1	1	0	1	1	1	1	1	2	0	1	0	1	1	1	1	1	2	0	1	0.87	34	74%

Appendix 3

Data Collected From Questionnaire (ERP System Characteristics, Q22-52)

		ERP System Characteristics		Respondent Numbers and Scores Recorded on Scales of Agreement Between -2 and +2																																															Agreed	
Line	Ques No	Survey Question	Cat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	Mean Score	No of +ves	Percent +ves
23	44	Simulation facilitates effective workshop.	H_6	0	0	0	2	1	0	1	1	1	0	-1	0	1	1	0	1	-1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	-1	1	1	0	0	0	1	1	0.35	17	37%
24	45	Effective use of prototyping accelerates the implementation of ERP systems.	Gen	2	1	2	1	2	2	2	2	1	2	2	2	2	2	2	0	0	2	2	2	2	2	2	0	2	2	2	2	2	2	0	2	2	2	2	2	1	2	2	0	2	1	2	2	1	1	1.63	41	89%
25	46	Iterative risk assessment eliminates the chance of project failure.	Gen	0	-1	2	2	2	2	1	0	0	0	2	2	2	1	0	1	2	1	2	1	2	1	1	-1	2	1	0	2	2	1	1	1	2	2	2	0	2	1	2	2	2	1	1	0	0	0	1.13	34	74%
26	47	Final check represents a vital step to secure the deployment.	H_7	0	2	0	0	1	1	0	0	0	0	1	0	2	1	1	0	-1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	2	0	0	0	1	2	1	1	0	0	-1	0	-1	0	0	0.33	14	30%
27	48	A parallel run must take place as an essential part of deployment.	Gen	1	0	1	1	1	0	2	2	0	2	2	2	2	0	0	1	0	0	0	0	2	2	2	0	1	1	0	2	2	0	0	2	0	0	2	2	0	0	1	0	2	2	1	2	1	2	1.00	28	61%
28	49	Constant review of the contingency plan helps achieve a smooth transition to the adaptation of ERP systems.	Gen	1	1	0	2	0	1	1	1	0	1	2	2	2	0	0	0	1	1	1	0	0	2	2	0	1	1	1	0	1	2	1	0	1	1	1	0	1	1	2	1	0	0	-1	1	1	0	0.80	30	65%
29	50	Inferior support during the warranty period fails the project.	H_8	2	1	1	1	1	1	2	0	1	0	2	1	1	1	0	0	0	0	1	0	1	0	0	2	1	1	1	-1	0	0	0	0	1	1	0	0	2	1	0	0	0	1	1	2	0	0	0.61	24	52%
30	51	Failure of ERP projects is largely due to poor arrangement of the post implementation support.	Gen	2	2	2	1	2	2	2	2	2	2	2	2	2	1	2	2	2	2	0	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1.87	45	98%
31	52	Delay of project completion is associated with improper adoption of implementation methodology.	Gen	0	1	0	2	2	2	1	1	0	1	0	1	-1	0	1	1	1	2	2	1	1	0	0	0	0	0	-1	1	1	0	1	0	1	0	0	0	1	1	1	1	1	2	-1	0	1	1	0.65	27	59%

Appendix 4

Data Collected From Questionnaire (Customer Expectations of Vendor, Q53-63)

