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**Exploring the Links between  
Business Process Re-engineering and  
Small and Medium-sized Enterprises**



by

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B.B.A M.B.A

A dissertation submitted in fulfilment of the requirements for the award  
of  
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# Declaration

This dissertation is presented in accordance with the regulations for the degree of doctor of philosophy. The work described in this dissertation is entirely original and my own, unless otherwise indicated. The author also confirms that this dissertation has not been submitted for a degree at another university. The interpretations in this dissertation are the sole responsibility of the author, and in no way represent the views of the participating organisations, nor of Warwick Business School.

The following papers arising from work on the thesis have been published before submission:

## *Conference Papers*

1. Presented Business process re-engineering in SMEs: Current evidence at the 6<sup>th</sup> European Conference on Information Systems (ECIS), June 4-6, 1998: Proceedings of the Conference
2. Presented Towards a framework for BPR in SMEs at the 2<sup>nd</sup> UK Academy for Information Systems (UKAIS) Conference, 2-4, April 1997: Proceedings of the 2<sup>nd</sup> UKAIS Conference, pp. 279-296

## *Journal Papers*

3. Chang, L. and Powell, P. (1998), Towards a framework of business process re-engineering in small and medium-sized enterprises, *Information Systems Journal*, 1998, pp. 199-215
4. Chang, L. and Powell, P. (1998), Business process re-engineering in SMEs, *Knowledge and Process Management*, Vol. 5, No. 4, 1998

## Abstract

Despite a growing literature on business process re-engineering (BPR) principles and prospects, there is little empirical research evaluating the success or failure of BPR initiatives. This is especially so in small and medium-sized enterprises (SMEs) where the potential for BPR benefit may differ significantly from that in their larger counterparts.

An examination of the literature on process re-engineering reveals that BPR guidelines derived from the experiences in large organisations are inadequate for SMEs given the different characteristics of SMEs in terms of size, structure, culture, resources and technology. The objective of this research is to develop an appropriate basis of BPR guidelines for SMEs. A pluralistic research method is used due to the exploratory nature of the study and the absence of existing rigorous research in the area. This consists of a questionnaire survey of 116 Taiwan-based SMEs, followed by case studies of eight chosen organisations. The findings from the survey enable the researcher to modify the proposed framework of BPR implementing for SMEs, and the case studies explore the factors that facilitate/inhibit BPR success in SMEs in greater detail.

The study reveals an opportunity for SMEs to benefit from BPR efforts, although their BPR initiatives are mainly inter-functional. Re-engineering in SMEs is often a response to positive trends, and is largely dependent upon the owner-manager's perceived benefits and risk-taking attitudes. A strategic vision as well as sound external relations may leverage SMEs' re-engineering efforts to higher business integration, while a lack of financial support and non-standardised IS infrastructure may restrict SMEs' BPR initiatives to functional areas. Employee empowerment, dedication to R&D, and innovative use of IT are intertwined and significantly related to BPR success. The study concludes by outlining the principles of BPR guidelines for SMEs based on a modified framework detailing the BPR environment in SMEs. These include a holistic and strategic view towards BPR, the roles of owner-managers and employees, change issues, and implementing BPR as a process change project.



## **Term Definitions**

In this thesis, the terms SMEs, BPR SMEs, non-BPR SMEs, BPR success/failure are defined as follows:

**SMEs** - SMEs are generally defined as firms with employees fewer than 500.

Small businesses are referred to as firm with employees under 50 while medium-sized enterprises are those with employees more than 50 but under 500.

**BPR SMEs** – BPR SMEs refer to firms who have undertaken BPR or are undertaking BPR

**Non-BPR SMEs** – Non-BPR SMEs, on the other hand, refer to firms who have not undertaken BPR

**BPR success/failure** – BPR success/failure is determined by the degree to which general BPR satisfaction is perceived by the respondents

# **Chapter 1 Introduction**

## **1.0 Introduction**

This chapter outlines the main issues with which this research is concerned. The first section illustrates how organisations today compete on the basis of new ground rules. Specifically, speed, flexibility, quality and cost efficiency underpinning the concepts of ‘time-based competition’ and ‘lean production’ are of considerable importance to business survival (Stalk and Hout, 1990; Childe et al, 1994). Organisations have to increase effectiveness to meet and exceed customer’s expectations (Janson, 1992). This entails speeding up innovation in order to gain a competitive edge (Charfield and Bjorn-Andersen, 1997; Keen, 1988). Coupled with modern information technology (IT), business process re-engineering (BPR) demonstrates a departure from conventional incremental process improvement methods towards fundamentally rethinking the management paradigm (Hammer, 1990; Hammer and Champy, 1993; Davenport, 1993).

The section 1.2 demonstrates the importance of small and medium-sized enterprises (SMEs) in economic development in much of the world. It is argued that SMEs compete directly with foreign firms and suffer the same consequences as large companies (Haksever, 1996). However, little research has done on how size shapes actual competition. Nor have researchers made any attempt to explore process-based attributes related to SMEs (Dilts and Prough, 1989; Chen and Hambrick, 1995). Despite a growing body of literature on BPR, many authors argue that what applies to large firms may not apply to SMEs (Blau and

Schoenherr, 1971; Pugh et al, 1968). Section 1.3 thus proposes a need for BPR research in SMEs on which is based the research objective of this study.

## **1.1 The Evolution of Business Process Re-engineering (BPR)**

Since the principles of BPR were first espoused in a 1990 *Harvard Business Review* article entitled 'Re-engineering work: Don't automate, obliterate', much interest has been generated. Defined by Hammer and Champy (1993) as 'the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance, such as cost, quality, service and speed', BPR is a customer-driven and IT-enabled approach which aims to transform organisations. A North American survey found BPR to be the most important management issue (Champy, 1993). Similarly, process re-engineering is ranked by British executives as one of the top ten IS issues in the 1990s (Galliers et al, 1994). Radical process redesign has become popular in Europe (Economist, 1994a; Edwards and Preece, 1994) and Asia (Martinsons, 1994). Successful stories, such as Ford Motor (Hammer and Champy, 1993), Bell Atlantic (Currid, 1994), Cummins Engine Company (Klimas, 1997), Barclays Bank (Hoffman, 1995), Lucas, (Parnaby, 1994) and British Telecom (Bartram, 1994), appear in both practitioner and academic works (Treacy and Wiersema, 1993).

However, BPR suffers from criticism, much of which is centred on what actually differentiates BPR as a new management paradigm. Some have argued that re-engineering is nothing but a 'new wonder drug' (Earl, 1994) or 'old medicine in a

new bottle' (Martinsons, 1995). Mumford (1994) sees re-engineering as the latest 'management fad' and argues that BPR is a 'repackaging of earlier principles of socio-technical redesign'. Kinni (1994) argues that the idea of 'clean-slate process redesign' is familiar to manufacturing managers, many of whom have already encountered fundamental process change during the implementation of strategies such as just-in-time, a corporate concept that seeks to eliminate non-value activities (Epps, 1995). Process skills and process constancy have been emphasised in the human relations and management of change school (Schein, 1985). Davenport and Short (1990) see BPR an application to business process approaches pioneered by Industrial Engineers in manufacturing operations. And in the field of innovation, Earl (1994) suggests that it is mandatory to distinguish product innovation from process innovation. The absence of theory allows consulting companies to use old and familiar analytical tools and techniques and call these re-engineering (Mumford, 1999).

Nonetheless, BPR's novelty does not come from its content. Hammer and Champy (1993) claim that BPR is a collection of previously existing business concepts and ideas. It represents an incremental refinement of process improvement methodology that draws very heavily on previous thinking. Davenport (1993) supports this view by stating that what is new is the combination of elements in a well-defined approach that yields a return that is greater than the sum of its parts. Earl (1994) contends that it is the integration of three core elements – IT, processes and transformation – rather than any fundamentally new idea which distinguishes BPR. Newell et al (2000) contend that BPR essentially represents a 'planned, rational and phased approach to the

management of organisational change generating cross-functional integration of knowledge, skills and processes’.

From an evolutionary point of view, BPR emerged in the early 1990’s as an approach for organisations to compete in a globally competitive environment. Specifically, BPR, characterised by its fundamental rethinking of business and radical method to process improvement, is driven from three critical factors: market and competition, customers, and information technology.

### **1.1.1 Globalisation of market and increased competition**

The competitive environment facing all industries has forced many organisations to choose strategies for increasing organisational effectiveness and efficiency and reducing organisational slack (Perrow, 1979). Firms may decide whether they are focused on growing or changing markets or on reducing costs in a stable or declining market share. Or alternatively, they seek ways to improve efficiency (Leatt et al, 1994). Competitive and financial pressures are the most compelling reason to change (O’Connell, 1996). Stewart (1994) notes that ‘... the competitive rigors of the new economy... are too big and too urgent to be addressed by anything less than change on a grand scale’. A driver of radical change such as BPR is simple impatience with existing change methods. Vitiello (1993) contends that re-engineering is much more visible and fast acting than incremental change methods like continuous quality improvement (Kaizen) or total quality management (TQM). Feurer (1995) concludes that in the face of accelerating change there is a need for a dynamic approach in which

opportunities are identified and evaluated simultaneously in the light of the organisation's existing and potential future competencies together with the level of resource commitment necessary. The integrated, cross-functional organisation involves co-ordination of a number of firm functions and disciplines (Wind and West, 1991).

Business strategies change as competition increases speed, flexibility, quality and cost efficiency are pursued simultaneously (Stalk and Hout, 1990). The ideas underpinning the concepts of 'time-based competition' and 'lean production' are of considerable importance to BPR (Childe et al, 1994). Stalk and Hout (1990) claim that time is the contemporary firm's most important competitive weapon. Lean production is defined in Womack et al (1990) as transferring 'the maximum number of tasks and responsibilities to those workers actually adding value'. The movement towards lean production cannot be made without understanding how processes operate.

BPR can be initiated from both strategic vision and a crisis. Pitt (1990) argues that crises can drive organisational, technical, and cultural changes that dramatically improve a firm's competitive, technological, and administrative capabilities. These crises can be induced outside competitive forces, but they can also be 'constructed' by top management to stimulate innovative organisational responses. According to Dixon et al (1994), the gap between the future requirements and current capabilities is perceived to be unbridgeable using incremental methods alone. Hence, they propose that re-engineering in many

contexts is not a reactive response to a crisis, but a proactive step toward the future.

### **1.1.2 Customer demand**

Another critical factor is changing customer profiles and expectations. Organisations have to increase flexibility in response to changing market conditions (Kanter, 1995), while at the same time to increase effectiveness and quality in products and services (Hammer, 1996). So-called 'mass customisation' is no longer relevant in an era when supply exceeds customer demand. Janson (1993) describes today's market as, 'instead of working toward goals that are internally generated, organisations must now operate according to a set of standards defined by their customers: quality, innovation, responsiveness, convenience, and the ability to offer variety'. This entails speeding up innovation in order to gain a competitive edge towards R&D intensive organisations (Chatfield and Bjorn-Andersen, 1997; Keen, 1988).

Indeed, by focusing on making improvements in all dimensions of the organisation - human resources, processes, and IT - BPR helps organisations to overcome the systemic work barriers that interfere with efforts to achieve higher levels of customer satisfaction (Janson, 1993). Hence, Davenport (1993) argues that competitive pressure is not the only driver of process innovation; increasingly, customers are the impetus for radical process change. As Feigenbaum (1983) puts it, 'quality is a customer determination .... and is based upon the customer's actual experience with product or service'.

### **1.1.3 Rapid technological change**

Advances in information technology have led to new modes of organising work. Many of these new organisational forms are complete departures from past practice of incremental improvements (Brynjolfsson et al, 1997). The focus on innovative and strategic computer-based information systems over the past decade has exposed the constraints imposed by traditional organisations and their methods (Martinsons, 1995). In the face of unprecedented environmental changes and intensified competition, bureaucratic streamlining has failed to deliver performance and improvement of a sufficient magnitude.

IT has historically delivered disappointing results - largely because companies tend to use technology to mechanise old ways of doing business (Hammer, 1990). However, such technology is now mature and pervasive and able to do a more than just speeding up old processes. Coupled with a parallel development - 'sweeping changes in management and organisational structure that are redefining how work gets done' (Gleckman, 1994), IT is said to facilitate radical changes to achieve dramatic improvements.

The global information age, and its attendant changes require a re-examination of the traditional business paradigm (Wind and West, 1991). Brynjolfsson et al (1997) argue that a strategy that co-ordinates and interacts among all the components of a business system must be formulated and operations may become more tightly coupled since IT and new organisational paradigms eliminate time, space, and inventory buffers. These linkages further aggravate change



management problems and process interactions (Rockart and Short, 1991).

In the face of global market competition, customers' demand and rapid technological advances, organisations, large or small, are forced to make fundamental changes in how they operate. Haksever (1996) argues that SMEs have been competing directly with foreign firms for a long time; some have suffered the same consequences as large companies. Thus, quality and productivity seem to be indispensable ingredients in small firms' struggle for survival in these new conditions. Given that small enterprises represent the main driving force in the growth of the economy (Drucker, 1984), a large and important sector is ignored when SMEs are excluded from research considerations (Dilts and Prough, 1989). The importance of SMEs and a lack of rigorous research in SMEs are discussed in the following section.

## **1.2 The Importance of Research into SMEs**

The importance of SMEs in economic development has received increasing attention in the literature. The decline of the mass production paradigm and the increasing importance of flexible organisations have focused attention on SMEs. SMEs have an increasingly important role in GDP in developed countries (OECD, 1993). This is a result of the increasing importance of subcontracting and labour flexibility for competitiveness (Storey, 1994). Given the importance of SMEs in many countries, however, SMEs are characterised by their high rate of failure. Up to 4 out of 5 small firms fail within 6 years (Thatcher, 1996).

Economists have examined the job generating potential of the SME sector (Storey and Johnson, 1986; Doyle and Gallagher, 1987); financial experts have assessed the need for, and the impact of, venture capital on the growth of small firms (Mason and Harrison, 1991); and sociologists have begun to examine inter-organisational networks (Johanson and Mattson, 1987; Szarka, 1990). Nevertheless, Chen and Hambrick (1995) acknowledge that little research has done on how size shapes actual competitive interaction. Nor have researchers made any attempt to explore process-based rather than content-based attributes of strategy. Consequently, the behavioural differences between the small and large firms competing in an industry and the means by which they build advantage via day-to-day competition, have left unexplored. Thus, the researcher considered it important and necessary to explore business process re-engineering in the SME sector.

### **1.3 The need for BPR research in SMEs**

Although there is no universal methodology for BPR, a number of common components exist within the growing body of literature (Hale and Cragg, 1996). Demkes and Franken (1996) call for a framework to understand the scope and viewpoints of the activities associated with BPR. One concern raised about BPR as an academic research topic is the lack of conceptual models for what is meant by BPR (Clark and Stoddard, 1996; Bartezzaghi et al, 1993). It is suggested that BPR efforts suffer from low success rates, due in part to a lack of tools for managing the change process (Brynjolfsson et al, 1997). This has resulted in, for instance, IS departments increasingly using 'mechanistic' systems development

models to model business processes (Heynes, 1993).

There is a lack of large-scale empirical research of BPR. Of the few studies conducted, the focus is on large organisations, and the majority use the case study approach on one or a few firms (Hale and Cragg, 1996). The existing BPR literature, which is oriented to applicability of various BPR elements in large firms, may not serve the needs of small firms (Amba-Rao and Pendse, 1985). There is little consideration for SMEs seeking to benefit from radical process improvement and achieve similar dramatic gains in performance which has been attributed to successful BPR (Hale and Cragg, 1996).

Organisational size has long been considered as one of the most significant contingency variables in macro-organisational studies (Kimberly, 1976) and many authors have argued that what applies to large firms may not apply to SMEs (e.g., Blau and Schoenherr, 1971; Pugh et al, 1968). SMEs have been shown to behave differently from large firms (Shuman and Seeger, 1986). Consequently, firm size, which may affect a firm's ability to pursue alternative strategic actions, should be actively investigated (Davis et al, 1985). Small enterprises operate under conditions which distinguish them from large ones; they are not simply smaller versions of large organisations (Dilts and Prough, 1989). Hence, there is a need to investigate the small firm arena in order to determine whether SMEs can benefit from undertaking BPR.

## 1.4 The Research Objective

The overall research objective of this study is:

*to examine the extent to which BPR is applicable to SMEs and to determine an appropriate basis for the development of BPR guidelines for SMEs*

As BPR is relatively new, there is a lack of empirical research in the field (Hale and Cragg, 1996). Hammer and Champy (1993) argue that any firm can adhere to the principles of re-engineering regardless of size. Barrier (1994) claims that BPR is also applicable to small businesses. There is a need to investigate SMEs in order to determine whether the same principles for BPR apply, or whether a different approach needs to be taken by a small business looking for radical process change. This study attempts to explore the relationship between BPR and SMEs by examining the extendibility of the existing BPR principles and methodologies to SMEs and provide an appropriate basis for the development of process re-engineering guidelines in the context of smaller enterprises. Specifically, the research objective requires investigating the following research questions:

- Do SMEs undertake BPR? Why and when do they undertake re-engineering initiatives?
- Can SMEs, as their large counterparts, benefit from process redesign and achieve better performance in cost reduction, shorter cycle time, higher product quality, and customer satisfaction?

- Do SMEs have more flexibility, in terms of organisational culture, IT-use, management structure, market response, and cross-functional orientation, to carry out re-engineering projects; or do their limited financial and technological resources *inhibit* BPR results?

## 1.5 The Plan of Research

The plan of research is as follows. **Chapter 2** reviews the literature on BPR and its relevance to SMEs. The move from IT-driven process redesign towards holistic strategic BPR planning is documented, the characteristics of SMEs are explained, and the need for fundamental change is explored. Following this, a framework of SMEs implementing BPR is introduced. The four organisational dimensions categorised into four dimensions, culture, structure, resources and technology that underline the BPR environment in the small business context are discussed. It is considered necessary and important to determine an appropriate basis for providing guidelines of re-engineering practice for SMEs.

Based on the conclusions from Chapter 2, a research objective is formulated and explained in **Chapter 3**. Possible methods of conducting the research are discussed in **Chapter 4**. It is argued that a pluralistic research approach is the most appropriate for this study. This approach is justified in the context of the exploratory nature of the subject area; the need for information on a wide variety of organisations; and the necessity to study some processes in detail. The research method chosen consists of a questionnaire survey of a sample of 116 organisations in Taiwan, followed by case studies of eight chosen SMEs. This approach enables the researcher to document important relationships which could

be explored in more depth during the case studies.

The first part of the research consists of a survey which is presented in **Chapter 5**. This chapter demonstrates the current BPR practice in SMEs. The factors identified in Chapter 2 that may enhance or inhibit BPR success are tested and the outcomes are subsequently documented. This chapter argues that although firm size does not directly influence BPR, other factors, such as risk-taking attitude, employee autonomy, and a strategic vision are critical to BPR success. The survey findings form a basis for a modification of the framework and further investigation with chosen individual organisations.

Eight SMEs are chosen for study in **Chapter 6** in order to investigate further the re-engineering processes of participants and to determine an appropriate basis for developing BPR guidelines for SMEs. The case studies not only look at the issues derived from the framework but also explore in greater detail those emerged from the survey. This enables a comparison and with extension of the previous findings from the survey allow the researcher to revise the framework of SMEs undertaking BPR. The case study analysis provides a basis for determining the appropriateness of the development of BPR guidelines for SMEs.

**Chapter 7** discusses the findings from the survey and the case studies in light of the research objective, method, and the three research questions. The limitations of the study are acknowledged, such as the lack of generalisability of the case study method and the inflexibility of the survey approach. The chapter examines the role of BPR in SMEs in search of process improvement, and argues that BPR

guidelines should be based on the SME environments identified in the revised framework of SME implementing BPR. It is argued that SMEs should take a holistic stance and initiate re-engineering as a process change project. This entails innovative use of IT and a careful review of resources at both organisational and business network levels. Based on these results, BPR guidelines are made for SMEs which are undertaking or contemplating implementing BPR. Finally, recommendations for further research are outlined. These recommendations acknowledge the necessity of validating the findings from this study and conducting further research on an explanatory basis.

# **Chapter 2 Literature Review and Conceptual Framework**

## **2.0 Introduction**

Chapter 1 illustrated that BPR has been recognised as an essential approach to business process improvement for organisations, but there is a lack of empirical study, especially for SMEs. Previous research (Hammer, 1990; Hale and Cragg, 1996; Daly and McCann, 1992) has proposed that small businesses have an equal opportunity to benefit from and succeed in BPR, while Barrier (1994) and Davidson (1993) argue that SME may undertake BPR differently from their larger counterparts.

This chapter presents a review of the underlying principles of BPR by first clarifying the terminology, examining the various definitions so far proposed, and then discussing the major concepts of BPR. Despite the growing literature on re-engineering, there is little agreement on what actually differentiates BPR from other management practices as discussed in Chapter 1 (Earl, 1994; Burke and Peppard, 1995; Parfett, 1994). The guidelines provided by BPR advocates are based upon proprietary expertise or anecdotal evidence from large organisations (Grover et al, 1995). Many authors argue that what applies to large firms may not apply to SMEs (e.g., Blau and Schoenherr, 1971; Pugh et al, 1968). This chapter outlines the characteristics of SMEs and proposes that several factors, such as size and control, organisational resources, and IT/IS infrastructure must be taken



into account for the development of BPR guidelines in the SME context.

## 2.1 Terminology

There are a variety of terms in the literature relating to business process change, including business process improvement (Harrington, 1991), business process innovation (Davenport and Short, 1990; Carr, 1993), core process redesign (Heygate, 1993; Hagel, 1993), business restructuring (Tanswell, 1993; Talwar, 1993) as well as BPR (Hammer, 1990). Re-engineering is probably one of the most abused terms in the corporate world (Filipowski, 1993). It has been used to refer to a wide range of organisational changes, including downsizing, restructuring, and process improvement. The confusion of terminology has led many authors to try to distinguish BPR from other process improvement methods. For example, Hammer (1990) argues that BPR is not automation. Short and Venkatraman (1992) comment that firms have been using IT to automate existing processes rather than to redesign them. Similarly, Harrington (1991) asserts that automating an inefficient process will simply produce a 'faster mess'.

Re-engineering is also considered different from downsizing and restructuring/rightsizing. While as a cost-reduction strategy, 'downsizing' involves a reduction in the number of personnel (Cameron et al, 1993), 'restructuring' or 'rightsizing' reconfigures organisational processes, products, and people, in order to refocus core competencies (Hitt et al, 1994). Restructuring may also result in some job losses but will be less traumatic because of its long-term nature. BPR is

distinguished from both as a managerial effort to restructure/change a ‘constructed’ process, highlighting both technological and social dimensions, i.e. processes, technology, people, structures etc. (Tinaikar et al, 1994). Whilst as a cost-cutting strategy, Carr and Johansson (1995) believe that BPR has a potential to achieve greater revenue. Table 2.1 shows a synthesis of comparisons, using criteria developed by Kissler (1996).

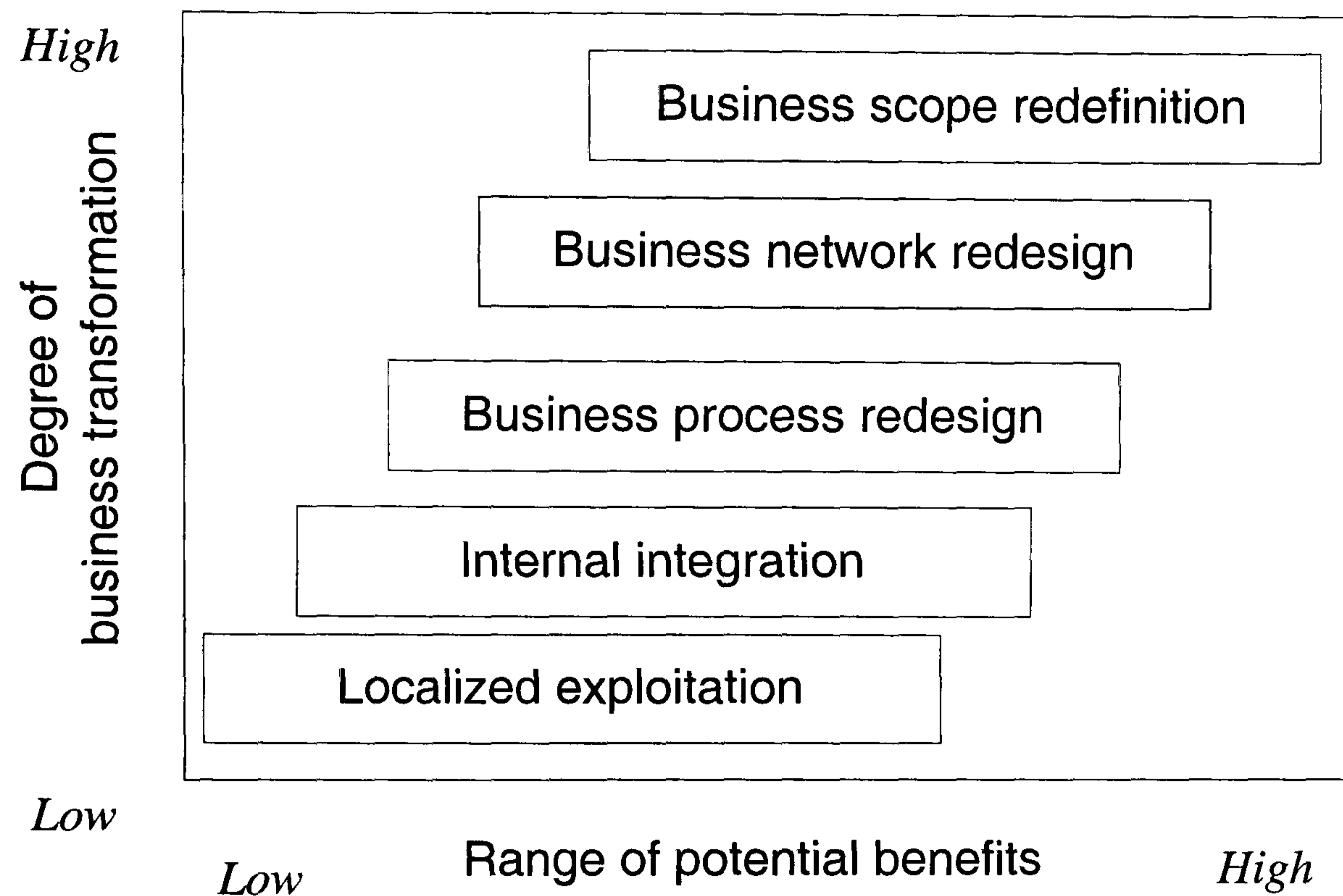
*Table 2.1: Comparisons among downsizing, re-engineering, and restructuring*

*(from Kissler, 1996)*

	<b><i>Downsizing</i></b>	<b><i>Re-engineering</i></b>	<b><i>Restructuring</i></b>
<b>Focus of change</b>	Cost reduction	Radical process redesign	Focus on core competencies
<b>Key assumption</b>	Too many people	Ineffective and inefficient processes	Inappropriate strategic focus
<b>Output/input goal</b>	Same output/fewer resources	More output/fewer resources	Different output/fewer or same resources
<b>Scope of change</b>	Moderate	Broad (cross-function)	Broad (across functions and units)
<b>Primary target</b>	Headcount reduction	Processes redesign for customer needs	Organisational restructuring
<b>Key enabler</b>	Reduce personnel	Improve information technology	New and reformed strategic business units
<b>Strategy</b>	Reactive	Proactive	Proactive
<b>Implementation time</b>	Short	Medium	Medium to long
<b>Direction</b>	Top-down	Top-down and bottom-up	Top-down
<b>Infrastructure change</b>	Ignore	Critical	Critical
<b>Improvement goal</b>	N/A	50%-100%	30%-50%
<b>Key risks</b>	Employee burnout Loss of employee trust Lower productivity Decreased patient care quality	Process design failures High cost with little return Loss of employee trust Decreased patient care quality	Lack of return in new/renewed businesses Financial investment Loss of employee trust Loss of patient loyalty

As shown in Figure 2.1, BPR has also been conceptualised by Venkatraman (1994) as the third among five levels of IT-enabled business transformation (he refers BPR as ‘business process redesign’). This suggests that IT benefits will be limited unless processes are extended beyond the focal organisation. Altered

inter-firm relationships may also deliver better value to customers (Venkatraman, 1994).



*Figure 2.1: Five levels of business transformation (from Venkatraman, 1994)*

Davenport (1993) distinguishes BPR (he terms BPR as ‘process innovation’) from ‘process improvement’, which seeks a lower level of change (Table 2.2). However, he advocates that BPR is best combined with improvement programmes, both concurrently across different processes and in a cycle of alternating for a single process. As shown in Table 2.2, it is clear that BPR is depicted as a radical top-down initiative that involves higher risk than process improvement and spans cross cultural and structural dimensions within an organisation.

*Table 2.2: Comparison of process improvement and process innovation (from Davenport, 1993)*

	<b>Improvement</b>	<b>Innovation</b>
<i>Level of change</i>	Incremental	Radical
<i>Starting point</i>	Existing process	Clean slate
<i>Frequency of change</i>	One-time/continuous	One-time
<i>Time required</i>	Short	Long
<i>Participation</i>	Bottom-up	Top-down
<i>Typical scope</i>	Narrow, within functions	Broad, cross-functional
<i>Risk</i>	Moderate	High
<i>Primary enabler</i>	Statistical control	Information technology
<i>Type of change</i>	Cultural	Cultural/structural

Recardo and Jones (1997) further clarify re-engineering from process improvement and process redesign. They argue that although these terms have been used interchangeably, each is distinct and can be thought of as falling across a conceptual continuum (Table 2.3). The approaches vary according to five different variables: scope of effort, philosophical approach, impact, time frame, and risk. Process improvement tends to focus at the process level or single function and do not include the entire value chain (suppliers and customers), while process redesign are output or result driven. Business re-engineering focuses on the enterprise level of an organisation. It is vision driven and, on a macro level, answers fundamental questions such as: are we in the right business?/who are our customers?

*Table 2.3: Comparison of process improvement, process redesign and business re-engineering (from Recardo and Jones, 1997)*

Type of Initiatives			
Attributes	<i>Process Improvement</i>	<i>Process Redesign</i>	<i>Business Re-engineering</i>
<i>Scope</i>	Activities within a process	Core or support processes within or across functions	Core processes across functions and enterprise
<i>Approach</i>	Process automation; Continuous improvement; TQM	Process innovation; Systems integration	Business transformation; organisational change
<i>Impact</i>	Low	Moderate to high	High
<i>Time Frame</i>	Less than 1 year	1 to 2 years	2-5 years
<i>Risk</i>	Low	Medium	High

While attempting to distinguish ‘business process re-engineering’ from other process improvement methods, some major concepts of BPR are being enlightened. For example, Kissler (1996) sees BPR as radical process redesign that entails top-down and cross-functional interactions. Such a ‘clean slate’ approach (Hammer, 1990; Davenport, 1993) to process change involves higher risk (e.g., Davenport, 1993; Kissler, 1996). While many have recommended the use of IT in redesigning business processes (Davenport, 1993; Hammer 1990; Venkatraman, 1994), Hammer (1990) and Harrington (1991) stress that BPR is ‘fundamental rethinking’ of how business is operated rather than automating existing business processes. Whether process redesign or business re-engineering, the emphasis should be placed on the ‘core business processes’ (Recardo and Jones, 1997). These key elements of BPR will be discussed in greater detail in 2.3.

## 2.2 The Definitions of BPR

The definitions of BPR reflect an evolutionary process of the concepts of BPR. For example, BPR was initially defined by Hammer (1990) as ‘the use of modern IT to radically redesign business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service, and speed’. Central to this definition is a concept which combines process orientation with an edict for radical change. There was somehow a lack of consideration of the ‘human’ aspects in BPR (Nwabueze and Kanji, 1997). In a later definition, he states that BPR is the complete reinvention of how work is done and all the attendant aspects of an organisation (job designs, organisational structures, management systems and the like).

Although numerous definitions of BPR have been offered, it is agreed that none has yet attained general acceptance (Burke and Peppard, 1995; Parfett, 1994). They may reflect fundamental differences of opinion concerning the basic nature of BPR, ranging from the early tools-oriented pragmatic views expressed by Davenport and Short (1990):

*‘the analysis and design of workflow and processes within and between organisations’,*

which has continued to be reflected by authors such as Parker (1993):

*‘the use of evolutionary tools/techniques combined with enabling technologies to*

*provide an explosive mix to make dramatic change throughout the organisation’.*

to the openly objectives-oriented and ‘outcome’ centred approach of Hammer and Champy (1993):

*‘the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed’*

to the structural and strategic focus (Raymond and Klein, 1994):

*‘the rapid and radical redesign of strategic, value-added business processes – and the systems, policies and organisational structures that support them – to optimise the workflow and productivity in an organisation’*

to the almost philosophical, cultural orientation proposed by Wood et al (1995):

*‘BPR can be both envisaged and enacted as a learning rather than an optimising process, and it becomes systemic rather than systematic in nature’.*

Davenport and Stoddard (1994) speculate that since its introduction in 1990, re-engineering would become integrated with much broader organisational phenomena - its integration into existing change methods; or its combination with quality and other process-oriented improvement approaches into an integrated process management approach. In general, BPR refers to initiatives,

large and small, whose common theme is the achievement of significant improvements in organisational performance by augmenting the efficiency and effectiveness of key business processes (Wastell et al, 1993). This research employs the definition given by Hammer and Champy (1993). It is considered clear and easily understood while representing the ‘fundamental rethinking’ and ‘outcome orientation’ spirit of BPR.

### **2.3 The Concept of BPR**

While organisations believe BPR will sharpen competitiveness, enhance productivity, shorten cycle time, enrich job content, reduce hand-offs, and improve customer service (Sia and Neo, 1997), the definitions of re-engineering cannot be linked to the implementation methods of BPR. Hence, Hammer and Champy (1993) present a list of principles to redesign processes, such as eliminating non-value-adding activities, empowering employees, and organising work around outcomes.

Indeed, BPR, from an organisational change perspective, is not a monolithic concept but rather a continuum of approaches to process change (Kettinger et al, 1997). Childe et al (1994) view the process of re-engineering as analogous to a ‘product development process’ which involves three stages: input, transformation and output. They point out that a ‘business process’ can be regarded as a conduit along which a commodity flows. A commodity might be conceptual (e.g. fundamental rethinking and customer focus) or material (e.g. process redesign



and dramatic outcomes). A review of the BPR literature applying this concept results in a framework for understanding business process re-engineering as depicted in Figure 2.2.

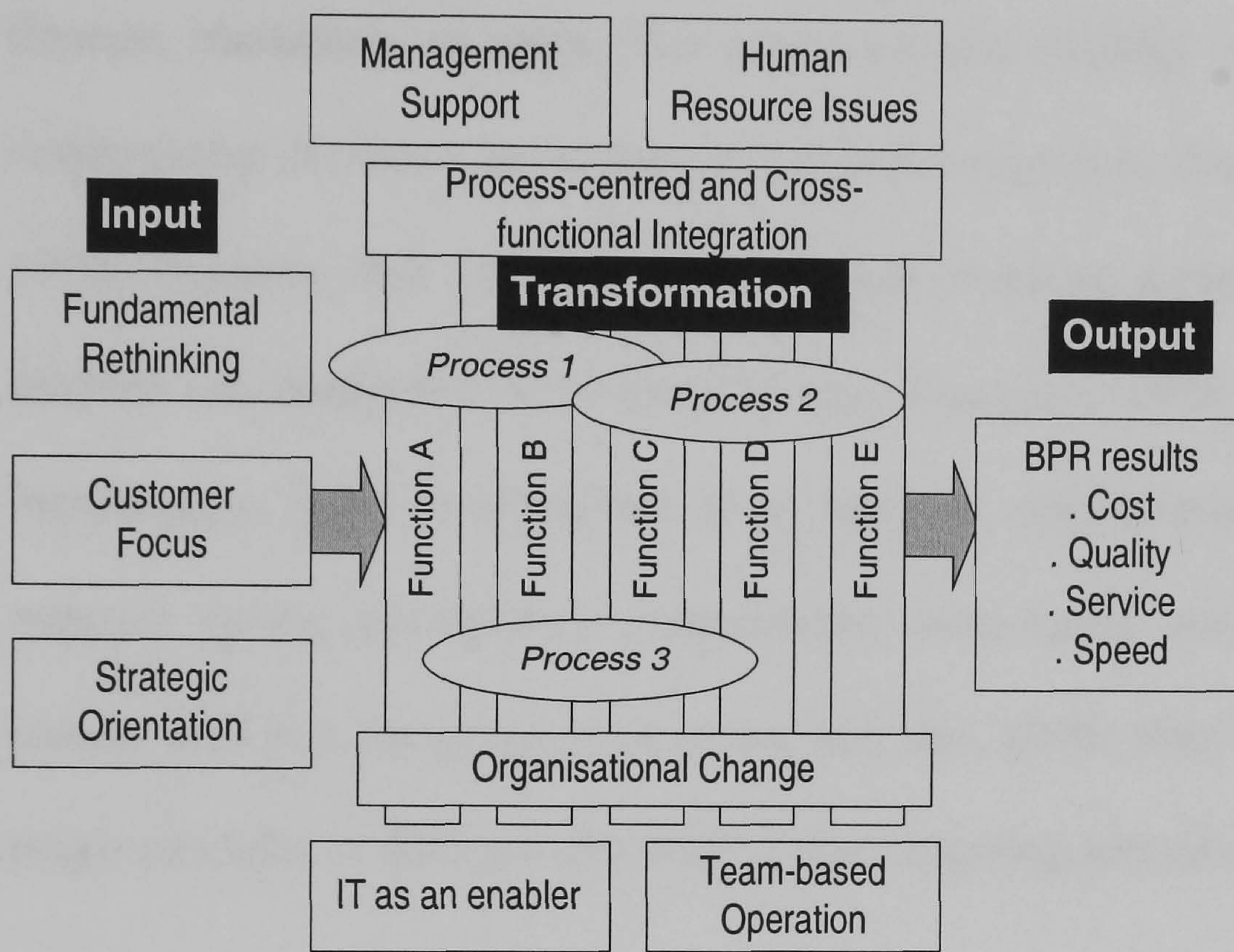


Figure 2.2: Framework for understanding business process re-engineering

The process of re-engineering starts by asking the question: how would you design the business process? (Hammer and Champy, 1993). Angus et al (1996) argue that BPR is purposely *fundamental* in that it concentrates on what the desired outcome should be and rejects conventional thinking. BPR is advocated as a *customer-driven approach* to eliminating non value-added activities of a process (e.g. Hammer and Champy, 1993; Motley and Parker, 1995). A business process, as Earl (1994) describes, encapsulates the interdependence of tasks, roles, people, departments and functions. The complexity of BPR implementation requires sound *strategic planning* to guide and ensure that the

firm's re-engineering efforts are '*outcome*' and '*objective*' oriented and carried out in conjunction with business strategy (Luftman et al, 1993; Davidson, 1993; Grover et al, 1993) and IT strategy (Hammer, 1990; Hale and Cragg, 1996). In Figure 2.2, Function A, B, C could represent departmental divisions such as finance, marketing, or sales. The actual process redesign is a process of de-emphasising divisions, *promoting functional integration* (Davenport and Short, 1990; Hammer and Champy, 1993). Such business transformation is often enabled and facilitated by *modern IT* (e.g. Hammer, 1990; Martinsons, 1995). Increasingly, BPR is perceived as a form of *organisational change* which requires strong *management commitment*, *team-based operation*, and proper *human resource management* (e.g. Sia and Neo, 1996; Bohl et al, 1996). These major concepts of BPR are discussed in the following sections.

### **2.3.1 Fundamental rethinking**

'Fundamental thinking' connotes that re-engineering '... begins with no assumptions and no givens' (Hammer and Champy, 1993). Instead of embedding outdated processes in silicon and software, Hammer (1990) recommends 'starting over'. Such a 'clean sheet of paper' approach concentrates on what the desired outcome should be, rejects conventional thinking (Angus et al, 1996) and discards current business practices (Levene and Braganza, 1996). Fundamental thinking is supported by Janson (1993) who asserts that BPR encourages organisations to abandon conventional approaches to problem solving and to 'think big', thereby freeing themselves from antiquated business practices and learn new ways to satisfy customers. Davenport (1993) refers to BPR as 'process

innovation', presuming that the purpose of introducing something new into a process is to bring about major, radical change, while Barrett (1994) argues that innovation begins with a clear mental picture of an imagined future state. Hall et al (1993) contend that only a clean-slate approach to process redesign can avoid the classic re-engineering pitfall trying to fix the status quo.

However, the clean-slate approach has been challenged by several authors. Manganelli and Klein (1994) argue that the 'clean sheet' approach ignores the existence of a business process and the presumption that there is no value in using the existing process as an input for re-engineering is not appropriate in reality. The findings of a study conducted by Stoddard and Jarvenpaa (1995) also ran contrary to Hammer (1990). They note, 'Although re-engineering can deliver radical designs, it does not necessarily promise a revolutionary approach to change. Moreover, a revolutionary change process might not be feasible given the risk and cost of revolutionary tactics'. Hall et al (1994) stress that starting from scratch, firms can plan and build the new infrastructure but the new infrastructure should include programmes like comprehensive training and skill-development plans that require years.

### **2.3.2 Customer focus**

In re-engineering, the critical starting point is understanding what customers want and need (Cross et al, 1994). Several studies (Hall et al, 1993; Stow, 1993; Allio and Allio, 1995) have indicated that the determination of the elements that comprise customer value is paramount to BPR success. The processes to be

redesigned must be broadly based upon customer value in order to improve performance across the entire business unit (Hall et al, 1993). The concept of a customer has been extended into external and internal customers. External customers are the buyers of a firm's products or services, while internal customers refer to co-workers or supply chain members that are involved in creation and delivery of products to external customers (Tersine et al, 1997; Earl, 1994). At the centre of a re-engineering initiative is the need to eliminate 'non-added value' to both internal and external customers (Hammer and Champy, 1993). Replacement of outdated processes with innovative ones is driven by the belief that the customer is 'a prized asset rather than a necessary evil' (Clark, 1993).

Taking a process approach implies adopting the customer's point of view (Davenport, 1993). Customers are the final arbiters and the ultimate beneficiaries of BPR (Martinsons, 1995). Accordingly, an important measure of a process is customer satisfaction with the output of the process. If quality is reinterpreted as the customer's declaration of satisfaction, an effective BPR effort is to allow an organisation to examine and redesign the network of commitments and actions in order to meet or exceed customer expectations, often by developing new products, services or capabilities (Galvin and Singer, 1996; Motley and Parker, 1995). This has led Tersine et al (1997) to propose establishing positive customer relationships in order to promote a customer-driven attitude in terms of service and responsiveness (Jones and Sasser, 1995).

### **2.3.3 Strategic orientation**

Since firms today operate on a multi-organisational basis (Gold and Sauvam, 1990), re-engineering a whole organisation, rather than only a function or sub-element, is an extraordinarily complex undertaking. Stalk et al (1992) propose that BPR requires sound strategic planning, transforming key processes into organisational capabilities providing superior value to customers. Buono (1997) and Pritsker (1995) acknowledge a lack of strategic vision in most BPR initiatives and thus, Jordan (1996) proposes a need to pursue ways for coping with the human and organisational complexity and maintaining strategic control. This has led many authors to postulate the value of aligning re-engineering efforts with business strategy in increasing the chance of BPR success (Luftman et al, 1993; Davidson, 1993; Grover et al, 1993), and to argue that BPR initiatives should take place within a strategic business context (Wastell et al, 1994).

Many researchers (e.g., Rockart, 1988; Johansson et al, 1993) recognise 'core processes' as having strategic value. As such, the challenge in re-engineering projects is to target only key processes that add value from the perspective of customers (Holland and Kumar, 1995). Consequently, outsourcing other businesses is proposed as an alternative way to concentrate on core processes (Minoli, 1995; Morley, 1993). Robbins and Asher (1995) and Pritsker (1995) support the use of the value chain and an explicit corporate vision and business strategy in assessing re-engineering opportunities, while Strisceck and Cross

(1996) recommend a detailed mapping of the current activities and a careful identification of the cross-functional hand-offs and decision points. In this regard, Angus et al (1996) find R&D's valued-added functions particularly helpful.

Strategic alignment, as Hale and Cragg (1996) note, involves change management to deal with cultural adjustments, surfacing opportunities for using IT, and allocation of resources. Hambrick (1983) has examined how external changes such as changing customer needs and new technology affect a firm's strategy. King (1994) observes the strategic dimension to process re-engineering from a human resource perspective. Since re-engineering engagements have considerable cross-functional impacts, Recardo and Jones (1997) propose using project management to enable vision, objectives, and scope of re-engineering on target and allow it to be completed on time and within budget. Particularly, strategic alignment of the IS strategy with the business strategy ensures that any changes adapted will be consistent with the goals of the business (Hale and Cragg, 1996). This is often referred to as 'holistic re-engineering' (e.g. Ghani, 1996), understanding the content of re-engineering and deploying it in conjunction with complementary disciplines.

#### **2.3.4 Process-centred and cross-functional integration**

The most salient feature of business process redesign is the focus on 'process', a decisive movement away from the traditional functional concept, which stresses vertical differentiation and hierarchical control, to an emphasise on horizontal integration across functions (Hammer, 1990; Harrington, 1991; Davenport,

1993).

The 'process' concept of BPR traces its origins back to the 19<sup>th</sup> century when Taylor proposed that managers use process re-engineering methods to discover the best way to perform work and optimise productivity (Taylor, 1911), although technology did not allow companies to design processes in a cross-functional manner. Specialisation, a main feature of scientific management, was the state-of-the-art method to maximise process efficiency given the technology of the time (Lloyd, 1994). Unfortunately, due to rapid technological progress, saturated and fragmenting markets, and a more educated and sophisticated labour force, many scientific management principles, such as task decomposition and rigid hierarchies, have become obsolete and poorly suited to meet customer demands for higher quality, greater innovation and better service (Martinsons, 1995). Hence, by de-emphasising division of labour, BPR recasts work design from a 'simple jobs, complex processes' set-up to one focused on 'complex jobs, simple processes' (Thompson, 1967).

According to the CIM-OSA Standards Committee (1989), processes can be subdivided into three main areas: managerial, operational, and supporting. Managerial processes are those concerned with direction setting, enabling change or managing/controlling performance activities (Veasey, 1994). Operational processes, also called 'primary processes' in Porter's 'value chain' concept (Porter, 1985), refer to those directly related to satisfying the customers, such as customer service, product development, and order fulfilment (Champy, 1995; Meyer, 1993). Supporting processes act in support of the managerial and

operational processes, including financial, personal, facilities management and IS activities (CIM Standards Committee, 1989).

Cross-functional integration can be expanded to inter-organisational co-operation (Davidow and Malone, 1992), resulting in a network of companies sharing expertise (Kelly and Parsons, 1994) and seeking out complementary core competencies, e.g. differentiated skills and specific assets (Hamilton and Singh, 1992). This is what Venkatraman (1991) calls 'business network redesign' where management's role is to create a learning orientation, both within their firms and among their partners (Miles and Snow, 1995), buyers, sellers, and even competitors within an industry (Clark and Stoddard, 1996). This is based upon an assumption that network-based organisations and new channel structures may result in dramatic reduction in communications costs, particularly for computer-to-computer linkages, such as electronic data interchange (EDI), and inter-organisational connectivity (Clemons et al, 1992; Morton, 1991).

The identification of critical business processes is one element which has been found to be crucial to the probability of successful re-engineering (Cypress, 1994). Thus, BPR typically concentrates on so called 'core processes' that increase the organisation's competitiveness (Johansson, 1993). Cross et al (1994) define a core process as 'all the functions and sequence of activities, policies and procedures, and supporting systems required to meet a marketplace need through a specific strategy'. Emphasis is given to workflow - not to organisation charts (Richard and Cross, 1991). The three major processes identified by Rockart and Short (1991) - developing new products, delivering products to customers, and



managing customer relationships - are themselves highly interdependent. While Kaplan and Murdock (1991) argue that there are only three or four 'core' processes, Hall et al (1994) and Davenport (1993) warn that targeted processes defined too narrow may inhibit process innovation.

### **2.3.5 IT as an enabler**

The original perspective on BPR has been the axiom of 'using the power of modern IT to radically redesign business processes' established by Hammer (1990) with Davenport and Short (1990). Today's business organisation is an information-based organisation (Drucker, 1988). Harrington (1991) is perhaps the first to address business process improvement directly, although his notion on 'automation' implies little role for technology in process change since, even until 1990s, the most prevalent use of computers by individuals in business is word-processing - hardly a process innovation (Kominski, 1989). Despite impressive advances in IT, productivity gains from IT have been disheartening (MacArthur et al, 1994) and organisations commonly tailor application packages to fit existing business practice (Davenport, 1993). Against this backdrop, came Hammer's message (1990), 'Don't automate, obliterate'. IT and BPR have been intrinsically inter-linked and most of the BPR literature highlights numerous examples of radical process improvements achieved through IT (Chita, 1996). In return, BPR has a profound impact on IS infrastructure (May and Kettelhut, 1996; Kettinger et al, 1997).

In relation to the issue of IT dominance, some argue that BPR is driven by IT

(Alter, 1990; Hammer, 1990; Gant, 1992; Aikins, 1993; Venkatraman, 1994), while others suggest IT that plays an important supportive role as a tool for change management (Carr and Johansson, 1995; Talwar, 1993; Holtham, 1994). Nevertheless, most BPR advocates agree on the role of IT in BPR as ‘an essential enabler’ such that IT underpins the architecture of BPR and fundamentally reshapes the old process assumptions (Hammer and Champy, 1993; Martinsons, 1995; Edwards and Peppard, 1994; Teng et al, 1994; Earl, 1994; Gant, 1992). The enabling power of IT for BPR has been widely discussed. Davenport and Short (1990) propose that IT and BPR have a recursive relationship, emphasising the combination of process and technological innovations. Described by Martinsons (1995) as ‘a formidable but common challenge’, IT offers a mechanism for process innovation (e.g., Clark and Stoddard, 1996; Coulson-Thomas, 1994; Higgins, 1993). Based upon Davenport’s ‘process innovation’ assertion and Porter’s work on competitive strategy (1985), Teng et al (1994) propose a BPR framework which aligns corporate strategic planning and IT strategic planning. Integrated information systems can facilitate and support value-added business processes by eliminating time and distance constraints, and improving both communications and information processing (Martinsons, 1995; Keen, 1991; Vantrappen, 1992; Smeds, 1990). Communication technologies, such as facsimile machines, electronic mail, can increase the degree of collaboration while shared information resources (such as databases and imaging) enables process redesign to eliminate administrative redundancy and non-value adding activities, thus achieving lower costs, improved turn-time, quality and service through enhanced information flow (Teng et al, 1994; Cross et al, 1994). IT also effectively links cross-firm functions or industry segments and integrates

specialised value chain activities to better serve final customers (Upton and McAfee, 1996; Ring and Van DeVen, 1994; Benjamin and Wignad, 1995). IT can supply employees with information that enables them to make their own process decisions (Walton, 1989). In summary, Davenport and Short (1990) identify nine different categories of IT opportunities for supporting process re-engineering as shown in Table 2.4:

*Table 2.4: IT opportunities for BPR (adapted from Davenport and Short, 1990)*

<b>Impact</b>	<b>Explanation</b>
<i>Automational</i>	Eliminating human labour from a process
<i>Informational</i>	Capturing process information for purposes of understanding
<i>Sequential</i>	Changing process sequence, or enabling parallelism
<i>Tracking</i>	Closely monitoring process status and objects
<i>Analytical</i>	Improving analysis of information and decision making
<i>Geographical</i>	Co-ordinating processes across distances
<i>Integrative</i>	Co-ordination between tasks and processes
<i>Intellectual</i>	Capturing and distributing intellectual assets
<i>Disintermediating</i>	Eliminating intermediaries from a process

Pearson and Skinner (1993), in a survey of BPR, found that IT most likely to be used were: client/server architecture, workflow management, and document image processing. In addition, groupware incorporating elements of workflow and document image processing are regarded as critical IT technologies that are fundamental to the changed organisation (Chita, 1996; Ellis et al, 1991). Workflow systems represent process-oriented examples of groupware (Hales and Lavery, 1991) and aim to enable groups of workers to carry out specific office based processes. Since 1990 vendors have combined both workflow and image into their systems as a means of differentiating their products (Lodge, 1994). This capability greatly facilitates increased responsiveness and employee

empowerment, and combined with workflow software it removes the need for the serial processing of information thereby providing a powerful information system that facilitates improved organisational performance.

On the other hand, Davenport (1993) argues that enablement can have both positive and negative connotations. Constraints are usually those aspects of existing technology infrastructure, referred to as 'legacy systems' (Davenport and Stoddard, 1994) that limit the possibilities for innovation and cannot, for whatever reason, be changed in the relevant time frame. Proponents of IT as a supportive role argue that IT-driven redesign often misdirects organisations to focus on IT rather than key organisational/business issues, making IT the end as well as the means (Edwards and Peppard, 1994). BPR, it is argued, should be seen as a powerful vehicle for integrating IS and IT with business objectives, culture, structure and resources in order to gain competitive advantage (Watts, 1993).

Some authors examining BPR experiences indicate that BPR is rarely IT-driven (Hobby, 1994) and stress the success of BPR projects without any involvement in IT (e.g., Davenport, 1993 [Xerox]; Johansson et al, 1993 [Bank of Boston]). It has been suggested that Hammer himself has changed his view on the relationship of IT to the BPR process over the years by de-emphasising the role of IT (Dixon et al, 1994; Walls, 1995). Wastell et al (1994) conclude that business process redesign solutions should involve more organisational and cultural elements.

### **2.3.6 Management support and control**

Sia and Neo (1996) assert that re-engineering efforts may lead to flatter and leaner organisation structure. BPR often targets at eliminating management layers because the 'check and control' mechanisms do not 'add value' to the business. Flatter organisations, with greater decentralisation and increased onus on people to take responsibility (Drucker (1988), facilitate better responsiveness to customers, more direct communications and less costly overhead (Cross et al, 1994), and essentially allow information to flow freely and naturally to promote innovation (Mintzberg, 1979). The traditional hierarchical corporate structure, represented by a pyramid and autocratic management style, does not promote the relationships required when business processes are re-engineered (Brite, 1994; Champy and Nohria, 1996).

It is advocated that re-engineering as a form of work design that must be top-down (Hammer and Champy, 1993; Moss, 1993; Drucker, 1996). This is due to the fact that the processes being addressed usually span across different functional areas and only the highest levels of management have the broad perspective to identify the core processes and possess the political power to force collaboration and mandate the breadth of changes (Stoddard et al, 1996). Janson (1993) thus points out that strong leadership from the top can help to overcome the resistance provoked by radically new behaviour. However, in contrast, localised or uncoordinated process initiatives can prove positively damaging to overall performance (Stevenson, 1993). Hall et al (1993) argue that without strong leadership from top management, the psychological and political

disruptions that accompany radical change can sabotage a BPR.

However, managers must provide adequate support and show their commitment to BPR initiatives (Harrison, 1994). This includes directly involving in the design and implementation of the project (Tushman et al, 1986; Dixon et al, 1994), promoting communication (Paula, 1997), and explaining/informing the change (Freed, 1996; Cauthorne-Lindstrom and Tracy, 1992). Holland and Kumar (1995) contend that while vision and perspective keep re-engineering initiatives on track, executive time and energy keep the BPR efforts moving.

### **2.3.7 Organisational change**

BPR is increasingly recognised as a form of organisational change characterised by strategic transformation of interrelated organisational subsystems producing varied levels of impact (Kettinger et al, 1997; Huczynski and Buchanan, 1991; Dixon et al, 1994). And organisational change does not occur without people changing (Bohl et al, 1996). Fottler (1990) notes that it is implementation that appears to be the major difficulty in the overall strategy process. Randall (1993) emphasises that the management of change is particularly relevant. For example, IT has been regarded as an enabler of change (Benjamin, 1993), yet attempts to introduce new information systems often meet resistance precisely because they threaten the status quo (Markus, 1983; Eason, 1990; Wastell, 1993; Wastell and Newman, 1993).

Much of the discussion on BPR as organisational change has been centred on the

impacts on employees in the organisation. As a cost-cutting strategy, re-engineering may involve the empowerment of individuals to take on greater responsibility (Jick, 1993), while employees unaccustomed to shared responsibilities may perceive re-engineering as a threat to their jobs (Klimas, 1997; Springsteel, 1997), or employees become overwhelmed by work loads (Witherill and Kolak, 1996). In some companies, re-engineering is equated with downsizing and may result in reduction in payroll (Hammer and Stanton, 1995). Although re-engineering may not result in job losses (Baxter and Lisburn, 1994), BPR often creates stress (Stoner and Fry, 1983), confusion and frustration (Witherill and Kolak, 1996), scepticism (Martinsons, 1995), low morale (Byars and Rue, 1991), disputes (Butler Cox, 1991), cynicism and fear (Melone, 1995). Change may cause individual and group behaviour to vary widely from active resistance to enthusiastic support (Judson, 1991).

Brynjolfsson et al (1997) argue that change management requires a mutually reinforcing practice involving cross-training, incentives, and open-door communication. A strong communication strategy can inject the process with energy and excitement (Janson, 1993). A wider range of skill training, such as specific process training (Davenport, 1993) or on-the-job process skill training (Lambert, 1990), not only increases greater depth of job knowledge and breadth of task expertise (Baxton and Lisburn, 1994), but also leads to greater job challenge and motivation (King, 1993). Job redesign is also important (Doherty and Horsted, 1996). Evaluation and reward structures may also need to be modified (Martinsons, 1995; Baxton and Lisburn, 1994; Quinn, 1992) as they relate to behaviours and attitudes (Kerr and Slocum, 1987). This may include

monetary incentives, e.g., project bonuses, recognition awards, etc., and compensation needs to ensure that people are properly motivated to perform their new tasks (Cross et al, 1994; Mills and Mabey, 1993). Apart from the above, Reger et al (1994) suggest that implementation of change is more likely to be successful if the process is perceived by individuals to build on the existing identity of the organisation. Similarly, Juran (1964) proposes participation in both the design and execution of the change. Peters and Waterman (1982) explains that employees respond quickly to change when the organisation creates a culture that they relate to and share. In the same vein, Maira (1994) argues that it is necessary to integrate top-down direction with open, participative employee involvement. This approach may result in better productivity and work satisfaction, and resistance to change can be avoided to a great extent (Smeds, 1994).

### **2.3.8 Human resource management issues**

The inability to overcome human resource (HR) issues, such as implementing teams, has been identified as the most negative correlate of BPR success (Davenport, 1995). Bergman (1994) believes that the streamlining of processes and centralising certain equipment will create multi-skilled workers from a re-engineering effort. Ettorre (1995) acknowledges the importance of employee accountability and performance management systems, while Wellins and Murphy (1995) recommend creating an alliance-focused organisation, with responsibility given for significant segments of the relationship, not simple single repetitive tasks. Spencer (1995) stresses the importance of re-engineering HR at the same



time that fundamental business processes are re-engineered.

When organisations radically change orientation, individuals need to adapt not only to the organisational changes, but also to the personal transition they experience, in order to successfully reach a new equilibrium (Doherty and Horsted, 1995). In this regard, Amoudse (1993) asserts that HR's most important contribution is to supply management with a change model that describes all dimensions necessary for successful implementation. This includes motivation (the context for change); design (the content of planned changes); and change architecture (processes that build stakeholder comprehension, commitment, and capability).

In an analysis of the pitfalls of re-engineering, McElrath-Slade (1994) concludes that one challenge is to understand the effects of BPR on the various skill sets that will be required. Similarly, a comprehensive review of the role of training in BPR (Saggers, 1994) points out that re-engineered processes will require different skills and improved leadership practices if they are to succeed. The organisation will need to communicate these new expectations to employees and have a method for assessing how current and new employees measure up to the requirements of the new environment. Guilford and Hubbard (1995) investigate HRM in the mortgage banking industry and stress the importance of systematic development efforts as an integral part of re-engineering. They assert that development needs to be focused on helping employees to close gaps between their current skills and those required in the new organisation. However, Davis (1995) reports that developing employees with the right skill mix is the biggest

problem that executives face today. Many organisations fail to provide sufficient training and rewards to motivate their employees to act in the best interests of their organisations (Markus and Benajamin, 1997). Saggars (1994) points out that training has played a central role in successful re-engineering efforts across a broad spectrum of industry groups, both private and public. In a study by Dixon et al (1994), two types of training are identified: process analysis is the most common training directly applicable to the re-engineering project, followed by team effectiveness training.

The move to employee autonomy, often referred to as 'empowerment', and the formation of teams resulting from BPR efforts has been recognised by Manz (1992). Bureaucracy, as opposed to empowerment, is a constraining and control mechanism (Baxter and Lisburn, 1994). As the organisation becomes flatter and less hierarchical, it will empower employees, both as individuals and in groups, to work more independently and to assume greater responsibilities (Wind and West, 1991). Hackman and Oldham (1980) contend that this heightened responsibility is a 'critical psychological state' that translates to increased motivation and satisfaction, and work effectiveness. Increased level of team development and the organisation's learning capacity were also found in a research of employee empowerment with 231 IS professionals (Janz et al, 1997).

### **2.3.9 Team-based operations**

BPR initiatives often require the formation of team-based organisations (Hammer and Champy, 1993). The relevance of work teams to BPR lies in their

empowered, team-based nature that is consistent with guidelines suggested in the BPR literature: flatter structure, cross-functional orientation, employee autonomy, and 'coaching' management style (Hammer, 1996). The use of cross-functional teams, also referred to as self-managed teams, empowered work groups, or self-directed work teams (Orsburn et al, 1990), means that employees with different disciplines are brought together to ensure that the process is viewed and understood comprehensively (Sellers, 1997). In the BPR context, fragmented and specialised responsibilities are consolidated and handed over to individuals or small teams, who provide direct and customised outputs by monitoring and acting across traditional boundaries (e.g., case managers) (Kim, 1994).

Teamwork is the mechanism used to bring about greater involvement (Janson, 1993). Team-oriented work structures have been identified as an intervention to initiate change (Grover et al, 1995), as well as an organisational and human resource enabler for BPR efforts (Davenport, 1993). Typically teams include a flexible mix of line managers and internal experts (Dixon et al, 1994). Team members have control over the management of work methods, task scheduling, and assignment of group members to tasks (Janz et al, 1997). It is believed that this will result in increased motivation, job satisfaction, quality of work life, and enhanced job performance (Hackman and Oldham, 1980; Janz, 1995). While the formation of teams is also proposed as an approach to managing resistance to change when BPR initiatives are being implemented (Grover et al, 1995), it is important to provide assistance and adequate time for them to develop into mature, high-functioning teams (Janz et al, 1997).

### 2.3.10 Radical change for dramatic results

'Radical' denotes that re-engineering replaces rather than modifies existing work processes, and 'dramatic' quantifies the expected cost, quality, service, or speed gains from re-engineering (Bergman, 1994; Hyde, 1995). Change is often described as either incremental or radical (Kotler, 1992). Hammer (1990) argues that for too long organisations have made incremental changes, by improving what was done earlier, within the functional structure. This has resulted in organisations unable and unprepared to respond to competitive pressures (Ostroff and Smith, 1992; Janson, 1993). Radical change is to achieve major change fast (Mangurian, 1993), and is claimed to take a short period of time, such as 6 to 24 months (Tushman et al, 1986). Since re-engineering aims to achieve quantum leaps in performance (Hammer and Champy, 1993)] and dramatic business improvement [10x rather than 10% (Davenport, 1993), the 'radical' approach of re-engineering, as opposed to less radical organisational changes (Belmiro, 1997), is strongly recommended by many BPR proponents (e.g., Kaplan and Murdock, 1991; Johansson et al, 1993; Belmonte and Murray, 1993).

However, radical process initiatives involve increased potential organisational risk, albeit balanced by increased potential performance gains (Dewar and Dutton, 1986; Damanpour, 1991; Hall et al, 1993). Risk is usually accompanied with uncertainty, disruption, resistance, and similar effects of introducing discontinuous change (Hyde, 1995). Carr and Johansson (1995) reinterpret *radical change*: 'does not mean that a firm must destroy all assets in place; rather it provides a new way of leveraging a firm's core competencies and meaningful

management investments'. Besides, radical change and 'clean state design' are often constrained by the existing organisational structure (politics, culture, and control) and legacy systems (old, typically mainframe-based systems) (Stoddard et al, 1996). Hence, the re-engineering concept has evolved from a 'radical change' to more incremental process change methods (e.g. TQM) towards a broader, yet more comprehensive process management concept (Stoddard and Jarvenpaa, 1995; Davenport, 1995).

Despite this, much confusion has centred on the lack of clarity concerning what constitutes BPR as opposed to less radical organisational changes (Belmiro, 1997). The complementary, but not mutually exclusive, nature of BPR and TQM has been well documented. Both approaches share the same principles in management by process, concern for customers (Hyde, 1995; Smith et al, 1996; Cross et al, 1994), cross-functional orientation (Teng et al, 1994), and extensive use of work teams (Hyde, 1995). TQM aids firms to realise the full benefits of re-engineering by providing the tools and disciplines necessary for innovation and radical change (Cross et al, 1994; Dixon et al, 1994). The best change programmes emerge from co-operation between quality and re-engineering advocates – TQM techniques help to sustain and build on the improvements gained through successful re-engineering (Davenport, 1993; Niven, 1993; Knorr, 1991; Imai, 1986). These assertions have led Zairi and Sinclair (1995) and Chang (1994) to propose that organisations that have already implemented TQM are in a better position to undertake BPR.

## 2.4 Implementing BPR

Fuelled by the continuing demand for corporate transformation, there has been a flood of BPR consultants and a proliferation of methodologies, techniques, and tools for conducting business process change projects. Faced with this onslaught, BPR project planners are often confused as to which methods are best suited for the project at hand (Ives, 1994). Kettinger et al (1997) distinguish methodology from technique and tool. Methodology is defined as a collection of problem-solving methods governed by a set of principles and a common philosophy for solving targeted problems (Checkland, 1981), while a technique is a set of specific steps for accomplishing a desired outcome (Hackathorn and Karimi, 1988). A tool, according to Palvia and Nosek (1993), refers to instruments or certain tangible aids, such as a computer software package, to support one or more techniques. While Hewitt and Yeon (1996) suggest that BPR is a tool-based methodology, analogous to traditional 'soft operational research (OR) traditions (Galliers and Baker, 1995), Morris and Brandon (1993) emphasise a need to take a structure and uniform approach to BPR.

Although there is little agreement between the various methods in the literature (Braganza and Myers, 1996; Kettinger et al, 1997), it is argued that BPR should be managed as a project (Narasimhan and Jayaram, 1997; Coulson-Thomas, 1992; Duck, 1993; McElroy, 1996) to avoid three BPR pitfalls: lack of focus, short of management support, and discontinuous improvement (Heygate, 1993). Essentially, BPR needs to be strategically driven and supported by senior management (Talwar, 1993; Guha et al, 1993; Bruss and Roos, 1993; Manganelli

and Klein, 1994; Teng et al, 1994; Tinnila, 1995). This view of incorporating project method with corporate strategy has led many authors to propose staged framework to BPR (e.g., Hyde, 1995; Manganelli and Klein, 1994; Davenport and Short, 1990; Horney and Koonce, 1995; Lowenthal, 1994). A strategy-driven BPR methodology may include the following stages:

*Table 2.5: Staged approach to implementing BPR*

Stages	References
Develop a business vision	Davenport and Short, 1990; Manganelli and Klein, 1994; Hyde, 1995; Kaplan and Murdock, 1991; Butler Cox, 1991; Dicher et al, 1993; Tapscott and Caston, 1993; Ghani, 1996; Martinsons, 1995; Lowenthal, 1994
Map current processes	Davenport and Short, 1990; Hyde, 1995; Harrington, 1991; Butler Cox, 1991; Kaplan and Murdock, 1991, Morris and Brandon, 1993; Martinsons, 1995; Lowenthal, 1994
Select process(es) to be redesigned	Davenport and Short, 1990; Morris and Brandon, 1993; Hyde, 1995; Ghani, 1996; Lowenthal, 1994
Create a BPR plan with mission and goals	Manganelli and Klein, 1994; Martinsons, 1995; Lowenthal, 1994
Set new performance standard and target	Lowenthal, 1994
Assemble BPR team and appoint BPR champion	Harrington, 1991; Dicher et al, 1993
Identify IT levers	Davenport and Short, 1990; Harrington, 1991; Morris and Brandon, 1993; Tapscott and Caston, 1993
Redesign processes	Davenport and Short, 1990; Butler Cox, 1991; Harrington, 1991; Morris and Brandon, 1993; Tapscott and Caston, 1993; Lowenthal, 1994
Conduct a pilot	Davenport and Short, 1990; Morris and Brandon, 1993; Lowenthal, 1994
Implement the new process(es)	Kaplan and Murdock, 1991; Morris and Brandon, 1993; Hyde, 1995; Martinsons, 1995; Lowenthal, 1994
Evaluate and refine process(es)	Martinsons, 1995; Lowenthal, 1994

Belmonte and Murray (1993), however, argue against a structured approach and assert that BPR requires creativity. While no two BPR projects are exactly alike, Kettinger et al (1997) suggest that BPR project planners customise their methodology and selectively emphasise pertinent project techniques and tools. Lyons (1995) argue that it is difficult to generalise about current BPR techniques

and tools, as they represent such a wide range of functionality and cost. Many authors argue that lack of specific theories and models on BPR have resulted in borrowing existing techniques and tools (Raymond, 1994; Silvestro et al, 1992; Hayes and Wheelwright, 1979), such as operational research methods (Cypress, 1994), and industrial engineering tools (Klein, 1993) and benchmarking (Talwar, 1993; Chang, 1994; Drew, 1994). This phenomena was found by Kettinger et al (1997), indicating that consultants and vendors are using techniques developed in other problem-solving contexts and applying them to BPR.

Talwar (1993) and Guha et al (1993) propose a strategic approach to BPR with the development of a BPR strategy being the key to success, while Scott (1996) argues that project management as well as the strong commitment of senior management are the main requirements for success in re-engineering projects. From a survey conducted by Boyle (1995), the critical success factors for re-engineering also include ambitious BPR goals, process orientation and team effectiveness. A survey carried out by Braganza and Myers (1996) reveals that managers need to focus upon and manage some key issues when implementing BPR such as: changing reward systems, shifting reporting lines from a vertical to a horizontal direction, using teams, and providing people with a broader set of skills.

BPR can be measured by organisational performance and the project team's effectiveness (Dixon et al, 1994). Despite the impressive business gains claimed by anecdotal cases (e.g., Hammer and Champy, 1993; Currid, 1994; Bartram, 1994), an increasing body of literature suggests that a majority of BPR projects



fail (Champy, 1995). The failure rates cited maybe as high as 70 percent (May and Kettelhut, 1996; Galliers and Baker, 1995). The fact that BPR initiatives typically achieve much less than promised (Short and Venkatraman, 1992) has made many authors to observe and identify the success/failure factors of re-engineering (e.g., Grover et al, 1995; Boyle, 1995; Ascari et al, 1995).

Several failure factors have been identified in the literature. Poor management of organisational change is regarded as the main reason of failure (Klein, 1994; Revenaugh, 1994; Grover et al, 1995). Keidel (1994) suggests that BPR efforts do not offer positive incentives to most employees. May and Kettelhut (1996) point out the management inattention to specific human factors, such as fear of change and changed job functions. Davenport (1995) criticises the association of re-engineering with cost reduction through layoffs, while Mumford (1999) emphasises that firms that cut staff to reduce costs as a major goal of re-engineering have been less successful in increasing profits than companies that take a longer-term view on improving their business activities. Other failure factors identified include high level managerial misunderstanding (Hammer and Stanton, 1995), lack of precision surrounding the focus and methodology of BPR (Buchanan, 1997), failure of incorporating competency alignment in the process (Horney and Koonce, 1995) and lack of project management (Economist, 1994b).

The above concepts of BPR have been addressed in a broad re-engineering literature. As discussed in Chapter 1, BPR emerged in the early 1990s as a management approach to business survival in a globally competitive market deriving from three critical factors: market competition, customer demand and

technological advances. Maggina (1992) suggests that in order to survive, SMEs need to undertake new initiatives in a conscientious manner and adopt management techniques that enhance their use of resources and strengthen their business capabilities. Many have argued that what applies to large firms may be not suitable for SMEs (e.g., Pugh et al, 1968; Blau and Schoenherr, 1971). This study poses the question as to whether the general BPR guidelines are applicable to SMEs. It is considered imperative, as a starting point, to understand what differentiates SMEs and the perceived characteristics of SMEs as follows.

## **2.5 Characteristics of SMEs**

There are an enormous variety of criteria applied to the definition of SMEs. This includes size of workforce or capital, form of management or ownership, production techniques, volume of sales, client numbers, levels of energy consumption, etc. (Geraldo, 1992). In this study, small businesses are defined as having employees fewer than 50 and medium sized businesses as having over 50 and under 500 employees (Haksever, 1996). Enterprises hiring fewer than 10 employees are further categorised as 'micro enterprises (Robertson, 1996).

Although large firms have been seen as giving a firm such advantages as economies of scale, experience, brand name recognition, and market power (Hambrick et al, 1982; Woo and Cooper, 1982), SMEs have been credited with increasing flexibility in production (Fiegenbaum and Karnani, 1991) and price (MacMillan et al, 1982; Tellis, 1989) and with enhancing speed (Katz, 1970) and

risk-seeking behaviour (Hitt et al, 1991; Woo, 1987).

In small firms, the organisational structure is typically informal, but highly centralised, which provides strength in decision-making and rapid implementation of decisions (Blili & Raymond, 1993). This enables more rapid implementation of change (Hale and Cragg, 1996). It is empirically confirmed that SMEs differ from large organisations in other matters such as maturity and environmental uncertainty (Raymond, 1992). The SMEs are also characterised as having short lines of communication, and being flexible in relation to the implementation of new management philosophy and approach (Hartz, 1998). One of the competitive advantages attributed to SMEs has been their flexibility to adapt to the environment and respond to changes in technology and customer needs (Porter, 1980). This enables small businesses to adjust to changing conditions, in the face of new challenges (Peterson, 1996).

The literature on small businesses highlights the differences between them and larger firms in terms of managerial, operational and organisational competencies (Ahire, 1996). On one hand, small firms are believed to have an edge over large firms in flexibility, innovation, and overhead costs, while on the other, they are limited by lack of market power, capital, and managerial resources (Sironopolis, 1994; Sonfeld, 1984). SMEs are characterised by a myopic view of management which focuses on meeting day-to-day survival challenges, partly due to a lack of resources and partly due to the inability of the owner-manager to exhibit understanding of the strategic aspects of business (Ahire, 1996). Amba-Rao and Pendse (1985) also point out that HR practices, such as incentives, are also

ignored by small business managers. Moreover, SMEs are not often interested in long-term strategic planning because of their short-term profit focus (IPD report, 1995). This perhaps needs sufficient support in both financial and technical terms (Gunasekaran et al, 1996). Given the difference between SMEs and larger firms, a different set of considerations may be important for the development of BPR guidelines for SMEs. The following section discusses the factors relevant to BPR in the SME context in greater detail.

## **2.6 Towards A Framework of SMEs Implementing BPR**

The relevance of BPR to SMEs is not clear cut. Few overt references to BPR implementations in smaller firms exist. While larger businesses re-engineer and become flexible enough to enter smaller markets, small firms may find that their niche becomes increasingly vulnerable, and need to become equally effective (Hale and Cragg, 1996). Hammer (1990) claims that any firm can adhere to the principle of re-engineering regardless of size, and a small firm merely needs to ensure that they do not fall into the same traps as larger companies as they expand. Rather than breaking the business up into functions as it grows, Hammer and Champy (1993) recommend keeping the focus on processes and continual improvement of those processes. However, Hale and Cragg (1996) comment that their guidelines for small firms, such 'use the small size of the company as an asset; smaller organisations can change more quickly on a smaller scale', are very general and do not offer assistance to the same depth as that available to larger organisations.

Daly and McCann (1992) suggest that small and medium-sized companies can benefit from re-engineering. Barrier (1994) suggests that SMEs may not find re-engineering as far-reaching and traumatic as large firms because the bureaucracy and inefficiency is not as ingrained. While Hammer and Champy (1993) propose applying the same principles to a small business as it grows and the structure and use of IT becomes inefficient, Davidson (1993) argues that SMEs' re-engineering efforts may not be triggered by a 'crisis situation' that needs radical improvements to stay in the business as SMEs are less likely to encounter such kind of crisis. From exploratory research with three small manufacturing firms, McSwiney (1995) concludes that a BPR programme is relevant to SMEs. This study indicates that SMEs may undertake BPR in a situation where survival or growth depends on radical performance improvement or a radical change in the way business is carried out; IT is viewed as a means and not an end while non-IT related BPR solutions (e.g., resource re-allocation) may exist. Another case study by Hale and Cragg (1996) with a small firm suggests that much of what is advocated in the BPR literature may be applicable to small firms. They report several similarities, such as management support of the project, team-based operation, and cross-divisional structure, to the principles stated to be necessary for large organisations. However, these conclusions cannot be generalised to all small firms without further investigation. There is a need for further research on BPR in order to develop a customised methodology specifically for small businesses.

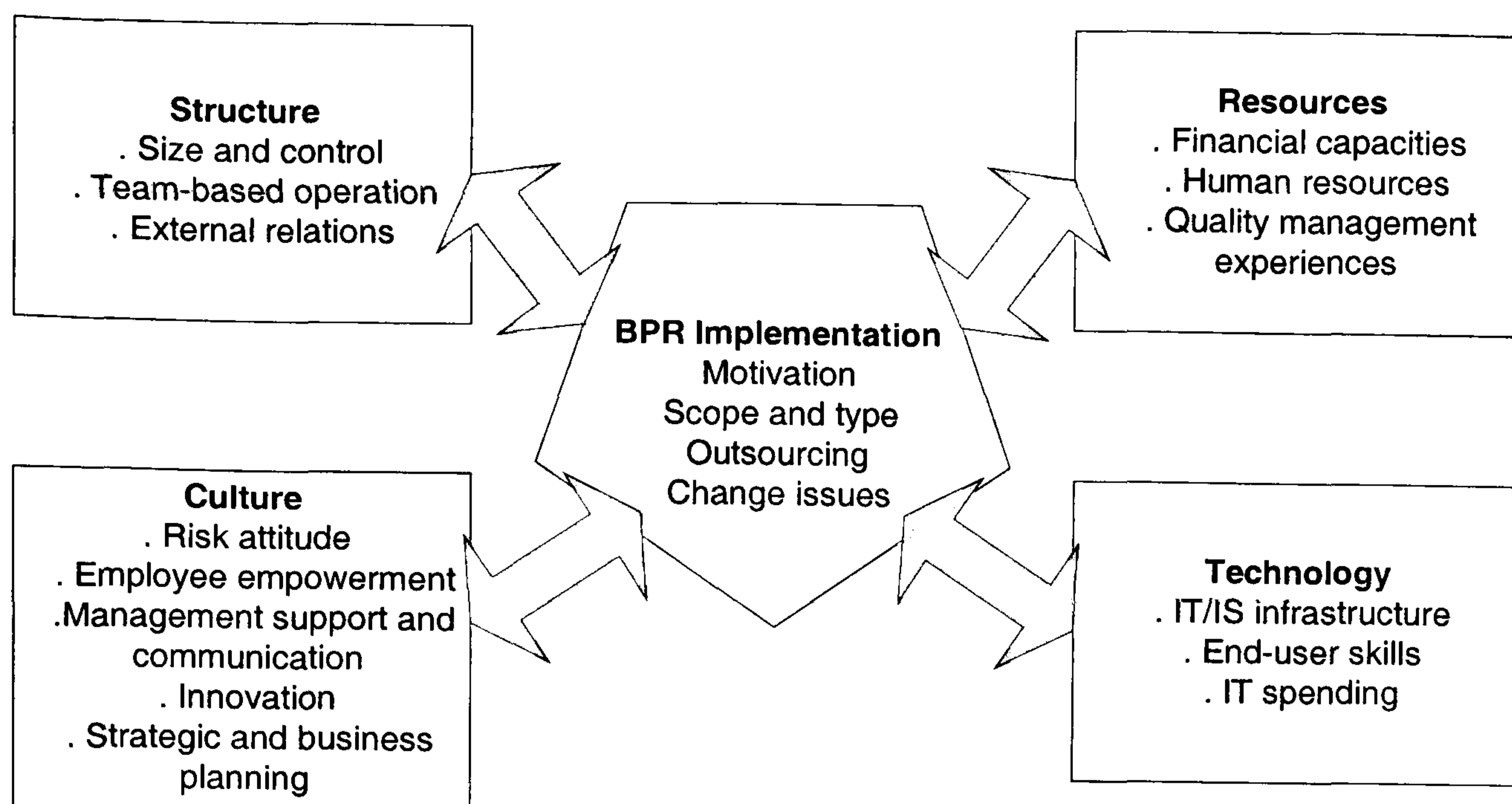
The development of a methodology for BPR has been attempted by a number of authors. For example, based upon a theoretical analysis and survey of literature

relevant to re-engineering, Kettinger and Grover (1995) outline some propositions to guide future enquiry into the phenomenon of BPR. Their propositions centre around the concepts of knowledge management, employee empowerment, adoption of new IT, and a shared vision. Earl et al (1995) have proposed a 'process alignment model' that comprises four lenses of enquiry: process, strategy, MIS, and change management and control, and used it for developing an inductive taxonomy of BPR strategies. Malhotra et al (1996) have developed the key emphasis on these issues based primarily on an integrative synthesis of the recent literature from organisation theory, organisation control, strategy, and MIS. However, there has been little empirical testing to confirm any of these approaches.

In studying the organisation as a dynamic and a human system, Leavitt et al (1973) identify four basic parts: structure, task, technology and people. They emphasise that change could take place in any part, with all the other parts capable of being modified to adjust to that change. Organisational *tasks* are business processes based on 'goals' and 'objectives', while *people* are seen as 'human resources' which shape organisational structure and culture (Leavitt et al, 1973). 'People issues' are critical in the organisational change process. Scott Morton (1991) argues that successful transformation entails investment in new skills and employee empowerment. In a comparative analysis of 16 companies, Ascari et al (1995) emphasise four elements in an organisation in regard to BPR challenges and pitfalls. The four elements are culture, structure, process, and technology. They define these four elements as follows:

- *Culture*: shared values and experiences and common goals of a group of people
- *Processes*: how and when actions are implemented
- *Structure*: who communicates with whom and how; responsibility and accountability
- *Technology*: how the organisation uses technology support itself

The current study seeks to identify SME attributes pertinent to organisational change, including size, team-based nature, and financial/human resources in establishing a new framework. Yusof and Aspinwall (2000) point out that the frameworks developed to date have largely centred on big companies. SMEs cannot simply follow a system in which ample resources are available. It is thus considered appropriate to include ‘resources’ element in the framework. Additionally, the study adopts a holistic view, proposing that BPR should be implemented as a process change project. Implementation issues, such as motivation, scope, and change management should also be taken into consideration. Modifying the work of Ascari et al results in a framework of four classifications, *structure, resources, culture, and technology* plus *implementation issues*; these are discussed below (*Figure 2.3*).



*Figure 2.3: A framework of implementing BPR in SMEs*

### **2.6.1 Structure**

Structure is the design of organisation through which the enterprise is administered (Chandler, 1962). Structure defines lines of communication and the degree of individual or collective responsibility and accountability (Ascari et al, 1995). As BPR emphasises cross-functional orientation (Hammer, 1990; Harrington, 1991; Davenport, 1993), there is a tendency to move toward flatter organisations with a larger span of control (Sia and Neo, 1996). Also, as BPR adopts a broad perspective on cross-organisational processes along the value chain (Boyle, 1995; Rockart, 1988; Johansson et al, 1993), it results in changes which span organisational boundaries (Sia and Neo, 1996). Thus, BPR must satisfy both internal (co-workers or suppliers) and external customers (Tersine et al, 1997; Earl, 1994).



### *2.6.1.1 Size and control*

As Conti and Warner (1996) indicate, firms that can be successfully organised on process lines will inevitably be small. Compared to large firms, the management structures of small firms are flatter and middle management plays a minimal role. Thus, they do not suffer from bureaucracy and cumbersome organisational systems (Lefebvre and Lefebvre, 1992). Stanworth and Gray (1991) believe that informal controls can be more effective than formal controls under which the individual can escape attention when they are only one of a large number. SMEs are generally considered to be flexible and adaptive (Storey, 1995). While flexibility offers the ability to respond quickly to forced change (Avison et al, 1995), SMEs may be easier entities in which to implement BPR.

However, Stanworth and Curran (1973) indicate that one of the problems for small businesses is that the owner-managers may be reluctant to relinquish control to new managers and even if they are appointed there may be friction. Gray (1993) notes that if the main enjoyment of business proprietors lies in organising other people or starting new projects, they are likely to grow up to but not beyond the point the business demands more professional, as opposed to personal, management systems. The literature reveals that most entrepreneurs seek and experience personal autonomy, a sense of achievement and enhanced job satisfaction from proprietorship, above the commercial imperatives (McClelland, 1961; Brockhaus, 1980; Chell, 1986).

### *2.6.1.2 Team-based orientation*

BPR initiatives often require the formation of cross-functional teams with various disciplines working together to ensure that the redesigned processes are viewed and understood comprehensively (Hammer and Champy, 1993; Sellers, 1997). Glazer et al (1992) emphasise that processes require integration, interactions, understanding others' functional perspectives, and recognition of integration mechanisms. Team-based operation enables organisations to share and build on individual knowledge to discover, develop, and implement new ways of doing business (Brien and Buono, 1996). SMEs encourage team and cross-functional orientations - it is suggested that every small business starts as an empowered team (Kinni, 1995). The lack of bureaucracy enables efficient and informal internal communications. As Kinni (1995) reports, smaller companies often form re-engineering teams comprised mainly of front-line supervisors and workers. The advantages of such a strategy are twofold: first, it allows smaller firms to maximise limited human resources, and second, including people from every level builds involvement and empowerment.

However, although there appears to be a high degree of agreement among business owners and managers that empowering teams is desirable, a great amount of confusion about what actions must be taken to effectively implement such empowerment. Again, Meuse and Bergmann (1996) argue that small-business owners and managers must learn to relinquish their need for control over the work environment. This requires confidence, trust, and security by both managers and employees. Frohman (1996) also emphasises that if a business owner's

current philosophy is one of tight hierarchical controls, the implementation of the team concept will be extremely difficult. The owner will have to take a more active and visible role to overcome the fears and concerns that employees have about moving toward team-based management.

### *2.6.1.3 External relations*

BPR is undertaken to satisfy both internal and external customers and suppliers (Tersine et al, 1997; Earl, 1994). SMEs are considered adaptable, able to respond readily to changing customers' needs (Hartz, 1998; Porter, 1980). Due to fewer management layers, small businesses tend to be closer to their customers (Brady and Voss, 1995), and they have the ability to react quickly to keep abreast of fast-changing market requirements (Goss, 1991). However, there is considerable dependency upon maintaining the contracts with large corporations. Poon (1996) indicates that maintaining a good reputation in terms of low-cost and flexible production for SMEs is crucial to secure a more steady flow of orders in the future. As a result, SMEs have little power to influence market price and are unable to erect barriers to entry to the industry. Their positioning in niche markets is often based on a small number of customers (Hendry et al, 1991).

Recent research indicates that collaboration among SMEs, such as partnerships, co-operation, and cross-border alliances, is an emerging approach to industrial competitiveness (Rosenfeld 1996; Bonk, 1996; Donckets and Lambrecht, 1997). This is based upon a belief that the fragility which accompanies small size can be

offset by the supportive environment provided by resilient networks (Szarka, 1990). Strategic alliances encourage product innovation, expanding product portfolios, and forging new kinds of supplier relationships (Maynard, 1996). Donckels and Lambrecht (1997) identify several variables in small business networking including external consultants, attendance of seminars, participation in trade fairs, and discussion of important business decisions with relatives. Relatives often serve as a solid base of support for those starting a business (Bragard et al, 1987). Social ties are one of the factors that explain the SME network structure (Mitchell, 1973; Holt, 1987; Baker, 1990). It is also evident that owner/managers of small businesses acquire information from the environment and somehow turn into that information into business opportunities (Bollinger, 1984; Welsh and White, 1981). A survey of 132 small organisations reveals spending almost one third of their information-seeking time looking for market-based information, i.e. sales data and customer problems (Johnson and Kuehn, 1987). However, Dyer (1996) contends that scarce entrepreneurial resources may restrict the range of activities that are practical in the small business context.

### **2.6.2 Culture**

Empirical research suggests that organisational culture has a significant effect on business performance and employee satisfaction (Pritchard and Karasick, 1973). Sisaye and Bondnar (1996) emphasise that behavioural and cultural change is necessary for effective organisational change. Stewart (1993) notes that re-engineering, in the end, is to change the way people work, while Coleman (1997)

points out that many re-engineering processes fail not due to technology but cultural difficulties. That is, an organisation can be limited to the extent that it is 'culturally ready' for fundamental rethinking and radical change (Kettinger and Grover, 1995).

Organisational culture embodies the deeply held, shared beliefs of an organisation (Schein, 1985). It is an organisation's value system in terms of risk taking, reward systems (Litwin and Stringer, 1968), or 'the way of doing things' (Walt, 1993). Culture represents the current state that must be 'unfrozen' before transformation can occur (Freed, 1996). The transformation in the context of BPR is referred to as the move from a traditional command and control mentality to a style that features leadership, teamwork, and empowerment (Tersine et al, 1997). Kettinger and Grover (1995) have posited that an organisation's culture influences its ability to learn, share information, and make decisions. Therefore, Covey (1996) proposes creating a culture by promoting learning and innovation and involving senior executives in order to prevent cynicism created from re-engineering efforts.

#### *2.6.2.1 Risk attitude*

Janz et al (1997) define risk attitude as 'the orientation of the organisation toward undertaking potentially innovative initiatives with uncertain outcomes'. The radical approach to re-engineering, as opposed to incremental organisational changes, involves increased risk (Belmiro, 1997; Kaplan and Murdock, 1991; Hall et al, 1993). SMEs, as Storey and Cressy (1995) argue, tend to be more

conservative than larger firms in their strategies and tend to change incrementally. While Hyvarinen (1990) indicates that most SMEs are willing to take risks and have the capability to enter small, new or risky markets, the attitude to radical change, however, is related to the owner-managers' personality and the organisational climate. According to Hirschfield (1994), when small firms are at start-up or rapid growth, it is more likely that a radical re-engineering approach will be adopted as the strategy. On the other hand, when owner-managers adopt a highly centralising, autocratic stance, it will be difficult to produce a conducive environment in which to re-engineer.

#### *2.6.2.2 Employee empowerment*

Simplifying work processes calls for a substantial reduction of behavioural observability (Sia and Neo, 1997). Empowerment is the authority to personally take control and make decisions (Hodgetts et al, 1999). Employee empowerment facilitates a culture that marshals creative energies for problem-solving and process improvements (Spector, 1995). As Flynn (1992) emphasises, 're-engineering from a social perspective involves changes to jobs and the social structure in order to increase motivation, to reduce stress and to improve performance by empowerment'. This enhances internal problem-solving and provides an ability to reorganise rapidly to adapt to changes in the environment (Goss, 1991). Such environment is considered more 'organic', allowing rapid exchanges of innovative ideas (Miller and Rice, 1967).

Small businesses, with their limited resources, need the full participation of every

employee in order to successfully compete (Kinni, 1994). In SMEs, employees perform a larger variety of tasks than in large ones; this promotes empowerment and a better understanding of the work process (Nathan, 1993). The smaller management hierarchy at many small companies often allows employees to make decisions for themselves (Brady, 1995). Hodgetts et al (1999) identify the approach to empowerment in SMEs, focusing on getting employees involved, communicating management's goals and focal points, and providing the resources to get the job done properly. While Nelson (1994) proposes empowering employees through a delegation process, Kinni (1994) emphasises that interpersonal, decision-making, and problem-solving skills rank high among the skill sets that empowerment thrives on.

#### *2.6.2.3 Management support and communication*

Given that redesigned processes usually span across different functional areas, a top-down approach to BPR is advocated by many authors (Hammer and Champy, 1993; Moss, 1993; Drucker, 1996). Strong leadership from the top, as Janson (1993) proposes, helps to overcome the resistance provoked from radically new behaviour. However, managers need to provide adequate support and show their commitment to BPR initiatives (Hammer, 1990; Harrison, 1994).

Scott and Bruce (1987) argue that the small business goes through a number of different stages of growth from inception to maturity. The role of small business management may change accordingly. For instance, Churchill and Lewis (1983) suggest that on the growth and expansion stages the top management roles should

be delegation, co-ordination and decentralisation. However, as Ghosh and Chan (1994) indicate, decision-making in SMEs is dominated by the CEO which may hinder top-down communication, while making it easier to implement forced change.

#### *2.6.2.4 Innovation*

BPR is viewed by Davenport and Short (1990) as synonymous with process innovation, which encompasses 'the radical improvement of business process performance through the use of innovative tools and work designs' (Davenport, 1993). Organisational size has been proposed as a variable to innovation (Acs and Audretsch, 1988; Hitt et al, 1990). Innovation is fostered in decentralised, highly integrated, informal organisations, such as SMEs (Teng et al, 1994; Wind and West, 1991). And the notion that there exists a powerful set of links between innovativeness, creativity and enterprise has long built into thinking and policy formulation about SMEs (Cannon, 1985). While SMEs face the same need for innovation if they are to remain competitive (Carrier, 1996), Miller and Rice, (1967) emphasise the need for an open, organic organisational structure if innovation is to emerge. This requires easy access to decision makers, willingness on their part to seriously consider ideas, lines of communications which are task rather structure determined and willingness to take tasks.

Innovation is especially related to IT use (Clark and Stoddard, 1996; Coulson-Thomas, 1994; Higgins, 1993), and small firms perceive that IT plays a significant part in their own innovation (Chen and Williams, 1993). There is a



growing literature on IS as an innovation, which enables a better understanding of small firm computing (Cooper and Zmud, 1990; MacPherson, 1992; Moore and Benbasat, 1991). For example, a study of the UK textile industry found a strong correlation between the use of IT and size, innovation, product development and R&D (Wynarckzyk et al, 1995). Lefebvre and Lefebvre (1993) point out that even without formal policies on technological innovation, SMEs implicitly emphasise efforts oriented towards the improvements or modification of the technical characteristics of a product (product innovation) or towards the adoption of a new manufacturing process or the introduction of new computer-based technologies (process innovation).

Process innovation may be hindered in SMEs due to their reduced access to technological information (OECD, 1995) and financial constraints (Nelson, 1995), although this can be overcome by using existing technologies (Thwaites and Wynarckzyk, 1993). Klepper (1995) takes a different view by noting that the main issue is not whether SMEs are more innovative than large firm, but in what conditions the promotion of innovation is desirable. For example, Schmidt (1990) argues that technological innovation is more likely to occur in SMEs managed by 'pioneering entrepreneurs'.

#### *2.6.2.5 Strategic planning*

It is recommended that BPR initiatives start from a strategic perspective (Buono, 1997; Pritsker, 1995; Stalk et al, 1992; Strisceck and Cross, 1996), and align corporate strategy with IT strategy (Teng et al, 1994) to better understand the

firm's markets and competitors (Schnitt, 1993), and reinforce a competitive system. The need for sound strategies is recognised by Carl and Zeithaml (1984), although research in this area has largely been directed toward large operations.

Many authors have suggested that formal or written business plans are not common and long-term planning is not typical in small firms (e.g., Hall, 1995; Rice, 1983). This is perhaps due to that small businesses often do not have the financial and human resources to establish and maintain a full time planning staff (Golde, 1964). In addition, SME managers-owners focus mainly on day-to-day operations with suppliers, distributors, and customers, and do not have the time to engage in systematic long-term planning (Johnson and Kuehn, 1987; Robinson, 1982). This has led many studies to propose seeking help from outside consultants (e.g., Kentzman and Samaras, 1960; Robinson, 1982) and government assistance programmes (Chrisman et al, 1985). This is especially the case for overall planning and planning in marketing (Nahavandi and Chesteen, 1988). Many of these have found to be satisfactory (Pelham, 1985) and cost effective (Chrisman et al, 1985).

However, the need for strategic planning is well acknowledged by SMEs, although more in an ad hoc fashion than in a comprehensive way (Ghosh and Chan, 1994). In a survey of 301 London-based small firms, Joyce et al (1996) report that for Strategic Planners, defined as firms with written or formal business plans of at least three years ahead, the right kind of strategic management style produce productivity growth by making technological improvements in processes. This study showed that the most strategically

managed businesses appear to be superior at process innovations which is strongly correlated with financial performance. As BPR addresses cross-functional integration which may be expanded to inter-organisational co-operation (Hammer, 1990; Davenport, 1993), the strategic issues in SMEs may range from establishing information-driven and value creating organisational units to include external changes and SME networks.

### **2.6.3 Resources**

Businesses are trying to do more with less and so they have re-engineered in order to reduce operating costs (Wetherill and Kolak, 1996). Hagel (1993) asserts that the organisation's energy needs to be harnessed and targeted if fundamental change is to lead to large-scale benefits. King (1996) also points out that BPR efforts stand a better chance of succeeding when the organisation allocates its resources in line with business objectives.

A firm's resources and capabilities include all of the financial, physical, human, and organisational assets used by a firm to develop, manufacture, and deliver products or services to its customers (Barney, 1995). In SMEs, an independent entrepreneur leverages individual human and social resources to acquire and build organisational, physical, and financial resources (Greene et al, 1999). Physical resources are tangible goods needed to operate the business including raw materials, plant, property and equipment (Dollinger, 1995). In the context of BPR, related to physical resources are IT facilities and this will be discussed within the technology dimension. Social capital refers to resources flowing

through a relationship network, such as family and personally developed network (Greene and Brown, 1997; Bourdieu, 1983; Coleman, 1988), which is embedded in the external relationship issue. The resources focus on two factors: human and financial resources. Organisational capital can be interpreted by organisational information and knowledge (Tomer, 1987). As many argue that TQM-oriented firms are in a better position to apply BPR (Sheridan, 1991; Sinclair, 1994; Zairi and Sinclair, 1995) and SMEs do implement TQM (Shea and Gobeli, 1995), it is considered necessary to include past quality management experiences in the resources dimension.

#### *2.6.3.1 Financial capacities*

Financial resources are primarily money, assets, and stocks (Dollinger, 1995; Grant, 1991). BPR may involve the organisation in several large and expensive programmes, such as skills and training development (Hall et al, 1993). Binks et al (1996) argue that 'Restricted access to finance is potentially a significant constraint on the growth of small businesses'. Weinrauch et al (1991) argue that small businesses often operate on a financial razor's edge, and a minor miscalculation in revenues or expenses could be fatal. As a result, small business owners should seek creative, low-cost ways to market their products and services, to identify the problems caused by limited financial resources, and to seek help dealing with such problems. Haksever (1996) clearly indicates that two of the most serious problems SMEs face when trying to implement quality management are the owner-manager's lack of business experience and knowledge, and a shortage of financial and human resources. Thus, while survival is the first

concern of SMEs, financial insufficiency or constraints may significantly inhibit SMEs from undertaking BPR.

### *2.6.3.2 Human resources*

Human resources include all the experience, knowledge, judgement, and wisdom of individuals associated with a firm (Barney, 1995). While the process focus dominates total quality re-engineering, a growing number of organisations see competence as the key to enduring performance and to making human resources most effective (Kochanski and Ruse, 1996). However, human resources in SMEs are limited. As Nash and Rock (1996) report, almost 60% of owner-managed businesses fail due to the owner's lack of appropriate management experience. Watkins (1983) found that small business owners do not see the need to implement even the most basic management practices. In many cases, the owner of a small business handles all personnel duties since the firm employs only a few people (Hornsby and Kuratko, 1990; Little, 1986). However, owners of small firms are caught up in day-to-day operations and lack perspective on the kinds of problems that can threaten the business (Woods, 1996). This is reflected in one study of personnel functions in smaller firms that the areas of accounting, finance, production, and marketing usually take precedence over human resource management (McEvoy, 1984).

Additionally, Worsham et al (1997) indicate that finding the right workers for SMEs - with proper knowledge, skills, experience, attitude, and work habits - can be extremely difficult. Ferrell (1996) notes that SMEs are at a greater

disadvantage than larger firms because they typically have fewer in-house technical experts to deal with new developments. This is in part due to the lack of sophisticated management support in SMEs that knowledge workers often find in larger organisations (Mackinnon, 1996). This phenomenon is further augmented by the fact that SMEs are particularly reluctant to train (Vickerstaff et al, 1991). Finegold and Soskice (1988) note that SME managers tend to regard training as an operating expense rather than an investment. Thus, owners of SMEs face a challenge in attracting and retaining talented employees.

#### *2.6.3.3 Quality management experiences*

SMEs are often suppliers to larger organisations and poor product quality adversely affects the competitive ability of their customers. Although most SMEs produce a service or product that could be competitive in international markets, knowledge about productivity and quality improvements in SMEs is relatively limited, and SMEs often consider quality as synonymous with costs (Gunasekaran et al, 1996).

As a radical approach to organisational change, BPR complements incremental improvement programmes (Martinsons, 1995). Yeo (1996) suggests that TQM and BPR do exist simultaneously within organisations and alternate with continuous improvements taking place between radical changes. BPR essentially extends the TQM concept of continuous/incremental improvement to drastic, IT-based, rapid improvement (Sharad, 1996). Sheridan (1991) emphasises that TQM-oriented organisations are in a good position to apply BPR techniques.

This is due to their greater use of strategic and process management techniques (Sinclair, 1994; Zairi and Sinclair, 1995).

A survey by Shea and Gobeli (1995) highlights that SMEs adopt TQM for different reasons such as promoting growth, changing customer expectations, or improving firm performance, and TQM principles and tools can be applied to improve small businesses. Indeed, managers and employees of SMEs usually have frequent and face-to-face contact with customers. This gives the firm a better chance to discover what the customer wants (Haksever, 1996). Commonly, small businesses face the issue of ISO 9000 implementation because of a customer demand and their willingness to show commitment to quality in order to regain competitiveness and expand the business internationally (Karapetrovic et al, 1997).

#### **2.6.4 Technology**

Many authors have argued that BPR is driven by IT, with the role of IT changing from producing data to integrating processes within functions (e.g., Hammer, 1990; Ribbler, 1996; Gant, 1992; Venkatraman, 1994). Successful companies build flexible organisational structures, often aided by innovative use of IT, to co-ordinate design, production, marketing, and distribution, linking workers, management, suppliers, and customers (Maital, 1994). For instance, workflow software dramatically reduces the time and expense involved in re-engineering a process (Lefebvre, 1996).

Busch et al (1991) argue that internal factors have a greater influence than external factors on the progressive use of IS in SMEs. Cragg and King (1993) document the factors influencing the evolution and sophistication of IS in small firms. Important motivators adopting modern IT include enthusiasm from the owner, as well as perceived benefits to individuals and the organisation. However, the identified inhibitors, such as low end-user literacy and skills, lack of funds, and technical complexity may increase the difficulties for SMEs initiating BPR.

#### *2.6.4.1 IT/IS infrastructure*

IT infrastructure is the foundation of IT capability, in the form of reliable services, shared throughout the firm, and has usually been provided by the IS function. It includes networks, management and provision of large scale computing, management of shared customer databases, and R&D aimed at identifying emerging technologies (Davenport et al, 1989). While competitive pressures and globalisation have provided an impetus for process innovation, particular attention is paid to the role of technology management as a success factor in technological innovation by SMEs (Cortese, 1996). According to Grover et al (1993), IT infrastructure can be a significant barrier or enabler of the practical options available to planning and changing processes for BPR.