		Issues of Importance (Customer Perspective)		Respondent Numbers and Scores Recorded on Scale of Agreement Between -2 and +2																																														Agreed		
Line	Ques No	Survey Question	Cat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	Mean Score	+ves	Percent +ves
1	53	Availability of local consultants	Cust	1	1	1	2	2	1	2	1	0	1	1	2	2	0	1	1	1	0	1	1	1	0	2	2	2	2	1	1	2	0	1	1	1	1	1	2	1	1	1	1	1	2	1	0	2	1	1.15	40	87%
2	54	Commissioning of managing consultants	Gen	1	1	1	1	0	1	0	1	2	2	1	0	1	1	1	0	0	0	1	0	0	0	1	0	2	2	1	1	2	0	1	0	0	1	1	1	1	0	0	1	0	1	1	1	0	0	0.72	28	61%
3	55	Competency of ERP consultants	Cust	1	1	1	2	2	1	1	2	2	2	2	2	1	1	1	2	1	2	1	2	2	1	1	2	2	1	2	1	1	2	2	2	1	2	2	2	1	2	1	2	2	2	1	2	2	1	1.57	46	100%
4	56	Continuity of work	Cust	0	0	0	1	1	0	0	0	1	2	1	0	1	1	1	1	2	0	0	0	0	0	1	2	1	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	1	0	1	2	0	1	0.54	21	46%
5	57	Rapid fixing of faulty programs	Cust	2	2	2	2	2	1	2	2	2	1	1	2	2	2	2	1	2	2	1	1	2	1	2	2	1	2	1	2	0	2	1	2	2	2	0	0	2	2	1	1	2	1	2	2	2	1	1.57	43	93%
6	58	Completion of process re-engineering	Gen	1	1	1	1	2	2	1	1	1	2	2	1	1	1	1	1	0	1	2	0	0	1	2	2	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	1	1	0	2	2	2	0	0.91	32	70%
7	59	Ability to integrate process re-engineering	Cust	1	2	2	2	2	2	1	2	2	2	2	2	1	2	0	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	1	2	2	1	1	2	2	2	1	2	2	2	2	2	2	1.76	44	96%
8	60	Effective education	Gen	2	1	1	1	1	2	1	2	1	2	1	1	2	2	1	1	1	1	2	0	0	0	1	0	1	0	0	1	0	1	1	1	2	1	2	1	2	2	2	1	2	0	1	1	1	0	1.09	37	80%
9	61	Availability of user tools	Cust	0	2	0	1	1	0	0	1	0	-1	-1	-1	1	-1	1	1	-1	-1	0	2	0	1	0	0	0	0	1	1	0	1	0	0	1	-1	0	1	0	1	1	1	-1	1	1	0	1	0	0.30	20	43%
10	62	Multiple site support on implementation	Cust	-1	-1	0	-2	1	-1	-2	-1	-2	-1	0	-1	-1	0	-1	0	-1	-1	-1	0	-1	-1	-1	0	-1	-1	0	1	0	1	-2	1	-1	0	0	-2	-1	1	0	-1	0	-1	-2	1	0	-1	-0.59	6	13%
11	63	Timely follow-ups & reporting	Cust	0	0	1	0	0	2	2	0	1	1	1	0	1	1	0	0	1	1	0	0	0	0	0	1	1	2	-1	0	0	-1	0	1	1	0	-1	-1	0	1	1	2	2	0	1	1	2	1	0.54	23	50%

Appendix 5

Data Collected From Questionnaire (Vendor Expectations of Customer, Q64-78)