Many researchers have suggested an increased use and ownership of IT in SMEs in the 1990s (e.g., Burns and Hatter, 1992), although many firms are still using the computers acquired in the early 1980s (Cragg and Zinatelli, 1995). Studies



indicate that computers are used by SMEs mainly for operational or administrative tasks, rather than for 'strategic' decision-making applications such as financial statements, sales analysis, and forecasting (Malone, 1985; Lincoln and Warberg, 1987; Khan and Khan, 1992; Raymond, 1987a). Customers' demand for quality is another reason for SMEs to adopt modern IT (Rishel and Burns, 1997), while to a large extent process innovations are connected to product innovations (Schmidt, 1990). Igarria et al (1997) note that computing in SMEs is often a matter of personal choice. The acceptance (Drucker, 1987) and perceived benefits (Henson, 1995) of computers by the owner-manager or CEO have been established to be critical to IT success in SMEs. Top management accordingly, as Yap et al (1992) argue, need to demonstrate commitment and full support while new technology is being introduced.

The distinctive and unique computing needs, as well as different technology acceptance patterns in SMEs (Cragg and King, 1993; Massey, 1986; Rogers, 1995) have encouraged researchers to investigate the relationship between organisational size and computer success characteristics (DeLone, 1988; Raymond, 1990). A study by Weeks (1996) highlights several key areas that technology helps SMEs to be competitive: responding to customers, improving quality, becoming more flexible and innovative, and speeding up production. Lefebvre et al (1992) evaluated 526 Canadian SMEs and found that the more technologically sophisticated firms tend to hold stronger competitive positions. Indeed, Gates et al (1996) indicate that SMEs may have taken better advantage of the opportunities IT created than larger business. It is argued that SMEs usually have low IT utilisation due to lack of several factors such as qualified personnel

(Eid and Moghrabi, 1995; Naylor and Williams, 1994), managerial abilities (OECD, 1995), formalisation of IT strategy (Ghosh and Chan, 1994; Naylor and Williams, 1994), and the awareness of recognising new technologies as a source of competitive advantage (OECD, 1995; Friedman, 1996).

#### *2.6.4.2 End-user skills and IT expertise*

Many BPR efforts use computing and telecommunication technologies which are new to the organisation, such as knowledge-based systems, imaging, wide-area networks and groupware (Martinsons, 1995). Correspondingly, the role of IS has evolved to include managing complex BPR projects, identifying and maintaining a technological vision in support of BPR, developing process-oriented IS, and managing on-going changes in processes (Khalil, 1997).

Kaplan (1996) also points out that the majority of SMEs adopt technology without acquiring IS skills, while DeLone (1988) comments that a lack of knowledge about the possibilities, limits, and requirements of business computing can cause SMEs to depend too much on vendors, misunderstand their own information requirements, or under-use or mismanage their information resources. Little internal support for personal computing is available to users in small firms (Zinatelli et al, 1996). Raymond (1988) in this regard proposes formal computer training, either through education or on-the-job training.

The lack of both human and financial resources in SMEs (Nooteboom, 1988; Soh et al, 1992) has also caused several authors to propose that the availability and

quality of external support could be considered as an alternative approach to in-house development (e.g., Raymond, 1990; Cragg and Zinatelli, 1995). It is suggested that external support, primarily involving consultants and vendors, has a positive influence on IS success in small firms (DeLone, 1988; Gable, 1991; Lees, 1987; Raymond, 1987).

#### *2.6.4.3 IT spending*

Re-engineering may involve expensive programmes such as skills training (Childe et al, 1994). Barua et al (1996) report that advances in new IT and changes in the business environment such as globalisation and competitive pressure have prompted organisations to embark on re-engineering projects involving significant investments in IT and business process redesign.

The nature and extent of IT investment for different management objectives is partly determined by the firm's strategic context (Earl 1989; Henderson and Venkatraman 1993). The business value that firms expect to derive from their IT infrastructure investment depends on their view of the role of IT infrastructure (Venkatraman, 1991). However, senior management in SMEs, inhibited by the long payback periods involved, may be reluctant to proceed (Childe et al, 1994).

#### **2.6.5 Implementation Issues**

It is suggested that BPR should be managed as a project (Narasimhan and Jayaram, 1997; Coulson-Thomas, 1992; Duck, 1993; McElroy, 1996) in order to

increase the chance of success. The assertion of incorporating project method with corporate strategy (Hyde, 1995; Manganelli and Klein, 1994; Lowenthal, 1994) should also apply to avoid three BPR pitfalls: lack of focus, short of management support, and discontinuous improvement (Heygate, 1993). It is proposed that the issues of implementing BPR as to the motivation, scope and type, outsourcing and external support, and change management are particularly pertinent to SMEs.

#### *2.6.5.1 Motivation to re-engineer*

The motivations and purposes for SMEs to re-engineer may be different from those for larger firms. Kinni (1995) argues that in SMEs re-engineering is often a response to positive trends - they tend to re-engineer from a position of strength. This is partly due to that SMEs are already short of the time and resources needed to re-engineer and it is unlikely that a small firm that is faltering can muster the required energy. Perry (1986) indicates that most small firms grow fastest from start-up until a 'comfort' stage is reached. From an organisational life cycle perspective, firms pursuing a growth strategy tend to re-engineer in order to enhance their external flexibility, i.e. relations with customers and suppliers, and internal efficiency, i.e. quality and production (Dodge and Robbins, 1992).

#### *2.6.5.2 Scope and type of BPR*

Levene and Braganza (1996) classify BPR initiatives by two dimensions: scope and scale. *Scope* includes the number of functions integrated to form the process

(Rockart and Short, 1989). *Scale* is the extent of change in terms of how radical the BPR project (Hagel, 1993). Davenport and Short (1990) identify types of processes as inter-personal, inter-functional, and inter-organisational. Broadbent et al (1994) contrast approaches to process redesign as simplification and innovation. Based upon the work of Venkatraman (1994), Childe et al (1994) depict a spectrum of process improvement activities, from personal/group improvement, quality improvement teams, process simplification, process re-engineering, business integration, to business re-engineering. While Craig and Yetton (1992) argue that process simplification offers firms the potential to capture some performance advantages and to minimise risk factors, higher levels of BPR, such as business integration, involve organisational and job redesign and new developments in IT, which are viewed as more strategic and radical with the potential for substantial gains. Thus, BPR in SMEs would be less risk-taking while focusing mainly on operational processes.

#### *2.6.5.3 Outsourcing and external support*

Limited by human resources (IS professionals and BPR expertise), SMEs may leave their re-engineering projects to outsiders (Adhikari, 1996). According to Fried (1991), 'consultants can help break the company out of any ingrained thinking patterns and bring a broader view of what is going on'. Outsourcing IT has been suggested as strategic thinking (McLellan and Marcolin, 1994). The benefits of outsourcing, as Kobelius (1996) elaborates, include reducing operational costs, giving access to technical expertise and keeping pace with rapid technological change, and freeing up internal resources to refocus on core

competencies.

In a survey of 126 small businesses indicates that overall business manager-owners are highly satisfied with the consulting services they receive and that they found them useful (Nahavandi and Chesteen, 1988). Contrary to this study, Aronoff and Ward (1996) found that most SMEs believe that professional advisors should be used only as a last resort. Risks, as McLellan and Marcolin (1994) point out, include stripping technology skill, loss of strategic control, technological obsolescence, and limiting of long-term flexibility. King (1996) adds that while firms are often highly secretive about re-engineering expenses, bills for consultants and internal costs can be extremely high.

#### *2.6.5.4 Change issues*

BPR, according to Hyde (1995), will impact many areas, such as converting old policies to new, realigning organisational structures, reconfiguring IT, and reaffirming customer interfaces and requirements. CSC Index suggest 75% of all BPR projects fall short of expectations because firms fail to manage resistance, scepticism, and job losses resulted from re-engineering efforts (Romney, 1994). Change issues in the context of BPR have been centred on the employees in the organisation, including resistance to change (e.g., Markus, 1983; Eason, 1990; Wastell, 1993), greater responsibilities (Jick, 1993), job losses (Klimas, 1997; Springsteel, 1997), and work overload (Witherill and Kolak, 1996).

Training is proposed as the best way to overcome resistance and for small firms

to grow successfully (Stanworth et al, 1992). For example, while introduction of new information systems, education and training appear to promote positive attitudes and use more effectively than does organisational experience with computers (Raymond, 1988; Trice and Treacy, 1996). A wide range of skill training leads to greater job challenge and motivation (Baxton and Lisburn, 1994). However, SMEs are particularly reluctant to train (Vickerstaff et al, 1991). Management tends to regard training as an operating expense rather than an investment (Finegold and Soskice, 1988).

Evaluation and reward structures may also need to be modified (Martinsons, 1995; Quinn, 1992). Commonly used techniques include monetary incentives, project bonuses, etc. (Cross et al, 1994; Mills and Mabey, 1993). However, Joyce et al (1996) point out that both lack of capital and managerial skills have constituted important impediments to change for the small firms in this regard. Informing and involving employees in both the design and execution of the change (Reger et al, 1994; Juran, 1964; Peter and Waterman, 1982; Maira; 1994) is perhaps more feasible in SMEs.

## **2.7 Conclusions**

There is a notable absence of research which evaluates BPR in SMEs. This may be because, as MacIntosh and Francis (1995) report, 'Smaller enterprises are less likely publicly to report their BPR efforts. More significantly however, it may be that BPR is not as relevant to them'. However, it is argued that SMEs can benefit from re-engineering and are considered more receptive to implement BPR

(Champy and Hammer, 1994; Manganelli and Raspa, 1995). This chapter has outlined the major components of business re-engineering and highlighted the issues pertinent to SMEs. Factors that facilitate or inhibit BPR success in SMEs are identified. These factors are summarised in Table 2.6.

*Table 2.6: Factors to enable/facilitate or inhibit business process re-engineering in SMEs*

<b>Classification</b>	<b>Organisational variables/BPR activities</b>	<b>Enabler/ Facilitator</b>	<b>Inhibitor</b>	<b>Indeterminate Effect</b>
<i>Structure</i>	Size and centralisation	√		
	Team-based operations	√		
	External relationships		√	
<i>Resources</i>	Financial capacity		√	
	Human resource		√	
	Research & development			√
	Previous quality management	√		
<i>Culture</i>	Risk-taking attitude		√	
	Employee empowerment	√		
	Strategic and business planning		√	
	Management support and communication			√
	Innovation	√		
<i>Technology</i>	IT/IS infrastructure		√	
	IT/IS investment		√	
	IT/IS expertise and end-user skills			√

It is suggested that SMEs may undertake BPR, but with a different background to larger firms, will employ different methods. The aim of this research is to present a holistic view of BPR facilitators and inhibitors in SMEs and to overcome the partial aspects of much past research. Most small enterprises, by definition, do not have the resources or the people to create rigid, hierarchical enterprises based around distinct functions; they tend to exhibit more informal communications and a less bureaucratic modes of operation. Simplicity and flexibility of organisational structure are of great value to SMEs undertaking BPR. SMEs' team-based nature, easier communication, and sound relations with



customers and suppliers may increase their chance of success in BPR. Like their larger counterparts, SMEs are in a better position to carry out BPR projects with top management support, previous quality management experiences, and empowered employees. However, a lack of in-house IT/BPR professionals and expertise, and strategic thinking, as well as financial constraints may inhibit BPR performance in SMEs. These will be developed in the form of propositions in the next chapter for further testing.

## **Chapter 3 Research Objective**

### **3.0 Introduction**

Chapter 2 concluded that a more integrated view of SMEs implementing BPR is necessary and showed that SMEs might benefit from BPR in different way due to their attributes in terms of size, structure, resources and IT infrastructure. While fewer academic efforts have so far placed emphasis on SMEs for their process improvements, the current research is an attempt to explore the links between SMEs and BPR. For the purpose of this study, a set of proposals in relation to SMEs implementing BPR is established in order to test the extent to which BPR is applicable to SMEs and to determine the appropriate basis for the development of BPR guidelines for SMEs.

### **3.1 The Research Questions**

The purpose of this study is to investigate whether a relationship exists between BPR and SMEs by exploring the factors that may benefit/inhibit SMEs while undertaking BPR. Whilst it is based upon previous studies – mostly conducted within larger companies, this study explores the feasibility of undertaking BPR in SMEs. The overall research objective of this study can be stated as:

*to examine the extent to which BPR is applicable to SMEs and to determine an appropriate basis for the development of BPR guidelines for SMEs*

Specifically, this research seeks to answer the following questions:

- Do SMEs undertake BPR? Why and when do they undertake re-engineering initiatives?
- Can SMEs, as their large counterparts, benefit from process redesign and achieve better performance in cost reduction, shorter cycle time, higher product quality, and customer satisfaction?
- Do SMEs have more flexibility, in terms of organisational culture, IT-use, management structure, market response, and cross-functional orientation, to carry out re-engineering projects; or do their limited financial and technological resources *inhibit* BPR outcomes?

### **3.2 The Research Propositions**

Derived from the research objective and research questions, the current research addresses the issues on why, when, and how SMEs may initiate their BPR projects. Chapter 2 offers an integrated perspective on BPR and suggests that for SMEs to succeed in their re-engineering efforts and gain expected results, some organisational factors should be investigated. The study is exploratory in nature as it deals with an issue that has to date received little specific attention in the literature. In keeping with Marshall and Rossman (1989) who address that ‘the purpose of exploratory research is to investigate little understood phenomena and

identify or discover important variables to generate hypotheses for further research', 'propositions' rather than 'hypotheses' are thus considered more appropriate. Based upon the framework established for SMEs implementing BPR, this mapping study seeks to answer the issues identified and the propositions are thus constructed under the four dimensions: culture, structure, resources, technology together with implementing issues discussed in Chapter 2. The propositions developed here allow operationalisation of the issues identified and empirical testing. Once validated and further refined the framework will form the basis of BPR guidelines for SMEs that will assist SMEs contemplating undertaking BPR.

### **3.2.1 Structure**

The structure dimension is concerned with firm size, management control, team-based orientation and external relations. Future organisations, as Ascari et al (1995) emphasise, will inevitably be small with flatter structure and shorter lines of communication. While BPR addresses a cross-functional perspective (Hammer, 1990; Harrington, 1991; Davenport, 1993), process re-engineering will favour SMEs since they are usually perceived as flatter organisations with informal controls (Lefebvre and Lefebvre, 1992; Stanworth and Gray, 1991). This gives the smaller firms flexibility to respond quickly to radical change such as BPR (Avison et al, 1995). The lack of formal management controls allows SMEs to operate in the form of an empowered team (Kinni, 1995). It is thus proposed in the study that team-based management in many SMEs enables an easier path to business process integration, although this may depend on the

owner's management skills and willingness to relinquish power. As BPR deals with internal and external customers (Tersine et al, 1997; Earl, 1994), external relations involve customers, suppliers, or the whole industry. It is argued that SMEs are closer to customers and more responsive to their needs (Hartz, 1998; Porter, 1980; Brady and Voss, 1995). The literature also suggests that collaboration among SMEs enhances competitiveness due to mutual network support (Donckels and Lambrecht, 1997; Rosenfeld, 1996). This may push SMEs to a higher level of business re-engineering that entails sophisticated inter-organisational interventions and communications. The propositions for the structure dimension can be summarised in Table 3.1.

*Table 3.1: Propositions for 'Structure' dimension*

Proposition 1	Due to their smaller firm size and simpler structure, SMEs will find it easier to implement BPR
Proposition 2	SMEs' team-based nature enhances their ability to integrate business processes
Proposition 3	As SMEs are closer to customers and suppliers, they will find it easier to build value networks on an inter-organisational basis and respond quickly to market. Hence BPR can be adopted as a growth strategy, although this also depends on the owner's management skills and firm's capabilities.

### **3.2.2 Culture**

The culture dimension deals with issues including firm's risk-taking attitude, employee empowerment, management support and communication, innovation as well as strategic management. BPR is usually distinguished as a more radical approach from incremental organisational changes which involve less risks (Kaplan and Murdock, 1991; Hall et al, 1993). Chapter 2 has argued that most

SMEs are willing to take risks, although the attitude to radical change is very much related to the owner-managers' personality and the organisational climate. Hence they might adopt a more incremental approach to BPR. Because of less management hierarchy (Brady, 1995) and limited resources (Kinni, 1994), SMEs require the full participation of every employee to assist in decision-making and problem-solving. It is thus proposed that owner-managers of small businesses need to learn to delegate power and promote top-down communication while offering adequate support in order to successfully implement BPR. SMEs are usually considered decentralised, highly integrated, informal organisations, which fosters innovation (Wind and West, 1991; Teng et al, 1994). This is, in particular, related to innovative use of IT in both production and process improvement (Hughes et al, 1992; Lefebvre and Lefebvre, 1993). However, less strategic thinking (e.g. Rice, 1983; Hall, 1995) or planning on a short-term basis (Ghosh and Chan, 1994; Joyce et al, 1996) may hinder BPR performance in SMEs. The propositions for the Culture dimension are outlined in Table 3.2.

*Table 3.2: Propositions for 'Culture' dimension*

Proposition 4	Although SMEs are willing to take risks, their business strategies tend to be more conservative and they may adopt more incremental process change.
Proposition 5	Employee empowerment will enhance BPR performance in SMEs.
Proposition 6	BPR projects in SMEs are unlikely to succeed without top management support and proper employee communication
Proposition 7	A culture of innovation will enhance SMEs' BPR efforts
Proposition 8	The absence of formal strategic planning and project management may limit BPR results

### 3.2.3 Resources

The resources dimension looks at firm's financial and human capacities as well as past quality management experiences. Restricted access to finance has been identified as a significant constraint on the growth of small businesses (Binks et al, 1996; Weinrauch et al, 1991). This can form an obstacle in undertaking BPR as re-engineering projects may involve expensive programmes such as skills training (Hall et al, 1993). Human resources are also limited in SMEs (Watkins, 1983; Little, 1986). There is an absence of sophisticated knowledge in process design and lack of in-house technical experts in SMEs (e.g. Nash and Rock, 1996; Woods, 1996). This may pose a constraint to BPR success. It is also considered crucial to include past quality management experiences (e.g. TQM) under the resources dimension, as TQM-oriented firms are believed to be in a better position to apply BPR (Sinclair, 1994; Sheridan, 1991). It is evident that SMEs do implement TQM (Shea and Gobeli, 1995; Haksever, 1996; Lin et al, 1999), which may largely increase the chance of success in BPR. The propositions for the Resources dimension are summarised in Table 3.3.

*Table 3.3: Propositions for 'Resources' dimension*

Proposition 9	Due to budget constraints, SMEs cannot undertake long-term continuous process improvement so their BPR projects will aim at short-term financial results
Proposition 10	Lack of in-house professionals and expertise in SMEs may significantly inhibit their BPR performance
Proposition 11	Success in more likely if SMEs have previous TQM experiences

### 3.2.4 Technology

The technology dimension is concerned with issues related to firm's IT/IS infrastructure, end-user skills and IT expertise as well and IT spending. It is argued that IT infrastructure can be a significant enabler or barrier for BPR (Grover et al, 1993). The literature appears to suggest that compared with bigger companies SMEs are behind in terms of adopting modern IT (Cragg and Zinatelli, 1995; Raymond, 1987; Lincoln and Warberg, 1987). Lower IT utilisation is attributed to many factors such as qualified personnel (Eid and Moghrabi, 1995; Naylor and Williams, 1994) and the absence of IT planning (Ghosh and Chan, 1994). Introducing new technologies without acquiring IS skills in SMEs may result in excessive dependence on vendors and consultants (Kaplan, 1996). Additionally, owner-managers in SMEs may be reluctant to invest in IT for BPR due to their short-term investment strategy (Childe et al, 1994). While many authors have addressed the role of IT in integrating processes within functions (e.g., Hammer, 1990; Venkatraman, 1994), insufficient IT facilities, end-user skills and IT spending may significantly inhibit BPR success in SMEs. The propositions for the Technology dimension are stated in Table 3.4.

*Table 3.4: Propositions for 'Technology' dimension*

Proposition 12	Poor IT/IS infrastructure in SMEs may inhibit BPR performance
Proposition 13	Inappropriate IT/IS expertise and insufficient end-user skills will inhibit BPR performance in SMEs
Proposition 14	The way in which SMEs invest in IT for BPR depends largely on their current strategies



### **3.2.5 Implementation**

The implementation issues include motivation to re-engineer, scope and type of BPR, outsourcing and external support, as well as change issues. It is argued that in a smaller enterprise, re-engineering is often a response to positive trends – SMEs tend to re-engineer from a position of strength (Kinni, 1995). Perry (1986), on the other hand, contends that firms pursuing a growth strategy may re-engineer in order to ‘enhance’ quality and production. Chapter 2 elaborated processes sub-divided into three areas: managerial, operational, and supporting (CIM-OSA Standards Committee, 1989). Many authors have tried to identify types of BPR (e.g. Craig and Yetton, 1992; Levene and Braganza, 1996; Venkatraman, 1994). For example, Childe et al (1994) propose a process improvement spectrum, ranging from process simplification to business re-engineering. It is argued in this study that SMEs may focus mainly on operational processes and target smaller scope and scale of business processes to re-engineer in order to minimise risks. Due to limited human resources, SMEs may outsource their re-engineering projects (Adhikari, 1996). While outsourcing may be considered cost-effective (Kobelius, 1996; Nahavandi and Chesteen, 1988), problems associated with outsourcing, such as loss of strategic control and technological obsolescence (McLellan and Marcolin, 1994) cannot be neglected. As for change issues, the literature suggests the focus should be on the approaches to overcoming resistance from within the organisation (e.g. Romney, 1994; Eason, 1990; Wastell, 1993). This may include training (Raymond, 1988) and modifying reward system (Quinn, 1992; Mills and Mabey, 1993). Due to their shorter communication lines and simpler structure, SMEs may be easier to

tackle these issues. The propositions for the implementation dimension are outlined in Table 3.5.

*Table 3.5: Propositions for ‘Implementation’ issues*

Proposition 15	SMEs may re-engineer from a positive of strength, although this depends on the current business strategies
Proposition 16	BPR projects in SMEs will focus on individual/group improvement and process simplification, as SMEs policies are more conservative and owners try to avoid risks. However, as SMEs grow, they will face competition which requires radical restructuring and strategic planning to change effectively
Proposition 17	Due to a lack of IT/IS and BPR expertise SMEs will rely heavily on external consultants
Proposition 18	The informal management structure and short lines of communication in SMEs will result in less resistance to change, while lack of capital and managerial skills may constitute impediments to change.

### **3.3 Overview of the Research Objective**

This chapter has outlined the research objective for this study. From this three research questions have been derived. In attempting to answer these questions, a set of 19 propositions derived from the factors identified in Chapter 2 is established for further testing. Propositions are chosen over hypotheses due to the exploratory nature of the research. The next chapter examines the most appropriate research method to be used given the research objective outlined in this chapter.

## **Chapter 4 Research Method**

### **4.0 Introduction**

Chapter 3 outlined the research objective for this study and emphasised that the research is of an exploratory nature. This chapter provides an overview of methods for examining the research propositions discussed in the previous chapter. It concludes that in certain situations a pluralistic research approach may be most appropriate. Exploratory research is a case in which pluralistic research methods may be fruitful. The chapter evaluates the alternative research approaches and methods, which are appropriate for exploratory research. It is considered that, given the constraints of time and finance, the two most appropriate research methods of this research are the survey and case study methods.

### **4.1 Epistemology**

Chapter 3 introduced a framework of SMEs implementing BPR and highlighted the issues, which may affect the success or failure in SMEs undertaking BPR. It has been suggested by many authors that BPR is triggered by IT/IS and re-engineering is, indeed, an IS issue. Davenport and Short (1990) emphasise that IT is a powerful force in redesigning business processes while process thinking has important implications for the IT organisation and for the technology infrastructure it builds.

Galliers and Baker (1995) take a more holistic and even-handed stance by emphasising BPR as a management issue, proposing that 'not only concerns with the physical restructuring of the organisation along its work flow processes and the identification of the technology required to do this, but also promotes as a learning experience requiring on-going assessment and review'.

Hence, this chapter provides an overview from both social study and IS research perspectives, of the methods available for the study being searched. The term methodology means a 'structured set of guidelines for activities to undertake to improve the effectiveness of an intervention' (Mingers, 1997). Zmud (1979) emphasises a careful selection of research methods is important, especially when research involves organisational realities. The rationale of the research method guides the whole research procedures where the research findings are accumulated (Franz and Robey, 1987). By reviewing the underlying epistemology which guides the research, an appropriate and 'valid' research approach can be selected (Myers, 1996). Epistemology, defined by Hirschheim (1992), refers to beliefs about the way in which knowledge is constructed. Two opposing views of epistemology, positivism and interpretivism are explained in the following section.

#### **4.1.1 Positivism vs. Interpretivism**

Positivism is a branch of epistemology which underpins quantitative research methods (Robinson and Reed, 1998). Known as the 'unity of scientific method',

positivism is characterised as an approach that can be applied both to natural and social scientific research, assuming that the principles of natural science can apply equally to investigative methods in the social sciences (Hood et al, 1999). Social reality is viewed as a complex of causal relations between events or observable and material circumstances (Blaikie, 1993). For positivism, causal relations are investigated with structured instrumentation, including formal propositions, quantifiable measures of variables, hypotheses testing, and the drawing of inferences about a phenomenon from the sample to a stated population (Orlikowski and Baroudi, 1991).

The unity of the scientific method implies that using scientific methods for knowledge acquisition is valid for all forms of inquiry. Whether the objects being studied are animate or inanimate, it needs to follow certain conventions for something to be classified as science. Failing that, it should be regarded as 'pseudo science' (Popper, 1963). Hirschheim (1992) argues that from Popper's point of view, all social science might be considered pseudo science. This view is further modified by reductionism, where the search for human causal relationships on the whole is incrementally reduced into its constituent parts (Robinson and Reed, 1998).

As a philosophy of science, positivism has been subject to criticism, from the interpretive perspective in particular. The interpretive critique has focused on positivism's inadequate view on the nature of social reality. Weber (1965) defines social study as 'a science which attempts the interpretive understanding of social

action in order thereby to arrive at a causal explanation of its course and effects'. Kuhn (1970) argues that positivism cannot account for the way in which social reality is constructed and maintained, or how people interpret their own actions and the actions of others. Interpretive researchers, therefore, attempt to understand social phenomenon in its natural setting and from the perspective of the participants (Orlikowski and Baroudi, 1991).

In interpretive epistemology, knowledge is seen to be derived from everyday concepts and meanings (Blaikie, 1993). Interpretive studies assume that 'people create and associate their own subjective and intersubjective meanings as they interact with the world around them' (Orlikowski and Baroudi, 1991). Interpretive research philosophy lies in the belief that meanings arise out of social interaction and developed and modified through an interpretive process (Boland, 1979). Such a process, as Blaikie (1993) notes, requires the researchers to grasp the socially constructed meanings and to reconstruct these meanings in social scientific language. Social process can thus be usefully studied with an interpretive perspective, which is explicitly designed to capture complex, dynamic, social phenomena (Orlikowski and Baroudi, 1991).

Interpretivism has also been subject to criticism. For example, Fay (1987) considers that interpretivism is unable to deal with the conditions which give rise to certain meanings and experiences; that is, it does not provide a means whereby one can study the causal factors which give rise to and support the continuing existence of

these meanings (Fay, 1975). Rex (1971) is also critical of interpretive social scientists for dissociating themselves from any form of structural analysis while Giddens (1979) argues that it is the important and typically unintended consequence of human action which reinforces beliefs, roles, and meanings, and sustains the structure and practices of the society as a whole over time.

#### **4.1.2 Pluralism**

Post-positivists, such as Lee (1991), propose that positivism and interpretivism are not necessarily regarded as opposing and irreconcilable viewpoints. They suggest 'methodological pluralism' - the assertion that there is no one correct method of science but many methods (Morgan 1980; Polkinghorne, 1983; Hirschheim, 1992).

Multimethodology, seen as a form of methodological pluralism, refers to 'the whole area of utilising a plurality of methodologies or techniques within the practice of taking action in problematic situations' (Mingers, 1997). Kuhn (1970) argues that the single perspective designed for research in normal science overlooks the anomalous quality of human experience. Thus, social science research requires breadth of vision, tolerance and a willingness to accept different approaches and objectives instead of conformity (Mumford, 1991; Orlikowski and Baroudi, 1991).

Mingers (1997) puts forward two arguments in favour of pluralism. First, the real-world problem situations are highly complex and multi-dimensional. Multimethodology provides different aspects of the situation and deals effectively

with the full richness of the real world. Second, as an intervention and research is not a discrete event but a process that proceeds through a number of phases, multimethodology combining a range of approaches may well yield a comprehensive result. The rationale of using multiple methods is advanced by Greene et al (1989). This includes developmental reason, wherein the first method is used sequentially to help inform the second method, initiation reason, wherein contradictions and fresh perspectives emerge, and expansionary reason, where the mixed methods add scope and breadth to a study.

The purpose of adopting pluralistic research is to ensure that the variation reflects the subject being studied and not the research method (Campbell and Fiske, 1956). This is achieved by using triangulation which broadly defined as 'the combination of methodologies in the study of the same phenomenon' (Denzin, 1978). This point of view is echoed by Gable (1994), suggesting using multiple methods to increase the robustness of results as findings are strengthened through cross validation. Such cross validation, as Benbasat et al (1987) propose, is achieved when different kinds and sources of data convergent and are found congruent. However, although many methods exist, not all are applicable to a particular study. (Fitzgerald et al, 1985). The adoption of particular research methods for a study, as Benbasat (1989) emphasises, depends on the objectives of the researcher, the amount of knowledge in the field, and the nature of the topic under investigation.



### 4.1.3 Epistemology and IS Research

Although positivism remains the dominant approach to IS research (Orlikowski and Baroudi, 1991), the scientific method is, as Banville and Landry (1989) argue, inappropriate for an emerging discipline such as information systems. Galliers (1993) suggests that IS research should be considered more of a social science or a socio-technical subject, and not simply a technical one, due to the focus of IS research questions changing from technological to managerial and organisational (Benbasat et al, 1987). The major reason for the scientific ethos being misplaced in social scientific enquiry is that data are subject biased as knowledge is not merely a mirror copy of reality (Landry and Banville, 1992). Kaplan and Duchon (1988) contend that the researcher impacts the social system being studied, too. There are many different interpretations of social phenomena and there will always be a mixture of intended and unintended effects of self-fulfilling prophecies or the opposite (Galliers, 1993). Interpretivism does not seek to claim a proof of its findings, but provide descriptions of a study being researched and see if they are true or accurate (Boland, 1985). Besides, Galliers (1992) points out that IS is a 'fragmented field' and an 'essentially pluralistic scientific field'. Banville and Landry (1989), in view of this, argue that IS can be best understood and analysed only with the help of pluralistic models.

## 4.2 Qualitative vs. Quantitative Research Approaches

Both qualitative and quantitative research methods are important tools for social studies. Kent (1993) identifies qualitative research as open-ended interview methods and the collection of data which are largely qualitative and in the form of narrative rather than isolated statements. The major benefit of adopting this approach for social researchers is directly understanding and interpreting the nature of the real world - a world based on experienced language context and complex behaviour (Cooper and Braithwaite, 1977). Another advantage of qualitative methods is its capacity to yield data from which process theories and richer explanations of how and why processes and outcomes occur can be developed (Marcus and Robey, 1988). A drawback of this approach lies in its inability to deal with complicated theoretical problems and the requirement of direct contact with respondents, necessarily too limited to represent any particular population (Cooper and Braithwaite, 1977; Yin, 1984).

By contrast, quantitative methods measure the numeric meaning of social events by using experimental investigations. The collection of data is based on pre-defined questions with pre-formatted answers. This results in the study of social systems involving more controlled and identified variables (Cook and Campbell, 1979). The stripping of context in order to produce generalisable, reproducible results contributes to the 'objectivity' and 'testability' of social research (Kauber, 1986). However, exclusive reliance on statistical or experimental testing of hypotheses has

been soundly criticised in the social sciences. Meehl (1978), for example, argues that social science does not, and cannot, proceed by incremental gains achieved through statistical significance testing of hypotheses.

Although the differentiated yet complementary features of either research approach are well discussed and documented (Kent, 1993; Cooper and Braithwaite, 1977; Kauber, 1986), there has been a move toward combining qualitative and quantitative methods to provide a richer, contextual basis for interpreting and validating research results (Maxwell et al, 1986; Cook and Reichardt, 1979; Light and Pillemer, 1982). Combining methods provides a wider range of coverage that may result in a fuller picture of the unit under study than would have been achieved otherwise (Bonoma, 1985). While Bryman (1992) proposes approaches of blending quantitative and qualitative methods, such as quantitative research facilitating qualitative research, which bring the greatest advantage for research design, Kent (1993) argues that the key point lies in the appropriate matching of methods to situations. Kaplan and Duchon (1988) further recognise the value of combining methods in IS research. They emphasise that the inconsistency of results between the initial quantitative analysis and the qualitative data require exploration. Mixing methods can alert researchers to potential analytical errors and omissions and lead to new insights and modes of analysis that are unlikely to occur if one method is used alone.

### 4.3 Research Methods in Information Systems

A range of research methods has been recommended for use in the general field of information systems (Van Horn, 1973; Hamilton and Ives, 1982, Vogel and Wetherbe, 1984; Galliers, 1985; Galliers and Land, 1987; Faroomand, 1987). As shown in Table 4.1, a classification of the proposed research approaches and whether they are categorised as the scientific or interpretivist tradition is outlined in Galliers (1992).

*Table 4.1: IS research approaches (from Galliers, 1992)*

<b>Scientific</b>	<b>Interpretivist</b>
Laboratory	Subjective/argumentative reviews
Field experiments	
Surveys	Action research
Case studies	Descriptive/interpretative
Theorem proof	
Forecasting	Futures research
Simulation	Role/game playing

The strengths and weaknesses of these research methods are discussed as follows:

#### 4.3.1 Laboratory Experiments

Laboratory experiments feature the identification of precise relationships between chosen variables assigned by the researchers in a designed, controlled environment (i.e. the laboratory). They usually involve using quantitative analytical techniques to make generalisable statements applicable to real-life situations. The major strength

of the approach rests in the ability of the researcher to fully control all the independent and intervening variables being studied that may affect the dependent variables (Stone, 1978). It enables a number of variables to be studied intensively (Galliers, 1992), and the internal validity is high, due to the control which the researcher can exert (Jarvenpaa, 1988; Dickson, 1989).

However, this approach is criticised by its over-simplification of the experimental situation and the isolation of such situations from most of the variables that are found in the real world (Mason, 1989). The lack of realism (Benbasat, 1989) leads Galliers and Land (1987) to argue that such experiments are more applicable in the natural sciences than in behavioural research, as the value given to those variables excluded from the experiment is zero. Thus, laboratory experiments are in general less likely to be applicable in societal or organisational contexts, such as IS studies (Galliers and Land, 1988; Lewin, 1951).

#### **4.3.2 Field Experiments**

Field experiments are considered as an extension of laboratory experiments into the real world of organisations/society, with a view to overcome the weakness of laboratory experiments. This is to construct an experiment in a more realistic environment than is possible in the artificial, sanitised laboratory situation, and thereby an increased external validity. Although field experiments may achieve greater realism, Galliers (1992) points out the difficulty in finding organisations

prepared to be experimented on. He also argues that replication of the experiment is problematic as the trade-off with achieving greater realism is insufficient control of the variables being studied. Specifically, only the research variables can be altered, while the study of social systems involves so many uncontrolled and unidentified variables (Cook and Campbell, 1979; Kaplan and Duchon, 1988). Therefore, Antill (1985) suggests that this approach is only applicable to social studies when the researcher has a reasonably clear prior notion of what variables probably matter and how these variables should be measured.

### **4.3.3 Surveys**

The survey approach, according to Gable (1994), refers to a group of methods involving quantitative analysis, where data for a large number of organisations is collected through methods such as mail questionnaires, telephone interviews, or from published statistics, and this data is analysed using statistical techniques. Pinsonneault and Kraemer (1993) identify three features of the survey approach: (1) the purpose is the generation of quantitative descriptions; (2) information is collected by asking pre-defined questions and (3) the information is generally collected from a sample of the study population in such a way as to enable generalisable findings to the population of interest.

Galliers (1992) emphasises that the survey approach is a good means of obtaining snap shots of practices, situations or views at a certain time, from which significant

results can be identified and inferences can be made. With careful design, surveys provide a reasonably accurate description of real world situation from a variety of viewpoints (Baroudi & Orlikowski, 1989). Surveys not only enable the examination of phenomena in their natural settings (Pinsonneault and Kraemer, 1993) but also allow the operationalisation of a far greater number of variables (Galliers, 1992). Additionally, Jick (1983) also suggests an increased confidence in the generalisability of results.

However, as Galliers (1992) argues, little insight can be obtained using surveys regarding the causes/processes behind the phenomena being studied due to possible bias in respondents, such as the self-selecting nature of questionnaire respondents. This view is strengthened by Gable (1994), stating that 'often the survey approach provides only a snap-shot of the situation at a certain time, yielding little information on the underlying meaning of the data'. Locke (1989) also points out that survey research is inflexible to discoveries made during data collection, suggesting that survey research should serve as a methodology of verification rather than discovery.

#### **4.3.4 Case Studies**

The case study approach refers to a group of methods which emphasise qualitative analysis (Yin, 1984). It is a means of describing the relationships that exist in a particular situation, usually in a single organisation (Galliers, 1992). Gable (1994) contends that this approach provides the opportunity to ask penetrating questions and

to capture the reality in considerably greater detail of organisational behaviour, although the conclusions drawn may be specific to the particular organisations studied and may not be generalisable. Case studies are appropriate where the objective is to study contemporary events and when the intent of the research is description, theory building, or theory testing (Yin, 1984). Benbasat et al (1987) identify the strengths of the case study approach in IS, emphasising that this research approach allows the researcher to learn about the state of the art and generate theories from practice; to understand the nature and complexity of the process taking place; and to gain insights into new topics emerging in the rapidly changing IS field. With both qualitative and quantitative nature, case study research can be used in either an interpretative or positivist manner (Cavaye, 1996).

Apart from the lack of generalisability, the limitations of the approach include the inability to manipulate independent variables, the risk of improper interpretation and the lack of power to randomise (Kerlinger, 1986); that is, as Lee (1989) summarises, a lack of controllability, deductibility, repeatability and generalisability, where the latter two limitations stem largely from the aforementioned lack of power to randomise. Yin (1984) hence suggests that case studies are appropriate where it is not necessary to control behavioural events or variables. And the difficulties in distinguishing between cause and effect can be overcome by undertaking longitudinal case study research (Vitalari, 1985), an approach that employs continuous data collection and focuses on issues of process (Orlikowski and Baroudi, 1991).



### **4.3.5 Theorem Proof**

This research approach refers to the capturing of application areas from fields such as computer science that otherwise would not be identified (Vogel and Wetherbe, 1984). Galliers (1992) argues that similar to other scientific methods, theorem proof describes reasonably accurately that subset of IS research approaches concerned with development and testing of theorems at the technical end of the socio-technical spectrum. Thus, the major weakness of this approach lies in its limited applicability to social science research.

### **4.3.6 Forecasting and Futures Research**

The forecasting approach uses statistical techniques, such as regression analysis (Draper & Smith, 1981) and time-series analysis (Chatfield, 1984) to deduce future trends or likely impacts from past data. Futures research is concerned with, in the interpretivist context of IS research, 'the emergence of new social forms and behaviours, and the development of the so-called information society or information age' (Vitalari, 1985). This is normally done by using various scenarios (Nilles, 1984), Delphi methods (Delbecq et al, 1975), or change analysis (Land, 1982). Futures research is, as Galliers (1992) argues, an appropriate approach when 'investigating the future societal impacts of information technology'.

One of the benefits of using forecasting approaches is its ability to provide insights

into likely future occurrences, such as the rapid changes taking place in IT and their impacts on individuals, organisations and society in general. However, it is arguable that the validity of the research significantly depends on the precision of past data in the one case and the expertise of the scenario builders on the other (Galliers, 1992). Checkland (1981) also identifies other limitations such as the unpredictability of environmental factors due to a lack of real knowledge of future events. This results in scenarios being not 'true' pictures of the future but enable decisions/reactions in different 'futures' (Galliers, 1992).

#### **4.3.7 Simulation and Game/Role Playing**

Chatfield (1988) refers to this approach as enabling the researcher to generate appropriate random variables. The major benefit of this method is, by copying the behaviour of a system, to solve problems which are difficult or impossible to solve analytically in reality. The main weakness is, similar to experimental research, the difficulty in devising a simulation that accurately reflects the real world situation it is supposed to replicate (Galliers, 1992).

#### **4.3.8 Subjective/Argumentative Research**

This approach is creative research based more on opinion/speculation than observation, thereby placing greater emphasis on the role/perspective of the researcher (Vogel and Wetherbe, 1984). Galliers (1992) points out that

subjective/argumentative research tends to be less structured and it is more likely to be individual, rather than group or activity focused. Thus the main weakness of this method lies in the unstructured, subjective nature of the process. While the positivists question whether this method is genuinely research, Remenyi and Williams (1996) argue that this method makes a valuable contribution as it starts with narrative descriptions within which the imagination is allowed to range freely and widely over many possibilities. This method is suitable for the building of theories which can subsequently be tested by more formal means (Galliers, 1992).

#### **4.3.9 Action Research**

The action research approach, seen as a subset of the case study and field experiment, is based upon the principle that the researcher is within the field of that research and becomes a partner in the action and process of change (Wood-Harper, 1985). This involves pure research (observing) within action (participation) (Cavaye, 1996). Therefore, the role of the action researchers is to actively associate with the practical outcomes of the research, other than to seek to identify theoretical outcomes (Foster, 1972). Clark (1972) argues that both roles as ‘observer’ and ‘participator’ can easily be reversed while research being studied.

By emphasising collaboration between researchers and practitioners, action research represents an ideal research method that address complex real-life problems and the immediate concerns of practitioners; researchers in return gain feedback from the

practitioners upon which the theory is modified (Avison et al, 1999). White (1985) also indicates a major strength of action research that the researcher's biases are made overt in undertaking the research. The weaknesses are similar to those of case study: the lack of generalisability, the potential for bias by the researcher in interpreting the data and the difficulties in distinguishing between cause and result. In addition, Avison et al (1999) emphasise that successful action research is unlikely where there is conflict between researchers and practitioners or among practitioners themselves.

#### **4.3.10 Descriptive/Interpretative Research**

This research method stems from the phenomenological school of thought (Husserl, 1936). That is, all that can ever be known are phenomena, the essence of our experience. Descriptive/interpretative research is based on the literature or past developments, in addition to actual, current happenings. Once the phenomena have been understood correctly, theories can be built, although continually questioned and refined, via such in-depth self-validating process (Boland, 1985).

The strengths of this research approach lie in its ability to represent reality following an in-depth self-validating process in which pre-suppositions are continually questioned and our understanding of the phenomena under study is refined (Galliers, 1992). The weaknesses relate to necessary expenditure of time, the ability of the researchers to identify their biases and unheralded assumptions without taken-for-

granted attitudes (Fish, 1990).

#### **4.4 Choosing a Research Approach**

Marshall and Rossman (1989) propose a framework for choosing a research approach by matching the purpose of the research with characteristics of various research methods (Table 4.2). The current study seeks to uncover the attitudes, processes, and events that are shaping BPR practices in SMEs in order to develop BPR guidelines. The lack of empirical research on BPR, and the consequent need to study the issue in order to further existing knowledge, implies an exploratory research design. Hence, it will be shown that case studies and field studies are appropriate research strategies, with associated data collection techniques including participant observation, in-depth interviewing, or elite interviewing.

Table 4.2: Choosing an appropriate research method (from Marshall and Rossman, 1989)

Purpose of the research	Research Question	Research Strategy	Examples of Data Collection Techniques
<p><i>Exploratory</i></p> <ul style="list-style-type: none"> <li>. To investigate little understood phenomena</li> <li>. To identify/discover important variables to generate hypothesis for further research</li> </ul>	<ul style="list-style-type: none"> <li>. What is happening in this social program?</li> <li>. What are the salient themes patterns categories in participants meaning?</li> </ul>	<ul style="list-style-type: none"> <li>Case study</li> <li>Field study</li> </ul>	<ul style="list-style-type: none"> <li>. Participant observation</li> <li>. In-depth interviewing</li> <li>. Elite interviewing</li> </ul>
<p><i>Explanatory</i></p> <ul style="list-style-type: none"> <li>. To explain the forces causing the phenomena in question</li> <li>. To identify plausible causal networks shaping the phenomena</li> </ul>	<ul style="list-style-type: none"> <li>. What events, beliefs, attitudes, policies are shaping these phenomena?</li> <li>. How do these forces interact?</li> </ul>	<ul style="list-style-type: none"> <li>. Multi-site case study</li> <li>. Field study</li> <li>. Ethnography</li> </ul>	<ul style="list-style-type: none"> <li>. Participant observation</li> <li>. In-depth interviewing</li> <li>. Survey</li> <li>. Questionnaire</li> <li>. Document analysis</li> </ul>
<p><i>Descriptive</i></p> <ul style="list-style-type: none"> <li>. To document the phenomena of interest</li> </ul>	<ul style="list-style-type: none"> <li>. What are the salient behaviours, events, beliefs, attitudes, structures, processes occurring in these phenomena?</li> </ul>	<ul style="list-style-type: none"> <li>. Case study</li> <li>. Field study</li> <li>. Ethnography</li> </ul>	<ul style="list-style-type: none"> <li>. Participant observation</li> <li>. In-depth interviewing</li> <li>. Document analysis</li> <li>. Survey</li> </ul>
<p><i>Predictive</i></p> <ul style="list-style-type: none"> <li>. To predict the outcomes of the phenomena to forecast the events and behaviours resulting from the phenomena</li> </ul>	<ul style="list-style-type: none"> <li>. What will occur as a result of these phenomena?</li> <li>. What will be affected? In what way?</li> </ul>	<ul style="list-style-type: none"> <li>. Experiment</li> <li>. Quasi-experiment</li> </ul>	<ul style="list-style-type: none"> <li>. Survey</li> <li>. Kinesics/Proxemics</li> <li>. Content analysis</li> </ul>

With the nature of exploratory studies, the need to map or document phenomena in order to gain empirical evidence from a wide variety of organisations is recognised. Galliers (1992) proposes the use of surveys in addition to case studies for theory building research. Pettigrew (1992) emphasises that context and action are

interwoven in the study of strategy and it is important to consider the past and present when looking to the future. Abbott (1992) acknowledges the nesting of processes within organisations, and recognises the need to understand the network of intertwined processes within an interactionist field. It is important, therefore, to study current practice in an attempt to design for the future. Thus, a type of mapping study designed to document current processes is recognised as being important in studying process re-engineering practices in SMEs.

As shown in Table 4.3, the choice of research methodology in this study is justified by matching method characteristics with research requirements. This table relates the problem being studied, and the kind of information being sought, to the research strategy as recommended by Hirschheim (1992) and Landry and Banville (1992). It therefore justifies the pluralistic research design chosen for the study, by combining survey and case study approaches to meet the requirements of the study.

*Table 4.3: Matching research methods and study requirements*

Study requirement	Survey research	Case study research	References
To document current practices in relation to BPR in SMEs	Surveys are snap shots of practices, situations or views at a particular point of time		Galliers, 1992
To delineate relationships between BPR principles and other organisational processes	Relationships that are common across the population will be discovered using the survey method		Gable, 1994
To produce generalisable results, i.e. findings that are also representative of large organisations in Taiwan	Surveys may contribute to greater confidence in generalisability of results		Jick 1983
To analyse a large number of variables that are not independent	Surveys analyse a far greater number of variables that is the case with the laboratory approach		Galliers, 1992
To study BPR in SMEs in greater detail, using a large number of variables		The strength of the case study is its ability to capture reality in greater detail, and the analysis of a considerably greater number of variables than is possible with any other research method.	Galliers, 1992
To gain a contextual understanding of BPR in related to SMEs		The case study emphasises the benefit of contextual understanding and emphatic research objectives	Gable, 1994
To study contemporary BPR issues in their real life context		A case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context when the boundaries between the phenomenon and the context are clearly defined and where multiple sources of evidence are used	Yin, 1984

A questionnaire was determined to be an appropriate method to map current BPR practices. The questionnaire survey method offers many potential benefits for this



study. In examining the relationship between BPR and SMEs the survey method contributes to the body of knowledge by ‘providing a snapshot of the current views on the subject’ (Galliers, 1992). The survey enables generalisable conclusions to be reached (Jick, 1983). This conclusion may then be used to form the basis for mapping out the extent to which BPR and SMEs are related. In addition, conducting a survey enables relationships that are common across the population to be discovered (Gable, 1994).

The case study method in contrast offers alternative benefits. It enables a more in-depth understanding (Bonoma, 1985) of the relationship between SMEs and BPR. It provides avenues for contextual understanding (Gable, 1994) and provides the ability to capture the reality of the relationship between SMEs and BPR in greater detail than is possible with the survey method (Galliers, 1992). Data collection techniques used for the case studies include in-depth interviewing and document analysis. Participant observation was not considered due to the non-physical nature of planning.

Both the survey and case study provide viable research methods for this study. However, each of these research methods has weaknesses as outlined in section 4.3 on research methods in this chapter. Attewell and Rule (1991) highlight the ‘complementarity between survey and fieldwork approaches to studying information technology’, stating that ‘each is incomplete without the other’. As shown in Table 4.4, this interconnection between the two research methods is pursued by Gable

(1994). He suggests that if used in tandem the strengths of one method can counter balance the weakness of the other.

*Table 4.4: Relative strengths of case study and survey methods (from Gable, 1994)*

<i>Characteristic</i>	<i>Survey method</i>	<i>Case study method</i>
Controllability	Medium	Low
Deductibility	Medium	Low
Repeatability	Medium	Low
Generalisability	High	Low
Discoverability	Medium	High
Representability	Medium	High

The main strength of the survey method over a case study is its generalisability (Jick, 1983). The weakness of a survey is that it only provides a static snapshot, which yields little information that enables the discovery of the underlying meaning of the data (Gable, 1994). This discoverability, the ability to capture reality in considerable detail, is one of the key advantages of case studies (Galliers, 1992)

For the purpose of this study both survey and case study methods were used. The main reason for using both is the synergistic benefits afforded by the complementary nature of the two methods. In particular, the two methods were combined for developmental reasons (Greene et al, 1989). As such the survey was used first to aid more informed questioning during the case study research.

## **4.5 Consideration of Alternative Research Methods**

The purpose of this research is to study the connection between BPR and SMEs. Chapter 3 demonstrated that the relationship between BPR and SMEs has not been studied in detail. As such, this study, being the first to specifically address the issue, is exploratory in nature. The purpose of exploratory research is to investigate little understood phenomena and identify or discover important variables to generate hypotheses for further research (Marshall and Rossman, 1989). Exploratory research has tentative theory building as its aim.

Theorem proof, laboratory experiments and field experiments are not appropriate for theory building (Galliers, 1992). Thus, these research methods were inappropriate for the study. Forecasting and future research were rejected, the former because adequate data was not available, and the latter because experts in the area of interest were not identifiable. Simulation and game/role playing were rejected due to the impossibility of generating a model that adequately represented the reality being investigated.

Subjective/argumentative research was used during the review of the literature to provide a multi-dimensional definition of BPR in SMEs. The research method was deemed inappropriate for further investigation due to the unavailability of data relating expressly to SME implementing BPR in the literature.

After eliminating the inappropriate research methods, three remain; survey, case study and action research, each of which has been proposed as being appropriate for exploratory research. Jarvenpaa (1988) proposes that a case study or action research is appropriate in aiding theory building. Marshall and Rossman (1989) also suggest that case studies are suitable for preliminary research. Galliers and Land (1988) in response to Jarvenpaa propose that survey research is equally valid for theory building.

While action research is an appropriate research method, it was not used due to the fact that the researcher was not an active participant in any organisations. The two remaining research methods were case studies and survey research. The choice of the most appropriate research method is dependent upon the specific problem being researched (Hirschheim, 1992).

#### **4.6 The Survey**

The first part of this study is a questionnaire survey. The main purpose of conducting the survey is the generation of quantitative descriptions of BPR implementation in SMEs. Based on the issues outlined in the framework of SMEs undertaking BPR (Figure 2.3), a set of pre-defined questions is designed to test the propositions presented in Chapter 3. Data is collected from a sample of population of interest, Taiwan-based SMEs in this study, to generalise findings for further investigation in the case study. The administration of the questionnaire survey includes choosing the

targeted sample, structuring the questionnaire, carrying out a pilot pre-test, conducting the survey, and non-response bias testing. These are discussed as follows.

#### **4.6.1 Construction of the targeted sample**

Taiwanese SMEs were chosen as the target sample of this study for several reasons. The first and the primary reason is that SMEs constitute a considerably high proportion of the business community in this area. According to official statistics, SMEs present, in terms of number of firms, over 95% of total enterprises in both service and manufacturing sectors (Lee and Chen, 1992). As an export drive of this country, SMEs are the most important source of foreign exchange earnings, providing ample employment opportunities (approximately 70% are supplied by SMEs [Lee and Ho, 1992]). From post-war period until now, SMEs have played an important role in sustaining the long-term prosperity of Taiwan's economy.

SMEs are often considered to be simple and flexible in terms of organisational structure, while the inability to market control forces SMEs to seek alternative ways to survive (Avison et al, 1995). During the period 1972 to 1989, the average cash turnover (average sales divided by average cash holdings) of SMEs in Taiwan was 25.03 compared to 16.02 of large business (Lee and Ho, 1992). This indicates that SMEs' management of cash is more efficient than large business. In 1987, the SMEs' inventory turnover was 4.91, which is higher than the 3.99 of their larger counterparts. This demonstrates that SMEs' management of inventory is more

effective than bigger firms.

Taiwanese SMEs, similar to those in the rest of the world, are confronting dramatic changes in the global environment. For example, due to lower capabilities of collecting market information, the majority of small businesses in Taiwan prefer to join in formal subcontracting or a 'sourcing system' to secure orders (Kuo and Wang, 1992). Export-oriented SMEs are restricted to labour-intensive and matured-technology industries that restrain SMEs from upgrading their technology, enlarging their scale of operations and promoting their marketing capability (Wu and Chou, 1992). The severe labour shortage and the rapidly rising wage rates have further made it more difficult for Taiwanese SMEs to maintain their competitiveness. The move from a reliance on unskilled to skilled labour, from labour-intensive to technology-intensive production, reflects a major structural change in response to increasing costs (Droker et al, 1989).

Financial insufficiency has been a major obstacle for SMEs to grow and develop. The average debt ratio of Taiwanese SMEs reached 70.19% in 1987, compared with 59.35% for larger firms. When borrowing from formal financial markets, small businesses often can not meet the requirements and have difficulty obtaining funds, although this situation has gradually improved since bank privatisation in 1989 (Yang and Shiau, 1992). However, due to their small scale and limited financial resources, the marketing capabilities of the SMEs are significantly constrained (Kuo and Wang, 1992).

Finally, because of the researcher's background, fewer difficulties were expected in conducting the survey in Taiwan.

#### **4.6.2 Structure of the questionnaire**

Because of a lack of related studies on SME undertaking BPR, a detailed questionnaire was designed for this research. Based on the literature review and case studies, the questionnaire, as presented in Appendix I, contains the key issues that were identified in Chapter 2.

The questionnaire begins with a definition of BPR as suggested by Hammer and Champy (1993) in order to aid the reduction of context-related errors and biases. Three most typical scales were used: dichotomous, open-ended and rank/order. Dichotomous scales offer the respondent one of two alternatives, true or false, yes or no. They provide, as Owen and Harvey (1991) comment, adequate scales for factual material. An open-ended scale permits the respondent to answer the question in his/her own words. This makes the respondents feel less constrained to fit their perceptions into narrow, artificially created scales and allows the respondents to provide additional information related to their BPR experiences. The rank/order scale is widely used in this questionnaire where the respondents are asked to rank, in order of importance, the underlying issues related to BPR success or failure. This form of scale is effective with respect to the attitude and preferences of the respondents (Hall, 1991).

Questions 1-3 are concerned with finding out information on what BPR is perceived by the respondents and the motives of undertaking BPR. The answers to these questions are used to ascertain the extent to which BPR is seen by SMEs from both strategic and project management perspectives.

Questions 5-9, 11, 12, 14 are used to find out how SMEs implement BPR, covering a wide range of issues such as management support, employee participation, external assistance, scope and type of processes re-engineered, and IT use. This is to map the current BPR practices in SMEs in an attempt to see if they are different from those in larger organisations.

Questions 4, 19-24 gauge the organisational traits and the business strategies when BPR projects are initiated in SMEs. These questions are also related to general business environments where external forces, such as customers, suppliers and other SMEs may affect BPR success or failure. Organisational factors include IT/IS infrastructure, resources, R&D, innovation, employee autonomy, and risk-taking attitude. This is to investigate the extent to which these factors are relevant to BPR. These questions were designed in a mixed form of dichotomous and rank/order scales in order to avoid the potential of biases and misunderstanding.

Questions 12, 13, 15-17 are concerned with how SMEs measure their BPR results, and ascertain the extent to which the responding organisations can benefit from BPR. These questions are largely in rank form and the respondents were asked to



evaluate result by ranking the facilitators/inhibitors identified in Chapter 2 in order to determine how these factors are relevant to BPR success/failure.

### **4.6.3 Pilot Pre-test**

The complete questionnaire was translated to a Chinese version for the survey to be conducted in Taiwan. Before the large scale send-out, a pilot pre-test was carried out. The main purposes of the pilot test are to examine the ambiguities in wording, scaling adequacy, measurement adequacy, likely answer distributions, and the respondent's comprehension (Hall and Adelman, 1991).

Seven copies were completed by the managers of 4 SMEs and 3 researcher's colleagues, and based upon the outcome of the pilot test the questionnaire was refined. The feedback from the respondents mainly focused on the wording, the format of the questionnaire, and timing. It took approximately 40 minutes to complete. Although there was no difficulty in understanding the questions, some respondents commented that the questionnaire was too long. Besides, it was found that lower level managers were incapable of answering some of the questions. These shortcomings were overcome by removing redundant words and rewriting the front page which offers the definition and explanation about BPR. The questionnaire was then targeted at the owner-manager of the organisation.

#### **4.6.4 Administrating the Questionnaire**

Originally the questionnaires were to be sent by mail. Considering the fact that the mailing approach would take much longer and that without proper incentive, or even with, the response rate would be relatively low, the researcher adopted an alternative method that was more efficient and effective. The questionnaires were sent and collected at various management courses available for small business managers offered by universities. This approach had several advantages. It was in most cases in the researcher's presence the survey was carried out. This allowed the researcher to respond to, if any, questions or problems arisen. The response rate was expected to be relatively higher by collecting the questionnaires immediately upon completion. The researcher could also briefly check to ensure all questions were answered properly. This reduced to a great extent the number of invalid copies. This approach, however, does have some shortcomings. For example, problems would emerge when the majority of attending students were reluctant to do the questionnaire or were unwilling to co-operate. Additionally, it should be acknowledged that the number of BPR SMEs may be higher than the real-world situation. Bias may occur since the survey was given out to organisations who already had their awareness raised by attending management courses.

Questionnaires were collected in the northern and central areas of Taiwan, dated from November 14, 1996, to Mar 26, 1997. In summary, there were 257 copies sent out. 194 were collected and 116 copies of questionnaires were valid (approximately

45% of response rate) and 78 copies were invalid.

#### **4.6.5 Testing for Non-response Bias**

In administering a questionnaire, bias may be introduced due to respondents having a different profile from non-respondents with respect to important variables, resulting in an unrepresentative sample population. One way to test for non-response bias is to assume that late-respondents can be taken as reasonable 'surrogates' for non respondents (Oppenheim, 1966; Wallace and Mellor, 1988). The characteristics of these late respondents can then be compared against earlier respondents to see if a significant difference exists. Alternatively, the way in which these later respondents answered the questions asked in the questionnaire can also be compared with early returns to see if they differ. A significant difference in either of these tests would indicate the presence of a non-response bias.

For the purpose of this study, late respondents were taken to be the 32 usable responses that were collected by university staff after the courses. The researcher compared the answers of a number of questions by these late respondents, with those provided by early respondents. The characteristic of responding and the 'surrogate' non-responding organisations were compared in terms of number of employees, firm status, and business strategy. The Mann-Whitney U test was used to test the null hypothesis that both sets of respondents have the same characteristics. These tests show no significant difference (Table 4.5).

*Table 4.5: Test for non-response bias on the basis of organisational characteristics*

Characteristic	Degree of significance between respondents and non-respondents
Number of employee	0.4798
Firm status	0.3885
Business strategy	0.6171

Non-response bias can also be tested by comparing responses to questions requiring opinions or subjective answers (Oppenheim, 1966; Wallace and Mellor, 1988). The researcher compared the answers to questions 2, 3, and 13. These questions were chosen as they sought to measure why (not) SMEs implement BPR and BPR success/failure, the major focus of this research. It was believed that any bias detected in the answering of these questions was likely to have a significant impact on the study. The Mann-Whitney U and Kruskal-Wallis H tests were used to test the null hypothesis that both sets of respondents had the same characteristics. These tests showed no significant difference existing between the beliefs of respondents and non-respondents (Appendix II).

#### **4.7 Case Studies**

The second part of this research consists of eight case studies. The main purpose of choosing this research method was to augment the survey research (Gable, 1994). As Walsham (1993) notes, the case study is used as an exploratory method of analysis *prior to, or in addition to*, more detailed large sample work. Specifically, the case studies were undertaken to complement the survey, aimed at obtaining more in-depth

information of the findings from the survey (Kaplan and Dunchon, 1988; Lee, 1991). The case studies also sought to discover the issues emerged from the survey findings. This includes owner-manager's attitudes towards business process change, further investigation into innovative use of IT on an inter-organisational level, outsourcing, the alignment of BPR strategy with business strategy, and organisational learning.

#### **4.7.1 The Purpose of the Case Studies**

Based on the profile of responding organisations obtained from the survey, a further contact with chosen SMEs enabled the researcher to obtain the following data:

- A detailed description about what they have done or are doing for BPR initiatives (why, when, how), including plans (strategic and BPR), financial considerations, IT use, time schedules, and measures of result, with a special focus on what tools and techniques used and external support.
- Success/failure factors and problems encountered.
- The owner/manager's personal attitudes and values (proactive or reactive in strategic orientation, entrepreneurial, e.g. seeking assistance from BPR experts or business consultants, being able to learn from the experiences of others in the industry, being conscious of technological advances, pursuing their objectives of growth, etc.) with respect to BPR success or failure.

- The potential of IT use for BPR in SMEs, including skills, tools, and innovation use of IT.
- The relationships with customers, suppliers, larger firms (horizontally), and with other SMEs and competitors (vertically) in relation to BPR results. This is to find out the potential of SMEs expanding their BPR projects from functional integration to inter-organisational co-operation.
- How SMEs manage organisational and technological change, including HRM, skill training, employee empowerment, top-down communication, and outsourcing.

#### **4.7.2 Selection of the Participating Organisations**

The case studies were conducted to enable more in-depth analysis of the findings from the survey (Kaplan and Duchon, 1988; Lee, 1991). The objective of this stage of the research is to explore in greater detail the connection between BPR and SMEs. In pursuing this aim the best unit of analysis for the case studies is the entire business operation of SMEs (Kambil and Short, 1994; Fredriksson and Vilgon, 1996).

Chapter 5 concludes that firm size does not seem to be a significant factor that

affects the success or failure of SMEs implementing BPR. However, it is believed that with their unique organisational structure and operations, SMEs might initiate BPR with different techniques from those larger firms use. Expanding from the questionnaire survey, it is the intent of this portion of the study to explore in more depth how SMEs undertake BPR in relation to owner-managers' attitudes to change, external support, IT use, and innovation. Another purpose of the follow-up interviews is to further seek empirical cases in support of the data from the questionnaire survey. The focus extends the current study to look into the owners' attitudes to re-engineer, BPR techniques, and external support, including sub-contracted firms, suppliers, or satellite plants. Hence, the case study chose four SMEs operating in the manufacturing sector and four in service to mitigate any biases that might cause. The selection of two successful and two failure cases for both sectors enabled a comparison and further investigation of success/failure factors. BPR success/failure, as defined in this study, is determined by the degree to which general BPR satisfaction is perceived by the respondents.

#### **4.7.3 Data Collection**

The primary method of data collection used was a personal interview. Information regarding BPR implementation in SMEs was provided for the interview by the questionnaire completed by each organisation in the first part of the study. Semi-structured interviews were carried out from 12th of April to 1st of June, 1998. This type of interview allows respondents to answer more on their own terms than the

standardised interview permits, but still provide a greater structure for comparability over that of the focused interview (Newton, 1996; May, 1997). Questions are based on the issues identified in 4.7.1. Qualitative information about the topic was recorded by the interviewer who could seek both clarification and elaboration on the answers given. This, as May (1997) argues, enables the interview to have more latitude to probe beyond the answers and thus enter into a dialogue with the interviewee. The semi-structured interview guide is shown in *Appendix III*.

## **4.8 Conclusion**

This chapter discusses various research methods. In conducting exploratory studies several research methods are appropriate and may be used in conjunction with each other. For the purpose of this study a hybrid research approach was chosen that combined the survey and case study research methods. This pluralistic approach was taken because of synergistic benefits that a combination of a survey and case studies provide. The first part of the research, a questionnaire survey, sought to map out, at a generalisable level, the relationship between BPR and SMEs. The case studies were designed to provide more detail on these relationships. The research findings of the survey are discussed in Chapter 5 and the case study analysis is presented in Chapter 6.



## **Chapter 5 The Survey**

### **5.0 Introduction**

This chapter presents the results from the survey. Detailed profiles of the responding organisations are given. This permits an initial analysis of the sample SMEs in terms of size, management control and other factors, such as market and customers. Implementing results are interpreted by business gains and process improvement, while BPR satisfaction is a determinant of success or failure. This is followed by the results from the survey, which show that SMEs do undertake BPR and the factors identified in Chapter 2 are subsequently tested and discussed. This part of the data analysis employs several non-parametric tests. The statistical methods used and the rationale for using them are explained. This chapter closes with conclusions based on the survey, which forms the basis for a more detailed analysis of the case studies that are discussed in Chapter 6.

### **5.1 Profile of Organisations**

This section first reports the characteristics of the sample SMEs. The responses are analysed using standard statistical measures, such as means and frequencies. As shown in Table 5.1, the responding organisations are approximately half small businesses (with employee fewer than 50 employees) and half medium-sized businesses (with more than 50 and fewer than 500 employees). The distributions for BPR SMEs and non-BPR SMEs are identical. It is initially suggested that there is no significant difference, in terms of firm size, between

BPR SMEs and non-BPR SMEs.

*Table 5.1: Profile of Respondents: Number of Employees*

Number of employee (people)	Frequency (SMEs)	Percentage (SMEs)	Frequency (BPR SMEs)	Percentage (BPR SMEs)	Frequency (non-BPR SMEs)	Percentage (non-BPR SMEs)
<50	63	54.3 %	34	54.8 %	29	53.7 %
50<N<100	20	17.2 %	7	11.3 %	13	24.1 %
100<N<200	14	12.1 %	8	12.9 %	6	11.1 %
200<N<500	10	8.6 %	7	11.3 %	3	5.6 %
Missing	9	7.8 %	6	9.7 %	3	5.6 %
Total	116	100 %	62	100 %	54	100 %

As shown in Table 5.2, the levels of management in the majority of the responding SMEs are fewer than 5. The span of management is typically under 10 people (Table 5.3). Both results represent the simpler structure and shorter communication lines in SMEs. It was found that the level and span of management were similar in BPR SMEs and non-BPR SMEs.

*Table 5.2: Profile of Respondents: Level of Management*

Levels	Frequency (SMEs)	Percentage (SMEs)	Frequency (BPR SMEs)	Percentage (BPR SMEs)	Frequency (non-BPR SMEs)	Percentage (non-BPR SMEs)
1-5	67	73.6 %	34	72.3 %	33	75 %
>5	24	26.4 %	13	27.7 %	11	25 %

*Table 5.3: Profile of Respondents: Span of management*

People	Frequency (SMEs)	Percentage (SMEs)	Frequency (BPR SMEs)	Percentage (BPR SMEs)	Frequency (non-BPR SMEs)	Percentage (non-BPR SMEs)
<5	39	33.6 %	21	33.9 %	18	33.3 %
5-10	33	28.4 %	13	22.6 %	19	35.2 %
11-15	5	4.3 %	3	4.8 %	2	3.7 %
16-20	2	1.7 %	0	0 %	2	3.7 %
>21	6	5.2 %	4	6.5 %	2	3.7 %
Missing	31	26.7 %	20	32.3 %	11	20.4 %
Total	116	100 %	62	100 %	54	100 %

Table 5.4 reveals that a large percentage of the sample SMEs are currently

growing or mature. BPR SMEs and non-BPR SMEs are different in that the number of start-up and declining non-BPR SMEs is larger than that of BPR SMEs. In keeping with Kinni (1995), this indicates that SMEs tend to re-engineer from a position of strength. Financing problems appear to be the focus for start-up firms. Many SMEs experience difficulties in bank borrowing and are crippled by high interest rates (Eglin, 1992). A UK SME study reveals that firms which use appropriate financial management techniques during the start-up phase are more likely to record superior growth records (Gorton, 1999). As for firms in decline, Kinni (1995) argues that it is unlikely that a small firm that is faltering can muster the required energy to reengineer itself out of decline.

*Table 5.4: Profile of Respondents: Firm Status*

Firm Status	Frequency (SMEs)	Percentage (SMEs)	Frequency (BPR SMEs)	Percentage (BPR SMEs)	Frequency (non-BPR SMEs)	Percentage (non-BPR SMEs)
Start-up	12	10.3 %	3	4.8 %	9	16.7 %
Grow	51	44.0 %	29	46.8 %	22	40.7 %
Mature	36	31.0 %	24	38.7 %	12	22.2 %
Decline	11	9.5 %	2	3.2 %	9	16.7 %
Missing	6	5.2 %	4	6.5 %	2	3.7 %
Total	116	100 %	62	100 %	54	100 %

Table 5.5 shows that the sample SMEs are overwhelmingly private companies, while approximately 55% have or are currently engaged in re-engineering. With so few firms from public sectors, a comparison of public firms and private companies is infeasible.

*Table 5.5: Profile of Respondents: Industry Sectors*

Industry sector	Frequency (SMEs)	Percentage (SMEs)	Frequency (BPR SMEs)	Percentage (BPR SMEs)	Frequency (non-BPR SMEs)	Percentage (non-BPR SMEs)
Public sector	3	2.6 %	1	1.6 %	2	3.7 %
Private company	111	95.7 %	60	96.8 %	51	94.4 %
Missing	2	1.7 %	1	1.6 %	1	1.9 %
Total	116	100 %	62	100 %	54	100 %

The survey further compares the responding organisations against industry sectors. Firms from the manufacturing sector are approximately 46% of the entire sample SMEs, while firms from the service industry are 29%. According to Standard Industrial Classification (WCB, 2000), machinery, electronics, petro-chemistry, clothing and shoes are categorised as manufacturing sub-sectors, while commerce, investment services, health and environment, and education are categorised as service sub-sectors. It should be noted that electronics, machinery and engineering comprise a higher percentage of the BPR SMEs in the manufacturing sector (Table 5.6). This suggests that businesses in rapid growth, such as Taiwan's micro chip and semi-conductor industries (Mathews, 1997; Economist, 1997) tend to foster an environment for BPR. Among the service categories, commerce, trade, insurance and investment companies are more likely to re-engineer. This result is due to the intensely competitive nature of the financial services sector (Capon and Ramsay, 1997) which tends to foster a motive to redesign and improve workflow and business processes. The motive of adopting a BPR strategy may be profit maximisation through rapid service turnaround, if the customers have high delay costs (Seidmann and Sandararajan, 1997).

*Table 5.6: Profile of Respondents: Industry Sectors*

<i>Industry Sector</i>	<i>Frequency (SMEs)</i>	<i>Percentage (SMEs)</i>	<i>Frequency (BPR SMEs)</i>	<i>Percentage (BPR SMEs)</i>	<i>Frequency (non-BPR SMEs)</i>	<i>Percentage (non-BPR SMEs)</i>
<b>Farm, fishing or forest</b>	4	3.45%	1	1.47 %	3	7.32 %
<b>Construction</b>	12	10.34 %	7	10.29 %	5	12.2%
<b>Retail or sales</b>	6	5.17 %	3	4.41%	3	7.32%
<b>Manufacturing (sub-total)</b>	53	45.7%	35	51.47%	18	43.9%
Electronics, information, or transmission	16	13.8 %	13	19.12%	3	7.32 %
Petro-chemistry, plastics, or pharmacy	10	8.62 %	5	7.35%	5	12.2 %
Clothing or shoes	2	1.72 %	0	0 %	2	4.88 %
Metalwork or machinery	25	21.55 %	17	25%	8	%
<b>Service (sub-total)</b>	34	29.31%	22	32.35%	12	29.27%
Commerce, trade, insurance, or investment	16	13.8 %	13	19.12%	3	19.51%
Distribution	7	6.03 %	3	4.41%	4	9.76%
Health or environment	5	4.31 %	4	5.88%	1	2.44%
Education, design, or others	6	5.17 %	2	2.94%	4	9.76 %
Missing	7	6.04%				
<b>Total</b>	<b>116</b>	<b>100%</b>	<b>68</b>		<b>41</b>	

A further comparison of BPR SMEs and non-BPR SMEs is made by investigating organisational traits and business operations. The results are presented in Table 5.7. The vast majority of the responding SMEs, 76.7%, claim to be operating in a competitive market with steady market share and loyal customers. This implies that BPR SMEs do not re-engineer from 'crisis'. While non-BPR SMEs are busy with day-to-day transactions, such as purchasing and sales, BPR SMEs enthusiastically seek management knowledge from various sources, e.g. government, purchasing IT software and outsourcing. 35 (56.5%) BPR SMEs, compared to 14 (25.9%) of non-BPR SMEs, have own IT director or professionals. According to Raman and Yap (1996), who suggest a positive relationship between IT infrastructure and number of IT professionals, BPR SMEs in the current study are more IT- and management- oriented.

Table 5.7: Profile of Respondents: Firm Operations

Operation	Frequency (SMEs)	Percentage (SMEs)	Frequency (BPR SMEs)	Percentage (BPR SMEs)	Frequency (non-BPR SMEs)	Percentage (non-BPR SMEs)
We are in a very competitive market	89	76.7 %	49	79.0 %	40	74.1 %
We have limited capital	31	26.7 %	14	22.6 %	17	31.5 %
We are contracted to bigger companies	13	11.2 %	5	8.1 %	8	14.8 %
We have steady market segment and some loyal customers	70	60.3 %	36	58.1 %	34	63.0 %
Diversification is our current product policy	50	43.1 %	27	43.5 %	23	42.6 %
We have our own IT director/professionals	49	42.2 %	35	56.5 %	14	25.9 %
Operating efficiency is more important than management skills	32	27.6 %	16	25.8 %	16	29.6 %
We always seek management knowledge from government, institute, or management consultants	25	21.6 %	18	29.0 %	7	13.0 %
We outsource some/all of our IT/IS	8	6.9 %	5	8.1 %	3	5.6 %
We purchase software packages for use	36	31.0 %	22	35.5 %	14	25.9 %
Our firm is located in industrial concentrated area	17	14.7 %	12	19.4 %	5	9.3 %
The owner is responsible for both purchasing and sales	35	30.2 %	15	24.2 %	20	37.0 %
Business rely mainly on the owner's sales skills and operation knowledge	48	41.4 %	26	41.9 %	22	40.7 %

There are more non-BPR SMEs subcontracted to bigger firms. The subcontracting network in Taiwan works as the local trading companies find appropriate producers, usually SMEs who, if successful in winning the contract, become the first-line contractor (Sit and Wong, 1989; Shieh, 1992). The SMEs in turn obtain their material supply or industrial services from other small firms through subcontracting arrangements (Lui, 1990). As Aubert (1996) argues, SMEs are at a disadvantage when they compete or co-operate with the large groups, given the lack of relatively codified rules governing subcontracting. Additionally, low-cost and flexible production that features the operation of a co-

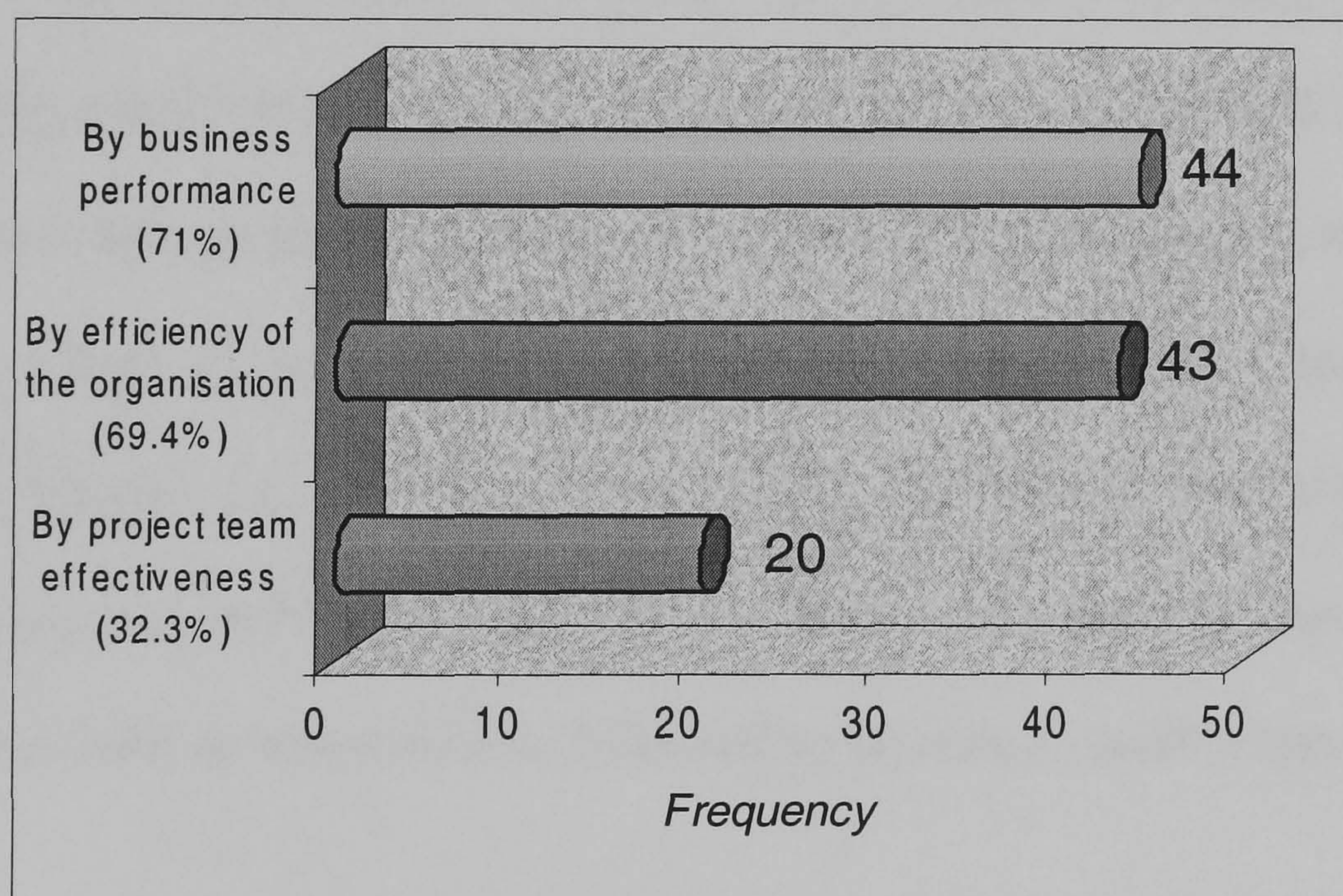
operative subcontracting network is no longer relevant in Taiwan due to the increasingly high labour rates (Poon, 1996; Tsay, 1994). Maintaining steady orders is perhaps more important than improving business processes.

More BPR SMEs are located in industrially concentrated areas, which may provide easier access to benchmarking and networking. The concentration of firms in close geographical proximity, referred to as 'industrial districts', allows SMEs to enjoy economies of scale and stay small (Marshall, 1952). In the context of process re-engineering, such SME networking demonstrates a potential for smaller firms to expand their re-engineering efforts across organisational boundaries.

In summary, the profile of the responding organisations has provided a general background of the SMEs that participated in the survey. The statistical technique mostly used in this part of the data analysis is variable frequency interpretation. By comparing data frequencies of BPR SMEs and non-BPR SMEs, some initial indications as to whether SMEs undertake BPR have been generated. For example, firm size as well as management control/span do not seem to pose direct constraints to BPR success in SMEs. In examining the organisational attributes of the BPR SMEs and non-BPR SMEs, it is revealed that re-engineering initiatives are more likely to take place in a competitively growing market environment and BPR SMEs tend to be more IT- and management-oriented. These results need to be further validated. The next part of the data analysis will investigate BPR performance in SMEs and probe the success/failure factors.

## 5.2 Implementing Results

The second research question in the study seeks to ascertain whether SMEs can benefit from process redesign as their larger counterparts. In researching this question the respondent was asked to rank a set of 22 implementation results, on a Likert scale of 1 to 5. The closer the value is to 5, the higher the degree of satisfaction organisations believe they are deriving from BPR. It should be noted that the majority of the organisations measure BPR outcomes by business performance and the efficiency of the organisation rather than the effectiveness of the project team (Figure 5.1).



*Figure 5.1: How SMEs measure BPR*

The implementation results are summarised in Table 5.8. The benefits achieved can be interpreted in four dimensions: cost, speed, quality, and customers as identified by Hammer and Champy (1993). 45 (72.5%) BPR SMEs indicate their BPR projects to be satisfactory, suggesting that SMEs have as much opportunity



to gain significant improvements via BPR as bigger firms. Specifically, BPR SMEs are most likely to achieve cost-efficiency from their re-engineering efforts. This shows that BPR can be undertaken as a cost-cutting strategy, which as Carr and Johansson (1995) argue, has a potential to achieve greater revenue. Different from other cost-cutting methods such as downsizing, BPR can help SMEs to better understand customers' needs and increase customer satisfaction. This finding reinforces the central notion of re-engineering principles that the starting point of re-engineering is to understand what customers want and need (Cross et al, 1994) and that an important measure of process output is customer satisfaction (Galvin and Singer, 1996; Davenport, 1993). Product and service quality can be significantly enhanced by BPR endeavours as quality is usually interpreted as the customer's declaration of satisfaction (Motley and Parker, 1995). With respect to the 'quality' dimension, the majority of BPR SMEs have realised their BPR goals as 77.4% of BPR SMEs initiated re-engineering projects aimed at enhancing product or service quality. Comparatively, improvements related to 'speed', e.g., reduction in cycle time, and delivery and response time, appear to be less significant. Overall, the survey demonstrates that SMEs can benefit from BPR in terms of cost, followed by customer, quality and speed.

*Table 5.8: Implementing Results*

BPR results	Mean	Ranking
Better cost-efficiency	3.53	1
Better understanding of customers' needs	3.49	2
Better customer satisfaction	3.42	3
Increasing product and service quality	3.41	4
More graphical user interface	3.35	5
Better top-down communication	3.33	6
More process-based management	3.33	6
Better motivated and independent employees	3.33	6
More flexible procedures, i.e. more streamlined office work	3.32	7
Highly specialised to more generally skilled employees	3.32	7
More responsive to market	3.30	8
Better understanding of technological change	3.30	8
Better relations with customers	3.28	9
Management intensive to more team-based	3.23	10
Improvement in delivery and response time	3.17	11
More employee involvement in decision-making	3.14	12
More common source of information	3.14	12
Reduction in cycle time (production time)	3.12	13
More process focused operation	3.11	14
Better sales and market share	3.07	15
Independent departments to more functionally-integrated departments	3.04	16
Better relations with suppliers	2.91	17

### **5.2.1 Success Factors**

In order to probe what contributes to BPR success in SMEs, respondents were asked to consider a list of success factors in terms of their criticality to the BPR initiatives. 11 specific factors were given, plus an 'others' write-in which, in fact, was rarely used. The average scores for each of the items illustrated in Table 5.9 were calculated to ascertain the degree of importance each respondent attached to them. Owner/top management commitment and support is seen as the single

most critical factor, ahead of a diverse group of factors which included team efficiency, planning, result management, and IT use.

*Table 5.9: Success factors*

Success factors	Mean	Ranking
Owner/top management support	4.13	1
Teamwork efficiency	3.77	2
Good BPR planning	3.59	3
Result management	3.59	3
Good IT-use	3.40	4
Change management	3.28	5
Good skill training	3.28	5

### **5.2.2 Failure Factors**

Respondents were also asked to rank a set of reasons given in the questionnaire which may have caused their BPR initiatives to fail. The findings are summarised in Table 5.10. The respondents identify the lack of top management support as a critical failure factor, which corresponds with the previous finding of management commitment as the most critical factor to success. It is noteworthy that poor understanding about BPR, financial difficulties and the issues related to project management, e.g. pilot implementation, project team, were stressed as the most significant failure factors, ahead of those related to organisational change management as found in previous studies (e.g., Boyle, 1995; Grover et al, 1995). It has been argued that while upgrading their business processes SMEs need to enhance their management skills at the same time (Posadas, 1998). Lack of BPR expertise and possible financial deficiency may result in the absence of project management skills in measuring BPR

performance (Figure 5.1). It is shown that the barriers to successful re-engineering in SMEs are closely interrelated. For example, a lack of BPR know-how in SMEs may encourage small business owner-managers to seek assistance from external business consultants, while financial constraints may inhibit SMEs from hiring them.

*Table 5.10: Failure factors*

Failure factors	Mean	Ranking
Lack of top management support	3.91	1
Poor understanding about BPR	3.62	2
Failure to provide necessary skills	3.57	3
Lack of a project team	3.49	4
Lack of pilot implementation	3.49	4
Failure to understand customers needs	3.45	5
Absence of external BPR consultants	3.45	5
Financial difficulties	3.40	6
Inappropriate result assessment	3.40	6
Inappropriate priority of business processes	3.32	7
Lack of market information	3.30	8
Failure to manage organisational change	3.30	8
Poor BPR planning	3.26	9
Lack of required incentive system	3.23	10
Failure to deal with employee work overload	3.19	11
Non-standardised IT/IS inhibits information sharing	3.17	12
Lack of internal IT/IS expertise	3.17	12
Failure to effectively monitor progress	3.13	13
Lack of appropriate BPR methodology	3.10	14
Inappropriate time scheduling	3.06	15
Limited IT/IS available for use	3.02	16
Poor top-down communication	2.94	17
Processes chosen too narrow	2.87	18

In summary, this part of the data analysis sought to answer the second research question – whether SMEs, as their large counterparts, can benefit from process redesign and achieve better performance in cost reduction, shorter cycle time, higher product quality, and customer satisfaction. The majority of BPR SMEs, 72.5%, consider their re-engineering projects to be satisfactory and it is found that SMEs can benefit from BPR in cost efficiency, customer satisfaction, quality and speed. It is understandable that, given the financial limits often found in

SMEs, BPR can be adopted as a cost-cutting strategy. A question raised here is how SMEs carry out BPR efficiently and effectively. While characterised by their teamwork nature, SMEs are less likely to assign a project team, particularly for re-engineering, and subsequently evaluate BPR performance by project team effectiveness. The ability of the owner-managers to conduct BPR initiatives as a change programme has thus emerged to be a vital element to a successful re-engineering in SMEs. And indeed, by probing the success/failure factors perceived among BPR SMEs, gaining management support stands out as the most important issue. BPR success/failure in SMEs are also related to strategic thinking, financial capacity, IT use and human resource management. These organisational factors are grouped into structure, culture, resources, and technology in Chapter 2, and will be analysed in greater detail using non-parametric statistical methods.

### **5.3 Non-parametric Statistical Analysis**

The remaining data analysis investigates the organisational factors derived from the framework of SMEs undertaking BPR, including culture, structure, resources, technology classifications together with implementation issues. Non-parametric tests such as the Mann-Whitney U and the Kruskal-Wallis test are largely used. These non-parametric tests are chosen over equivalent parametric tests since some of the data set does not meet the conditions required for the latter. Specifically, the data do not meet the requirements with respect to normality of distribution and homogeneity of variance (Conover, 1980). BPR is a relatively new phenomenon and one would therefore not expect to find a large population

of organisations undertaking it currently. This resulted in a sample size not large enough to execute parametric statistical tests.

While the majority of conventional statistical inferences are largely concerned with population parameters, such as the population mean or variance, in non-parametric statistical analysis, a parameter of considerable interest is the population median (Daniel, 1990). This study aims to map the current BPR practices in SMEs and discover how re-engineering is perceived in smaller businesses. With the qualitative nature of this research, it is meaningless to calculate parameters such as standard deviation. Thus, the study is more concerned with trend, independence or correlation, rather than actual values.

Statistical tests were conducted under the following assumptions. First, all the respondents understood the BPR definition and the explanations provided on the front page of the questionnaire. Second, the respondents were capable of answering all the questions and thus the answers fully reflect the current business practices of the responding organisations. Finally, all the answers were true and no manipulated data were to be found.

Apart from the general limitations with the questionnaire survey strategy which will be discussed in Chapter 7, there are two major limitations associated with the use of non-parametric statistical procedures (Berenson and Levine, 1996; Daniel and Terrell, 1989). First, it is disadvantageous to use non-parametric methods when all the assumptions of the parametric procedures can be met, which does not appear to be the case in the current study. Second, as the sample

size gets larger, data manipulations required for non-parametric procedures become laborious. However, this can be easily overcome by using appropriate computer software.

Three non-parametric statistics used in this study are explained as follows:

#### *Mann-Whitney U (Z) test*

The Mann-Whitney U test is a rank-sum test used to compare two population distributions on the basis of a random sample drawn from each distribution, where the samples are independent of each other (Mann and Whitney, 1947). It is a test of equality of two population distributions and an alternative approach to the t-test in parametric statistics, when the scale of measurement is ordinal and other parametric assumptions are not met. Hence, the Mann-Whitney U test is used for variables with dichotomous data (yes or no) to determine whether observations of two groups come from the same population, or have the same median or identical distribution. For sample, in a test of whether a relationship exists between 'conducting a pilot for BPR' (Q1.15) and 'general BPR satisfaction' (Q13.23), BPR SMEs were grouped into firms who assigned a project team for BPR and those who did not. The Mann-Whitney U test was then executed to see whether these two groups' ranked scores for general BPR satisfaction pose identical distribution. The statistics U was replaced by Z. This is because the Mann-Whitney test may compute and compare the results of significance with critical values of the standard normal distribution when the sample size is, as in the study, larger than 20 (Noether, 1976; Daniel and Terrell, 1989).

### *Kruskal-Wallis H test*

The Kruskal-Wallis test is an alternative to one-way analysis of variance when parametric assumptions are not met (Kruskal and Wallis, 1952). It is an extension of the rank-sum test for two independent samples, such as the Mann-Whitney U test. When more than two populations are involved, the Kruskal-Wallis test is used to compare  $k$  populations, where  $k$  is greater than 2. Here, the Kruskal-Wallis test was adopted to analyse questions with ordinal or ranked data. For example, respondents were asked to rank the firm's relationship with customers (Q4.5) on a Likert scale of 1 (poor) to 5 (very good). In a test of whether a relationship exists between 'customer relationship' and 'general BPR satisfaction', BPR SMEs were placed in five groups by rank scale. A Kruskal-Wallis test was executed to see whether these five groups' ranked scores for 'general BPR satisfaction' pose similar distributions. Normally when sample size are large - each group sample size equal to 5 or larger, the statistic H will pose approximately in a chi-square distribution  $\chi^2$  (Daniel and Terrell, 1989).

### *Spearman's rank correlation coefficient ( $\gamma_s$ )*

Calculating the correlation of two variables measures the degree of association between them. This provides estimates as to the strength and direction of association between independent and dependent variables, thus complementing the tests of statistical significance. Among a number of non-parametric measures of correlation, the most widely used is Spearman's rank correlation ( $\gamma_s$ ). The value of  $\gamma_s$  may range from -1 to +1, representing a negative or positive result. Negative values imply an inverse relationship.



### 5.3.1 An example of a Mann-Whitney test

In a test of whether forming a project team will enhance cost-efficiency of BPR, a Mann-Whitney test was executed on the variables ‘forming a project team’ (Q1.8) and ‘improved BPR cost-efficiency’ (Q13.10). The null hypothesis (Ho) can be stated as:

*Ho: There exists no relationship between forming a project team and BPR cost-efficiency (result)*

Mann-Whitney test grouped BPR SMEs into firms who assigned a project team for BPR and those who did not. These two groups’ ranked scores for BPR cost-efficiency were then compared and the Mann-Whitney statistic Z (due to sample size larger than 20) was computed to see whether there existed a significant difference. This generated the following statistical values:

Z	p-value
-2.2583	0.0239

The values can be interpreted as follows. For BPR SMEs there is only a 2.39% chance that no significant differences occur between mean distribution of variables; these being ‘forming a project team’ and ‘BPR cost-efficiency’. Thus, at a significance level of 0.05, the test rejects the Ho and concludes that there DOES exist a significant relationship between forming a project team and BPR cost-efficiency. Spearman’s rank correlation coefficient ( $\gamma_s$ ) was then calculated. The generated value, 0.3018, demonstrates a positive relationship, suggesting

that a firm is more likely to achieve cost-efficiency if a project team is established for BPR.

### 5.3.2 An example of a Kruskal-Wallis test

Analogously, in a test of whether a good relationship with other firms may increase the general BPR satisfaction, a Kruskal-Wallis test was executed on the variables ‘relationship with other firms’ (Q4.6) and ‘general BPR satisfaction’ (Q13.23). The null hypothesis (Ho) can be stated as:

*Ho: There exists no relationship between relationship with other firms and general BPR satisfaction*

The Kruskal-Wallis test grouped BPR SMEs into five groups, on the Likert scale of 1 (poor) to 5 (very good). These five groups’ ranked scores for general BPR satisfaction were then compared and the Kruskal-Wallis statistic  $x^2$  (due to each group sample size larger than 5) was computed to see whether there existed a significant difference of distributions among the groups. This generated the following statistical values:

$x^2$	p-value
7.487	0.112

The values can be interpreted as follows. For BPR SMEs there is a 11.2 % chance that no significant differences occur between mean distribution of variables; these being ‘relationship with other firms’ and ‘general BPR

satisfaction'. At the 0.05 level of significance, the test accepts the  $H_0$  and concludes that there exists NO significant relationship between 'relationships with other firms' and 'general BPR satisfaction'. As a result, there is no need to calculate Spearman's rank correlation coefficient.

From 5.4, factors associated with the classifications, structure, culture, resources, technology, and implementation, derived from the framework of SME undertaking BPR, are investigated and statistically tested at a 0.05 level of significance, using non-parametric methods explained above. All the statistical tests were carried out using SPSS for Windows Version 8. The test results are listed and numbered in *Appendix IV*.

#### **5.4 Structure Factors**

Structure defines lines of management control (Ascari et al, 1995) and structural factors in the context of BPR are concerned with cross-functional integration (Hammer, 1990; Harrington, 1991; Davenport, 1992), team-based orientation (Hammer and Champy, 1993; Sellers, 1997), and external relations, e.g. customer focus (Hall et al, 1993; Stow, 1993; Clark, 1993) or inter-organisational co-operation (Hamilton and Singh, 1992; Miles and Snow, 1995). Chapter 2 argued that due to their firm size and simpler structure, SMEs will find it easier to undertake BPR. The lack of formal management controls enables SMEs to operate as an empowered team, which favours process re-engineering. It is also proposed that SMEs are closer to customers and other firms so that they are at greater advantage of building value networks on an inter-organisational basis.

These are tested as follows.

<i>Proposition 1</i>	Due to their smaller firm size and simpler structure SMEs will find it easier to implement BPR.
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#### **5.4.1 Firm size and BPR implementation in SMEs**

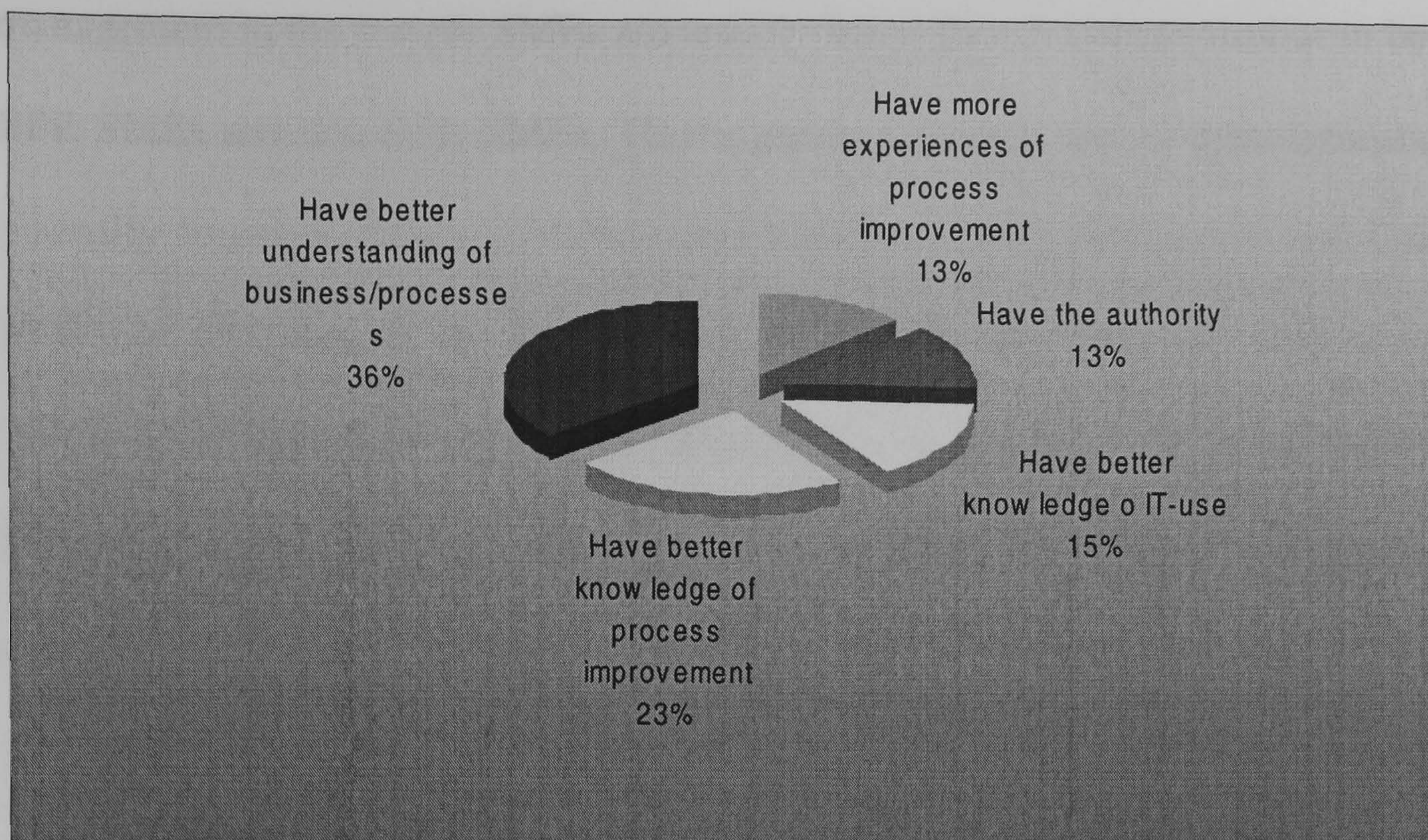
Firm size is operationalised by the number of employees. As aforementioned in 2.5, small businesses are defined as firms with number of employees fewer than 50 and medium-sized businesses as those with more than 50 and under 500 (Haksever, 1996). The respondent was asked to provide this information in Q19.2. The frequency analysis of ‘number of employees’ in 5.2 demonstrated identical distributions between BPR SMEs and non-BPR SMEs. It was suggested that no significant difference exists, in terms of firm size, between BPR SMEs and non-BPR SMEs. This result is reaffirmed by a Kruskal-Wallis test which shows no statistically significant effect between ‘number of employees’ and ‘whether SMEs undertake BPR’ (Q2) [T1.1].

This part of the data analysis also investigates firm size as to whether smaller firms stand a better chance of BPR success. The average scores for ‘general BPR satisfaction’ for small firms and medium-sized firms are 3.17 and 3.21 respectively. This shows no significant difference with respect to BPR result. Using Kruskal-Wallis test, no statistically significant association is found to exist between the ‘number of employees’ and ‘general BPR satisfaction’ [T1.2].

It appears that, from this sample of 62 SMEs (53.4%) who claim to have re-engineered or are re-engineering their current workflow and processes, BPR is equally relevant to SMEs. In keeping with Hammer (1990) and McSwiney (1995), firm size does not influence SMEs' willingness to re-engineer to a significant extent. Neither does firm's size affect general BPR satisfaction. It should be noted that, however, this result only applies to SMEs.

#### **5.4.2 Growth and leadership**

When asked who leads BPR (Q5), the majority of the respondents (44 firms, 71%) indicate that their BPR initiatives are led by CEO/owners. However, a finding borne out here is that the bigger the firms, it is more likely that functional managers lead BPR, instead of CEO/owners. This is a result of a Kruskal-Wallis test that demonstrates a positively significant relationship between 'number of employees' and 'functional managers leading BPR' [T1.3]. Another Kruskal-Wallis test also reveals that it is more likely that IS/IT professionals participate in BPR planning as firms grow [T1.4]. A total of 17 BPR SMEs (27.4%) BPR initiatives are led by functional managers and the participating organisational perceive that functional managers can take the role as BPR champions because of their better understanding of business processes and adequate knowledge of process improvement. This is exhibited in Figure 5.2.



*Figure 5.2: Reasons of functional managers leading BPR*

BPR led by functional managers, however, may jeopardise re-engineering due to a lack of management support when the targeted processes are being redesigned and implemented [T1.5]. A series of Kruskal-Wallis one-way analysis of variance on 'number of employees' against 'management participation' at four stages of BPR, i.e. planning, redesigning, implementing, and evaluating (Q8.1) results in negative scores of correlation. As shown in Appendix IV [T1.6/7], this includes process redesign stage and BPR implementation.

### **5.4.3 Management control and BPR implementation in SMEs**

Future firms are argued to move toward flatter organisations with a larger span of control (Sia and Neo, 1996; Drucker, 1988), while BPR, with its broad perspective on cross-functional boundaries, often eliminates management layers (Hammer, 1990; Harrington, 1991). It was shown in 5.1 that the levels of

management in the sample SMEs are usually fewer than 5 and are similar in both BPR SMEs and non-BPR SMEs. This suggests a simpler line of communication normally found in SMEs (Lefebvre and Lefebvre, 1992; Stanworth and Gray, 1991). In this part of the data analysis, Kruskal-Wallis tests are used to test 'levels of management' against 'whether SMEs re-engineer' (Q2) and 'general BPR satisfaction' (Q13.23). Both tests did not attain the level of significance, indicating that simpler structure in SMEs, in terms of management control, does not influence smaller firms to engage in re-engineering or find it easier to succeed in BPR [T1.8/9]. Issues regarding management support will be further analysed in 5.5.8.