		Issues of Importance (Vendor Perspective)		Respondent Numbers and Scores Recorded on Scale of Agreement Between -2 and +2																																															Agreed	
Line	Ques No	Survey Question	Cat	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	Mean Score	+ves	Percent +ves
1	64	Support from top management	Vend	1	2	1	1	2	1	2	1	0	1	2	2	2	1	2	2	1	0	1	1	2	2	0	2	0	2	2	2	1	2	2	2	1	2	2	2	1	2	2	2	2	2	0	2	2	2	1.50	41	89%
2	65	Recognition of corporate readiness	Vend	1	1	2	2	1	1	1	1	0	2	1	1	0	1	1	2	0	0	2	0	0	1	0	2	1	0	2	0	1	1	2	2	2	2	2	1	0	2	2	2	1	2	2	1	2	0	1.15	35	76%
3	66	Scope of work in accurate & clear definition	Vend	1	2	1	1	2	1	0	1	0	0	1	0	1	1	2	1	1	1	0	0	0	1	0	2	1	1	2	2	1	0	1	2	1	2	2	0	1	0	2	0	2	1	2	1	0	1	0.98	33	72%
4	67	Availability of internal IT support	Vend	-1	0	2	1	1	1	1	0	0	-1	2	1	2	0	-1	-1	1	-2	0	0	1	1	1	0	1	1	0	1	1	0	2	1	-1	1	-1	0	0	1	1	0	0	0	-1	1	-1	-1	0.33	22	48%
5	68	Avoidance of modification	Vend	1	2	2	2	2	2	2	1	2	2	1	2	2	2	0	2	2	1	2	2	2	2	2	2	2	2	0	2	2	1	2	2	0	2	2	2	2	2	1	2	2	1	2	2	2	2	1.72	43	93%
6	69	Appointment of an advisory project manager	Vend	1	1	1	0	2	2	0	1	1	1	0	0	0	0	2	1	0	1	1	0	1	1	-1	-1	0	2	1	-1	0	1	0	0	0	1	1	0	-1	-1	0	1	-1	1	0	2	-1	0	0.43	22	48%
7	70	Adoption of prototyping	Gen	0	0	0	2	1	1	0	0	0	1	0	1	2	0	0	0	1	1	0	0	1	1	0	0	1	-1	-1	0	0	1	1	2	0	2	1	0	2	-1	0	0	0	2	1	1	0	0	0.50	20	43%
8	71	Regular executive briefing	Vend	0	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	0	-1	-1	-2	-1	0	-1	-1	-1	1	-1	-1	-2	-1	-1	-1	-1	-2	-1	0	0	1	-1	0	2	-1	-2	-1	0	-1	-2	0	-1	-1	-1	-0.76	3	7%
9	72	Share of ownership among the key users	Gen	0	0	1	1	1	0	0	0	0	1	1	2	2	2	2	0	1	1	0	1	1	0	0	0	0	1	1	1	1	0	0	0	-1	1	-1	1	1	1	1	0	0	0	1	0	0	0	0.54	23	50%
10	73	Extensive training workshops	Vend	0	-1	-1	-1	-1	0	0	1	0	-1	-1	-1	0	-1	0	1	2	-1	-1	1	0	1	1	-1	-1	-1	0	1	1	1	-1	0	-1	0	0	-1	-1	-1	0	-1	1	0	-1	-1	0	0	-0.22	10	22%
11	74	Adoption of simulation	Gen	-1	-1	-1	0	1	0	0	1	0	0	0	-1	0	1	1	2	0	-1	0	1	0	1	1	0	-1	1	2	0	1	1	2	0	0	-1	1	1	0	0	-1	0	1	2	1	1	-1	-1	0.28	19	41%
12	75	Continuous analysis of risks	Vend	0	-1	0	0	-1	-1	-1	0	-1	-1	0	0	1	-1	1	0	-1	0	-1	0	0	-1	-2	-1	-1	-1	-1	1	0	1	-1	-2	0	-1	-1	-2	-1	1	0	1	0	-1	-1	0	0	-1	-0.46	6	13%
13	76	Regular check-up of data integrity	Gen	0	0	1	1	0	1	0	1	0	1	1	1	0	1	1	0	0	0	0	0	0	1	-1	0	0	1	1	1	0	1	1	0	0	1	1	1	-1	0	0	1	1	0	1	1	1	0	0.46	23	50%
14	77	Chargeability for data fixing	Gen	-2	-1	-1	-2	-2	-1	-2	0	-2	-2	0	-1	-1	-1	-2	-2	-2	-2	-2	-2	-1	0	-1	-1	-1	-2	-2	0	-2	-2	-1	-1	-2	-2	-2	-2	-1	-2	-2	-1	-2	0	0	-2	-2	-2	-1.43	0	0%
15	78	Management of Change	Gen	1	1	2	1	1	0	1	0	1	1	2	0	1	0	1	1	1	1	0	0	-1	0	0	1	2	1	1	2	2	2	2	1	0	0	1	1	1	1	1	0	1	1	1	1	1	0	0.85	33	72%

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