<i>Proposition 2</i>	SMEs' team-based nature enhances their ability to integrate business processes
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#### **5.4.4 The characteristics of the BPR SMEs that use project teams for BPR**

BPR calls for team-based organisations (Hammer and Champy, 1993). The respondent was asked to indicate whether they use work teams for BPR (Q1.8). 17 firms (27.4%) of BPR SMEs claim to have assigned a project team for re-engineering. A series of Mann-Whitney tests are executed on 'forming a team to carry out BPR' against the organisational attributes provided in Part III of the questionnaire. It was found that these firms are more likely to be characterised by, first, a formal organisational structure with their own IT/IS professionals and clear job responsibilities for each position [T2.1/2]. Second, they are proactive firms, willing to make radical changes if necessary [T2.3], seeking management

knowledge from various sources [T2.4] and benchmarking against competitors [T2.5]. Third, a statistically positive association was found to exist between ‘forming a project team’ and ‘having a special budget for BPR’ [T2.6], implying that these firms tend to be more financially sound. This was followed by a Mann-Whitney test on team-based operation against BPR results. It was found that firms who assign a project team are more likely to achieve cost-efficiency in their BPR initiatives [T2.7].

#### **5.4.5 Past TQM experiences and use of project team for BPR**

The literature argues that due to the complementary but not mutually exclusive nature of BPR and TQM, the use of work teams for BPR can be seen as an extension of a firm’s previous quality programme (Hyde, 1995). It is evident in the current study that assigning a team especially for BPR has a significant relationship with past TQM practice. Mann-Whitney tests indicate that a statistically significant effect is found between BPR and TQM in terms of ‘using work teams’ (Q10.3) [T2.8] and ‘promoting employee involvement’ (Q10.4) [T2.9]. Positive correlation coefficients suggest that SMEs with previous TQM experience are more likely to establish a project team for BPR.

In exploring the reasons why SMEs use project teams for re-engineering, a series of Mann-Whitney tests on who actually participates in a firm’s BPR initiative reveals that the use of work teams has a strong association with external consultants. As shown in Appendix IV-2 [T2.10-14], assigning a project team for BPR is statistically positively related with involving BPR experts and business



consultants at the planning stage of BPR [T2.10/11] and external IT/IS professionals, business consultants and BPR experts when business processes are being re-engineered [T2.12-14]. The significance of the team-based nature to BPR lies in its cross-functional orientation which brings together employees with various disciplines in order to increase motivation and ultimately the BPR performance (Kim, 1994; Janson, 1993; Hackman and Oldham, 1980). Whether the use of project teams for BPR in SMEs generate these positive results is tested next.

#### **5.4.6 Forming a BPR team to enhance employee involvement**

The necessity to form a project team for BPR in SMEs is arguable, as it has been suggested that every small business starts as an empowered team (Kinni, 1995). This part of data analysis intends to ascertain whether forming a project team for BPR in SMEs enhances their ability to integrate business process. It is argued that the use of cross-functional teams in BPR will bring employees together with different disciplines. This ensures that the process being re-engineered is understood comprehensively (Hammer and Champy, 1993; Janson, 1993; Kim, 1994). Team members, as Janz (1995) points out, have reasonable control over work methods and task scheduling. It is believed that this will result in increased motivation and greater employee involvement (e.g. Kim, 1994). It is thus assumed in the current study that employees will become more independent and motivated due to the establishment of BPR teams, while the cross-functional nature of teamwork may result in more generally skilled employees.

The respondents were asked to indicate the degree to which the employees feel more independent and motivated (Q13.20) and become more generally skilled (Q13.22) after re-engineering. The answers obtained from these two questions were tested against 'forming a project work for BPR' (Q1.8) to see whether a significant relationship exists among them. In order to test employee involvement, Mann-Whitney tests were executed to ascertain whether use of work teams will increase 'employee participation' at four BPR stages (Q8.2/Q8.6). Here, employees also include the IT/IS professionals within the firm.

As shown in Appendix IV [T2.15], a Mann-Whitney test demonstrates no statistically significant effect between 'forming a project team for BPR' and 'employees becoming more independent and motivated'. Nor is it more likely that employees become generally skilled because of the establishment of BPR teams [T2.16]. A Mann-Whitney test on 'general BPR satisfaction' (Q13.23) against the use of project teams also reveals no statistical association between them [T2.17]. It should be noted that, as mentioned in 5.2, only 20 firms (32.3%) measure their BPR success/failure by project team effectiveness, compared to 44 firms (71%) by business performance and 43 firms (69.4%) by the efficiency of the organisation.

Nevertheless, it is affirmed that BPR teamworking can greatly increase employee involvement. This is a result of a series of Mann-Whitney tests that compared employee participation at four BPR stages in firms that assign a project team for re-engineering and those who do not. It was found that due to team-based

operation employees are more likely to get involved in BPR planning, redesigning and evaluating [T2.18-20], while IT/IS professionals tend to participate when selected processes are being redesigned and implemented [T2.21/22]. It is worth mentioning that when all the 35 perceived BPR success/failure factors are tested against ‘forming a project team for BPR’, only ‘good communication and employee co-operation as a critical success factor’ attains the level of significance [T2.23]. This may well explain how team-based operation achieves greater employee involvement in SMEs.

<i>Proposition 3</i>	As SMEs are closer to customers and suppliers, they will find it easier to build value networks on an inter-organisational basis and respond quickly to market.
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#### **5.4.7 Sound relationships with customers and market enhance BPR**

One of the essential goals of BPR is to eliminate non-added value to customers (Hammer and Champy, 1993; Hall et al, 1993). It is argued that understanding what customers want and need is paramount to BPR success (Cross et al, 1994). The respondents were asked in Q3 the purposes of implementing BPR and a high percentage of BPR SMEs (43 firms, 69.4%) indicate ‘to improve customer satisfaction’. 33 firms (53.2%) also claim to carry out market survey to know customers’ needs in support of BPR initiatives (Q1.3). This suggests that the majority of the researched BPR SMEs are taking a process approach based on the customer’s point of view, which is consistent with the principles of re-engineering.

While Hall et al (1993) argue that the processes to be re-engineered should be based upon customer value in order to improve performance (Hall et al, 1993), Tersine et al (1997) propose establishing positive customer relationships in order to promote service and responsiveness. The survey investigated this by asking the respondents to evaluate their relationship with customers on a Likert scale of 1 to 5 (Q4.5). The average score is 3.32, indicating that the responding organisations have reasonably good relations with their customers. Using Kruskal-Wallis tests, a statistically significant effect is found to exist between customer relationship and three enhanced BPR results – customer satisfaction, improvement in delivery and response time, and product and service quality [T3.1-3]. Positive correlation coefficients demonstrate that, in keeping with previous research (Hall et al, 1993; Allio and Allio, 1995), building a sound relationship with customers enables firms to achieve better quality, service and speed. A high positive coefficient value, 0.6886, between ‘relationship with customers’ and ‘general BPR satisfaction’ suggests that maintaining a good relationship with customers is vital to BPR success [T3.4].

#### **5.4.8 Good relationships with other firms and inter-organisational BPR**

Inter-organisational process integration stems from the belief that a network of companies sharing expertise and seeking out complementary core competencies can result in, when aided by modern IT, dramatic reduction in communications costs (Davidow and Malone, 1992; Kelly and Parsons, 1994; Clemons et al, 1992). Previous studies have suggested that SMEs can gain a competitive edge through collaboration among SMEs, or cross-border alliances, creating a

supportive environment (Rosenfeld, 1996; Donckets and Lambrecht, 1997; Szarka, 1990). Such business network redesign may include firms and their partners, buyers, sellers and even competitors within an industry (Clark and Stoddard, 1996; Miles and Snow, 1995).

The respondents were asked to evaluate their relationship with other firms on a Likert scale of 1(poor) to 5(very good) in Q4.6. The average score was 3.27, suggesting a reasonably good relationship with other firms. A Kruskal-Wallis test reveals a significant effect that better relationship with other firms aids small businesses to gain an easier access to benchmarking, referred to as 'comparing business performance with competitors in the same industry' in the questionnaire [T3.5]. A sound relationship with other firms, however, does not increase the probability of BPR success. In a Kruskal-Wallis test, no statistically significant association is found between 'relationships with other firms' and 'general BPR satisfaction' [T3.6].

This research, as proposition 3 states, seeks to ascertain whether SMEs with sound relationships with other firms are more likely to initiate BPR on an inter-organisational basis. The respondents were asked in Q6 to identify the scope of their BPR projects to be within a functional unit, spanning across functional area, or spanning across organisations. Using the Kruskal-Wallis test, no significant association is found to exist between 'relationship with other firms' and 'inter-organisational BPR' [T3.7]. Geographical distance may pose a constraint since only 17 BPR SMEs (14.7%) are found to be located in industrially concentrated areas. However, a sizeable 28 BPR SMEs (45.2%) consider their BPR projects

across-organisational boundaries. Although this is fewer than those within functional and across functional, there is a potential for SMEs to elevate their BPR efforts to an inter-organisational level. Issues associated with this type of business process integration should be further investigated.

#### **5.4.9 Summary of test results for structural factors**

To summarise, this part of the data analysis investigated structural factors, i.e. firm size and management control, team-based operation and external relations. It reaffirmed that firm size does not appear to be a significant factor to BPR success, and simpler structure in terms of management control does not make it easier to implement BPR. It should be noted that as SMEs grow, re-engineering still requires full management support while functional managers may take the role as BPR champions. These findings, however, should be further validated by a research sample that contains both larger corporations and SMEs.

A series of Mann-Whitney tests against organisational attributes revealed that forming a project team for BPR tends to occur in proactive firms with formal organisational structure. These firms are more likely to budget for BPR, therefore resulting in better cost-efficiency in their BPR projects. It was found that the use of work teams has a positively statistical association with previous TQM practice. Team-based operation can also be derived from interventions with external business consultants. It was found that use of project teams for BPR can greatly increase employee participation at both planning and evaluating stages of re-engineering. Nevertheless, employees, including firm's IT/IS professionals, do

not become more motivated and generally skilled as expected.

The survey investigated external relations by asking the respondent to rank, on a Likert scale of 1 (poor) to 5 (very good), their relationships with customers and other firms. The majority of the BPR SMEs claim to have reasonably good relations with customers. Statistical tests revealed that this is positively associated with increased customer satisfaction and general BPR satisfaction. Subsequently, quality and speed are greatly improved. A sound relationship with other firms, however, does not generate the above results but aids SMEs to benchmark. Kruskal-Wallis tests on external relations showed no statistical effect with respect to BPR at an inter-organisational level. However, 45% of BPR SMEs claim their BPR initiatives to be across-organisational boundaries. Given that collaboration among SMEs are receiving greater attention (Bonk, 1996; Rosenfeld, 1996), it is indicated that the potential of process re-engineering among SMEs and other firms should be further investigated.

## **5.5 Culture Factors**

Cultural factors are concerned with risk-taking attitude, employee empowerment, management support and communication, innovation and strategic thinking. Chapter 2 argued that SMEs are likely to adopt a more incremental approach to process redesign, although this may depend on owner-managers' willingness to take risks. Management support and employee participation are considered equally crucial to BPR success. It is proposed in this study that a culture of innovation will enhance SMEs' BPR efforts, while the absence of formal

strategic planning in SMEs may limit BPR results. Cultural factors are tested as follows.

<i>Proposition 4</i>	Although SMEs are willing to take risks, their business strategies tend to be more conservative and they may adopt more incremental process change.
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### **5.5.1 Risk-taking attitude in the sample SMEs**

Process re-engineering, as opposed to incremental quality programmes such as TQM, is a more radical approach which involves higher risks (Kaplan and Murdock, 1991; Hall et al, 1993). It is argued that SMEs are more conservative than larger firms in their strategies and thus tend to change incrementally (Storey and Cressy, 1995).

The risk attitude dimension in the current research is operationalised by two metrics, 'business strategy' and 'business policy'. In Q23.1 and Q23.4, the respondents were asked to rank their business strategy on the Likert scale of 1(cautious) to 5(ambitious) and business policy on the Likert scale of 1(conservative) to 5(risk-taking). The mean scores for business strategy and business policy are 3.33 and 2.46 respectively. This demonstrates that the sample SMEs are somewhat ambitious yet conservative.

The literature argues that a radical approach will be adopted as the strategy when SMEs are in rapid grow (Hirschfield, 1994). Risk-taking attitude was then tested



against 'firm growth' (Q20.2) using Mann-Whitney tests. However, neither 'business strategy' nor 'business policy' attained the level of significance [T4.1/2]. This indicates that the SMEs currently pursuing a growth strategy are not necessarily risk-takers. The attitude to radical change is also related to the owner-managers' personality and the organisational climate (Hyvarinen, 1990). This is investigated next.

### **5.5.2 Owner's attitude to radical change**

The survey asked the respondents to indicate the willingness to make a radical change if necessary on the Likert scale of 1 to 5 (Q22.7). Since the questionnaire was only aimed at the CEOs or the owner-managers of the responding organisations, it was assumed that the responses to this question fully reflect the owner's attitude to radical change. A mean score of 3.36 shows that SMEs are willing to take risks. However, the attitude to adopting a radical change programme is not statistically linked to the likelihood of undertaking BPR. A Kruskal-Wallis one-way analysis of variance did not find a statistically significant association between 'willingness to make a radical change' (Q22.7) and 'whether SMEs undertake BPR' (Q2) [T4.3].

It is argued that when owner-managers adopt a highly centralising stance, it will be difficult to produce an environment in which to re-engineer (Hirschfield, 1994). The respondents were asked in Q23.3 to rank their 'organisational structure' on a Likert scale of 1(centralised) to 5(decentralised). The mean score, 2.66, indicates that the sample SMEs tend to adopt a more centralised

management style. A Kruskal-Wallis test on 'organisational structure' (Q23.3) against 'whether SMEs undertake BPR' (Q2) found a statistically significant effect between them [T4.4]. The Spearman's correlation coefficient, 0.121, suggests that SMEs with more decentralised management structure are more likely to engage in process re-engineering.

### **5.5.3 Risk attitude and 'dramatic' BPR results**

BPR authors emphasise that radical change aims to achieve 'quantum leaps in performance' (Hammer and Champy, 1993) and dramatic business improvement [10x rather than 10% (Davenport, 1993)'. A series of Kruskal Wallis tests on risk-taking attitude, including 'business strategy' and 'business policy', reveals a positive correlation with 'general BPR satisfaction' (Q13.23) [T4.5/6]. Further, 'business strategy' (Q23.1) was positively related with two BPR results, 'improved delivery and response time' (Q13.16) [T4.7] and 'increased product/service quality' (Q13.18) [T4.8]. This is in keeping with Bergman (1994) and Hyde (1995) who contend that risk-taking attitude to radical change can result in quality and speed gains from re-engineering.

Radical change is usually accompanied with uncertainty and resistance (e.g., Hall et al, 1993; Damanpour, 1991). Skills training is widely believed to be an effective method of coping with resistance to organisational change (e.g., Davenport, 1993; Lambert, 1990; King, 1993). Using Kruskal-Wallis test, a statistically significant association was found to exist between 'business policy' (Q23.4) and 'employee training for newly required skills' (Q1.14) [T4.9]. The

positive correlation between both indicates that employees need to be provided with proper training when a BPR strategy is adopted. This finding is supported by another Kruskal-Wallis test that shows a positively statistical relationship between ‘business policy’ and ‘BPR budget spent on training’ (Q9.23) [T4.10].

<i>Proposition 5</i>	Employee empowerment will enhance BPR performance in SMEs.
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#### **5.5.4 The employee autonomy in the sample SMEs**

Employee autonomy is often referred to as ‘empowerment’ (Manz, 1992). In the current research ‘employee empowerment’ is defined as ‘the authority to personally take control and make decisions’ (Hodgetts et al, 1999). It is argued that in SMEs, employees perform a larger variety of tasks than in large organisations, which promotes empowerment (Nathan, 1993).

The survey first asked the respondents to indicate whether SMEs involve employees’ participation when developing BPR strategies (Q1.4). This is followed by an evaluation of ‘employee autonomy’ on a Likert scale of 1(low) to 5 (high) [Q23.5]. Approximately half of the BPR SMEs (32 firms, 51.6%) claim to develop strategies involving employees’ participation. The mean score for ‘employee autonomy’ is 3.05. This is in keeping with Brady’s notion that in the small business sector management often allows employees to make decision for themselves (Brady, 1995).

A series of Kruskal-Wallis one-way analysis of variance on ‘employee

autonomy' (Q23.5) against organisational attributes (Part III) reveals that an empowered organisation is statistically associated with decentralised structure (Q23.3) and reasonable organisational regulations (Q23.11) [T5.1/2]. This shows support for Nelson (1994) and Kinni's (1994) who assert that when the owner-managers adopt a less autocratic stance it is more likely that they will delegate workers and allow them to make decisions.

### **5.5.5 Employee empowerment and innovation**

The significance of empowerment to BPR lies in its capacity to create a culture that 'marshals creative energies for problem-solving and process improvement' (Spector, 1995). Such an environment is believed to be more 'organic', allowing rapid exchanges of innovative ideas (Miller and Rice, 1967). This, as Goss (1991) reports, will lead to enhanced problem-solving ability and quicker response to changes in the environment. The survey investigated 'innovation' in SMEs by asking the respondent to indicate whether they are dedicated to creating an innovative work on a Likert scale of 1 to 5 (Q22.8). The mean score is 3.65, suggesting that innovation as a competitive advantage is receiving attention in the small business sector.

In researching the link between empowerment and innovation, a Mann-Whitney test was executed on 'dedication to innovation' (Q22.8) against 'employee autonomy' (Q23.5) and a Kruskal-Wallis analysis was performed against 'employee involvement in strategy development' (Q1.4). None of the tests attained the 0.05 significance level [T5.3/4]. A statistically significant

relationship, however, was found between 'employee autonomy' and two BPR results, 'response to market changes' (Q13.3) and 'understanding of technological change' (Q13.11). Positive rank correlation from the tests demonstrates that an empowered SME may find it easier to adapt to dramatic changes in the environment [T5.5/6].

### **5.5.6 Empowerment and BPR success**

The significance of empowerment in a re-engineering organisation lies in the increased motivation and independence of employees gained from assuming greater responsibilities (e.g., Wind and West, 1991). This will result in higher job satisfaction and work effectiveness (Hackman and Oldham, 1980). As the increased responsibilities require different skills and improved leadership practices, it is believed that employees will become more generally skilled (Saggers, 1994).

It is found in the current research that an empowered organisation tends to foster an environment to re-engineer and are more likely to succeed in BPR. This is a result from two Kruskal-Wallis tests that show a statistically significant association between 'employee autonomy' (Q23.5) and 'whether SMEs undertake BPR' (Q2) and 'general BPR satisfaction' (Q13.23) [T5.7/8]. Positive correlation coefficients confirm the above notion.

In order to ascertain whether employees become more independent and motivated from empowerment practice, 'employee autonomy' (Q23.5) was tested

again BPR results (Q13) using Kruskal-Wallis one-way analysis. Although no statistically significant effect was found to exist between ‘employee autonomy’ and ‘increased motivation and independence’ (Q13.20) [T5.10], the survey reveals an increased level of ‘top-down communication’ (Q13.21) attributable to higher level of ‘employee autonomy’ [T5.11]. This can be explained in that the CEO needs to communicate new expectations imposed upon employees, while Cross et al (1994) contend that decentralisation facilitates more direct communications.

<i>Proposition 6</i>	BPR projects in SMEs are unlikely to succeed without top management support and proper employee communication.
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### **5.5.7 Top-down BPR initiatives**

When asked who leads BPR, 44 (71%) of respondents indicated that BPR initiatives are being driven virtually exclusively by CEO/owners. In keeping with Hammer and Champy (1993) and Moss (1993), this shows that BPR in SMEs is clearly a top-down initiative, as in larger firms. As exhibited in Figure 5.3, the majority of the BPR SMEs perceive owner-managers as having a better understanding of business and possessing the authority to lead BPR. This supports previous research such as the CSC Index (1994) that CEOs act as an important catalyst in helping to launch initiatives and the notion that highest levels of management have the broad perspective to identify the core processes and possess the political power to force collaboration and mandate the breadth of

changes (Stoddard et al, 1996).

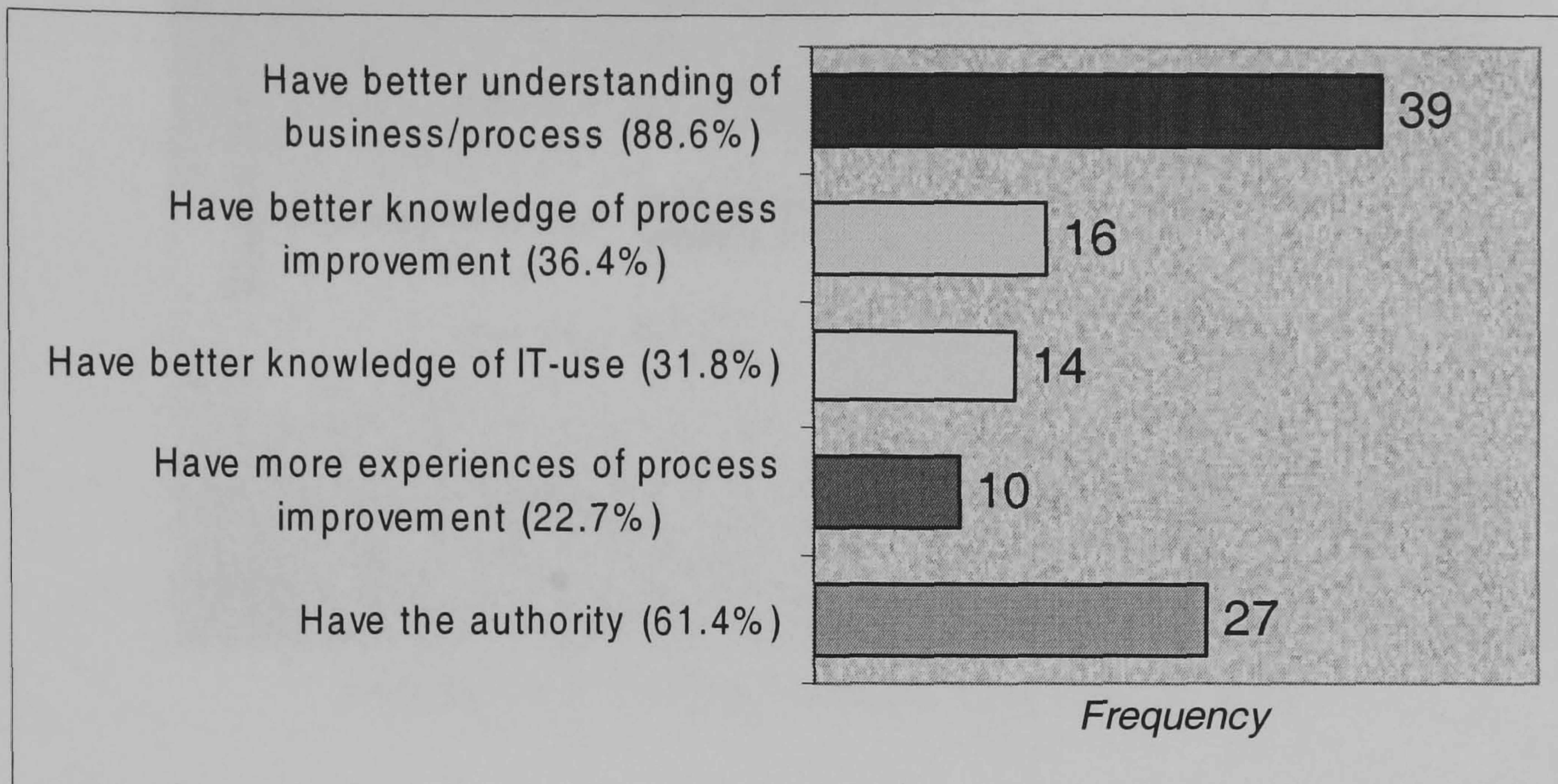
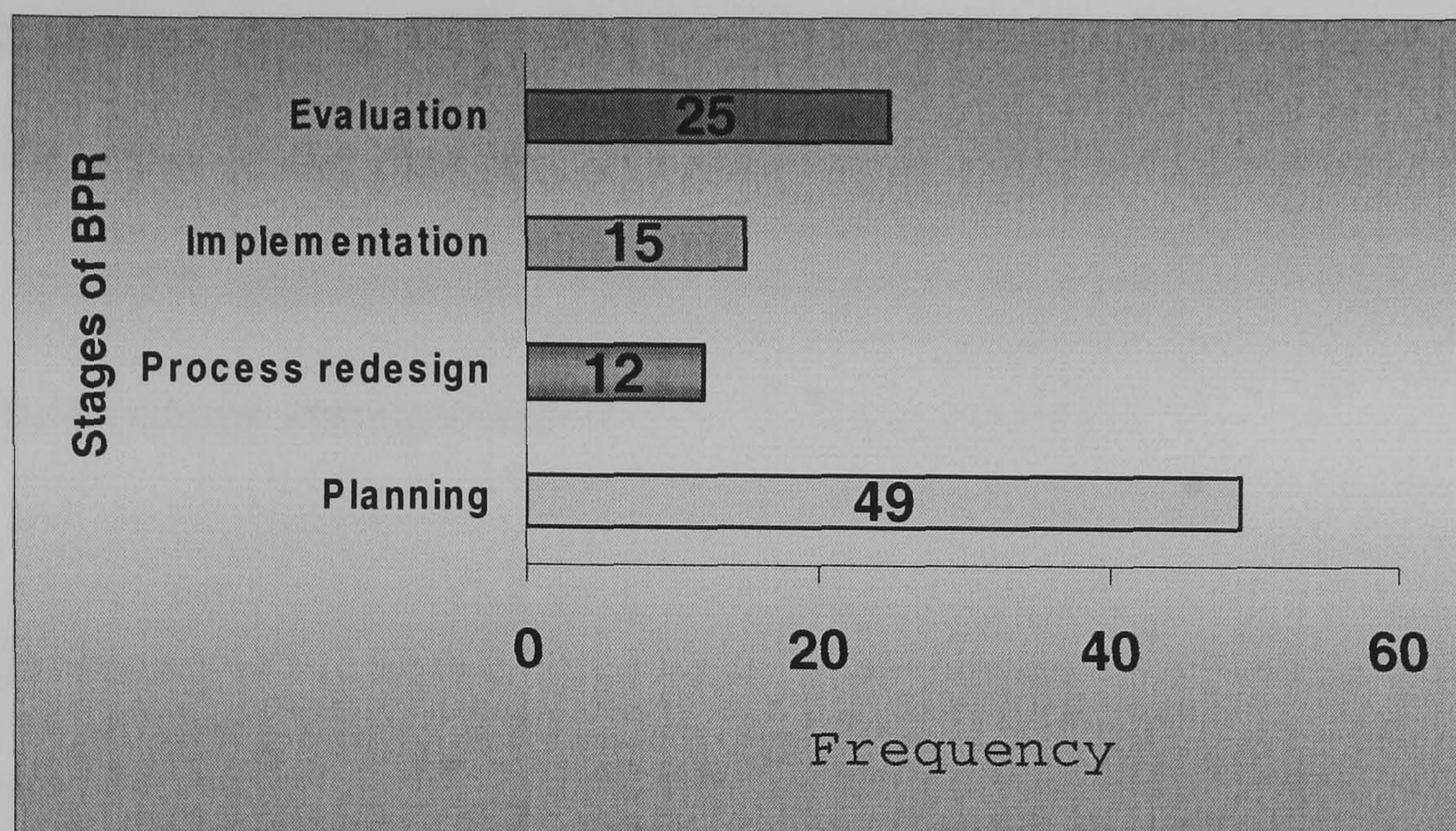


Figure 5.3: The reasons for CEO/owners leading BPR

### 5.5.8 How the management supports BPR

Management can support re-engineering in several ways, such as direct involvement (Tushman et al, 1986; Dixon et al, 1994) and informing employees of the expected change (Freed, 1996; Cauthorne-Lindstrom and Tracy, 1992). This survey investigated this by asking the respondent whether the owner-managers were involved in the four BPR phrases: planning, redesigning, implementing, and evaluating. Contrary to the notion that top management must be involved in the design and implementation of the BPR project (Tushman et al; 1986 Dixon et al, 1994), CEO/owners in the current survey are most likely to take part at the planning and the evaluating stages of process re-engineering (Figure 5.4).



*Figure 5.4: CEO/Top management support BPR*

As found in 5.2.1, 'top management support' is perceived as the most critical success factor to BPR among the researched SMEs. In exploring the importance of management participation to BPR, a statistically significant relationship was found to exist between 'involving CEO/owner-manager at the planning stage of BPR' (Q8.11) and 'budgeting for re-engineering' (Q9.1). A positive correlation suggests that the input from CEOs/owner-managers in the planning phase of BPR makes the financial back-up more obtainable [T6.1]. Another positively statistically significant relationship was found to exist between 'involving top management at the evaluating' and 'better cost-efficiency BPR result' (Q13.10) [T6.2]. This finding indicates that BPR results assessed by owner-managers can achieve significant cost-efficiency.

### **5.5.9 Top-down communication and BPR success**

Apart from direct involvement in the four phrases of BPR, management needs to provide adequate support and commitment (Harrison, 1994). This includes



promoting communication (Paula, 1997) and explaining/informing employees for possible change during BPR (Freed, 1996; Cauthorne-Lindstrom and Tracy, 1992). This part of the data analysis focuses on top-down communication with respect to BPR performance, while informing employees of change as an approach to change management will be discussed in 5.8.9.

The respondents were asked to evaluate their top-down communication on a Likert scale of 1(easy) to 5(very difficult)[Q23.2]. The survey sought to ascertain whether easier communication aids SMEs to achieve better BPR results. This was done by performing a Kruskal Wallis test on ‘top down communication’ against ‘general BPR satisfaction’ (Q13). However, no statistically significant association was found to exist among them [T6.3]. A plausible reason is that the mean score for ‘top-down communication’ (Q23.2) is 2.6, indicating that responding organisations have easy top-down communication and communication does not constitute an obstacle to achieving BPR goals. This explanation is supported by the fact that poor top-down communication is ranked as the seventeenth most critical factor to BPR failure (5.2.2).

<i>Proposition 7</i>	A culture of innovation will enhance SMEs’ BPR efforts.
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### **5.5.10 Innovation in the sample SMEs**

As aforementioned, information concerning ‘innovation’ was obtained by asking the respondent to indicate their dedication to creating an innovative work on a

Likert scale of 1 to 5 (Q22.8). The average score is 3.65, demonstrating a growing awareness of innovation as a competitive edge in the SME sector. The literature argues that innovation is more likely to occur in decentralised and informal organisations (e.g., Teng et al, 1994) where people rapidly exchange innovative ideas (Miller and Rice, 1967). A Kruskal-Wallis test executed on 'dedication to innovation' (Q22.8) against 'organisational structure' (Q23.3), however, did not show a significant relationship between them [T7.1].

A study by Wynarckzyk et al (1995) found a strong correlation between firm size, innovation, product development and R&D. The survey investigated this by testing innovation against 'firm size' (Q19.2), 'diversification product policy' (Q21.305), and 'R&D' (Q22.10) [T7.2-4]. It was found that a firm's dedication to innovation is positively correlated with R&D. A high correlation coefficient, 0.586, suggests that innovation is more likely to occur in the SMEs that can afford their own research and development.

#### **5.5.11 Innovation and BPR**

It is strongly advocated by Davenport (1993) that BPR is 'process innovation'. There is a growing literature on IS as an innovation (Moore and Benbasat, 1991). The survey seeks to ascertain as to whether IT plays a significant part in SMEs' process innovation (Chen and Williams, 1993). A series of Kruskal-Wallis tests was executed on 'dedication to creating an innovative environment' (Q22.8) against IT tools (Q23.6), IT performance (Q23.7), end-user skills (Q23.8) and IT spending (Q23.9).

A statistically significant association was found to exist between innovation and IT tools and IT performance [T8.5/6]. Positive correlation coefficients indicate that a more innovative and creative environment are attributable to sufficient IT tools and satisfactory IT performance. This finding supports previous research, arguing that process innovation may be hindered in SMEs due to their reduced access to technological information (OECD, 1995). Approximately half of BPR SMEs (30 firms, 48.4%) claim to use IT for process redesign. Issues related to IT-use will be further investigated in 5.7.

<i>Proposition 8</i>	The absence of formal strategic planning and project management may limit BPR results.
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#### **5.5.12 BPR strategic planning and project management in SMEs**

Chapter 2 has identified the key elements of strategic planning, including focusing on ‘core processes’ (e.g., Rockart, 1988; Johansson et al, 1993), adding value from the perspective of customers (Holland and Kumar, 1995), developing corporate vision and strategy in assessing re-engineering opportunity (Robbins and Asher, 1995; Pritsker, 1995), mapping of the current activities (Cross, 1996), allocating of resources (Hale and Cragg, 1996). Outsourcing non-valued processes (Minoli, 1995; Morley, 1993) is also considered as strategic thinking, which will be investigated in 5.8.5-5.8.7.

It is argued that BPR should be managed as a project (e.g., McElroy, 1996; Coulson-Thomas, 1992). This research adopts a ‘holistic re-engineering’ view,

incorporating strategic planning and project management towards a strategy-driven approach to implementing BPR. A staged BPR methodology was presented and discussed in 2.4. The respondents were provided with a set of 18 BPR activities in Q1, embedded within the context of strategic planning, project management, and BPR implementing issues. The findings are summarised in Table 5.11.

*Table 5.11: Summary of BPR Activities*

<i>BPR activities</i>	<i>Frequency: BPR SMEs</i>	<i>Percentage: BPR SMEs</i>	<i>Activities</i>
Examining current workflow and business processes	37	59.9%	BPR
Examining firm resources and environment – employee skills, technology, financial situation, and relations with other firms	27	43.5%	Strategic
Carrying out market surveys to know customers' needs	33	53.2%	Strategic
Developing strategies involving employees' participation	32	51.6%	Strategic
Establishing a new business vision and objectives	43	69.4%	Strategic, BPR
Setting out a BPR plan with goals for each process	30	48.4%	Strategic, BPR
Informing employees for possible change during BPR	39	62.9%	BPR
Forming a team to carry out BPR projects	17	27.4%	BPR, Project
Using information technology (IT) for process redesign	30	48.4%	BPR
Purchasing new IT applications	41	66.1%	BPR
Setting new performance standards and targets	36	58.1%	Project
Redesigning the workflow and processes	30	48.4%	BPR
Setting time schedule	16	25.8%	Project
Training employees for newly required skills, e.g. IT skills	42	67.7%	BPR
Conducting a comprehensive pilot of the new design	13	21.0%	Project, Strategic
Measuring BPR result regularly during implementation	20	32.2%	Project, Strategic
Refining BPR goals, objectives, and implementing methods after each assessment	17	27.4%	Project, Strategic
Outsourcing the whole BPR project	13	21.0%	Strategic, BPR

It was found that only 5 firms of the sample SMEs are involved in all the underlying strategic activities. This confirms the notion that strategic planning is

uncommon in SMEs (Levy and Powell, 1996; Hall, 1995; Rice, 1983) and even those SMEs do get involved in strategic thinking, it is usually performed more in an ad hoc fashion than in a comprehensive way (Ghosh and Chan, 1994). Project management in SMEs is weak, too. As shown in Table 5.12, relatively fewer BPR SMEs are involved with the activities categorised as ‘project management’, such as forming a team to carry out BPR projects, setting time schedule, conducting a pilot, measuring results and refining goals.

### **5.5.13 The importance of strategic planning and process management to BPR success**

While Stalk et al (1992) propose that BPR requires sound strategic planning, Buono (1997) and Pritsker (1995) acknowledge a lack of strategic vision in most BPR initiatives. This part of the data analysis sought to address the issue by exploring the importance of strategic thinking and project management to successful BPR in SMEs. This was done by a series of Mann-Whitney tests, examining each element of strategic planning and project management against ‘BPR results’ (Q13). Some significant findings are discussed as follows.

The purpose of investigating a firm’s resources and environments is to document the organisational capacities which can be used to deliver value or quality to end customers (Robbins and Asher, 1995; Pritsker, 1995). The survey confirms this view by revealing a positively statistically relationship between examining firm resources/environments (Q1.2) and two BPR results, ‘increased customer satisfaction’ (Q13.15) and ‘better relations with customers’ (Q13.13) [T8.1/2].

Higher customer satisfaction and enhanced customer relations are attributable to market surveys [T8.3/4]. Carrying out a market survey was also found to be significantly enhance market response (Q13.3) [T8.5]. A total of 30 BPR SMEs (48.4%) claim to have planned for BPR, while proper BPR planning (Q1.6) is proved to increase general BPR satisfaction (Q13.23) [T8.6]. Setting new performance standards is as much a human resource issue. The organisation needs to communicate these new expectations to employees (Saggers, 1994) and develop them with the right skill mix (Davis, 1995). The survey supports this assertion and found that setting new standards (Q1.11) is positively correlated with two BPR improvements: better top-down communication (Q13.23) and more generally skilled employees (Q13.22) [T8.7/8].

Project management, as Recardo and Jones (1997) propose, is to enable vision, objectives, and scope of re-engineering on target and allow it to be completed on time and within budget. The survey supports this view and points out that cost-efficiency (Q13.10) can be achieved by managing BPR initiatives as a project. This finding is derived from a series of Mann-Whitney tests. A positive correlation was found to exist between 'better cost-efficiency' BPR result (Q13.10) and three key project management components, i.e., setting time schedule (Q1.13), measuring results during implementation (Q1.16) and refining goals, objectives and implementing methods (Q1.17) [T8.9-11]. In addition, conducting a comprehensive pilot of the new process design (Q1.15) was found to significantly increase BPR satisfaction [T8.12].

#### 5.5.14 Reasons not to re-engineer

Despite fewer SMEs being involved in strategic thinking and project management, it should be noted that a large proportion of *non-BPR SMEs* have been engaged or are engaging in some re-engineering activities. 40.7% of *non-BPR SMEs* are currently examining workflow and business processes, and 25.9% claim to have redesigned them. This indicates that these firms may be ignorant of the term (22.2% of *non-BPR SMEs* had never heard of BPR) but are potential BPR undertakers. This finding is strengthened by 37% amongst the non-adopters of BPR claiming to wish to undertake BPR in the future. Other reasons not to re-engineer are lack of BPR expertise (55.6%), insufficient IT capacity (9.3%), concern of costs (13.3%), high failure rate (3.7%), and BPR as a management fad (14.8%). This is shown in Figure 5.5.

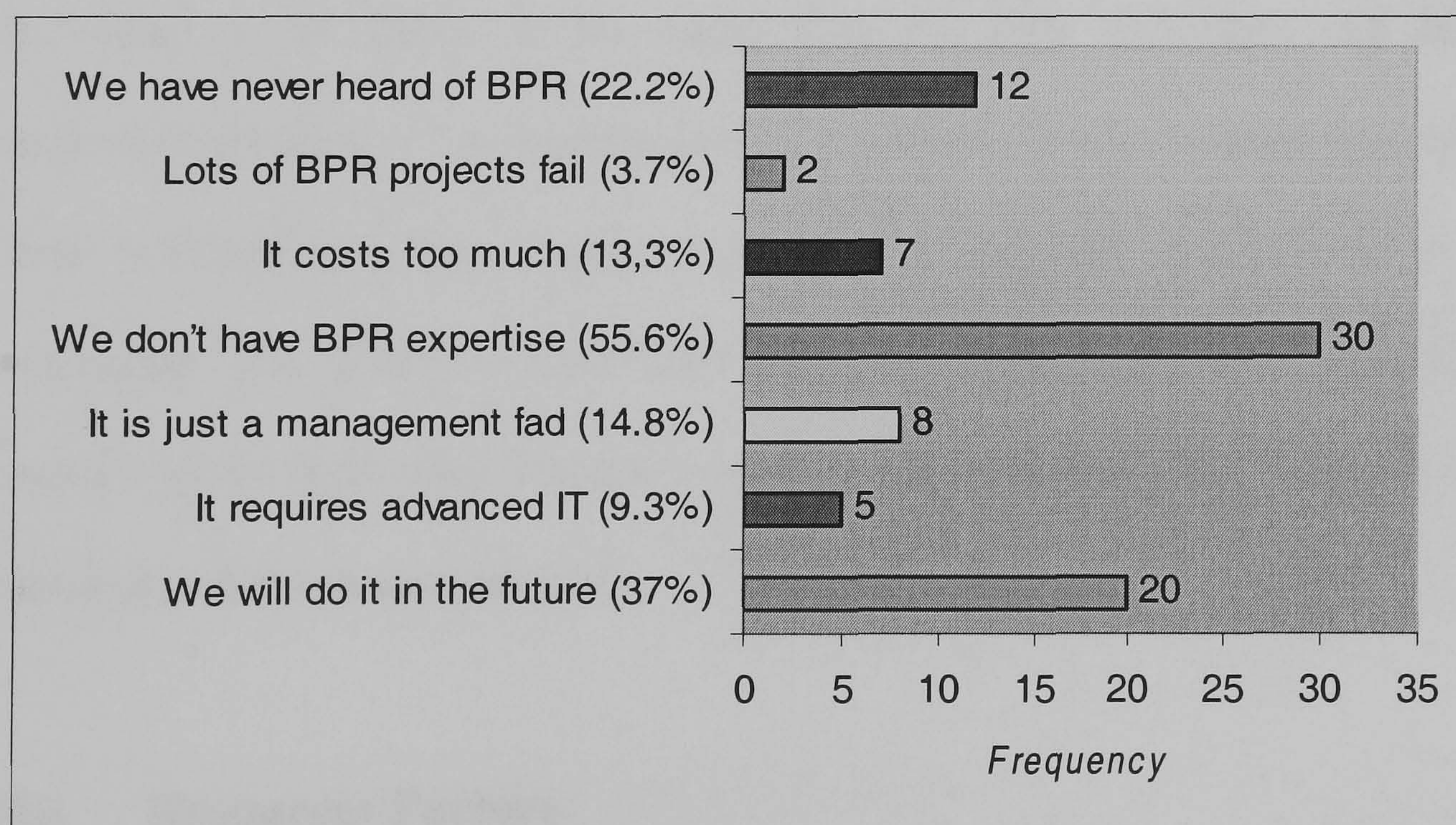


Figure 5.5: Reasons not to Re-engineer

### **5.5.15 Summary of test results for cultural factors**

To sum up, this part of the data analysis investigated the cultural dimension and its affiliated factors outlined in the framework, i.e., risk attitudes, management support, employee empowerment, innovation and strategic thinking. It is shown that an ambitious business strategy and a higher risk-taking attitude significantly increase the chance of BPR success. If the SMEs' strategy is dominated by owner-managers (Ghosh and Chan, 1994), the characteristics of small business entrepreneurs as related to firm policy formulation should be further investigated. Management style within SMEs will need to be focused on more as the finding suggests that a sound communication system and higher employee autonomy tend to foster a more innovative and team-based environment that favours BPR. In the context of strategic thinking, the survey reveals that SMEs do re-engineer the core business processes, which delivers strategic value to major customers. However, fewer SMEs in the study plan for BPR and carry out their re-engineering initiatives as a process change project. While conducting a pilot and time scheduling within budget can largely increase cost-efficiency, it is paramount for SMEs to undertake BPR in a more systematic and efficient manner given their often-limited organisational resources. The resources factors are analysed in the next section.

## **5.6 Resources Factors**

Chapter 2 identified resources relevant to SMEs undertaking BPR as financial capacities, human resources, and quality management experiences. It was



proposed in Chapter 3 that both financial constraints and a lack of in-house professionals in SMEs are potential inhibitors to BPR success. This is justified by the fact that re-engineering projects often involve expensive programmes such as skills training (Hall et al, 1993) and require sophisticated know-hows in process redesign (Kochanski and Ruse, 1996). In the context of human resource management, SMEs investing in R&D are more likely to promote process innovation, and hence to succeed in BPR initiatives. It was also proposed in Chapter 3 that quality management experiences in SMEs may largely increase the chance of success in BPR. These issues are tested as follows.

<i>Proposition 9</i>	Due to budget constraints, SMEs cannot undertake long-term continuous process improvement so their BPR projects will aim at short-term financial results.
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### **5.6.1 Sound financial position to undertake BPR**

The financial capacity in BPR SMEs is operationalised by two metrics: BPR budget (Q9) and limited capital (Q21.302). SMEs that could establish a BPR budget are presumably more financially sound.

There is a high percentage of BPR SMEs (40 firms, 64.5%) who claim to have arranged a budget for their re-engineering projects. As shown in Figure 5.6, BPR budget in SMEs is mainly allocated for employee training (59.7%), ahead of purchasing IT/IS applications (48.4%) and business consulting (11.3%).

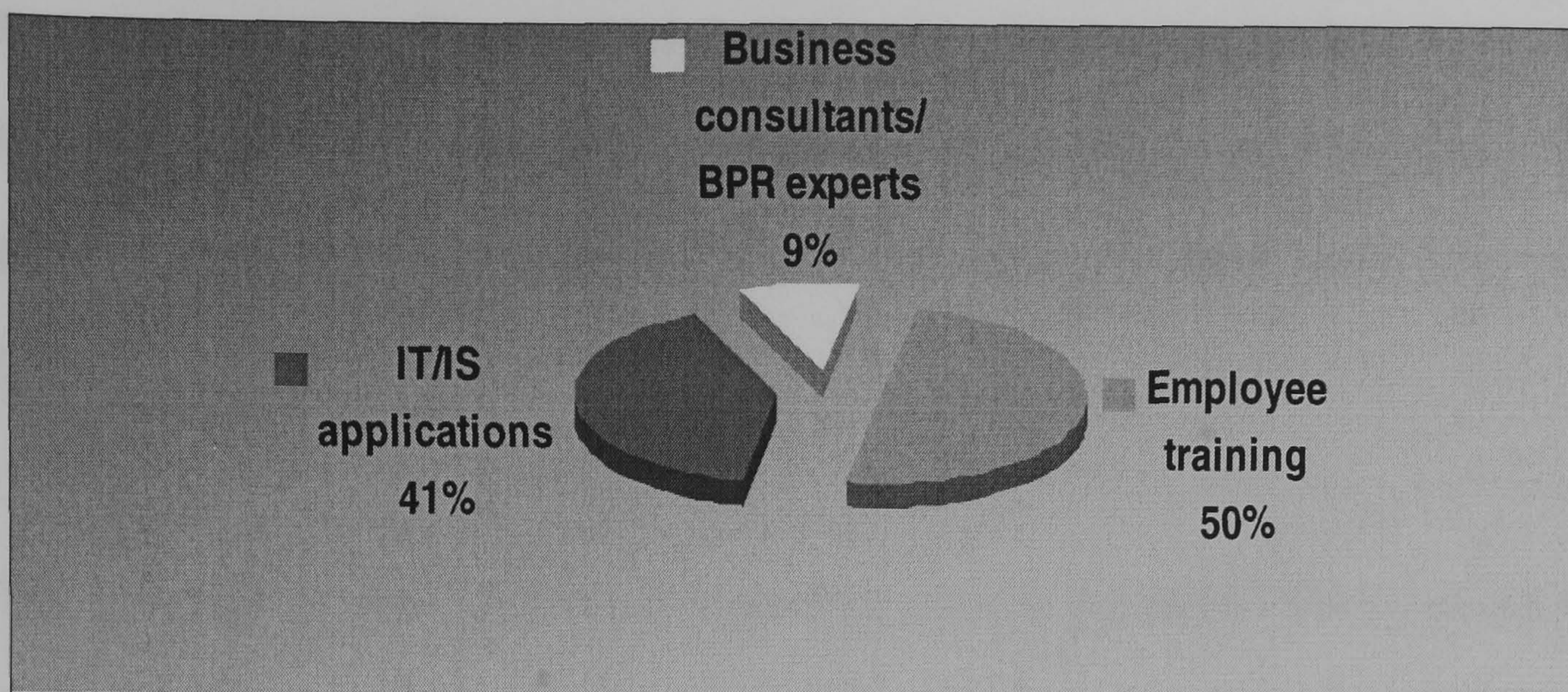


Figure 5.6: BPR spending

It appears that SMEs have to be in a reasonably good financial position to launch BPR. This finding is derived from the fact that only 14 firms (22.6%) of BPR SMEs acknowledge a financial insufficiency within the organisation in Q21.302. The survey further validated this by a Mann-Whitney test that shows a statistically significant relationship between 'limited capital' (Q21.302) and 'redesigning workflow and processes' (Q1.12). The Spearman's correlation coefficient, -0.2913, suggests that it is less likely for SMEs to engage in BPR when they are financially deficient [T9.1].

### 5.6.2 Financial insufficiency as an inhibitor of BPR

In investigating the financial situation in SMEs, the respondents were asked, on a Likert scale of 1(disagree) to 5(agree), to indicate whether cost is a major concern. A mean score of 4.26 suggests that the responding organisations are very cost-conscious. Hence it is understandable that 43 BPR SMEs (69.4%) re-

engineered aimed at decreasing costs. Since SMEs typically have limited financial resources (Weinrauch et al, 1991), the owner-managers have to find a low-cost way to deal with their expenditures. It was found that ‘budgeting for BPR’ (Q9) is positively correlated with ‘cost-efficiency’ BPR result (Q13.10) [T9.2].

The respondents were asked to indicate how relevant financial difficulties are to BPR failure on a Likert scale of 1(not at all) to 5(very much) [Q16.7]. The mean score of responses is 4, demonstrating that financial insufficiency could pose a significant constraint to BPR. Consistent with a previous finding that financial insufficiency may inhibit SMEs from redesigning workflow and processes (5.6.1), a Mann-Whitney test reveals a reverse relationship between ‘limited capital’ (Q21.302) and ‘willingness to re-engineer again’ (Q18) [T9.3]. Without financial support, SMEs are less likely to commit themselves to BPR.

<i>Proposition 10</i>	Lack of in-house professionals and expertise in SMEs may significantly inhibit their BPR performance
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### **5.6.3 Human resource management in the sample SMEs**

Human resources in SMEs refer to owner-manager’s management experience and employees’ skills/expertise. The literature argues that human resources in SMEs are limited. The owner’s lack of appropriate management experience contributes to almost 60% of owner-managed businesses failure (Nash and Rock; 1996), while SMEs typically have fewer in-house technical experts to deal with

new developments (Ferrell, 1996). This phenomenon is augmented by the fact that SMEs are reluctant to implement management practices and to train employees (Watkins, 1983; Machinnon, 1996; Vickerstaff et al, 1991).

48 firms (41.4%) indicate in Q21.313 that their businesses rely primarily on the owner's sale skills and operation knowledge, while only 25 firms (21.6%) claim to regularly seek management knowledge from the government, SME institutes, or management consultants (Q21.308). A plausible explanation is that small firms are usually caught up in day-to-day operations (Woods, 1996). However, fewer SMEs (32 firms, 27.6%) view operating efficiency more important than management skills (Q21.307). This means a large proportion of responding organisations recognise the need for owner-managers to upgrade their management knowledge.

Q22.6 asked the respondents, on a Likert scale of 1 (disagree) to 5 (agree), whether their employees are well skilled workers and no extra training is required. A mean score of 1.92 clearly indicates a need for employees in the researched SMEs to update their work skills. In evaluating general human resource management, the respondents were asked to rank 'firm's HRM for employing, promotion, and performance standards' on a Likert scale of 1 to 5 (Q22.3). A mean score of 3.69 demonstrates a reasonably good HRM within the responding organisations.

#### **5.6.4 Management knowledge and BPR**

A sizeable 30 firms (55.6%) of non-BPR firms indicate that they do not have the BPR expertise to carry out re-engineering projects. The research seeks to ascertain whether enhanced management knowledge increases the probability of BPR success. This is examined by a Mann-Whitney test, comparing the perceived general BPR satisfaction (Q13.23) of the firms who seeks management skills from various sources, e.g., government and that of those who do not (Q21.308). A positive correlation was found between 'seeking management skills' and 'general BPR satisfaction' [T10.1].

As to what 'management skills' are required in a re-engineered organisation, BPR authors advocate team-based 'coaching' rather than a centralised or autocratic management style (Hirschfield, 1994; Hammer, 1996). Techniques and tools may range from project management, e.g. setting clear time lines and using a PC for mapping and documentation, to 'soft' issues, e.g., motivating employees and dealing with change. This will be discussed in later sections and in the case studies. Alternatively, due to a lack of management skills and BPR expertise, SMEs may turn to external consultants for implementation assistance (Adhikari, 1996). The respondents were asked in Q1.18 whether they outsourced their BPR project. A total of 13 BPR SMEs (21%) gave positive answers to this question. Issues related to outsourcing will be discussed in 5.8.5-7.

### 5.6.5 Employee participation and skills training to BPR success

It is argued that small businesses, with their limited resources, need the full participation of every employee in order to compete (Kinni, 1995). Employee involvement is vital to BPR success (Nelson, 1994; Brady, 1995). Q8.6 investigates employee participation by four BPR stages, planning, process redesigning, implementing and evaluating. As shown in Figure 5.7, employees are largely involved at the implementation stage of SMEs' BPR initiatives.

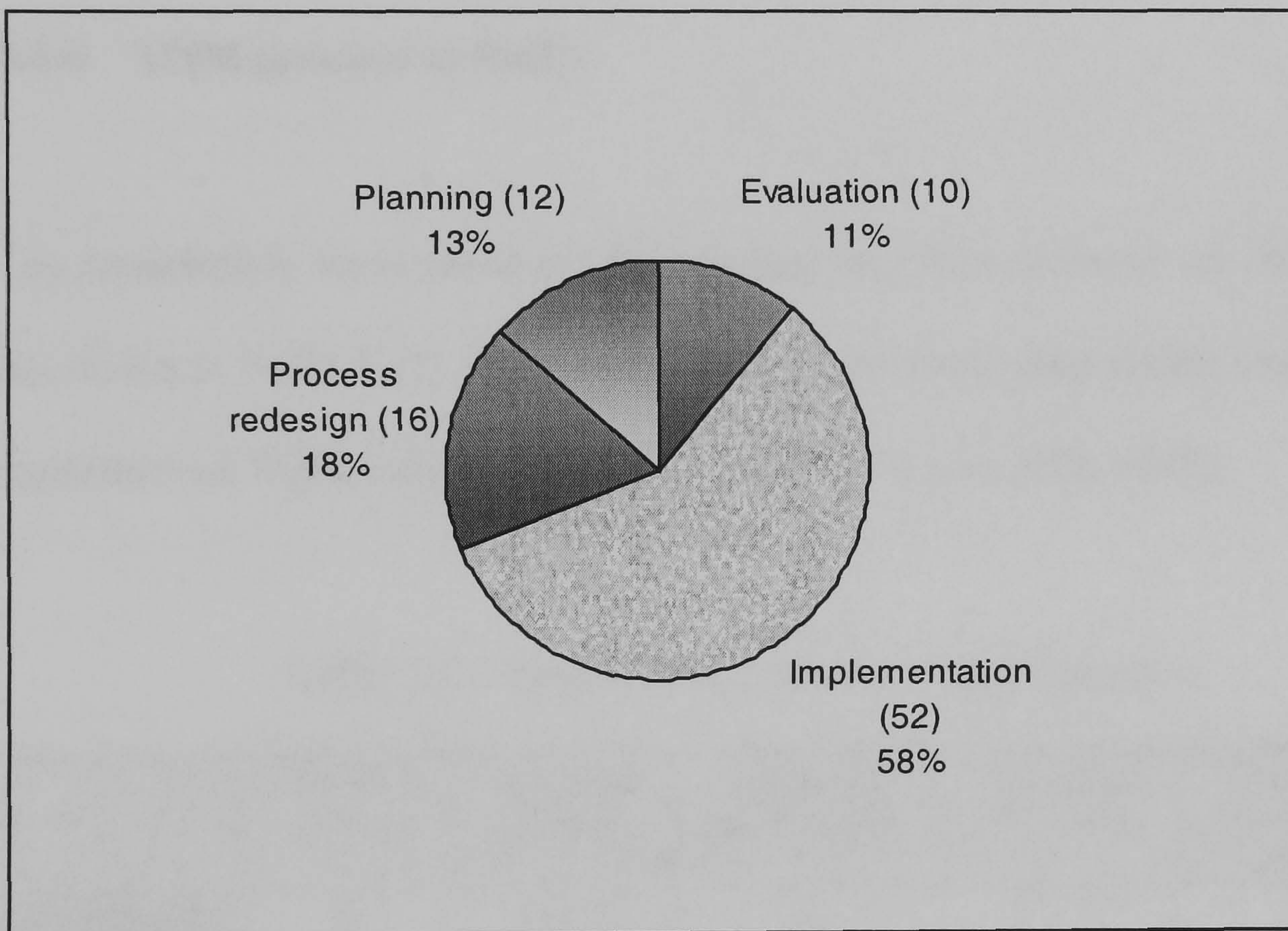


Figure 5.7: Employee participation in BPR

Bergman (1994) argues that the streamlining of processes and centralising certain equipment will create multi-skilled workers from a re-engineering effort. In 5.6.4, the majority of responding organisations acknowledged a need for further skills training. Contrary to the notion that SMEs are reluctant to train, a high percentage of BPR SMEs (42 firms, 67.7%) train employees for newly required

skills, e.g. IT skills for their BPR initiatives (Q1.14). Training employees was found to be positively correlated with BPR success. This is a result from a Mann-Whitney test that reveals a positively significant relationship between ‘training employees’ (Q1.14) and ‘general BPR satisfaction’ (Q13.23) [T10.2].

<i>Proposition 11</i>	Success in more likely if SMEs have previous TQM experiences.
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### 5.6.6 TQM practice in SMEs

The respondents were asked in Q10 whether they have done or are doing TQM. As shown in Table 5.12, 62 firms (53.4%) of the researched SMEs claim to have implemented TQM, among which 54 firms (87.1%) are BPR SMEs.

*Table 5.12: Profile of Respondents: TQM practice*

	<i>Frequency (SMEs)</i>	<i>Percentage (SMEs)</i>	<i>Frequency (BPR SMEs)</i>	<i>Percentage (BPR SMEs)</i>	<i>Frequency (non-BPR SMEs)</i>	<i>Percentage (non-BPR SMEs)</i>
Firms with TQM experiences	62	53.4 %	54	87.1 %	8	14.8 %

The notion that TQM and BPR do exist simultaneously within organisations (Yeo, 1996) is reaffirmed by a Mann-Whitney test that reveals a statistically significant relationship between ‘whether SMEs undertake TQM’ (Q10) and ‘whether SMEs undertake BPR’ (Q2) [T11.1]. A high score of Spearman’s correlation coefficient, 0.723, indicates a strong association between both approaches.

### 5.6.5 Past TQM experiences enhance BPR

The literature argues that TQM-oriented organisations are in a better position to apply BPR techniques (Sinclair, 1994; Sheridan, 1991). Specifically, both approaches share the same principles, e.g., management by process, concern for customers (Hyde, 1995; Smith et al, 1996; Cross et al, 1994), and extensive use of work teams (Hyde, 1995).

The survey investigates this by asking the respondents to rank the extent to which TQM enhances BPR. Five specific factors were given: management by process, concern for customers, use of work teams, employee involvement and quality improvement (Q10). The results, as shown in Figure 5.8, demonstrate a high level of support.

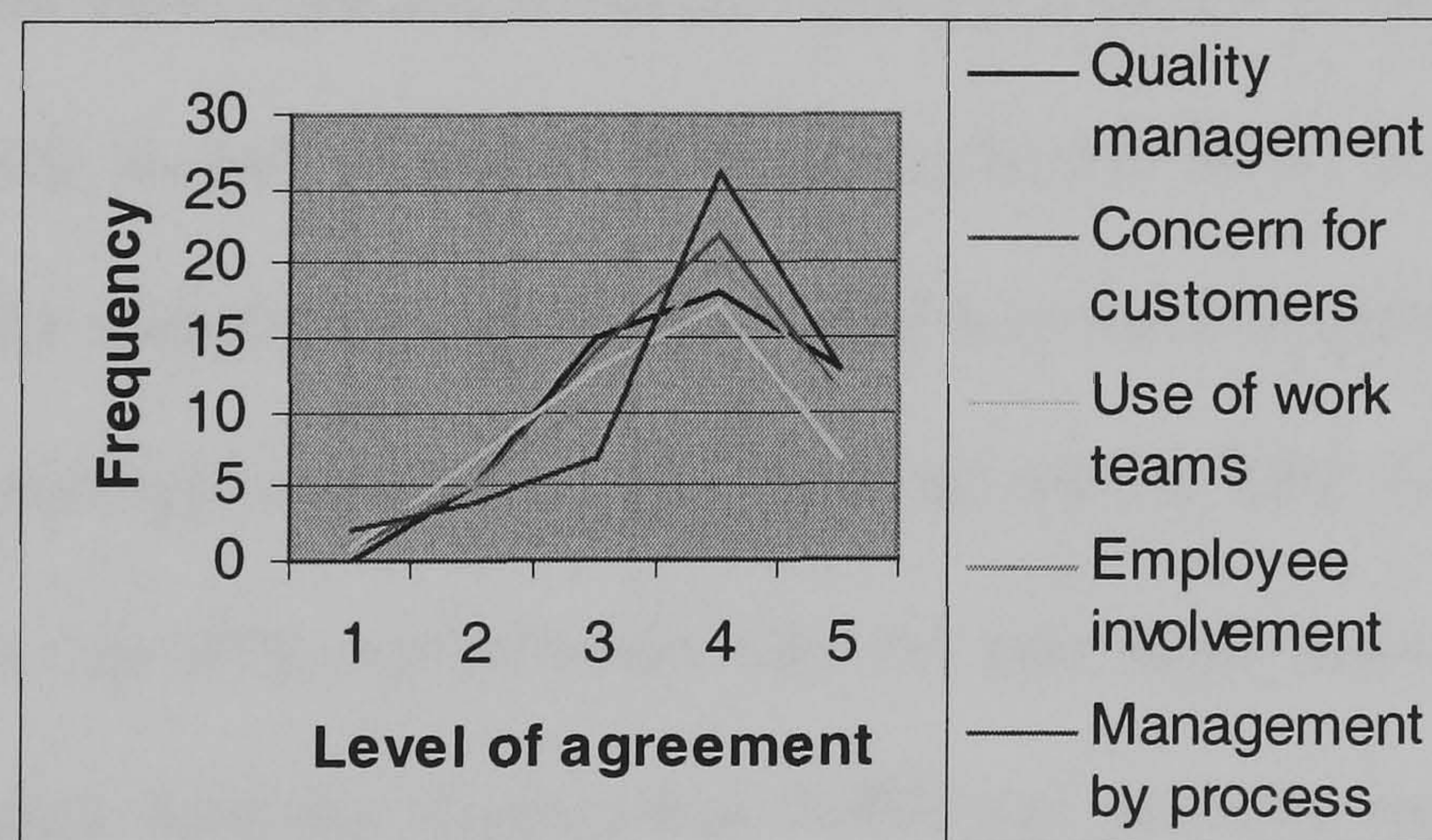


Figure 5.8: How TQM supports BPR

The survey also seeks to ascertain whether TQM disciplines and techniques aid firms to realise the full benefits of re-engineering (Cross et al, 1994; Dixon et al,



1994). A series of Kruskal-Wallis was executed on the five factors of TQM against 'BPR results' (Q13). 'Process management in TQM' (Q10.1) was found to be positively correlated with three BPR results: 'more team-based operation' (Q13.2), 'more employee involvement in decision-making' (Q13.12), and 'more functionally integrated departments' (Q13.1) [T11.2-4]. 'Concern for customers in TQM' (Q10.2) is positively correlated with four BPR improvements: 'better more response to market'(Q13.3), 'better understanding customer's needs'(Q13.9), 'increased customer satisfaction'(Q13.15), and 'enhanced product and service quality'(Q13.18) [T.11.5-8].

#### **5.6.8 Summary of the test results for resources factors**

In summary, the resources factors looked into firms' financial capacities, human resources as well as past TQM experiences. Consistent with previous findings in the survey, financial insufficiency may pose constraints to BPR success. This is due to the fact that BPR typically involves expensive programmes such as skills training. Budgeting as part of the BPR planning is proved to be cost-efficient. The majority of the responding organisations claim to have undertaken TQM and past quality management experiences are believed by the BPR SMEs to have a positive influence on BPR performance. On the one hand, management skills need to be upgraded. And this implies that SMEs can use what has been learned from TQM, e.g. management by process, employee empowerment and apply it to BPR. On the other hand, further skills training is necessary for employees to adapt themselves to the newly re-engineered environment. The required skills, as found in the survey, are IT expertise and end-user computing in particular.

Indeed, IT plays a significant part in process innovation (Davenport and Short, 1990; Clark and Stoddard, 1996; Lefebvre and Lefebvre, 1993). Technological factors will be tested in the next section.

## **5.7 Technology Factors**

Technological factors include issues related to a firm's IT/IS infrastructure, end-user skills and IT expertise as well as IT spending. Chapter 2 argued that compared to larger corporations SMEs are relatively behind in adopting modern IT and lower IT utilisation is attributed to factors such as unqualified personnel or inappropriate IT planning (Cragg and Zinatelli, 1995; Raymond, 1987; Ghosh and Chan, 1994). It is thus proposed in Chapter 3 that poor IT/IS infrastructure in SMEs may inhibit BPR performance. Insufficient end-user skills can also pose constraints to BPR performance given the essential supportive and enabling roles IT plays as a tool for change management (Gant, 1992; Venkatraman, 1994). Because of their short-term investment strategy, SMEs may be more reluctant to invest in IT for BPR. These propositions are tested as follows.

<i>Proposition 12</i>	Poor IT/IS infrastructure in SMEs may inhibit BPR performance.
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### **5.7.1 IT/IS infrastructure in SMEs**

IT/IS infrastructure refers to the IT capability within a firm, usually the services provided by the IS function (Davenport et al, 1989). This may include IT

applications available for use, both hardware and software. In the current study, IT/IS infrastructure in SMEs is operationalised by IT tools and IT performance. The respondents were asked to rank their IT tools (Q23.6) and IT performance (Q23.7) on a Likert scale of 1(poor) to 5(sufficient/satisfactory). The mean scores are 2.88 for IT tools and 2.69 for IT performance, indicating a lower than average IT/IS infrastructure within the researched SMEs.

The responding organisations are still at an immature stage of using IT for business operations. On average the responding organisations have five years of computerisation, with BPR SMEs' 5.57 years longer than non-BPR SMEs' 4.38 years. In Q24.2, the respondents were asked to indicate what IT applications/tools are currently in use. While PCs and telecommunications – telephones, facsimile machines – are commonly used by responding organisations, the IT applications generally available are mainly used for word-processing, E-mails, and databases (Table 5.13). BPR SMEs are more likely to use mainframe computers and tend to use knowledge software more (for decision-making support), imaging processors, and production applications. This suggests a shift of IT potential from a supportive role to offering a mechanism for process innovation (Davenport and Short, 1990).

*Table 5.13: IT tools in SMEs*

IT tools	Frequency (SMEs)	Percentage (SMEs)	Frequency (BPR SMEs)	Percentage (BPR SMEs)	Frequency (non-BPR SMEs)	Percentage (non-BPR SMEs)
Hardware – Mainframe computers	26	22.4%	18	29.0%	8	14.8%
Hardware – PCs	98	84.5%	54	87.1%	44	81.5%
Hardware – Telecommunications	89	76.7%	46	74.2%	43	79.6%
Software – Word-processing	87	75%	46	74.2%	41	75.9%
Software – E-mails	42	36.2%	27	43.5%	15	27.8%
Software – Databases	61	52.6%	35	56.5%	26	48.1%
Software – Decision making support	12	10.3%	7	11.3%	5	9.3%
Software – Image processing	14	12.1%	11	17.7%	3	5.6%
Software – Production support	18	15.5%	12	19.4%	6	11.1%

### **5.7.2 IT/IS applications in support of BPR**

Previous studies suggest that process innovation is IT driven (Hammer, 1990; Alter, 1990; Gant, 1992; Aikins, 1993), achieved by IT (Chita, 1996), and in turn BPR has profound impact on IS infrastructure (May and Kettelhut, 1996; Kettinger et al, 1997). 30 BPR SMEs (48.4%) use IT for process redesign (Q1.9). Further insight into how IT facilitates SMEs' re-engineering initiatives was obtained by asking the respondents to specify the IT tools used in support of BPR (Q11.2) and to identify the reasons for using them (Q11.3).

The most commonly used IT applications, as exhibited in Figure 5.9, are electronic messaging, telecommunications and networks and workflow software and imaging. This is consistent with previous studies that electronic messaging, such as electronic data exchange (EDI) has been used for network-based linkage to reduce communications costs (Clemons et al, 1992; Morton, 1991) and workflow software and document imaging have been identified as critical IT tools for organisational change (Chita, 1996; Ellis et al, 1991).

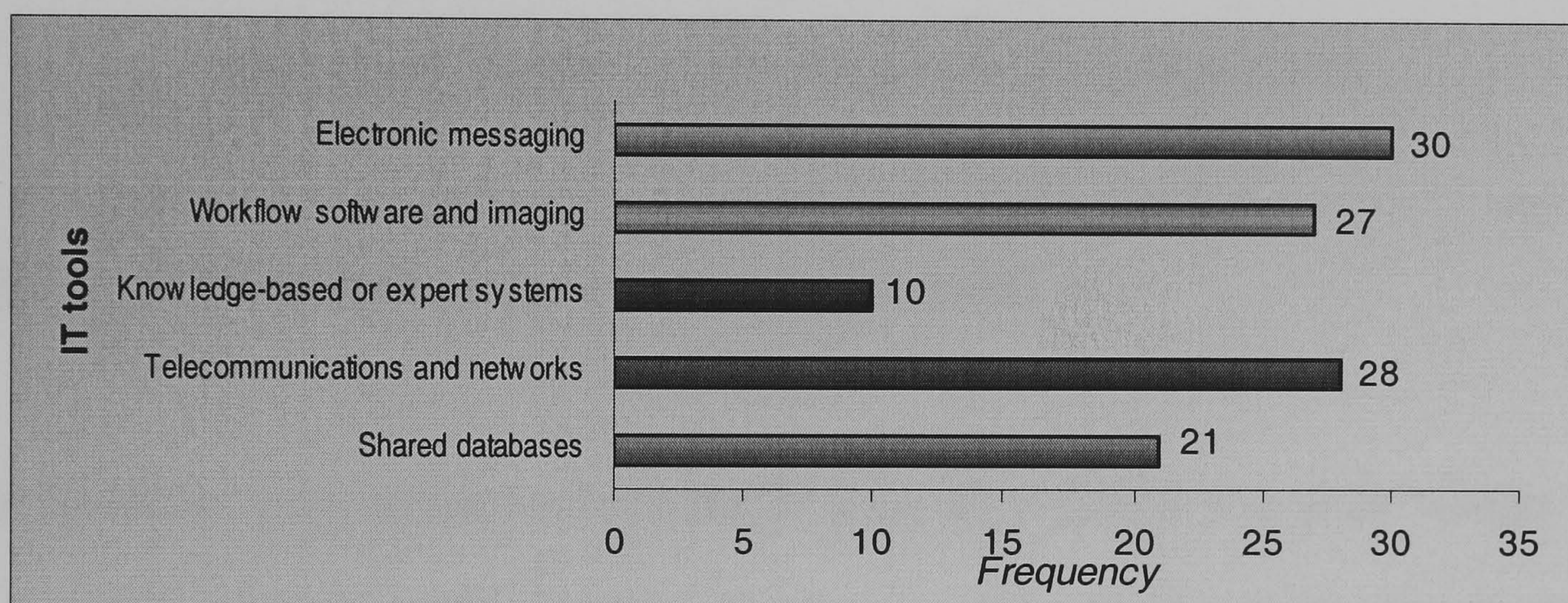
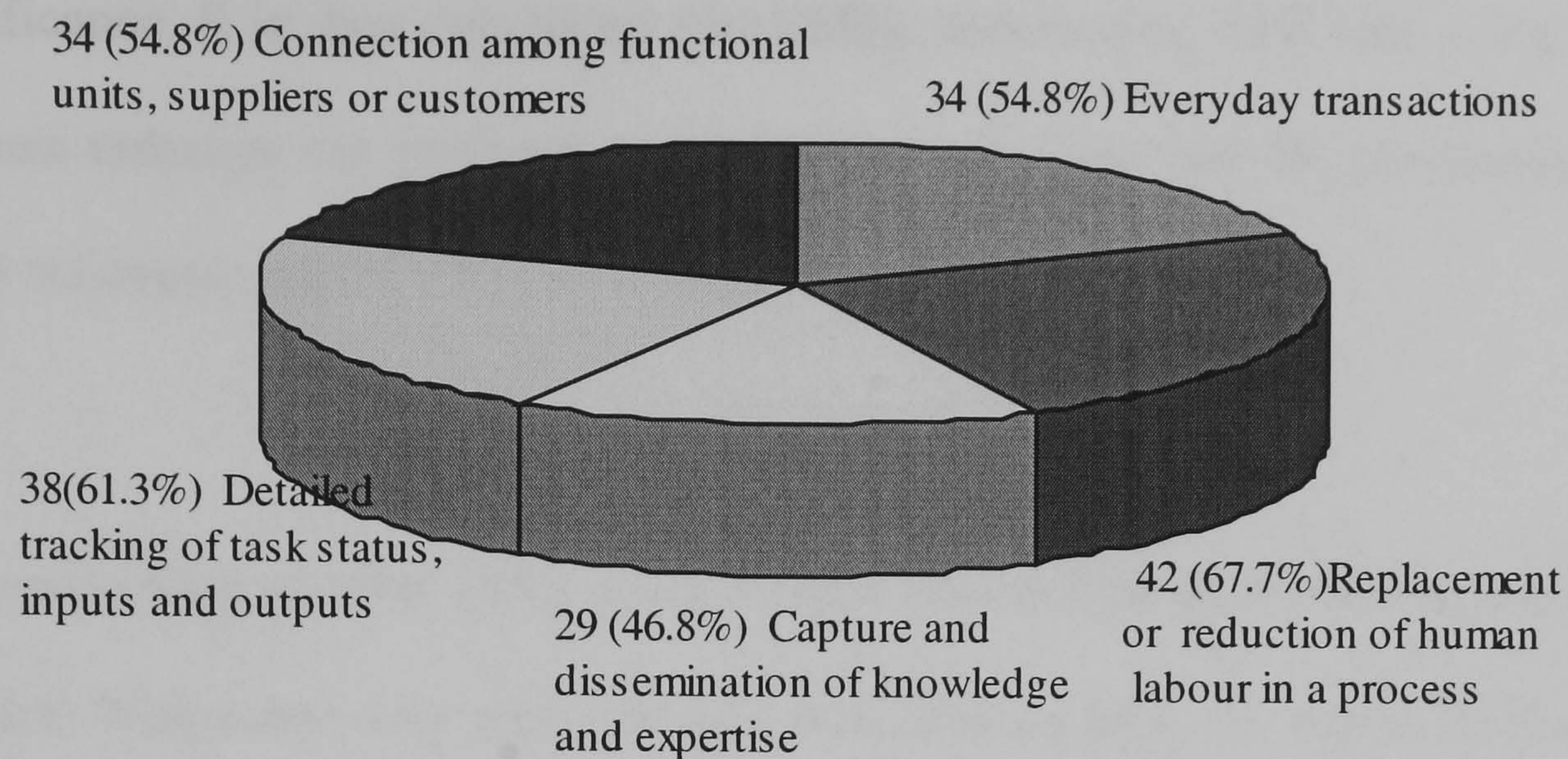


Figure 5.9: IT tools used for BPR in SMEs

While the reasons for using these IT/IS tools for BPR appear similar as shown in Figure 5.10, much consideration is on replacement or reduction of human labour in processes. On reflection of the nine categories of IT opportunities for supporting process re-engineering identified by Davenport (1993), IT utilisation in SMEs in support of BPR is relatively low. Many have argued that this may be due to a lack of several factors such as qualified personnel (Eid and Moghrabi, 1995; Naylor and William, 1994), managerial abilities (OECD, 1995), and formalisation in IT strategy (Ghosh and Chan, 1994), thereby resulting that the potential of IT capacities in process integration has not been fully realised in SMEs.



*Figure 5.10: Purpose of using IT/IS tools for BPR in SMEs*

### 5.7.3 IT/IS infrastructure and BPR performance

It is evident in the current research that IT plays an important role as an ‘enabler’ (e.g., Hammer and Champy, 1993; Martinsons, 1995). A statistically significant relationship was found to exist between ‘IT tools’ (Q23.6) and ‘whether SMEs implement BPR’ [T12.1] (Q2). A positive Spearman’s correlation coefficient, 0.227, suggests that in SMEs where sufficient IT tools are available a BPR strategy is more likely to be adopted. A Kruskal-Wallis analysis of variance further reveals a statistically significant relationship between IT tools (Q23.6) and using IT for process redesign (Q1.9) [T12.2]. The correlation coefficient, 0.336, indicates that with sufficient IT tools available SMEs are more likely to use IT for BPR.

Similar results were generated from two Kruskal-Wallis tests on ‘IT performance’ (Q23.7) against ‘whether SMEs undertake BPR’ (Q2) and ‘using

IT for process redesign' (Q1.9) [T12.3/4]. Both tests attained the level of significance. It is thus concluded that SMEs undertaking BPR and using IT for process redesign are positively correlated to IT tools and IT performance, or IT/IS infrastructure.

In investigating whether IT/IS infrastructure affects BPR performance, a series of Kruskal-Wallis one-way analysis were executed on both 'IT tools' (Q23.6) and 'IT performance' (Q23.7) against 'BPR results' (Q13). It was found that 'general BPR satisfaction' (Q13.23) is positively statistically correlated with both IT tools and IT performance [T12.5/6]. This gives a clear indication that better IT/IS infrastructure significantly increases the probability of BPR success. Specifically, 'IT tools' were found to be positively linked to 'functional integration' (Q13.1) and 'more common source of information' (Q13.7) BPR results [T12.7/8]. This supports previous research, suggesting that IT aids BPR in eliminating time and distance and improving communication and information sharing (Martinsons, 1995; Keen, 1991; Vantrappen, 1992). It is evident in the current study that this is achieved through a more common source of information sharing, resulting in more functionally integrated organisations.

<i>Proposition 13</i>	Inappropriate IT/IS expertise and insufficient end-user skills will inhibit BPR performance in SMEs.
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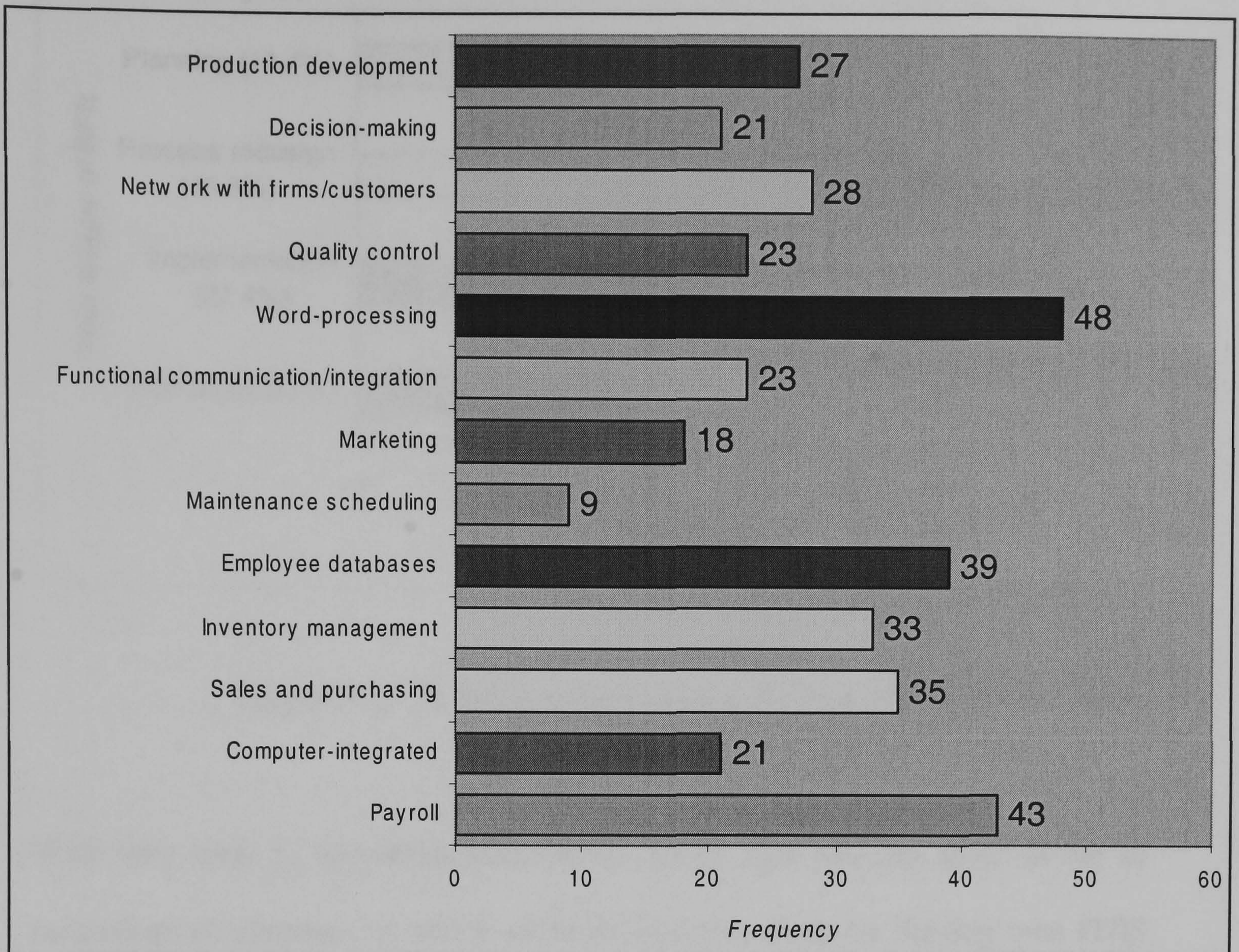
#### **5.7.4 End-user computing and IT/IS expertise in SMEs**

The survey investigates IT expertise and end-user computing in SMEs by looking at the ‘internal support for personal computing available to users in small firms’ (Zinatelli et al, 1996). Q21.306 asked the respondents whether they have own IT/IS director/professionals. Less than half of the sample SMEs (49 firms, 42.2 %) gave positive responses to this question. In keeping with Zinatelli et al (1996) and Raymond (1988), this finding indicates the limited internal IT support and in-house developments in SMEs.

Alternative to internal IT support, many authors propose the use of external IT consultants/vendors (e.g., Cragg and Zinatelli, 1995; DeLone, 1988). However, only 8 SMEs (6.9%) in the study were found to have outsourced some/all of their IT/IS.

The respondents were asked to rank their end-user skills in Q23.8 on a Likert scale of 1(poor) to 5(sufficient). A mean score of the responses, 2.61, demonstrates a restricted IT/IS knowledge in the small business sector. Due to the lack of internal IT expertise, 36 SMEs (31%) simply purchase software packages for use (Q21.310). The general purposes of IT use in the sample SMEs are internal control, e.g., word-processing, payroll and employee databases, rather than strategic management, e.g., marketing, decision-making, and networking. This is shown in Figure 5.11.





*Figure 5.11: The purposes of using IT/IS in SMEs*

### **5.7.5 IT/IS professionals involvement in BPR initiatives**

More BPR SMEs (35 firms, 56.5%) claim to have their own IT director/professionals, compared to 14 (25.9%) of non-BPR SMEs. As shown in Figure 5.12, IT professionals are largely involved at the process redesign stage of process re-engineering.

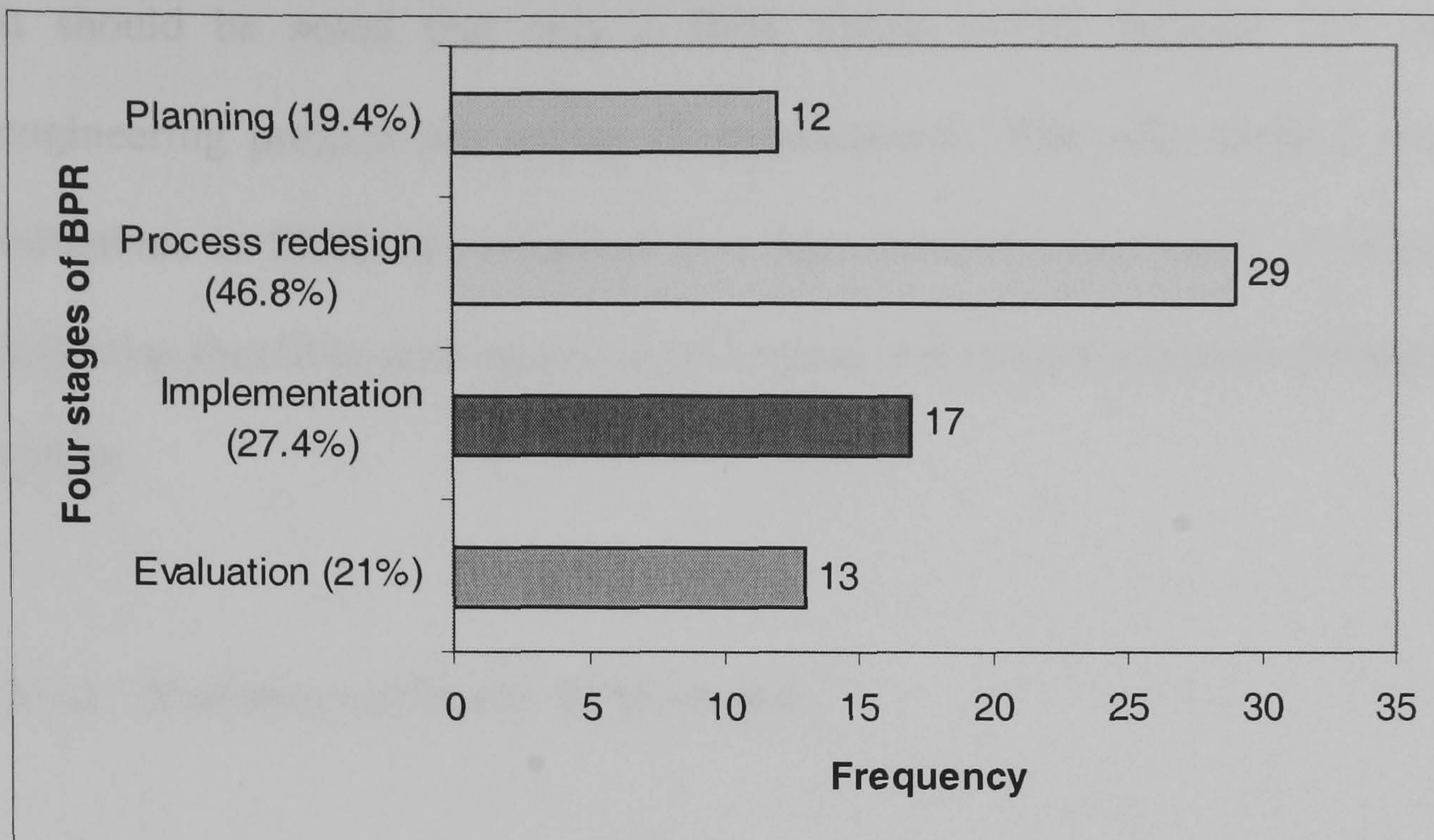


Figure 5.12: IT professionals support BPR in SMEs

With their own IT director/professionals, SMEs may become more aware of technological advances. A series of Mann-Whitney tests on 'having own IT/IS director/professionals' (Q21.306) against 'BPR results' (Q13) reveals a statistically significant association between internal IT/IS and 'better undertaking of technological change' BPR result (Q13.11) [T13.1]. However, in-house trained IT/IS does not significantly increase the chance of BPR success. No statistically significant effect was found to exist between 'having own IT/IS director/professionals' and 'general BPR satisfaction' (Q13.23) [T13.2].

It should be noted that only 3 BPR SMEs (4.8%) indicate that their re-engineering projects are led by IT professionals. This may suggest that BPR initiatives in SMEs are regarded as a management issue where re-engineering solutions should involve more organisational and cultural elements (Wastell et al, 1994).

### **5.7.6 End-user skills and BPR success**

As discussed in 5.7.2, IT utilisation in support of BPR is relatively low. IT tools commonly used by the responding SMEs, e.g., electronic messaging, workflow software and imaging, networks, can be new to the organisation (Martinsons, 1995). Providing employees with end-user skills facilitates the practical implementation of BPR. A positive statistically significant relationship was found to exist between 'end-user skills' (Q23.8) and 'conducting a comprehensive pilot of the new design' (Q1.15) [T13.3]. This indicates that employees with technological know-how find it easier to conduct a pilot of the redesigned business process.

Adequate end-user skills are perceived to be a significant factor to BPR success. This finding is a result of a Kruskal-Wallis test that reveals a statistically significant relationship between 'end-user skills' (Q23.8) and 'general BPR satisfaction' (Q13.23) [T13.4]. The Spearman's correlate coefficient, 0.393, indicates that sufficient end-user skills significantly increases the chance of a successful re-engineering.

<i>Proposition 14</i>	The way in which SMEs invest in IT for BPR depends largely on their current strategies.
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### 5.7.7 IT spending in SMEs

According to Childe et al (1994), inhibited by the long payback periods, management in small business may be more reluctant to engage in large scale IT spending. In order to ascertain if this is the case, the respondents were asked to provide information on the extent to which SMEs invest in IT on a Likert scale of 1(low) to 5(very high)[Q23.9]. A mean score of the responses, 2.53, indicates that it is less likely for SMEs to heavily invest in IT for BPR. SMEs willing to spend on IT are usually those with in-house IS/IS. 'IT spending' (Q23.9) was found to be positively correlated with 'having own IT director/professionals' (Q21.306) [T14.1].

It is argued that IT investment is determined by the firm's strategic context (Earl, 1989; Henderson and Venkatraman, 1993). Using the Kruskal-Wallis test, a statistically significant association was found to exist between 'IT spending' (Q23.9) and 'short-term cost-profit focus' (Q22.5) [T14.2]. The positive correlation coefficient, 0.121, reflects a short-term strategy in IT investment. This finding corresponds with the IPD Report (1995) that acknowledges the short-term profit focus usually found in the small business sector.

Nevertheless, higher IT spending has a positive influence on IT/IS infrastructure and end-user computing. This finding is justified by the positively significant

relationships found between 'IT spending' (Q23.9) and IT tools (Q23.6), IT performance (Q23.7), and end-user skills (Q23.8) [T14.3-5]. The relevance of IT investment in SMEs to BPR performance is tested next.

### 5.7.8 IT investment and BPR performance

As shown in Figure 5.13, BPR SMEs spend more on IT than non-BPR SMEs. It should be noted that higher IT investment does not result in higher percentage of SMEs implementing BPR. Using Kruskal-Wallis test, 'IT spending' (Q23.9) has no statistically significant effect on 'whether SMEs undertake BPR' (Q2) [T14.6].

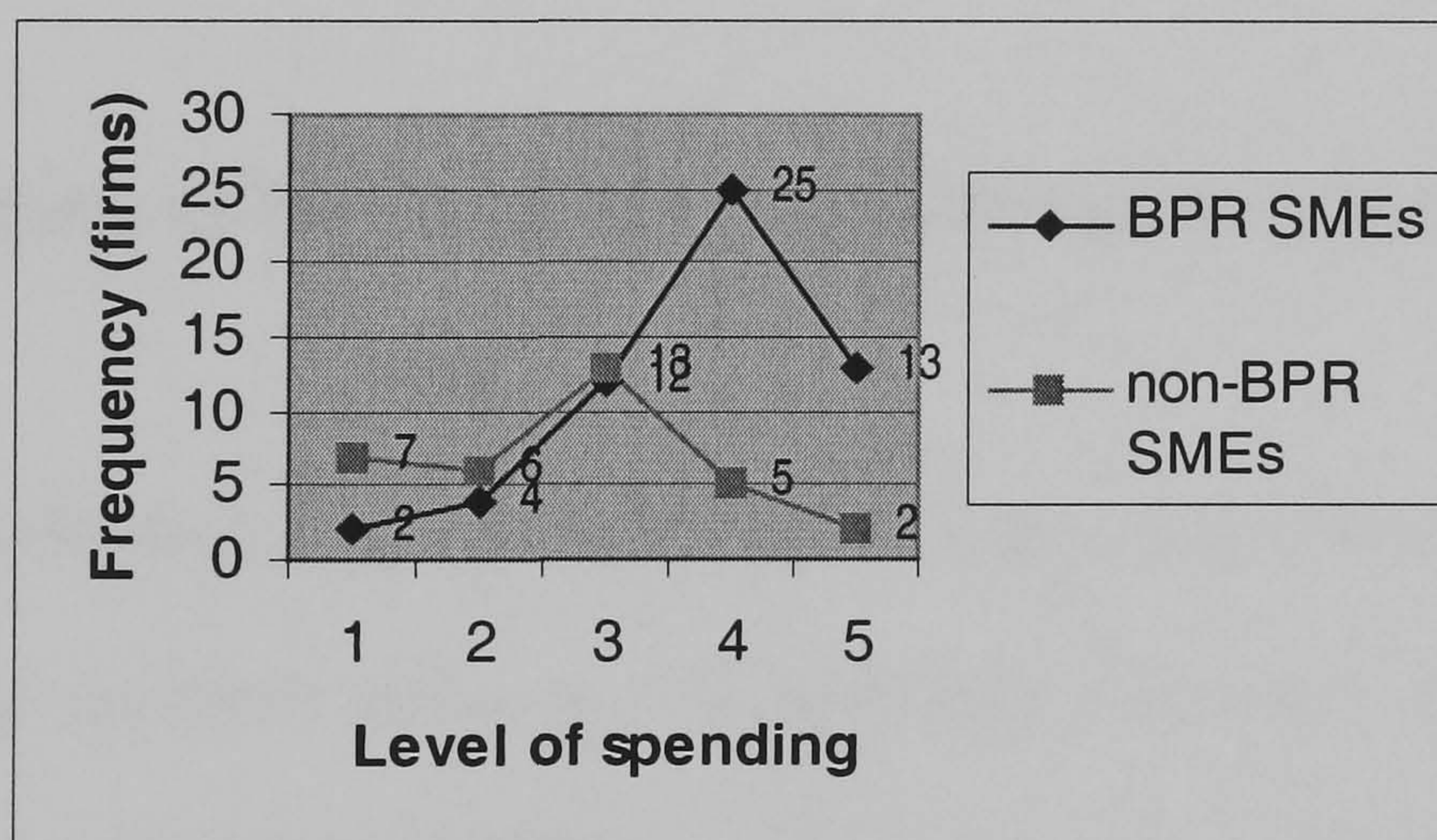


Figure 5.13: Comparison of BPR SMEs and non-BPR SMEs in IT spending

However, it is evident that using IT tools for re-engineering is related with higher IT investment. This is a result from a Kruskal-Wallis one-way analysis of variance that shows a statistically significant association between 'IT spending' (Q23.9) and 'using IT tools for BPR' (Q11.1) [T14.7] This finding is supported

by the fact that for the BPR SMEs that could establish a special budget for BPR, approximately half (30 firms, 48.4%) claim to have purchased IT/IS applications for their BPR initiatives.

Larger investment in IT may greatly increase the probability of BPR success. Using a Kruskal-Wallis test, a positively statistically significant association was found to exist between 'IT spending' (Q23.9) and 'general BPR satisfaction' (Q13.23) [T14.8]. This is understandable given that IT spending has a positive influence on IT/IS infrastructure and end-user computing (5.7.7), while better IT/IS infrastructure – including sufficient IT tools and satisfactory IT performance, and appropriate end-user skills are positively related to BPR success (5.7.3, 5.7.6).

### **5.7.9 Summary of the test results for technological factors**

In summary, the technological dimension is concerned with issues such as IT/IS infrastructure, end-user skills and IT spending. This part of the data analysis looked into how IT enhances BPR for SMEs. In general, the IT utilisation among the sample SMEs is relatively slow. Commonly used IT applications are word-processing, E-mails and databases. However, there is a strong indication that BPR SMEs are more likely to use telecommunications and networks, workflow software and imaging in support of their re-engineering initiatives. This implies a potential for SMEs to build networks through IT in order to facilitate BPR on an inter-organisational basis, which needs to be further investigated. The finding here reaffirms that BPR SMEs are more likely to have in-house IT professionals,

and suggests that IT plays an important supporting role in business process redesign as BPR SMEs invest more in functional process integration, e.g. accounting systems, personnel and facilities. Further research may focus on how IT actually aids SMEs in redesigning selected processes and the issues related to system integration and innovative use of IT. In practice, questions emerged here in the survey would include outsourcing IT while re-engineering core business processes, developing standardised system interfaces, and dealing with various human resource issues, e.g. resistance from employees when new systems are being introduced. BPR implementation issues are discussed in the next section.

## **5.8 Implementation**

Finally, the tests examine implementation issues, including motivation to re-engineer, scope and type of BPR, outsourcing and external support, as well as change issues. Chapter 3 proposed that SMEs might re-engineer from a position of strength, although this depends on the owner's characteristics and organisational climate. As SMEs policies are more conservative, BPR projects will focus on individual/group improvement and process simplification. However, it should not rule out the possibility that when SMEs grow and the environments become more dynamic, BPR initiatives may involve firm-to-firm interactions and networks. Due to a lack of IT/IS and BPR expertise, SMEs will rely heavily on external support. However, this should be justified by the cost-effectiveness of 'outsourcing'. It is proposed that the simpler management structure, team-based nature, process efficiency and communications of SMEs will result in less resistance to change. These are tested as follows.

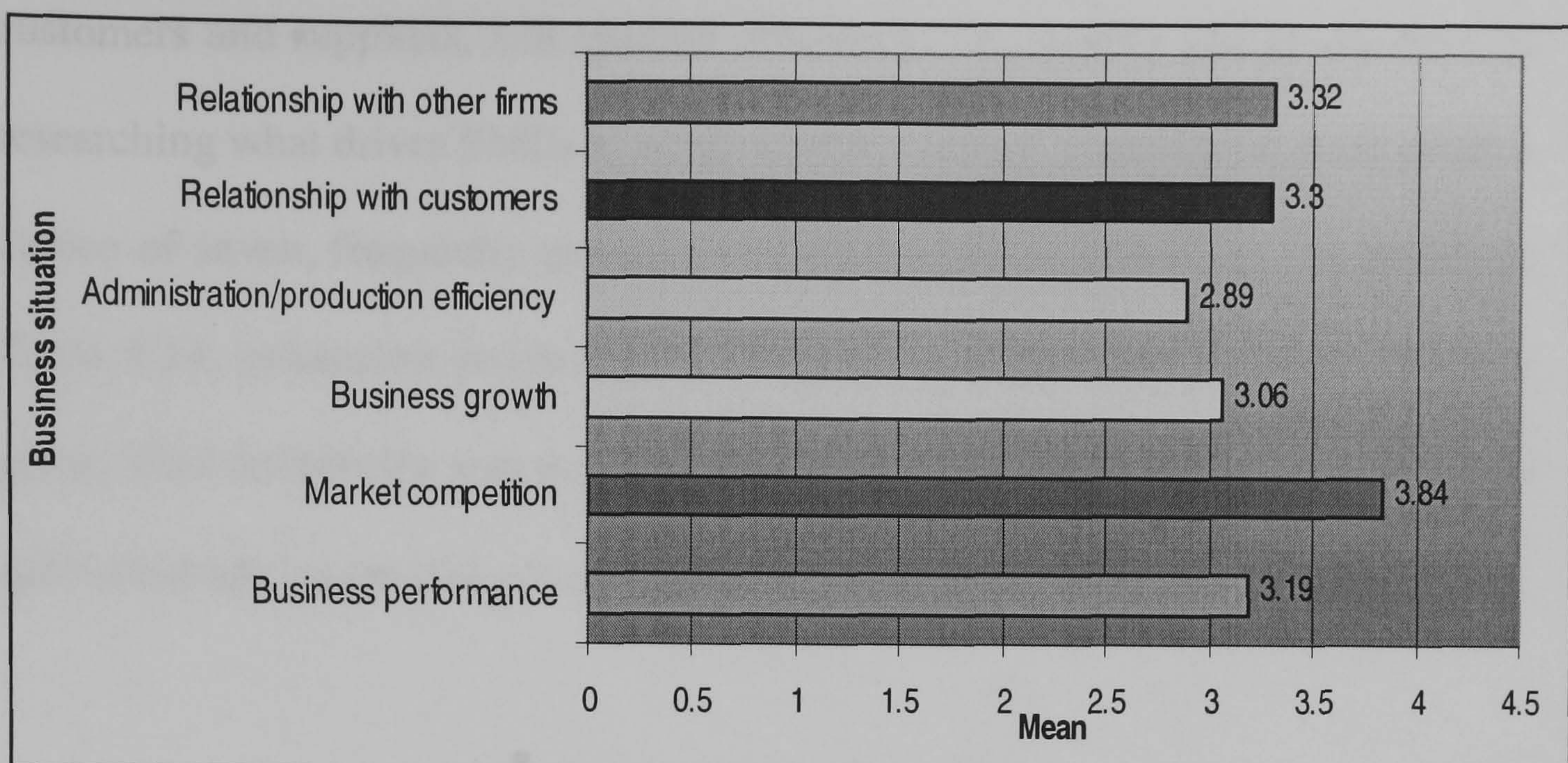
<i>Proposition 15</i>	SMEs may re-engineer from a position of strength, although this depends on the current business strategies
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### **5.8.1 SMEs re-engineer from a position of strength**

As discussed in 5.1, a larger percentage of the BPR SMEs is currently growing or mature (Table 5.4). From an organisational life cycle point of view, the current research argued that SMEs re-engineer from a position of strength. This is based upon Kinni's notion (1995) that it is unlikely for start-up or declining SMEs to 'muster the required energy to re-engineer'.

This part of the data analysis investigated the issue by examining the SMEs' business situation when initiating BPR. In Q4, the respondents were asked to evaluate the business performance on a Likert scale of 1(poor) to 5(excellent), market competition of 1(not intense) to 5(very intense), business growth of 1(slow) to 5(fast), and efficiency, relationship with customers and other firms of 1(poor) to 5(very good). The results are summarised as Figure 5.14:





*Figure 5.14: Summary of business situation in BPR SMEs*

It is shown that BPR SMEs operate in a competitive market. The mean score for business performance, 3.19, demonstrates a 'better-than-average' business situation. Relationships with customers and other firms are reasonably good and the issues related to external relations were discussed in 5.4.7-9. The mean score for business growth business, 3.06, means that the majority of the BPR SMEs are steadily growing. The mean score for administration/production efficiency, 2.89, is lower than average. This may imply that internal efficiency is probably the main area that SMEs wish to improve through re-engineering. The purposes of re-engineering in SMEs are discussed next.

### **5.8.2 Motivation to re-engineer in SMEs**

Dodge and Robbins (1992) argue that firms pursuing a growth strategy tend to re-engineer in order to enhance their external flexibility, i.e., relations with

customers and suppliers, and internal efficiency, i.e., quality and production. In researching what drives SMEs to adopt a BPR strategy, respondents were given a choice of seven, frequently quoted potential drivers of BPR (Q3). As shown in Table 5.14, enhancing product/service quality was the most frequent response given. This reflects the current environment in which quality is a requirement to gain competitiveness in the market (Karapetrovic et al, 1997).

*Table 5.14: Purposes of BPR*

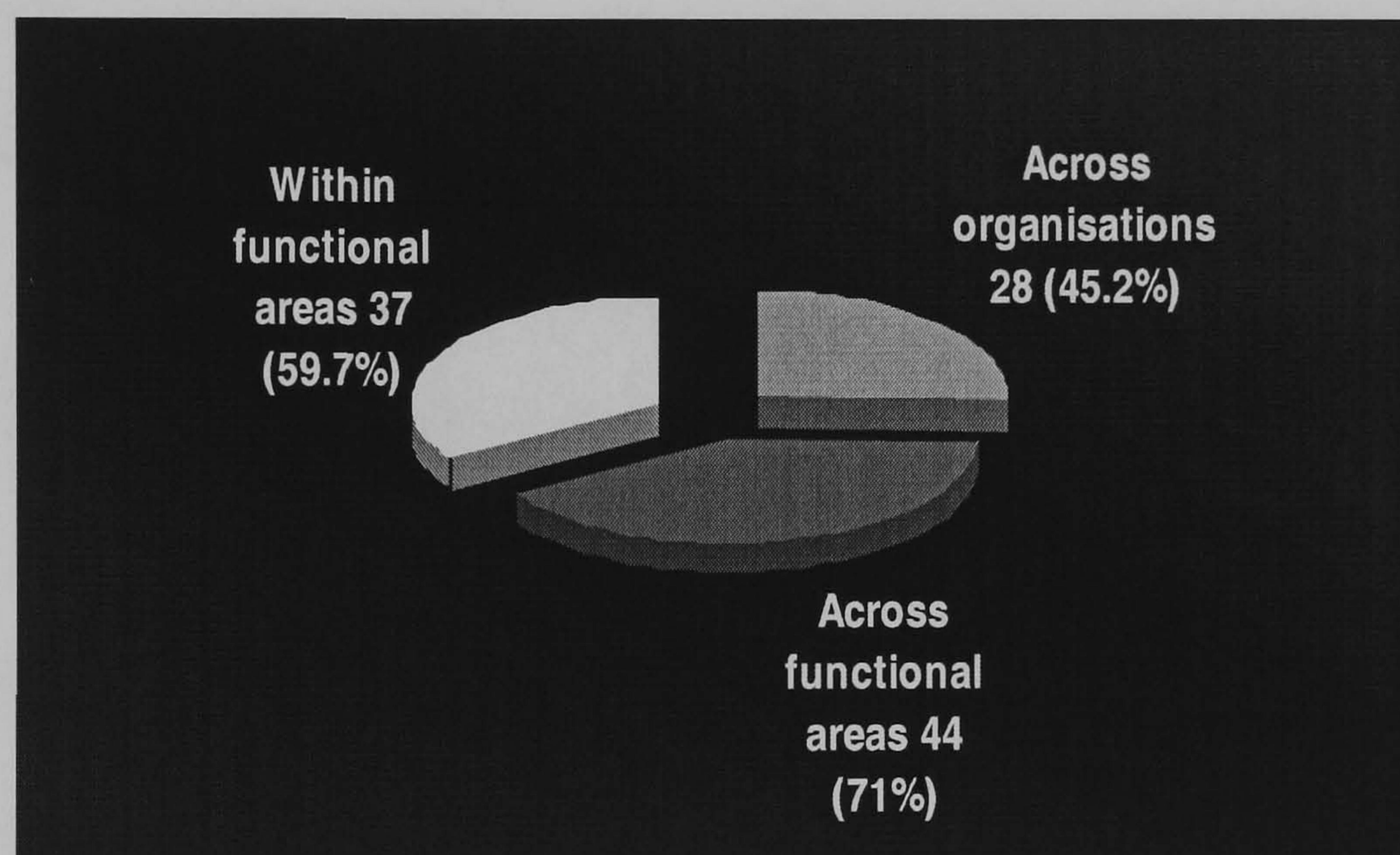
<i>Motivation</i>	Frequency	Percentage	No.
Enhancing product/service quality	48	77.4	1
Improving current workflow and business processes	45	72.6	2
Decreasing costs	43	69.4	3
Improving customer satisfaction	43	69.4	3
Keeping up with competitors	42	67.7	4
Taking advantage of modern information technology	36	58.1	5
Shortening time of finishing/delivering a product/service	30	48.4	6

Other frequent responses as to what drives SMEs to re-engineer are ‘improving current workflow and business processes’ and ‘reducing costs’. According to Venkatraman (1994), SMEs seem to re-engineer in order to ‘improve efficiency’, e.g., reducing costs, improving processes, rather than to ‘enhance capacities’, e.g., keeping up with customers, enhancing customer satisfaction.

<i>Proposition 16</i>	BPR projects in SMEs will focus on individual/group improvement and process simplification, as SMEs policies are more conservative and owners try to avoid risks. However, as SMEs grow, they will face competition which requires radical restructuring and strategic planning to change effectively.
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### 5.8.3 The scope of BPR

The current research adopts Davenport and Short's classification of processes as inter-personal, inter-functional, and inter-organisational (Davenport and Short, 1990). The respondents were asked in Q6 to indicate whether their BPR initiatives are within functional areas, spanning across functional areas or spanning across organisations. The results are summarised in Figure 5.15.



*Figure 5.15: Scope of BPR in SMEs*

Figure 5.35 shows that the majority of BPR SMEs re-engineer business processes that are cross functional areas (71%), compared to those within functional areas (59.7%) and those across organisations (28%).

### 5.8.4 Scope of BPR and risk-taking attitude

Based on the spectrum of process improvement activities depicted by Childe et al (1994), lower functional integration, e.g., process simplification involves less

risks, while higher levels of BPR, e.g., business integration and business re-engineering are viewed more strategic and radical. It is proposed in the study that SMEs may undertake lower levels of BPR, as their business policies tend to be more conservative.

As discussed in 5.5.1, the risk attitude dimension in the current research is operationalised by two metrics, business strategy and business policy. The survey investigates the ‘BPR scope’ issue by performing two Kruskal-Wallis tests on ‘scope of BPR’ (Q6) against ‘business strategy’ (Q23.1) and ‘business policy’ (Q23.4). However, either test attained the level of significance [T15.1/2].

It is also argued that as SMEs grow, it is more likely that a more radical BPR strategy will be adopted. A Kruskal-Wallis one-way analysis of variance on ‘scope of BPR’ (Q6) against ‘firms status’ (Q20) indicates that this is not the case. No statistically significant association was found [T15.3]. This suggests that whether SMEs re-engineer within functional areas, across functional areas or across organisations is not determined by the phases of organisational life cycle.

<i>Proposition 17</i>	Due to a lack of IT/IS and BPR expertise SMEs will rely heavily on external consultants.
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### **5.8.5 Using external consultants in SMEs**

Outsourcing is an alternative to in-house developments. It is argued that due to a lack of human resources, including IT/IS professionals and BPR expertise, SMEs

may leave their re-engineering projects to outsiders (Adhikari, 1996). The respondents were asked to indicate whether they outsource their BPR projects in Q1.18 and whether they outsource some/all of IT/IS in Q21.309. 13 respondents (21%) claim that they are currently hiring external consultants in support of BPR projects. Although outsourcing IT has been suggested as strategic thinking (McLellan and Marcolin, 1994), only eight firms (6.9%) of the researched SMEs indicate to outsource some/all of their IT/IS, among which five firms are BPR SMEs.

Outsourcing in support of re-engineering in SMEs may involve business consultants, BPR experts, and external IT/IS professionals at four phases of BPR, i.e., planning, process redesigning, implementing, and evaluating. The respondents were asked indicate what stages of BPR they participate (Q8.3-5). As shown in Figure 5.16, while BPR experts and business consultants are more likely to get involved at the planning, process design and evaluating stages of BPR, external IT/IS professionals tend to participate in process redesigning and to facilitate implementation.

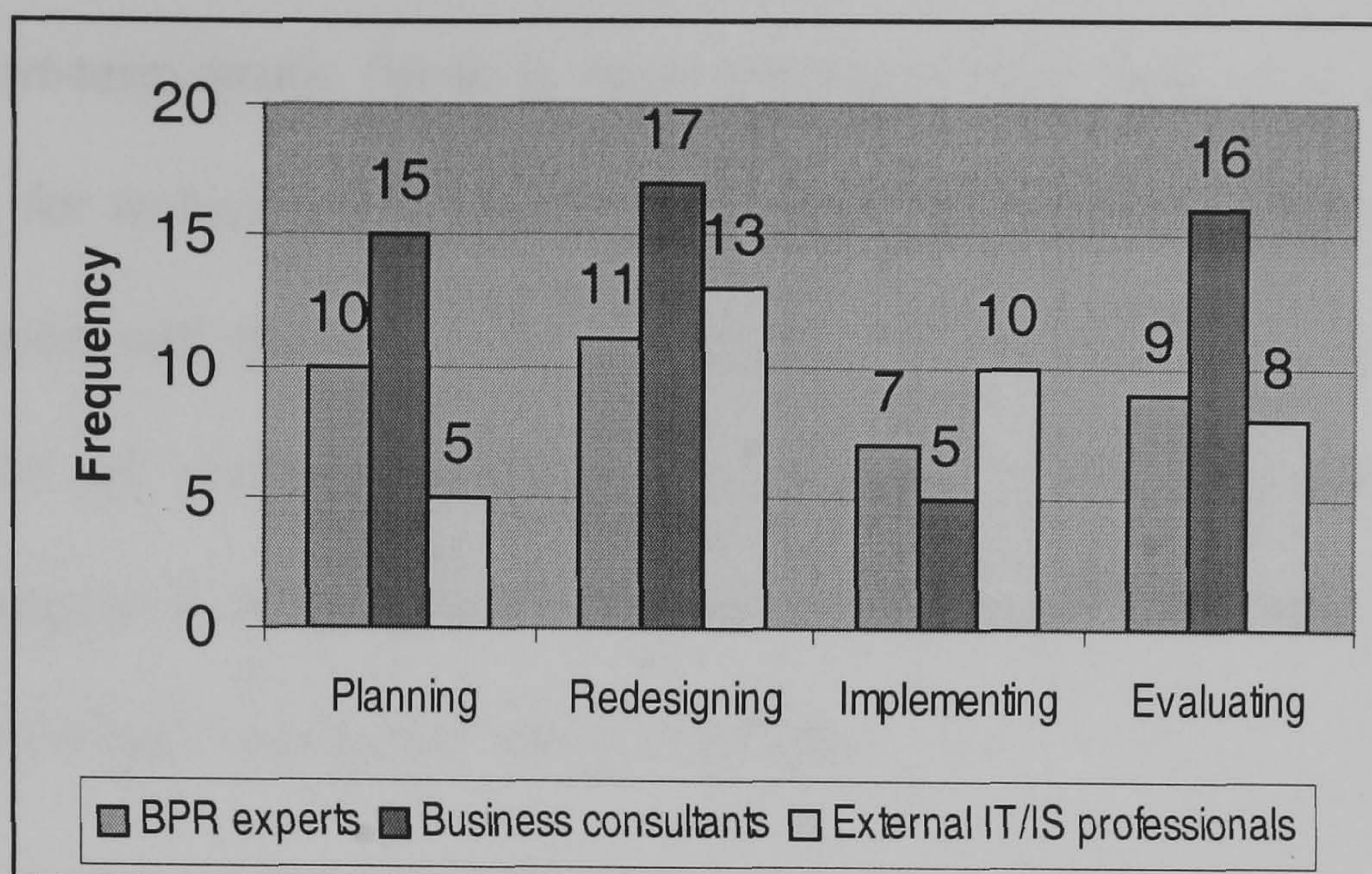


Figure 5.16: External outsourcing for BPR in SMEs

#### 5.8.6 The benefits and risks of outsourcing

Kobelius (1996) acknowledges the benefits of outsourcing, including reducing costs and keeping pace with rapid technological change. The survey investigates this by performing four Mann-Whitney tests on 'outsourcing BPR' (Q1.18) and 'outsourcing IT/IS' (Q21.309) against two BPR results, 'better cost-efficiency' (Q13.10) and 'better understanding of technological change' (Q13.11) [T16.1-4]. However, none of the tests attained the level of significance.

It is also argued that outsourcing may involve risks such as loss of strategic control, technological obsolescence, and limiting of long-term flexibility (McLellan and Marcolin, 1994). Only two firms (3.2%) indicate that external consultants/BPR experts led their BPR projects. This result is encouraging as it shows that the management wants to own and control the BPR initiative to avoid loss of strategic control. Outsourcing limiting long-term flexibility is reflected in

the fact that the majority of the BPR SMEs that outsource (11 firms, 73.3%) consider short-term profit focus is more important than long-term investment (Q22.5). As for technological obsolescence, it is assumed that SMEs that seek external support will result in a lack of in-house IT developments. Two Mann-Whitney tests on ‘outsourcing BPR’ (Q1.18) and ‘outsourcing some/all IT’ (Q21.309) against ‘having own IT director/professionals’ (Q21.306), however, reveal no statistically significant effect [T16.5/6].

### **5.8.7 Outsourcing and BPR performance**

Contrary to Minoli (1995) and Morley (1993), assistance from outside does not seem to significantly increase the probability of BPR success. This is justified by two Mann-Whitney tests on ‘general BPR satisfaction’ (Q13.23) by ‘outsourcing BPR’ (Q1.18) and ‘outsourcing some/all IT/IS’ (Q21.309). As shown in Appendix [T16.7/8], neither of them shows a statistically significant relationship.

<i>Proposition 18</i>	The informal management structure and short lines of communication in SMEs will result in less resistance to change, while lack of capital and managerial skills may constitute impediments to change.
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### **5.8.8 Critical failure factors related to organisational change in SMEs**

Chapter 2 argued that BPR as organisational change may involve the empowerment of individuals to take on greater responsibility (Jick, 1993), while employees unaccustomed to shared responsibilities may perceive re-engineering

as job losses (Klimas, 1997; Springsteel, 1997), or employees become overwhelmed by work loads (Witherill and Kolak, 1996).

The survey investigated BPR as organisational change by asking the respondents to first identify the problems related to change issues. These problems were given as ‘critical failure factors’ of BPR in Q16, including absence of proper training (Q16.9), failure to manage organisational change (Q16.12), poor top-down communication (Q16.13), failure to deal with employee work overload (Q16.18), failure to provide necessary skills (Q16.19), and lack of require incentive system (Q16.22). The respondents were asked to indicate the extent to which these failure factors may pose a constraint to BPR success on a Likert scale of 1(little) to 5(very much). The mean scores of the responses are summarised as Figure 5.17.

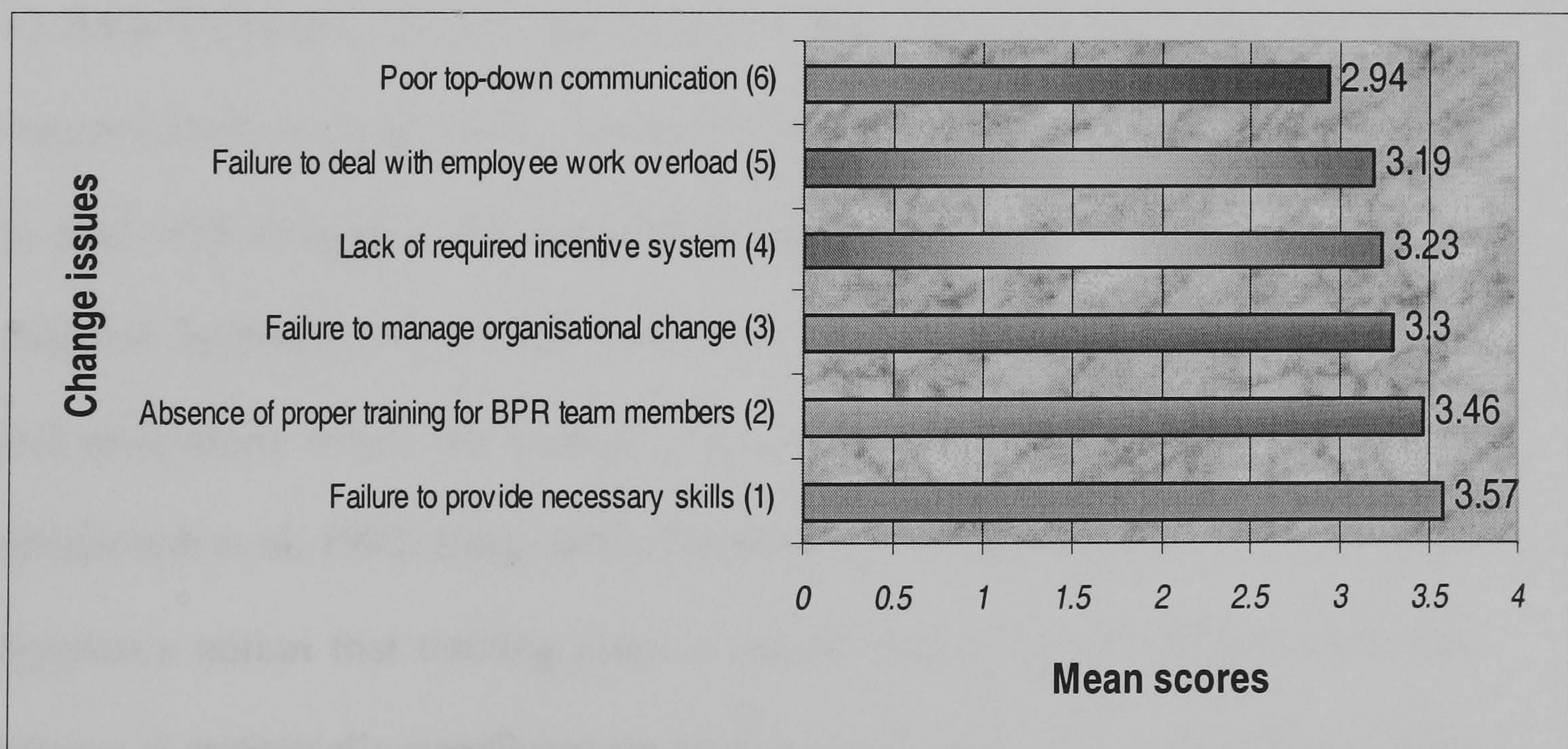


Figure 5.17: Problems related to BPR change issues in SMEs (\*): Ranking



As shown in Figure 5.17, the responding organisations perceive ‘failure to provide necessary skills’ and ‘absence of proper training’ to be two factors most relevant to unsuccessful BPR. This is followed by ‘failure to manage organisational change’, e.g., resistance from employees, ‘lack of required incentive system’, ‘failure to deal with work overload’ and ‘poor top-down communication’.

### **5.8.9 Approaches to dealing with organisational change problems**

Chapter 2 identified the approaches to dealing with change issues, including skill training (Davenport, 1993; Lambert, 1990), modifying reward systems (Martinsons, 1995; Quinn, 1992), establishing a strong communication strategy (Janson, 1993).

42 BPR SMEs (62.7%) indicate in Q1.14 that they train employees for newly required skills, e.g., IT skills. This is probably the most commonly used method to deal with change in the responding organisations. Training is not only an effective approach to overcome resistance, but also leads to greater job challenge and motivation which are critical in an empowered, team-based organisations (Stanworth et al, 1992; King, 1993; Hammer, 1996). The current survey supports Siggers’s notion that training plays a central role in successful re-engineering efforts. A statistically significant association was found to exist between ‘training employees for required skills’ (Q1.14) and ‘general BPR satisfaction’ (Q13.23) [T17.1]. The correlation coefficient, 0.298, indicates that proper skills training increase the probability of BPR success.

Evaluation and reward structures need to be modified (Martinsons, 1995; Quinn, 1992). This is to make sure that people are properly motivated to perform their new tasks (Cross et al, 1994; Mills and Mabey, 1993). The survey investigated this by asking the respondents whether new performance standards and targets are set up for new business process (Q1.11). 36 BPR SMEs (58.1%) gave a positive answer to this question. However, no statistically significant effect was found to exist between 'setting new performance standards and targets' (Q1.11) and 'general BPR satisfaction' (Q13.23) [T17.2].

Finally, BPR calls for a strong communication strategy to 'inform' employees the new expectations and to 'involve' them in both the design and execution of the change (Saggers, 1994; Juran, 1964). 39 BPR SMEs (62.9%) informed employees for possible change during BPR (Q1.7), while 32 BPR SMEs (51.6%) claim to have developed strategies involving employees' participation (Q1.4). Using Mann-Whitney tests on 'general BPR satisfaction' (Q13.23), however, neither 'informing employees' nor 'involving employees' attained the level of significance [T17.3/4].

#### **5.8.10 Summary of the test results for implementation issues**

To sum up, implementation issues looked into aspects of BPR such as motivation, the scope BPR, outsourcing and change management. It seems clear that SMEs may adopt BPR as a cost-cutting strategy in order to improve efficiency, both product and process. Re-engineering may take place within or

across functional boundaries, which entails employees from different disciplines to work together as a team. SMEs can also adopt BPR as a competing strategy, which involves customers, suppliers and other firms. Problems regarding differentiated skills, core competencies negotiation, and non-standardised IT platforms as a result from inter-organisational interactions are to be identified. Only 13 respondents claimed to involve external consultants in support of BPR projects, although the results did not seem to be encouraging. An examination of the outsourcing issue in SMEs is necessary. In Chapter 2, approaches to change management in the context of process re-engineering were identified. This includes informing, involving, training, dealing with work overload and establishing a proper incentive system. Skills training is found to be the most effective way to deal with change. Informing and involving promote employee participation. Adopting a sound BPR methodology and establishing a proper incentive system help to overcome resistance to process change. These, though, need further investigation in the case studies.

## **5.9 Modifying the Framework of SMEs Undertaking BPR**

A review of the propositions constructed under the four dimensions: culture, structure, resources, technology together with implementing issues in Chapter 3 enabled the researcher to modify the framework of SMEs undertaking BPR based on the findings from the survey. The alteration of the framework can be summarised as follows.

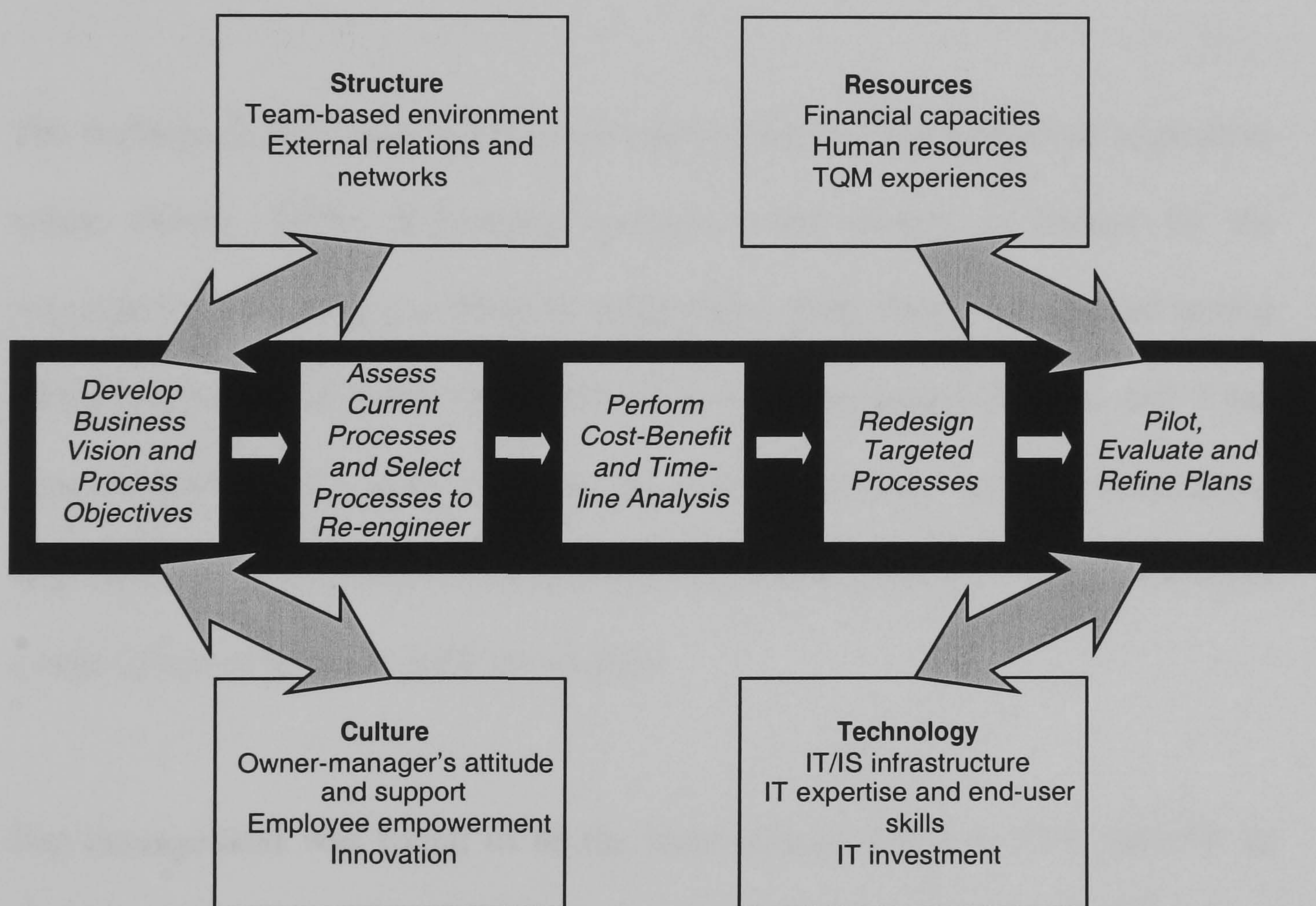
- Firm size does not appear to pose a constraint to BPR success in SMEs,

thereby removing the 'size and control' element from the structure dimension.

- The necessity of establishing a project team in the small business domain especially for BPR is questionable, given the team-based nature of most SMEs. It is suggested from the survey that a team-based environment is desirable for BPR, as this will promote employee involvement and innovation.
- Geographical proximity to customers, suppliers and other firms put SMEs in a advantageous position for information sharing, networking and benchmarking, thus encouraging inter-organisational business integration.
- Risk-taking attitude in terms of business strategy and policy is found to be positively related with BPR performance. It is argued that organisational climate and decision-making are dominated by SME owner-managers. Their management style and support will be of great importance to BPR success.
- The findings reveal that team-based operation, innovation, R&D and IT performance are interrelated. While IT has demonstrated its powerful capacity in integrating functional areas, innovative use of IT will be a focused issue in the case study. IT investment, however, will depend on whether the current strategy is cost-cutting or competing. Adopting IT for either strategy will need further training in IT expertise and end-user computing.

- It is evident from the survey that strategic thinking, carrying out BPR as a change project and sound business planning will increase the chances of BPR success. Thus, developing business vision, selecting ‘core processes’ to redesign, time scheduling, conducting a pilot, evaluating and refining should be integrated as strategic BPR planning. This will, as found in the study, largely enhance the cost-efficiency and effectiveness of SMEs’ BPR efforts.

The modified framework of SMEs undertaking BPR is illustrated as Figure 5.18.



*Figure 5.18: Modified framework of SME undertaking BPR*

## 5.10 Conclusions

111 copies of questionnaire were returned and analysed. Approximately half of the sample SMEs claim to have undertaken or be undertaking BPR. Their BPR initiatives are mainly inter-functional, with a focus on operational processes. Operational processes refer to those directly related to satisfying the customers (Champy, 1995; Meyer, 1993). Given that BPR should be targeted at processes that add value to perspective customers, this finding implies that the majority of the responding organisations are re-engineering their 'core processes'.

The findings confirm that in SMEs, re-engineering is often a response to positive trends (Kinni, 1995). Enhancing product/service quality is ranked by the respondents as the major purpose of undertaking BPR. This is largely due to that a large percentage of BPR SMEs claimed to have implemented TQM, and it has been shown that two approaches do exist simultaneously within organisations and complement each other. It is thus concluded that TQM-oriented SMEs are in a better position to apply BPR techniques.

Top management was found to be the most critical factor to BPR success, as suggested by previous studies (e.g. Janson, 1993; Harrison, 1994; Holland and Kumar, 1995). The vast majority of BPR initiatives in the responding organisations are led by the owner-managers, instead of IT professionals, functional manager, or business consultants, suggesting that BPR is indeed a management issue and should be undertaken in a top-down manner. While

strategic thinking is not common among the SMEs, this survey provides a clear indication that strategic planning for BPR, coupled with the principles of project management, can prevent SMEs from being out of focus and can enhance cost-efficiency.

IT has demonstrated its potential for BPR in the study as an important supporting role in eliminating problems of time and space, thereby resulting in a more process-based management and increased BPR satisfaction. In particular, the innovative use of IT tools is found to be positively related to teamwork efficiency, HRM and R&D. This tends to reinforce the view that while teamwork offers a mechanism used to bring about greater involvement (Janson, 1993), HR's most important contribution is to empower people, provide required skill training and supply management with a change model that facilitates all dimensions, e.g. motivation, evaluation and reward systems, necessary for successful BPR implementation.

The survey has provided insights into SMEs undertaking BPR with respect to the underlying issues derived from the framework and conceptualising knowledge of SMEs implementing BPR upon which the further case studies can be based. In addition, some questions emerging from the data analysis need to be further investigated in the case study. These include, for instance, the owner-manager's attitude towards business process change, how IT can be employed for BPR in inter-organisational settings, and how smaller businesses can implement BPR efficiently and effectively. The issues will be addressed through the analysis of the case studies in Chapter 6.

## **Chapter 6 The Case Studies**

### **6.0 Introduction**

This chapter presents the findings of the case studies of this research. The purpose of this section of the research is twofold. First, it is to explore in more detail the findings of chapter 5. Second, other issues that emerged from the survey can be further investigated. This chapter first provides details of the eight chosen organisations that participated in this stage of the research and the rationale for choosing them. Next, the issues of how BPR affects SMEs of the entire business operations are explored. The discussion is constructed around the four classifications, structure, culture, resources, technology together with the implementation issues derived from the modified framework of SMEs undertaking BPR in Chapter 5. 'Other issues' include how the owner-managers interviewed perceive BPR to be for their organisations and their attitudes towards process change, which may influence how re-engineering is implemented in SMEs, the potential for inter-organisational business integration, change issues, implementing BPR on a continuous basis. The chapter then compares findings of the case studies and the survey research, and finishes by revising the framework from which the conclusions are drawn.



## **6.1 Profile of the Chosen Organisations**

The purpose of this stage of the research is to augment the survey research (Gable, 1994). Specifically, the case studies were conducted to enable more in-depth analysis of the findings from the survey (Kaplan and Dunchon, 1988; Lee, 1991). Chapter 4 stated the purpose of this part and the information that the case studies seek to obtain. Further, the criteria of choosing the participating SMEs are provided. The profile of the organisations that participated in the case studies is exhibited in Table 6.1. Three of the interviewed organisations are small businesses with under 50 employees and five organisations are medium-sized firms with between 50 and 500 employees. In order to attempt to mitigate contextual biases, the case studies chose four SMEs operating in the manufacturing industry and four in the service sector. SMEs' perceived BPR satisfaction is a determinant for BPR success or failure. For both sectors, two successful and two failure cases are selected. This enables a comparison to be made and a further investigation of the success and failure factors to be discussed.

As shown in Table 6.1, the majority of the organisations that participated in the case study are currently adopting a growth or expansion strategy. This includes business expansion, e.g. Telecoms Supplier is enlarging its sales division to target more market segments, and product diversification, e.g. Supersonic Machinery Manufacturing Company is developing its supersonic-related technology to manufacture semi-conductor products. In contrast, the Automatic Assembling Retailer and the Freight Shipping Company tend to have steady

orders and some loyal clients. The business strategies adopted are reflected in the firms' risk-taking attitudes and market competition. Five of the organisations in the case studies are operating in an intensely competitive market. For example, the Telecoms Supplier is competing with more than 400 firms that sell telecommunication devices, while others, such as the Financial Institution that is protected by the government and the Shoe Trading Company, seem to be content with their current business performance and are focusing their BPR efforts on functional integration and internal efficiency. It should be noted that firms such as Automatic Assembling Retailer and Shoe Trading Company are subcontractors to bigger organisations. This secures regular orders, but at the same time they have no power to influence the market prices. A common feature of the eight organisations is that the purpose of adopting a BPR strategy is derived from a desire either to improve efficiency or to enhance capacities, rather than from a 'crisis situation', which is consistent with the BPR literature (Kinni, 1995).

Table 6.1: Profile of the Organisations in the Case Studies

Cases	Number of employee	Success/Failure	Manufacturing /Service	Current Strategy	Market	Sub-contracting	Purpose of BPR
<i>Telecoms Supplier</i>	300	Failure	Manufacturing	Expansion	Competitive	No	Reduce cost
<i>Geodetic Surveying Company</i>	15	Success	Service	Expansion	Steady	No	Inter-organisational integration
<i>Financial Institution</i>	200	Failure	Service	Market Development	Steady	No	Increase efficiency and process innovation
<i>Supersonic Machinery Manufacturing Company</i>	40	Success	Manufacturing	Diversification	Growing	Yes	Enhance product innovation and improve process efficiency
<i>Shoes Trading Company</i>	100	Failure	Manufacturing	Market penetration	Growing	Yes	Increase efficiency
<i>Retail Grocery Organisation</i>	200	Failure	Service	Product development	Competitive	No	Redefine market position and increase efficiency
<i>Automatic Assembling Retailer</i>	10	Success	Manufacturing	Market Segmentation	Steady	Yes	Improve process
<i>Freight Shipping Company</i>	150	Success	Service	Market penetration	Competitive	No	Improve efficiency and reduce cost

As stated in 4.7.3, the method of data collection for the case studies was a personal interview; semi-structured interviews were carried out from the 12th of April to the 1st of June, 1998. The Telecoms Supplier's BPR project was implemented by integrating several functional units while re-engineering at the Geodetic Surveying Company involves a co-operation with its clients. The Financial Institution case represents a failure in the use of IT for BPR because of the lack of customer focus, while Supersonic Machinery Manufacturing Company provides a successful case, the BPR being based on a sound customer/supplier relationship. Shoe Trading Company's BPR initiative aimed to cut down costs but failed to deal with change issues, such as employee workload. On the contrary, re-engineering in the Automatic Assembling Retailer succeeded thanks to owner's full support and adequate training. Retail Grocery Organisation embarked on its BPR project without a long-term business plan, while Freight Shipping Company illustrates that re-engineering should be customer-driven and carried on a continuous basis. The detailed profiles of the eight participating SMEs, including time, location of the interviews and the position of interviewees, are presented in *Appendix V*. The contents of the interviews were recorded under permission for the data analysis purpose in this chapter.

To be consistent with the survey analysis, the main findings from the case studies are organised around the four classifications, structure, culture, resources, technology together with the implementation issues derived from the framework of SMEs undertaking BPR modified in Chapter 5 (Figure 5.54). The findings of the case studies enable a further modification of the framework and a further

investigation of the success/failure factors that influence the BPR performance in SMEs. The case study findings are discussed as follows.

## 6.2 Structural Issues

Sia and Neo (1996) assert that re-engineering efforts may lead to flatter and leaner organisation structures, while the cases reveal that a formal and hierarchical structure found in some organisations, such as the Telecoms Supplier, can impede SMEs from successful implementation of BPR. The R&D director at Telecoms Supplier explains,

*'The idea of improving business processes was derived from one of our managers. The owner hasn't been very interested but didn't reject the project. However, we found it very difficult to carry out the project as it seems every staff has to report to someone about his progress. Perhaps we need someone to be in charge the BPR project. And I guess we need to re-engineer our organisational structure first'.*

In contrast, team-based operations are more likely to occur in smaller businesses, e.g. Automatic Assembling Retailer and Geodetic Surveying Company, due to their decentralised structure and shorter lines of communication. While the literature suggests that the use of cross-functional teams is to ensure that the process is viewed and understood comprehensively (Sellers, 1997), in SMEs, a major benefit from team-based operation is to bring greater involvement,

increased motivation and communication, and enhanced job performance. The owner of Geodetic Surveying Company believes,

*'All our employees are professionals. They are talented and responsible. There are only about 15 of us and we've been working like a team. We respect each other and this is the best way to get things done. I never felt superior because I am the boss'.*

The majority of the participating organisations perceive building sound relations with suppliers, customers and other firms to be of great importance. Jarillo (1988) and Charan (1991) claim that strategic behaviour is the main reason for building relations, while the case studies demonstrate that this is largely due to a unique feature among Taiwanese SMEs, subcontracting, and their closer relationship with suppliers and other firms. Social ties, as Baker (1990) argues, are one of the factors that explain the SME network structure. This implies a potential for SMEs to integrate business processes through inter-organisation interventions which will be discussed in 'other issues'.

In summary, the case studies looked further at the structural issues as to whether a simpler, informal and team-based nature organisational structure put SMEs in a better position to undertake BPR. The Telecoms Suppliers case gives an example of formal management hierarchy inhibiting BPR success. The lack of management support is resulted from complex 'reporting systems'. On contrary, Automatic Assembling Retailer and Geodetic Surveying Company cases demonstrate that team-based operation in SMEs significantly increases

employee involvement. This creates an environment based upon respect and trust which favours BPR. In investigating external relations with customers and suppliers, subcontracting emerges as an important issue to explain SME network. From the interactions of SMEs with their subcontracted firms and satellite manufacturing firms, the potential for an inter-organisational re-engineering is brought to light.

### **6.3 Cultural Issues**

In the cultural context, it is evident in the case studies that SMEs with ambitious business strategies and higher risk-taking attitudes are more likely to benefit from undertaking BPR. These firms, e.g. Geodetic Surveying Company and Supersonic Machinery Manufacturing Company did not confine their re-engineering to merely functional areas but extended it to include the entire business network. In relation to firms' current business strategies, the case studies reaffirm that when SMEs are following a growth strategy, either business expansion or product diversification, it is more likely that a radical re-engineering approach will be adopted. However, the case studies also show that when owner-managers adopt a highly centralising, autocratic stance, it will be difficult to produce a conducive environment in which to re-engineer (Hirschfield, 1994).

Management support, coupled with good top-down communication, is considered by all of the interviewed organisations as the most critical factor to BPR success. This finding is supported by many BPR authors (e.g. Janson, 1993;

Stevenson, 1993). Direct involvement appears to be an effective approach given that the owner-managers normally possess proficient knowledge and understanding of the business, for example, the owner of Freight Shipping Company claims to have been in the shipping industry for over 10 years, and they are often in charge of several functional duties, e.g. personnel, sales, and finance. Due to a lack of management support, the Telecoms Supplier has experienced difficulties in obtaining sufficient financial backup and launching process change programme as part of the firm's business strategy.

In keeping with Wastell et al (1994) who argue that BPR initiatives should take place within a strategic business context, the case studies provide a clear indication that re-engineering firms' core processes by transforming key processes into strategic capabilities will greatly increase the chance of BPR success. Geodetic Surveying Company's customer system and Automatic Manufacturing Retailer's combination of ordering system and client/supplier's databases are examples of this. The targeted business processes to be re-engineered among the participating organisations are shown in Table 6. 3. There is a high degree of agreement on the alignment of BPR strategy and business direction. In the case of the Retail Grocery Organisation, the BPR implementation lacked strategic vision and was based more on intuition than analysis. Due to this it was later recognised that the costs incurred could not be justified.



Table 6.2: Targeted business processes to be re-engineered among the participating organisations in the case studies

Case	Targeted business processes to be re-engineered
Geodetic Surveying Company	Firm-client linkage for technological support and information sharing
Supersonic Machinery Manufacturing Company	Integration of R&D, product development, and sales
Telecoms Supplier	Office workflow and management hierarchy
Retail Grocery Organisation	Integration of design, planning, and marketing departments
Automatic Assembling Retailer	Integration of ordering system, product line and supplier/client databases
Freight Shipping Company	Integration R&D and IT departments and firm-client linkage
Financial institution	On-line Internet banking system
Shoe Trading Company	Integration of design and sales divisions

Contrarily, the Financial Institution, although operating in a competitive environment since bank privatisation in 1992, is protected by the Central Bank of Taiwan. The firm's business policy is relatively conservative. Similarly, the Shoe Trading Company is subcontracted to several large organisations and their re-engineering efforts are focusing mainly on internal efficiency which yields limited results. The Design Division Manager admits that:

*'Our competitive advantages are quality, speed, and the reputation which are created over the last 10 years. We have six major clients in the US and we are currently expanding our business to Australia and some European countries. The market is competitive and we do not have much power to control the prices. Thus, BPR to us is to cut down the costs and simplify the business process in order to enhance efficiency. Quality, speed, and price are three major competitive advantages by which we stand out from our competitors.'*

In relation to managing BPR as a project, most of the unsuccessful cases demonstrate a lack of managerial knowledge and strategic vision. Little

consideration has been made to what customers really need and want. For example, the Telecoms Supplier has mainly focused on expanding its distribution channels and improving cost-efficiency of its sales network while the firm pays little attention to the competition and the latest technology related to electronic products it sells. The Retail Grocery Company engaged in establishing its reputation and business images while ignoring the quality that the customers expected. Similarly, the Financial Institution launched its Internet banking without considering the possible resistance from its clients due to security concerns. The IT department at the Telecoms Supplier was building a web site which features a wide range of products the firm sells as part of their re-engineering efforts. The R&D director at Telecoms Supplier notes:

*'The thing is we did not consider the feasibility of the on-line ordering system while creating our web site. Because of the nature of our products (electronic appliances ranging from facsimile machines to mobile phones), customers are used to buy these goods with sales staff's assistance'.*

A similar situation was found in the Financial Institution case. The on-line banking system was created by an external IT support firm without careful planning and management backup. The Investment Manager recalls,

*'The initial idea was to reduce the workloads of the operators and to simplify the banking procedures. The services include various on-line services such as balance check, account statement request and investment advises. Clients only need to install provided software and key in their usernames and passwords*

*at home using their PCs. We believed this was the trend of future banking. However, there aren't many people taking advantage of this facility. One reason is that customers are suspicious about this due to security reasons. And our customers' age ranges from 18 to 60. We can't expect all of them have a PC at home'.*

In summary, this part of the case study analysis investigates the cultural issues as to why a higher risk-taking attitude in SMEs results in a more satisfactory BPR, how owner-managers support BPR, and the importance of strategic/project thinking to BPR success. As shown in the cases of Geodetic Surveying Company and Supersonic Machinery Manufacturing Company, the willingness to take risks is usually associated with firms current 'growth' and 'product diversification' strategies. Their BPR projects involved more risks since their BPR goals went beyond internal efficiency to include the entire business network. Firms are more likely to get management support if the owner-managers enthusiastically participate in the actual process redesign. In the context of strategic planning, this generates two merits. On the one hand, BPR initiatives are more likely to obtain financial backup; on the other, owner-managers, because of their better understanding of the business, tend focus more on the 'key processes'. Planned and designed by the owner-managers, Geodetic Surveying Company's customer system and Automatic Manufacturing Retailer's combination of ordering system and client/supplier's databases are two examples of this.

## 6.4 Resources Issues

The majority of the participating organisations indicate that the adoption of BPR is a reflection of their current strategy to reduce operating costs. This is especially so when SMEs are following a growth strategy (Binks et al, 1996). Restricted access to finance, as illustrated in the case of the Retail Grocery Organisation, poses a significant constraint on BPR. The Planning Manager notes,

*'The main reason for adopting a BPR strategy was to reduce administrative costs as well increase internal efficiency. The market was in rapid growth and we spent a lot of money on marketing and advertising. The owner-manager hadn't been good at finance and we had no idea about the return on investment. We could've used someone more capable of planning out budgets. But for a medium-sized firm like us, it's not easy to get the capital we need. So we haven't even gone half through our BPR project. Survival is more important'*

As most of the interviewed SMEs, such as the Geodetic Surveying Company and the Telecoms Supplier, are highly technology-oriented, their employees, provided with proper skill training, appear to be competent at doing their jobs. Wedded to firms' R&D functions, knowledge workers demonstrate a potential in forging a flexible environment to promote innovation, in particular product innovation among the participating organisations.

Managerial skills are relatively poor. Woods (1996) argues that owners of small firms are usually caught up in day-to-day operations and lack perspective on the

kinds of problems that can threaten the business. This makes the management unable to provide necessary support when a radical process change programme is undertaken, e.g. the Shoe Trading company has experienced difficulties in retaining its talented designers after a radical process change. The Design Manager describes this situation,

*'Since the owner started this re-engineering programme, we have felt terribly insecure about everything. You never know .... when you'll be sacked. You suspect everybody is seeking new employment. The owner never told us ... even though the business condition hasn't been that bad...'*

In summary, resources issues look at the impacts of financial constraints and lack of in-house human resources on BPR. In keeping with the survey finding, the Retail Grocery Organisation demonstrates that financial insufficiency can impede firms from undertaking BPR. This is due in part to the absence of staff capable of planning budgets. It was found that the majority of the participating organisations in the case studies are highly technology-oriented firms, e.g., Geodetic Surveying Company, Telecoms Supplier and Supersonic Machinery Manufacturing Company. The employees in these firms are virtually knowledge workers. Given their current 'product diversification' strategy, R&D plays an important part in their BPR efforts. Training is provided in particular on product innovation and manufacturing techniques.

## 6.5 Technological Issues

The survey clearly indicates that innovation is positively correlated with both sufficient IT tools and good IT performance, while innovation in SMEs is significantly related to team-based operations and teamwork efficiency. The survey further indicates that innovation is mostly likely to occur in the SMEs that are currently adopting a growth strategy. The case studies support the above and further reveal that in most of cases innovation tends to be reinterpreted as using IT for 'product innovation'. This is understandable as the majority of the participating organisations, such as Geodetic Surveying Company, Supersonic Machinery Manufacturing Company, Telecoms Supplier, and Automatic Assembling Retailer are highly technology-oriented. When a growth or expansion strategy is adopted, IT is most likely to be applied to product development, usually coupled with R&D functions, e.g. the Telecoms Supplier. The role of IT in BPR is illustrated by the general manager from the Supersonic Machinery Manufacturing Company:

*'BPR to us is not merely process improvement. With our IT professionals, we are trying to broaden our business services, which is consistent with our current policy of differentiation. It allows us to redefine our business direction and customer target'.*

The potential of IT acting as an important supporting role in eliminating time and distance and integrating functional units is demonstrated in the case studies. Telecommunication applications, such as E-mails and world-wide web (WWW)

are extensively used for linking organisations with customers, suppliers, and other firms. As an automatic parts retailer, the Automatic Assembling Retailer combined three major operational functions: the ordering system, clients and supplier databases, and production lines. This was achieved by using several IT tools, e.g. spreadsheets and workflow software. The firm indicated an increased speed and flexibility in customised production and improved customer satisfaction. IT has helped in creating an efficient communication network with the firm's customers and satellite manufacturers. A senior technician explains,

*'All the contracted down-streamed plants and customers are detailed in a database and connected to the ordering system in which all the company's products are standardised and numbered. This simplifies the ordering process and results in increased flexibility in catering for customers' specific needs'.*

The potential of IT use may be restricted due to lower IT capacities. The Design Manager from the Shoe Trading Company stated:

*'We built a web site on which the photos of our latest designs are exhibited. We are using electronic mail, too. However, because of security reasons, on-line ordering has not been feasible. .... The designers are still drawing manually, which takes much longer time. But they seem to be happy with what they are doing. .... IT is mainly used for administrative control, instead of process redesign. Although we have installed some 3D software which aid designing, very few people are able to use it and actually using it'.*

Successful cases of applying IT for BPR are usually those SMEs that could provide adequate end-user training and align their IT/IS strategy with business strategy, such as Geodetic Surveying Company. According to Grover et al (1993), the existing IT infrastructure can be a significant barrier, limiting the practical options available to planning and changing processes for BPR. It was found in the case studies that this usually refers to low end-user literacy and skills and lack of funds. With fewer in-house technical experts to deal with new developments, the Financial Institution relied heavily on vendor's support which resulted in a loss of strategic control. Lack of financial support inhibited the Shoe Trading Company from advanced use of IT in support of their re-engineering initiative.

In summary, this part of the case study analysis looks further at the underlying technological issues of the framework, i.e., IT tools, end-user computing and IT spending with respect to BPR performance. Given the high-tech nature of the products in the interviewed SMEs, it is understandable that using IT for 'product innovation' is common among them. This is seen in the cases of Geodetic Surveying Company and Supersonic Machinery Manufacturing Company. It is evident in the Financial Institution case that low IT end-user literacy and lack of funds could constitute significant factors to BPR failure. This may result in relying too much on the vendors or external IT support. Frequently mentioned IT tools in the interviews were telecommunication applications, such as E-mails and WWW. These IT tools are used to link firms with their clients and suppliers. SMEs are now competing globally. Re-engineering 'core processes' on an international basis will be the trend while the future challenge for SMEs is to



build up a communication network with suppliers and satellite manufacturers.

## 6.6 Implementation Issues

In keeping with the survey findings, seven of the SMEs interviewed consider their BPR initiatives cross-functional. As BPR emphasises horizontal integration across functions (Hammer, 1990; Harrington, 1991; Davenport, 1993), a common BPR strategy adopted by the case organisations was combining two or three of their functional units in order to reduce administrative costs and streamline workflow or business processes. This appears to comply with the principles of re-engineering by de-emphasising division of labour and recasting work design from a 'simple jobs, complex processes' set-up to one focused on 'complex jobs, simple processes' (Thompson, 1967). The intent for functional integration is illustrated in the words of the Shoes Trading Company's Division Manager:

*'We seem to have sophisticated organisational structure but also have lots of employees doing nothing. It was when I did your questionnaire we decided to combine the operating department and design division in order to cut down costs. Now apart from designing I also need to take care of the orders from our clients and contact our satellite manufacturing plants'.*

The survey found that a larger percentage of BPR SMEs are currently adopting a growth strategy. For instance, the Supersonic Machinery Manufacturing Company is using its supersonic-related technology to extend its business to

manufacture semi-conduct products. It is considered very important that the focus of the firm's business strategy is placed more on product innovation and developing efficient distribution channels with customers and suppliers. On the other hand, the Telecoms Supplier is increasing its market share by targeting a broader range of customers. Their BPR strategy was aimed at integrating the firm's sales channels in order to increase speed and reduce time and costs.

The identification of BPR scope and type in the interviewed SMEs is not so clear-cut. For example, the creation of an integrated system at Automatic Assembling Retailer that combines the ordering system and production linking to supplier/customer's databases is considered an across-functional re-engineering endeavour, while it also greatly involves interventions with customers and suppliers. Whether firms' BPR projects are functional or inter-organisational was not found to be significantly related to BPR success/failure.

In relation to the change issues, providing required skills, especially end-user training, was identified by the participating organisations as the most effective approach to dealing with resistance accompanied with radical process change. As a cost-cutting strategy, re-engineering may involve downsizing and empowering individuals to take on greater responsibility (Jick, 1993). The Shoe Trading Company demonstrates an example of unsuccessful BPR due to an ignorance of the human aspects of re-engineering and the work overload problem. Involving employees in participating in decision making and strategy formulating, as found in the Automatic Assembling Retailer and the Supersonic Machinery Manufacturing Company cases, is proved to be helpful, although this is largely

related to team-based nature of their business operation. The Supersonic Machinery Manufacturing Company, on the other hand, illustrates a case of combining departments without downsizing. Approaches to managing change, such as carrying out job rotation and creating a new reward system, were indicated.

Employees are found to play an important part in building sound relations with customers and other firms. Take the Freight Shipping Company case, for example. The company could not establish a budget to carry out large-scale market surveys due to their limited financial resources as found in most SMEs. Market information on customer expectations relies heavily on the contacts of the front-line workers with their clients. This acts an effective approach to providing the management with useful market information in formulating business strategies. The owner of the company notes:

*'I believe that it is impossible to force changes by the top management. It should be the first-line workers who convey the customers' ideas/complaints to the centre, from which the business policy is refined. They know what the customers want and we need such information to adjust our business strategies. So we take very seriously about the feedback and opinions from our employees'.*

In summary, implementation issues are concerned with motivation and scope of BPR, and change issues. The majority of the participating organisations in the case studies indicated that they initiated BPR, or 'simplified business processes' to be exact, with a view to reducing costs. Combining functional units, as

demonstrated in the Shoes Trading Company, was a recognition of complex management hierarchy and the high administrative costs incurred from it. This supports the survey finding that the majority of BPR SMEs are to some degree involved with across-functional BPR. In respect to change issues, it appears in the cases studied that various approaches proposed in Chapter 2 are employed by the individual SMEs according to different problems encountered. For example, Automatic Assembling Retailer involved employees in BPR strategy development, Supersonic Machinery Manufacturing set a new reward system in support of the new process design. In general, all participating organisations considered job retraining, end-user skills in particular, to be very effective.

The major findings from the case studies based on the framework classifications can be summarised in terms of success/failure factors as related to BPR performance in SMEs. This is exhibited in Table 6.2.

*Table 6.3: Further identification of the success/failure factors of SMEs implementing BPR in the case studies*

Classifications	Elements	Success factors	Failure factors
Structure	Size and Control		<ul style="list-style-type: none"> <li>Formal hierarchical structure [Telecoms Supplier]</li> </ul>
	Team-based operation	<ul style="list-style-type: none"> <li>Teamwork efficiency [Automatic Assembling Retailer; Geodetic Surveying Company]</li> </ul>	
	External relations	<ul style="list-style-type: none"> <li>Good relations with customers and suppliers [Supersonic Machinery Manufacturing Company]</li> <li>Good relation with suppliers [Automatic Assembling Retailer]</li> <li>Good relation with customers [Freight Shipping Company; Shoe Trading Company]</li> </ul>	

Culture	Risk attitude	<ul style="list-style-type: none"> <li>Higher risk-taking attitude and ambitious business strategy [Geodetic Surveying Company; Supersonic Machinery Manufacturing Company]</li> </ul>	<ul style="list-style-type: none"> <li>Conservative business strategy and policy [Financial Institution]</li> </ul>
	Employee empowerment	<ul style="list-style-type: none"> <li>Higher employee autonomy [Geodetic Surveying Company; Supersonic Machinery Manufacturing Company; Automatic Assembling Retailer]</li> </ul>	<ul style="list-style-type: none"> <li>Autocratic management style [Financial Institution; Shoe Trading Company]</li> </ul>
	Management support and communication	<ul style="list-style-type: none"> <li>Top-down approach [all cases expect Telecoms Supplier]</li> <li>Direct involvement [Geodetic Surveying Company; Supersonic Machinery Manufacturing Company; Automatic Assembling Manufacturing Retailer]</li> <li>Good top-down communication [Automatic Assembling Retailer]</li> </ul>	<ul style="list-style-type: none"> <li>Lack of management support [Telecoms Supplier]</li> <li>Bad top-down communication [Retail Grocery Organisation; Financial Institution; Shoe Trading Company]</li> </ul>
	Innovation	<ul style="list-style-type: none"> <li>Product innovation [Supersonic Machinery Manufacturing Company]</li> <li>Innovative environment [Retail Grocery Organisation]</li> </ul>	
	Strategic and business planning	<ul style="list-style-type: none"> <li>Strategic thinking and customer focus [Geodetic Surveying Company; Supersonic Machinery Manufacturing Company]</li> </ul>	<ul style="list-style-type: none"> <li>Lack of strategic vision [Financial Institution; Telecoms Supplier; Retail Grocery Organisation]</li> </ul>
	Resources	Financial capacities	
Human resources		<ul style="list-style-type: none"> <li>Knowledge workers [Geodetic Surveying Company; Supersonic Machinery Manufacturing Company; Automatic Assembling Retailer]</li> </ul>	<ul style="list-style-type: none"> <li>Lack of managerial skills [Telecoms Supplier; Retail Grocery Organisation; Financial Institution]</li> </ul>
Technology	R&D	<ul style="list-style-type: none"> <li>Product innovation [Telecoms Supplier; Geodetic Surveying Company]</li> </ul>	
	TQM experiences	<ul style="list-style-type: none"> <li>Integrating TQM and BPR within the strategic context [Geodetic Surveying Company; Supersonic Machinery Manufacturing Company]</li> <li>Organisational learning [Automatic Assembling Retailer]</li> </ul>	<ul style="list-style-type: none"> <li>Lack of long-term business plans [Retail Grocery Organisation; Shoe Trading Company]</li> </ul>
	IT/IS infrastructure	<ul style="list-style-type: none"> <li>Applying IT to core processes [Freight Shipping</li> </ul>	<ul style="list-style-type: none"> <li>Lack of IT tools [Shoe Trading Company]</li> </ul>

Implementation		Company; Automatic Assembling Retailer] Inter-organisational co-operation [Geodetic Surveying Company]	
	End-user skills	<ul style="list-style-type: none"> <li>• Skill Training [Geodetic Surveying Company]</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of IT expertise [Financial Institution; Shoe Trading Company]</li> </ul>
	IT spending	<ul style="list-style-type: none"> <li>• High IT spending [Geodetic Surveying Company]</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of funds for IT investment [Retail Grocery Organisation]</li> </ul>
	Motivation	<ul style="list-style-type: none"> <li>• Customer satisfaction and quality [Supersonic Machinery Manufacturing Company; Freight Shipping Company]</li> </ul>	
	Scope and type	N/A	
	Outsourcing		<ul style="list-style-type: none"> <li>• Rely too much on external IT vendors and consultants [Financial Institution]</li> </ul>
	Change issues	<ul style="list-style-type: none"> <li>• Involving [Automatic Assembling Retailer]</li> <li>• Motivation [Supersonic Machinery Manufacturing Company]</li> <li>• Skill training [Geodetic Surveying Company; Automatic Assembling Retailer]</li> <li>• Proper HM support [Retail Grocery Organisation]</li> </ul>	<ul style="list-style-type: none"> <li>• Failure to deal work overload [Shoe Trading Company]</li> </ul>

## 6.7 Other Issues

While analysing the survey data, several issues have emerged to be of considerable importance and need further investigation. The potential of inter-organisational business integration among SMEs, satellite factories and other firms to form SME networks, for example, is an issue that is receiving much attention. The owner-manager's attitude towards business process change and the willingness to provide full support are believed to take precedence over other technological factors in achieving firm's re-engineering objectives. Implementing BPR on a continuous basis, incorporated with other change

initiatives, will be more cost-efficient and effective. Additionally, change issues cannot be neglected since BPR will affect all aspects within the organisation, new job definitions, reward systems, organisational climate and owner-employee relationship. Approaches to change management have to be further examined in greater detail. These are discussed as follows.

### **6.7.1 Owner-Manager's Attitude to Re-engineering**

The survey found that the majority of BPR initiatives, 71%, were led by CEO/owners. Similarly in the case studies, only the Telecoms Supplier indicated that the ideas of process change, such as streamlining workflow and office work, eliminating non value-adding activities, e.g. unnecessary hierarchical approvals were derived from departmental managers. In keeping with the survey, the R&D director from the Telecoms Supplier commented that the functional managers have better understanding of business processes and adequate knowledge of process improvement. However, when asked about the owner's attitude to BPR, he replied as follows:

*'We're thinking some good ideas but the owner's just not interested'.*

The lack of a full commitment from the top management is considered as an important factor to failure by most of the participating organisations. Many BPR authors have stressed the importance of obtaining support from the top management (e.g., Drucker, 1996; Stoddard et al, 1996; Stevenson, 1993). In the survey management commitment was ranked as the most critical factor to BPR

success. The case studies support this view and further investigate the extent to which the own-managers' attitudes and perceived benefits of BPR affect how re-engineering is implemented in SMEs. Most of the interviewed organisations consider a commitment from the management of top levels very important. Lack of top-down communication and an autocratic management style can significantly affect the results the organisations intend to achieve.

Direct involvement of the owner-managers may increase the chances of a successful BPR. This is illustrated in the Geodetic Surveying Company where the owner participated in building its business network with the clients. Having been in the business for over ten years, he has established a good relationship with several loyal clients. Similarly, the Automatic Assembling Retailer represents a case of applying 'top-down' approach to BPR. The owner-manager is in charge of several functional duties, e.g. personnel, finance and accounting. Led by the owner, the firm's re-engineering project aimed at integrating several functional divisions encountered fewer difficulties. It is worth noting that direct involvement tends to occur in smaller firms, such as the Geodetic Surveying Company, the Supersonic Machinery Manufacturing Company and the Automatic Assembling Manufacturing Retailer where the organisational structures are less formal and the communication lines are shorter.

### **6.7.2 Potential of Inter-organisational Business Integration**

The majority of the responding organisations in the survey claim to have good relations with their customers and other firms for mutual support and information



sharing. This aids small businesses in gaining easier access to benchmarking and networking. The external relations can be reinterpreted from two perspectives. First, as SMEs normally operate in only a few markets, social ties as well as their relationships with suppliers are very important for marketing and sales. The owner-managers of the Geodetic Surveying Company, the Automatic Assembling Retailer, and the Shoe Trading Company claim to have steady market share in the industry and loyal customers since that they have been in the business for a long time during which they have developed a sales and distribution network that is largely attributable to sound relations with suppliers and regional retailers. This is explained by the general manager at Supersonic Machinery Manufacturing Company:

*'We view our clients as our partners. We inform them of our latest machinery and equipment. Through discussion, customers know exactly what the products are going to be. This produces two benefits: first, through such contacts, we obtain updated information about what the customers expect. Second, such interactions help to maintain a lasting co-operative relationship with customers'.*

Second, as many of SMEs are subcontracted to larger organisations and in some cases SMEs are themselves subcontractors who farm out jobs to their satellite manufacturing firms. Thus the relationships of SMEs and their subcontracting organisations and other firms become sophisticated. For example, the focus of the Shoe Trading Company's BPR initiative was to improve the efficiency of communicating with its 150 contracted manufacturing plants while building up a

good relationship with its foreign clients to secure regular orders. Another case is the Automatic Assembling Retailer which is subcontracted to several major clients while at the same time acting as a subcontractor for about 50 satellite manufacturing firms. As their products are highly technology-oriented, the company has to ensure the accuracy of the materials provided by its contracted suppliers. Thus, their re-engineering project was an intent to deal with the complexity of business processes by integrating its ordering system, production line and supplier/clients databases. The senior technician describes their current relations with clients/customer/contractors as follows:

*'We have been trying to maintain a sound relationship with our clients and down-stream satellite plants. And we're at a great advantage of being located in an industrial park where we get mutual support from other SMEs, such as sharing materials and facilities. With different market differentiation/segmentation, we have good relationship with other firms in the industry. There is no malicious competition'.*

Brady and Voss (1995) suggest that SMEs are closer to their customers. This is not the case for the organisations in the case studies as the majority of the participating SMEs are operating on an international basis. For example, the Supersonic Machinery Manufacturing Company's sales points reach several countries in south-eastern Asia. The major clients of the Shoe Trading Company are American and Australian shoes companies.

Cross-functional integration can thus be expanded to inter-organisational co-operation (Davidow and MaLone, 1992). The survey suggests that SMEs involved in such a level of 'business network redesign' (Venkatraman, 1994) are relatively few, although collaboration among SMEs, such as partnership and cross-border alliances, has been widely discussed in the literature (e.g. Rosenfeld, 1996; Bonk, 1996). A higher level of business re-engineering is illustrated in the Geodetic Surveying Company case. The firm built up an integrated information system with a customer interface for linking its major clients. This system enables mutual information sharing and facilitates on-line service inquiries. The firm also provides its clients with necessary technical support and the latest information about geodetic surveying tools. Within the organisation, the owner has been conscious of the advances of IT and offers the employees, most of them also specialising in the field of geodetic surveying, opportunities for further skills training to ensure that they are familiar with the systems the company are currently using. It should be noted that their clients, mainly civil-engineering firms, exhibit similar IT infrastructure. Otherwise, the costs for establishing such network system would be extremely high. When asked how to use IT on an inter-organisational basis, the owner of Geodetic Surveying Company replied:

*'We are one of the few companies that use computers in geodetic surveying. It's different from traditional manual drawing and the quality is significantly improved. Recently we've built up a network system linking to our clients' computers. This on-line communication network, again, saves lot of time and costs'.*

In summary, this part of the case study analysis further investigates the interactions between researched SMEs and their customers, suppliers and other firms. For firms such as Shoes Trading Company and Geodetic Surveying Company, it is vital for them to build a sound relationship with suppliers and regional retailers for businesses to survive. Their market share is determined by long-built reputation and some steady loyal clients. Customers and suppliers are essentially viewed as 'partners'. As aforementioned in 6.2, subcontracting forms the SME business network in Taiwan. The complexity is augmented by the fact that while SMEs are subcontracted to larger organisations, they are sometimes subcontractors themselves. It is argued that inter-organisational BPR in SMEs will be based upon such network, while IT will play a crucial part in eliminating time and space, and integrating IS platforms in different organisations.

### **6.7.3 BPR as an On-going Effort towards Learning Organisations**

The finding from the survey suggests that TQM and BPR do exist simultaneously and the literature argues that TQM techniques help to sustain and build on the improvements gained through successful re-engineering (Davenport, 1993; Niven, 1993; Knorr, 1991). However, BPR needs to be strategically driven (Talwar, 1993; Guha et al, 1993) and requires a plan to ensure that any changes adapted will be consistent with goals of the business (Hale and Cragg, 1996). The Retail Grocery Organisation had difficulties in sustaining their initial benefits from re-engineering and failed to deliver 'core value' to their customers due largely to a lack of strategic vision and long-term business plans. Similarly, the absence of a BPR plan made the Shoe Trading Company unable to deal with

the consequences of a radical process change. Specifically, a major problem was its inability to keep the company's main designers since the firm could not provide sufficient support for them and establish a proper reward system to deal with the work overload problem. The Design Division Manager believes that:

*'Our main clients always provide latest information about shoe design. Our employees are professional designers who discuss with our clients about their orders. However, most of our employees/designers are self-trained. We found it difficult when people leave the company and we need to give full training for the new recruits. This is the same situation with external IT support. We rely heavily on vendors' training programmes. This means, we spent lots of money but couldn't learn much from them'.*

The Retail Grocery Organisation offers an example of failing to implement BPR on a continuous basis. This company redefined its business direction in a view to gaining dramatic business results. It largely invested in marketing and refurbishing the shop. Although the owner of the company is open to all constructive ideas, he is the dominant decision-maker. The Planning Manager describes the situations as follows:

*'The owner is ambitious and we did hit the market when we first entered the market. However, the administrative costs have been so high and we needed to eliminate unnecessary costs. This was the main reason to adopt a BPR strategy which was suggested by a business consulting company. However, we found it very difficult, as the firm did not have proper planning and long-term*

*vision of where the company would lead. When we were suggested to combine divisions in order to cut down the administrative costs and simplify the business processes including top-down communication, the owner laid off one third of the entire workforce, which caused lots of problems. People do not trust the company any more. Besides, the owner is short of management skills. Short-term paid-off was the main concern. This is, I think, the main reason that our BPR project failed’.*

A question as to how SMEs can sustain the benefits from process redesign and adopt an efficient approach to learning from experiences emerges here, since most SMEs are limited in financial and human resources, as suggest by many authors (e.g. Binks et al, 1996). Among the eight organisations interviewed, only the Financial Institution indicates that they have formally sought advice from external IT professionals and business consultants, although the lack of strategic control made the company unable to align the BPR strategy with the corporate strategy. Some technology-oriented SMEs, e.g. the Geodetic Surveying Company and the Supersonic Machinery Manufacturing Company, claim to regularly attend seminars and management programmes provided by the government and universities. The Automatic Assembling Retailer provides an example of empowering employees in a view to creating an environment of ‘ownership’ and offering formal skill training in a manner that what the employees learn, technological or managerial, can be transformed as ‘knowledge’ and accumulated within the organisation. A senior technician stated:

*‘We care very much about the learning process in which new employees*

*learn experiences from the senior technicians. We can't afford to spend lots of time for training. We document the details of each production session. Thanks to modern IT, we are now able to standardise our products. This is the most efficient way to accumulate our experiences and knowledge. It saves time and, essentially, simplifies the ordering process'.*

In summary, given the limited financial and human resources usually found in SMEs (Haksever; 1996; Nash and Rock, 1996), small businesses need to make use of existing financial/human resources for maximal return of investment. This entails a long-term focus, incorporating radical BPR with other change programmes. Retail Grocery Organisation and Shoes Trading Company are two unsuccessful cases due to their lack of strategic vision and long-term business plan. Alternatively, SMEs may seek external support to complement absence of in-house developments. Automatic Assembling Retailer demonstrates an example that knowledge from skills training can be accumulated within the firm to achieve cost-efficiency. This is to sustain the benefits derived from re-engineering and to create a learning organisation.

#### **6.7.4 Organisational Change Issues**

The survey identified several techniques to dealing with organisational change, largely involved with employees. These include providing skills training, empowering or informing/involving employees in decision making, dealing with work overload and establishing a proper incentive/reward system. Training has been viewed as the most efficient way to eliminating resistance when

organisational change takes place. In relation to skill training, the Geodetic Surveying Company offers an example of using state-of-the-art technology in linking its business with the clients while providing employees with required skill training. The owner notes,

*'Employers are invaluable asset of the company. We work together just like a family. They are all professionals in the field. While updating our geodetic surveying facilities regularly, we make sure that our employees are happy with it. Necessary training is always provided. It is wrong to invest in those expensive equipment and software without considering how the employees could cope with those new machines'.*

The Automatic Assembling Retailer is a case of involving employees in decision-making and developing strategies. This is, in part, due to its long standing teamwork culture and decentralised organisational structure, while Hackman and Oldham (1980) believe that empowering workers may lead to increased motivation and satisfaction. This corresponds with the survey finding that higher levels of employees autonomy result in increased top-down communication, which is consistent with Janson (1993) who proposes adopting a communication strategy in dealing with resistance resulting from radical change programmes such as BPR.

As discussed, the most common BPR strategy adopted for functional integration in the cases is combining functional units. This, in most cases, results in job losses. For example, the Shoe Trading Company combined its sales department



with the design division, which although greatly reducing administrative costs shrank the workforce significantly. The creation of 'case managers' has imposed a greater workload upon the employees who used to be 'shoe designers'. Without a proper incentive/reward system, the employees perceived BPR as equivalent to 'downsizing'. This resulted in increased stress, scepticism, low moral, and cynicism.

In contrast, the Retail Grocery Organisation demonstrates a case of combining departments without causing too much resistance, as it was supported by adequate human resource management. The impact of a reduction of forty positions from the radical process change was not as traumatic as it might have been since the employees had been well informed about the possible changes and the company provided sufficient support for the employees during the transition.

The Supersonic Machinery Manufacturing Company, on the other hand, is a successful case of combining functional units without downsizing. This may be due to cost reduction not being their primary reason to re-engineer. Nonetheless, the company provided useful techniques to help employees to adapt to the new work environment and requirements. These include carrying out job rotation and developing new performance standards and targets, which resulted in greater motivation and challenge. The general manager at the Supersonic Machinery Manufacturing Company notes,

*'Laying off employees is probably the last thing we would think about doing, especially as the current business situation is not bad at all. We would*

*rather control our administrative expenditures and carefully control wastes in each department’.*

In summary, this part of the case study analysis investigates change issues in greater detail. Section 6.6 reinforced a view that methods used to tackle resistance from change depends on the problems caused in the organisation. It is obvious that the underlying approaches to change management, i.e., ‘training’, ‘informing’, ‘involving’, ‘establishing new reward structure’ are all about people. Successful implementation of these methods depends on firm’s general human resource management. In the case of Geodetic Surveying Company, end-user skill training was provided to both employees and clients when introducing the new system. Supersonic Machinery Manufacturing Company adopted job rotation to deal with the impacts from functional integration. It was found in the Automatic Assembling Retailer case, ‘informing’ and ‘involving’ are more likely to occur when management adopts a less autocratic and centralising stance. This promotes top-down communication and employee involvement. These findings correspond with the Spencer (1995) who stresses the importance of re-engineering HR at the same time that fundamental business processes are re-engineered.

## **6.8 Comparison of Survey and Case Study Findings**

The main purpose of the case studies was to augment the survey research (Gable, 1994). The case studies were undertaken to complement the survey, aimed at obtaining more in-depth information of the findings from the survey (Kaplan and

Dunchon, 1988; Lee, 1991). A review of the survey and case studies findings enables a comparison to be made and the similarities and differences of the findings derived from two research approaches to be identified. The comparison, illustrated in Table 6.4, is based upon the framework of SMEs undertaking BPR which outlines the main issues the study is concerned with.

Table 6.4: Comparison of the survey and the case studies findings

Classifications	Elements	Survey	Case Studies
Structure	Size and control	<ul style="list-style-type: none"> <li>No difference found between BPR SMEs and non BPR SMEs in terms of size and control</li> <li>The bigger the firms, it is more likely that functional managers lead BPR</li> </ul>	<ul style="list-style-type: none"> <li>Formal hierarchical organisational structure can be an inhibitor</li> </ul>
	Team-based operation	<ul style="list-style-type: none"> <li>Teamwork brings greater involvement and improves top-down communication, achieving cost-efficiency</li> </ul>	<ul style="list-style-type: none"> <li>Team-based operation encourages involvement and innovation</li> <li>Teamwork promotes learning</li> </ul>
	External relations	<ul style="list-style-type: none"> <li>Respondents have reasonably good relations with customers and other firms</li> <li>BPR SMEs tend to be located in industrially concentrated areas, while non-BPR subcontracted to bigger organisations</li> </ul>	<ul style="list-style-type: none"> <li>Social ties form the basis for customer and suppliers relations and are important for building a business network</li> <li>Good relationship with subcontracting and other firms is an important success factor</li> </ul>
Culture	Risk-taking attitude	<ul style="list-style-type: none"> <li>SMEs with ambitious business strategy and higher risk-taking business policy are more likely to benefit more from BPR</li> </ul>	<ul style="list-style-type: none"> <li>Organisations with higher risk-taking attitude are more likely to benefit from BPR</li> </ul>
	Employee empowerment	<ul style="list-style-type: none"> <li>Higher employee autonomy is positively correlated with higher risk-taking attitude and a willingness to re-engineer</li> <li>Higher employee autonomy is positively related to a decentralised structure</li> <li>Higher employee is positively related to response to market and</li> </ul>	<ul style="list-style-type: none"> <li>Employee autonomy is highly related to top-down communication and an effective approach to change</li> <li>Higher employee autonomy is related to a decentralised organisational structure</li> </ul>

		technological change	
Resources	Management support and communication	<ul style="list-style-type: none"> <li>• 71% of the respondents claim their BPR initiatives are led by CEO/owners</li> <li>• Top management tend to get involved at planning and evaluating stages of BPR</li> <li>• Only 19.4% indicate direct involvement</li> </ul>	<ul style="list-style-type: none"> <li>• Most BPR initiatives of the participating organisations are led by owner-managers</li> <li>• Top management support is the key to BPR success</li> <li>• Direct involvement increases the chances of a successful BPR</li> </ul>
	Innovation	<ul style="list-style-type: none"> <li>• Innovation is positively related to IT tools and IT performance</li> <li>• Innovation is positively correlated with teamwork</li> <li>• Innovation is mostly likely to occur when firms are following a growth strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Participating organisations focus mainly on product innovation, especially those that are currently adopting a growth strategy</li> <li>• Using IT for innovation is common</li> <li>• Innovation is highly related to teamwork efficiency</li> </ul>
	Strategic and business planning	<ul style="list-style-type: none"> <li>• Overall, SMEs lack of strategic thinking</li> <li>• BPR SMEs are more likely to engage in strategic management and business planning</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of strategic vision is an important inhibitor</li> </ul>
	Financial capacities	<ul style="list-style-type: none"> <li>• Limited capital poses a constraint in SMEs for BPR</li> <li>• Higher risk-taking attitude is positively related to higher BPR budget</li> <li>• Larger firms are more likely to spend on business consultants and BPR experts for re-engineering</li> </ul>	<ul style="list-style-type: none"> <li>• Financial constraints will inhibit firms from investing on IT</li> </ul>
	Human resources	<ul style="list-style-type: none"> <li>• Employees are largely involved in BPR implementation</li> <li>• Required skill are related to IT expertise and end-user skills</li> <li>• Proper skill training significantly increases BPR satisfaction</li> <li>• Good HRM can have a positive influence on teamwork efficiency and R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of management skills is related to an ignorance of market competition, latest technology and what customers need and expect</li> </ul>
	R&D	<ul style="list-style-type: none"> <li>• R&amp;D is positively correlated with IT capacities, HRM and teamwork efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• R&amp;D is highly related to product innovation</li> </ul>
	Quality	<ul style="list-style-type: none"> <li>• 94% of BPR SMEs claim</li> </ul>	<ul style="list-style-type: none"> <li>• BPR should be integrated</li> </ul>

Technology	management experiences	<ul style="list-style-type: none"> <li>to have undertaken TQM</li> <li>TQM and BPR do exist simultaneously and complement each other</li> </ul>	with firm's long-term change programmes in a view to creating a learning environment
	IT/IS infrastructure	<ul style="list-style-type: none"> <li>BPR SMEs tend to extensively use knowledge software, imaging processors, and production applications</li> <li>Main purpose of IT use is to reduce human labour in a process</li> <li>Sufficient IT tools is positively related to BPR satisfaction</li> <li>IT benefits is achieved through a more common source of information sharing and graphical user interface</li> <li>IT tools are highly related to R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>IT/IS play an important supporting role in eliminating time and distance for functional integration</li> <li>The potential of IT can be restricted due to a lack of IT tools</li> <li>IT use can be expanded for inter-organisational co-operation</li> <li>Non-standardised IS may inhibit inter-organisational linkage</li> </ul>
	End-user skills	<ul style="list-style-type: none"> <li>IT professionals are largely involved with process redesign</li> <li>Only 4.8% indicate that BPR is led by IT professionals</li> <li>Sufficient end-user skills are perceived as a success factor</li> <li>Adequate IT skills are positively correlated with HRM and BPR satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>Process change, either functional integration or inter-organisational co-operation, must be accompanied by proper end-user training</li> <li>Lack of IT literacy may result in relying to much on external IT professionals or vendor's support</li> </ul>
	IT spending	<ul style="list-style-type: none"> <li>BPR SMEs are more likely to spend on IT</li> <li>IT spending is positively correlated with BPR success</li> </ul>	<ul style="list-style-type: none"> <li>Proper IT investment increases the chances of BPR success</li> <li>IT investment must be aligned with strategic IT planning</li> </ul>
Implementation	Motivation	<ul style="list-style-type: none"> <li>Enhancing product/service quality</li> <li>Improving workflow and business processes</li> <li>Decreasing costs</li> <li>Improving customer satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>Improving process efficiency</li> <li>Improving customer satisfaction and quality</li> </ul>
	Current strategy	<ul style="list-style-type: none"> <li>A larger percentage of the sample SMEs is currently adopting a growth strategy</li> <li>76.7% claim to be operating in a competitive market</li> <li>43.5% are currently adopting a product diversification strategy</li> </ul>	<ul style="list-style-type: none"> <li>6 organisations are currently following a growth strategy, including expansion and diversification</li> </ul>
	Scope and type	<ul style="list-style-type: none"> <li>71% of BPR initiatives</li> </ul>	<ul style="list-style-type: none"> <li>7 organisations consider</li> </ul>

		<ul style="list-style-type: none"> <li>• are inter-functional</li> <li>• There is no much difference among three types of processes</li> </ul>	<ul style="list-style-type: none"> <li>• their BPR initiatives to be inter-functional</li> </ul>
	Outsourcing	<ul style="list-style-type: none"> <li>• 21% respondents seek advice from consultants</li> <li>• 3.2% indicate that their BPR projects were led by business consultants/BPR experts</li> <li>• Outsourcing does not directly increase BPR satisfaction</li> </ul>	<ul style="list-style-type: none"> <li>• Only one organisation sought advice from business consultants, although loss of strategic control may inhibit BPR</li> </ul>
	Change issues	<ul style="list-style-type: none"> <li>• 72.6% of respondents perceive proper change management is highly relevant to BPR success</li> <li>• Change management is positively correlated with training and top-down communication</li> <li>• Communication programmes are related to monitoring process and evaluating system</li> <li>• Resistance to change can be overcome by skill training</li> <li>• Work overload can be solved by properly selecting the processes to be re-engineered</li> </ul>	<ul style="list-style-type: none"> <li>• Management of change is highly related to skill training</li> <li>• Involving employees in decision-making is proved to be useful, especially in decentralised organisations</li> <li>• Functional integration can be done without downsizing</li> <li>• Ignorance of important human aspects, e.g. dealing with work overload can be fatal</li> </ul>

### 6.8.1 Organisational Structure

While the survey suggests that there is no significant difference between BPR SMEs and non-BPR SMEs in terms of organisational size, the case studies found that a more formal and hierarchical structure might inhibit BPR. This normally occurs in bigger organisations with more than 50 employees. Several organisations, such as Telecoms Supplier, indicate that a major purpose of their BPR initiatives was to de-emphasise division of labour with a view to streamlining business processes and reducing administrative costs. The survey also suggests that in bigger SMEs it is more likely that functional managers lead

BPR, which is not supported by the case studies since the BPR initiatives in the participating organisations are overwhelmingly top-down endeavours. The Telecoms Supplier is the only case that re-engineering was launched by functional managers but did not get full support from the top management.

There seems to be consistency between the survey and case studies on that team-based operation brings greater involvement and motivation. In keeping with Stanworth and Curran (1973) and Frohman (1996), the case studies reveal that this depends largely upon whether the owner-managers are willing to relinquish power and control. It has been shown that at the Automatic Assembling Retailer a senior technician describes their working environment as 'like a family', while in the Shoe Trading Company, the owner is seen as a 'dominant boss'. The owner's management style is an important determinant of teamwork efficiency.

The survey indicates that the responding SMEs have reasonably good relations with their customers and other firms. The case studies further explored the issue by investigating the interventions between the organisation and its clients, suppliers, subcontracting companies and subcontracted satellite firms. As small businesses often operate in only a few markets (Dilts and Prough, 1989) and social ties are one of the factors that explain the SME network structure (Mitchell, 1973; Holt, 1987; Baker, 1990), the case studies reinforce a view that strategic behaviour is the main reason for building relations. The Geodetic Surveying Company's client-oriented interface and the Automatic Assembling Retailer's integrated ordering system are both highly related to the firms' core processes.

## 6.8.2 Culture

In keeping with the survey findings, the case studies reveal that a higher risk-taking attitude may lead to increased satisfaction in BPR. In the survey, the risk attitude dimension is operationalised by two metrics, business strategy and business policy, while in the case studies the willingness to make a radical change is largely dependent upon the owner-managers' perceived benefits and related to the current growth strategy. For example, the Telecoms Supplier engaged in a large-scale functional integration as part of their expansion strategy in a belief that a simpler business process would be beneficial for both the organisation and its increasing distributors. Similarly, the Supersonic Machinery Manufacturing Company recognised a need for re-engineering its R&D in order to use its supersonic expertise to manufacture semi-conductor products.

Both the survey and the case studies support the notion that employee empowerment and top management commitment are two critical elements of a successful BPR (Janz et al, 1997; Janson, 1993; Hammer, 1990). The survey indicates that higher employee autonomy is more likely to occur in decentralised SMEs, and the Automatic Assembling Retailer and the Supersonic Machinery Manufacturing Company cases confirm this view. These two organisations demonstrate that small businesses operate as an empowered team (Kinni, 1995) where knowledge workers are greatly involved in decision-making and product discussion. 71% of the responding organisations in the survey claim that their BPR initiatives are led by owner-managers and the case studies accord this



finding since the majority of the participating organisations adopted a top-down approach to BPR. While only 19.4% of the owner-managers in the survey were personally involved in process redesign, the case studies suggest that direct involvement has a positive influence on BPR success. In the Automatic Assembling Retailer, the owner was enthusiastically involved with developing the integrated ordering system, and at the Geodetic Surveying Company the owner-manager was in charge of establishing the linkage between the firm and its clients using IT. A similarity in these cases is that the owner-managers are very familiar with both the business and the technology, thus they are capable of leading BPR and conducting the process change.

In the survey, innovation was found to be positively related to IT tools and IT performance, in particular when firms are currently following a growth or expansion strategy. The cases studies support this finding and further indicate that in the situation when the organisations are at rapid growth, such as the Geodetic Surveying Company and the Telecoms Supplier, product innovation usually takes precedence over process innovation. Since these companies are highly technology oriented, using latest IT tools and applications in support of product innovation is common. Consistent with the assertion that innovation is fostered in decentralised, highly integrated, informal organisations (Teng et al, 1994; Wind and West, 1991), both the survey and the case studies suggest that innovation is positively correlated with team-based orientation. For example, the Retail Grocery Organisation encouraged 'unconventional ideas' among the project members when creating the company's new image.

In regard to strategic thinking and project management, the survey reveal a lack of both among the responding organisations. In the case studies, five of the participating organisations are re-engineering their core processes. For example, the Geodetic Surveying Company's firm-client interface is largely involved with customer services and product development. The Automatic Assembling Retailer's integrated information system comprises of its three major operational processes: ordering system, client/supplier database and manufacturing process. However, a long-term strategic planning is required to ensure that the business gains from re-engineering can be sustained. For example, the Retailer Grocery Organisation soon lost its competitive advantage due to a lack of long-term business planning, a focus on short-term pay-off and failure to implement process change on a continuous basis.

### **6.8.3 Resources**

Both the survey and the case studies agree on a finding that a lack of capital poses a constraint on SMEs for BPR. Financial deficiency restricted the Shoe Trading Company and the Retail Grocery Organisation from advanced use of IT for functional integration and inter-organisational linkage. The survey indicates that larger SMEs are more likely to establish a budget for BPR for business consulting, while the Financial Institution provides an example of relying too much on external support and losing strategic control. In other cases, the financial issues are mainly centred on IT investment since most of the participating organisations are highly technology-oriented and functional or across-company integration largely involves IT. In this regard, the case studies

support a view that the extent to which SMEs spend on IT for BPR is a matter of the owner-manager's perceived benefits to individuals and the organisation (Cragg and King, 1993). For example, the use of IT for BPR at the Geodetic Surveying Company results from the owner's awareness of technological advances in geodetic techniques. A large investment in IT has been made so as to provide a better service to clients.

The survey has revealed that employees are largely involved at the implementation stage of BPR and proper skill training, especial end-user training, may significantly increase the chances of BPR success. In the case studies, the majority of the employees in the participating organisations are knowledge workers, specialising in their business professions. As Meltzer and Goldsmith (1997) point out, owners of SMEs face a challenge in attracting and retaining talented employees. The Shoe Trading Company demonstrates an example of improper HRM significantly inhibiting BPR. The company had difficulties retaining its major designers due largely to the absence of management support and of an adequate evaluating system. This finding echoes Spencer's proposition (1995) that HR needs to be re-engineered at the same time that fundamental business processes are re-engineered.

A need for providing employees with necessary skill training in an attempt to closing gaps between their current skills and those required in the new organisation is recognised in both the survey and the case studies. The importance of skills training for BPR is widely discussed in the literature (e.g., McElrath-Slade, 1994; Saggars, 1994). While the survey has identified that HRM

correlates with innovation and R&D, the case studies further indicate that this is especially the case when firm's BPR initiatives focus primarily on product innovation. For example, at the Supersonic Machinery Manufacturing Company and the Telecoms Supplier where product diversification was adopted as the strategy, R&D could not facilitate product innovation unless employees were well motivated and equipped with required skills. The case studies also stress the issue as to how SMEs sustain the business gains and learn the experiences derived from quality programmes and re-engineering efforts since they are usually short of financial and human resources (Weinrauch et al, 1991; Watkins, 1983). A case of this is the Automatic Assembling Retailer. It is suggested that knowledge and experiences obtained from skill training and business consulting can be accumulated within the organisation by documenting each training and consulting session for future reference. Job rotation at the Supersonic Machinery Manufacturing Company was also found to have positive impacts on organisation learning and cost-efficiency.

#### **6.8.4 Technology**

The survey has identified that the most commonly used IT tools among responding organisations include PCs and telecommunications, e.g., telephones, facsimile machines and electronic mails and the primary reason for using them is to reduce or replace human labour in a process. Despite an increased use and ownership of IT in SMEs suggested by many researchers (e.g., Burns and Hatter, 1992), such level of IT utilisation, according to Davenport (1993), is relatively low. In contrast, the participating organisations in the case studies appear to

widely use IT for process integration and product innovation. A plausible reason is that many of these companies, e.g., the Geodetic Surveying Company and the Telecoms Supplier, are providing technology-related products or services.

The extensive use of IT applications, such as spreadsheets, databases, and document imaging for inter-organisational linkage is evident. However, the application of workflow and knowledge software to 'process innovation' is comparatively rare. This finding seems to dispute the suggestion that BPR is exclusively driven by IT (Alter, 1990; Gant, 1992; Venkatraman, 1994). Rather, IT plays an important supportive role as a tool in eliminating time and distance for process integration (Carr and Johansson, 1995; Talwar, 1994). In keeping with the survey findings, a lack of IT tools, as found in the Financial Institution and the Shoe Trading Company, is shown to be an inhibitor to functional integration. In regard to inter-organisational linkages, the Geodetic Surveying Company provides an example of successfully establishing an integrated system between the organisation and its clients for mutual support and information sharing, while the non-standardised IT platforms between the Supersonic Machinery Manufacturing Company and its 200 contracted satellite firms demonstrate an obstacle to successful implementation.

In the survey, only 4.8% of the responding organisations indicate that their BPR initiatives are led by IT professionals, implying that BPR is indeed a management issue where re-engineering solutions should involve more organisational and cultural elements (Wastell et al, 1994). The case studies support this finding and further reveal that process change, either functional

integration or inter-organisational co-operation, must be accompanied with proper end-user training. As Ferrell (1996) suggests, SMEs typically have fewer in-house technical experts to deal with new developments. The Financial Institution sought assistance from business consulting companies due to a lack of IT literacy, while relying too much on external IT professionals and vendors resulted in a loss of strategic control.

As aforementioned, financial constraints may significantly inhibit firms from investing on IT. This has been shown in the Retail Grocery Organisation case. While both the survey and the case studies agree that IT spending is positively correlated with BPR satisfaction, the case studies reinforce the view that IT investment should be aligned with firm's strategic IT planning and current business strategy. For example, the investment on IT for the Internet banking system at the Financial Institution based on a suggestion from IT consultants rather than firm's business planning only to find out that the time and costs incurred could not be justified. Similarly, the results of the Shoe Trading Company's re-engineering efforts were doomed to failure since the purchase of IT tools was merely for integrating some 'supporting processes' which yields little value to the end customers.

### **6.8.5 Implementation**

There are similarities between the survey and the case studies findings in respect to the implementation issues. The survey has identified that enhancing product/service quality is the primary purpose of re-engineering, followed by

improving process efficiency, decreasing costs, and increasing customer satisfaction. Similarly, 5 participating organisations in the case studies indicate that enhancing product/service quality in an attempt to increasing customer satisfaction is a critical driver to re-engineering, and 3 organisations re-engineered in order to improve process efficiency and reduce costs. This is illustrated in Table 6.5.

*Table 6.5: The main purposes of re-engineering in the case studies*

<b>Case</b>	<b>Primary purposes of re-engineering</b>
<i>Geodetic Surveying Company</i>	Quality and process efficiency
<i>Supersonic Machinery Manufacturing Company</i>	Customer satisfaction and process efficiency
<i>Telecoms Supplier</i>	Process efficiency and cost reduction
<i>Retail Grocery Organisation</i>	Process efficiency and cost reduction
<i>Automatic Assembling Retailer</i>	Customer satisfaction and process efficiency
<i>Freight Shipping Company</i>	Quality and customer satisfaction
<i>Financial Institution</i>	Customer satisfaction and quality
<i>Shoe Trading Company</i>	Cost reduction and process efficiency

In relation to the firms' current business strategy, the survey reveals that the majority of the responding organisations, 76.7%, are following a growth strategy, while the case studies further indicate that this includes business expansion and product diversification. Several organisations, such as Supersonic Machinery Manufacturing Company, Telecoms Supplier, and Automatic Assembling Retailer, believe that product innovation and better process efficiency are particularly relevant.

The survey shows that a large proportion of the BPR initiatives in the responding organisations are inter-functional. This is in keeping with the principle of BPR, an emphasis on horizontal integration across functions (Hammer, 1990; Harrington, 1991; Davenport, 1993). The case studies support this finding and

demonstrate the potential of SMEs expanding from functional integration to inter-organisational co-operation which Venkatraman (1994) refers to as 'business network redesign'. Somehow, as the owner of the Geodetic Surveying Company and the general manager from the Supersonic Machinery Manufacturing Company admits, this is very much dependent upon the IT infrastructure of the participating organisations. While the survey did not find any difference among three types of business processes, as discussed in 6.8.2, 5 organisations in the case studies focus their re-engineering efforts on operational processes, implying that the participating organisations are re-engineering their core processes which deliver value to the customers (Rockart, 1988; Johansson et al, 1993; Champy, 1995; Meyer, 1993).

21% of the responding SMEs in the survey claim to have sought advice from business consultants, but only 3.2 % indicate that their BPR initiatives were led by them. This finding is encouraging since the majority of the firms do intend to keep control of their BPR initiatives. Among the eight interviewed organisations, only the Financial Institution indicates the use of business consultants and IT support. However, this case provides an example that the management should stay in strategic control in order to avoid the risks associated with outsourcing, such as stripping technology skill, technological obsolescence, and limiting of long-term flexibility (McLellan and Marcolin, 1994).

There is consistency between the survey and the case studies on the approaches adopted to managing radical process change. The survey supports the literature, indicating that resistance to change can be overcome by skills training



(Davenport, 1993; Lambert, 1990; Baxton and Lisburn, 1994); work overload can be solved by properly selecting the processes to be re-engineered (Witherill and Kolak, 1996); and communications strategies are adopted to reduce confusion, scepticism, and cynicism risen from re-engineering (Janson, 1993; Maira, 1994). The case studies reaffirm the above and provide further insight into firms seeking effective and efficiency methods to managing change issues. For example, the Supersonic Machinery Manufacturing Firm believes that job rotation increases motivation and brings new challenges to employees, while the Automatic Assembling Retailer creates a learning environment where individuals are empowered, well motivated and provided with skills during the transition.

## **6.9 Revising The Framework of SMEs Undertaking BPR**

Having analysing the case studies, the findings enabled the researcher to further modify the framework for SMEs undertaking BPR. The new framework can be regarded as *the BPR implementing environment in the small business context* upon which the development of BPR guidelines for SMEs can be based. The concept of this revised framework is constructed around three main findings from the questionnaire survey: a holistic view on strategic process re-engineering, implementing BPR as an organisational change project, and aligning IT strategy with BPR strategy towards an innovative and learning organisation. The new framework of SMEs implementing BPR is illustrated as Figure 6.1.

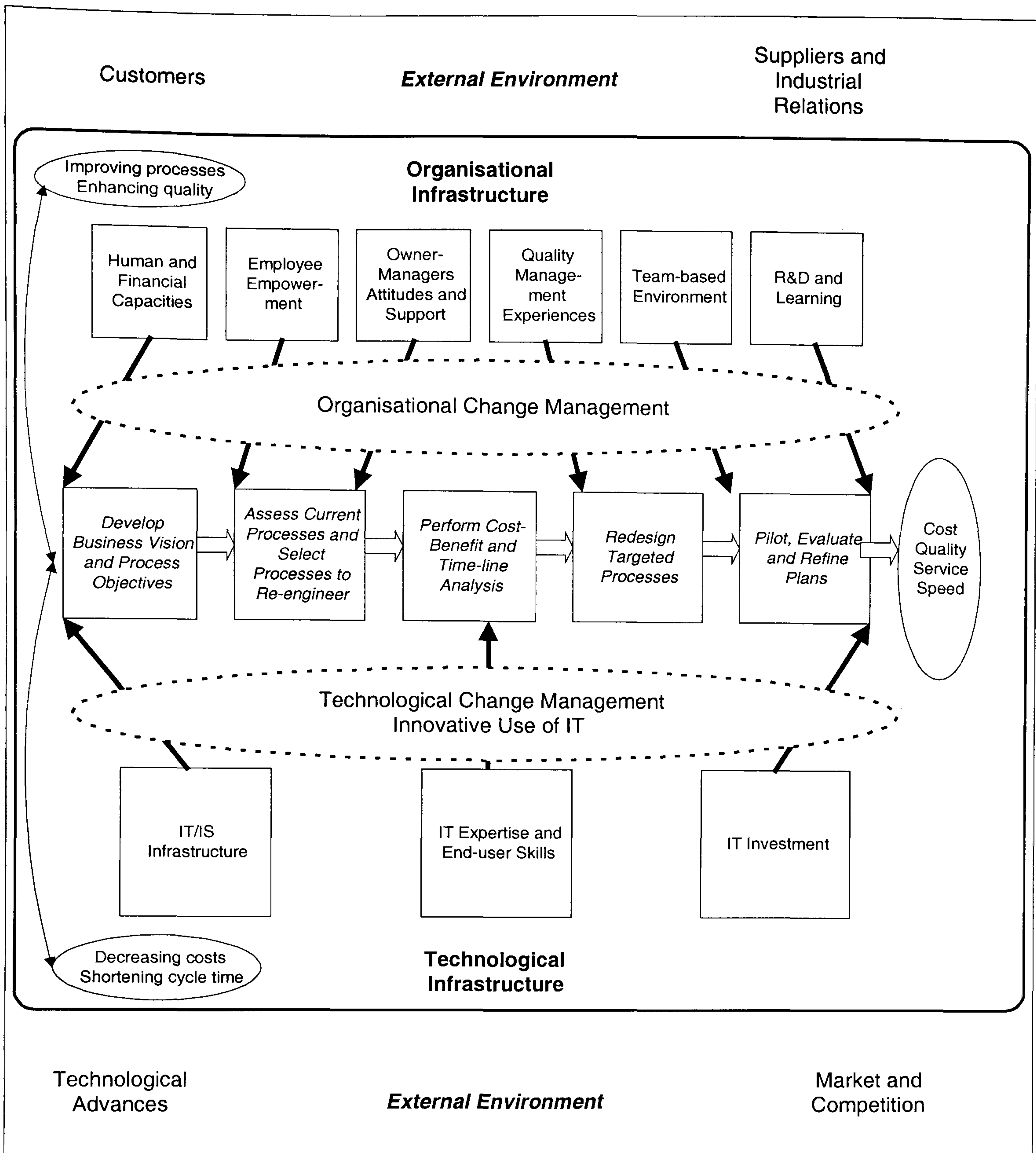


Figure 6.1: Revised framework of SME undertaking BPR

A holistic view on strategic BPR planning is a recognition that the factors that result in a desire for process re-engineering manifest themselves internally and externally. External factors may include customers' needs, market trends and competition, technological opportunities, and the relations with suppliers, subcontractors or other SMEs. The owner-managers have to decide how radical

their re-engineering efforts will be and the level of functional or inter-organisational integration. The study reveals that SMEs are at a disadvantage of less strategic thinking, while the strong social ties and sound relations with customers, suppliers, and other firms (Mitchell, 1973; Holt, 1987) imply a potential of SMEs attaining a higher level of business integration along the process improvement continuum. This can be facilitated and achieved by the use of modern technology and telecommunications. Internal factors are those concerned with the organisational resources, including financial and human capacities. The study has suggested that past TQM experiences have put SMEs in a better position to re-engineer. A review of firm's strengths and weaknesses enables the CEO to determine the core competencies and select the major processes to re-engineer. The need of a fundamental process change, though, is very much dependent upon the owner-managers' risk-taking attitudes and received benefits from BPR.

Once the targeted processes have been chosen, SMEs need to examine whether the organisations are culturally and structurally ready for re-engineering. Specifically, re-engineering requires a strong commitment from owner-managers since they play a decisive role in determining firms' strategic directions. Full support from employees cannot be neglected. Change issues, such as resistance and lack of required skills, may arise and need to be tackled at two levels: organisational and technological. Employees have to be well motivated and empowered in order to increase top-down communication and response to customers. Training has been demonstrated in the survey as an effective approach to enhancing managerial knowledge as well as inter-functional work

skills. The role of the IS function has to be repositioned in facilitating BPR by investing in IT tools and providing required end-user skills. Change has to be managed as a strategic project. This is to ensure that re-engineering efforts are implemented as planned and assessed by new performance standards and targets. Conducting pilots and measuring results regularly may significantly increase cost-efficiency. While the lack of a project team is ranked as a major factor to BPR failure, the survey reveals that, however, forming a project team for some SMEs may not be necessary and financially feasible. Due to the team-based nature in small firms, the majority of re-engineering initiatives in the responding organisations are led by owner-managers. This acknowledges the importance of full range management support from BPR planning to evaluation.

Despite much debate on whether IT is a necessity for BPR, this study has shown the powerful potential of IT use in firms' re-engineering efforts. The role of IT/IS has evolved from automating existing outdated business processes to providing organisations with a wide array of business opportunities by shortening communication lines and eliminating space and time. This can be achieved, in essence, by the innovative use of IT. The survey has found that firms' IT capacities are significantly correlated with innovation in BPR SMEs. However, the focus has to be on the alignment of IT strategy and BPR strategy derived from a strategic vision. This is to ensure that the investment on IT and any required end-user skill training can be evaluated by internal and external customers, or 'process outputs,' rather than by functional performance or cost savings. Given the often limited financial and human resources in a smaller company, the knowledge and experiences accumulated from the innovative use

of IT and the efforts of R&D provide a valuable basis for continuous process improvement towards a learning organisation.

## **6.10 Conclusions**

The chapter has outlined the findings from the case studies. Eight organisations were selected and grouped into proactive and reactive firms in terms of risk-taking attitude, management style, and market situations. Two apparently successful cases and two unsuccessful cases were chosen for each group, which enabled a comparison to be made and allowed a further investigation of the success and failure factors to BPR. In order to try to mitigate contextual biases, the case studies chose four SMEs operating in manufacturing and four in service. The cases provide further insights into SMEs undertaking BPR.

In relation to the structural factors, de-emphasising division of labour with a view to reducing administrative costs and improving process efficiency is one of the primary reasons for re-engineering. This explains that most of the BPR initiatives in the participating organisations are inter-functional, which is consistent with the underlying principle of BPR, horizontal integration across functions to achieve dramatic improvements (Hammer, 1990; Harrington, 1991; Davenport, 1993). Team-based operations, usually found in smaller organisations such as Automatic Assembling Retailer and Geodetic Surveying Company, are shown to be an important factor that brings greater involvement and better top-down communication, two critical elements for innovation and organisational learning. As social ties have been proposed as one of the factors that explain the

SME network structure (Mitchell, 1973; Baker, 1990), the participants acknowledge that a sound and mutual-supporting relation with suppliers, clients and other firms is of paramount importance in establishing an inter-organisational linkage which may bring the SME's re-engineering endeavours to a higher level along the business integration continuum (Venkatraman, 1994).

In the cultural context, the case studies support the finding of the survey, suggesting that SMEs with a higher risk-taking attitude are more likely to benefit from undertaking BPR. While a more ambitious business strategy among the participating organisations usually refers to large-scale functional integration which may involve downsizing, adopting a radical approach as recommended by many BPR proponents (e.g., Kaplan and Murdock, 1991; Johansson et al, 1993) is not evident in the case studies. It can be concluded that SMEs tend to reconcile the radical nature of BPR and their wish to avoid risk by making incremental process changes. However, a strong commitment from the top management is essential. In keeping with Tushman et al (1986), the case studies indicate that direct involvement is strongly related to strategic control and project efficiency. Lack of owner's support or adopting an autocratic management style, as found in the Financial Institution and the Shoe Trading Company, could hinder a firm's re-engineering efforts to a great extent. It is suggested that employees need to be well empowered and motivated in order to take greater responsibilities and adapt to new performance standards and requirements.

The case studies reaffirm the finding from the survey that financial constraints and inadequate HRM are two important inhibitors to BPR. Nash and Rock

(1996) have estimated that 60% of owner-managed businesses fail due to the owner's lack of appropriate management experience. Watkins (1983) explains that this is due to owners of small firms being caught up in day-to-day operations and in many cases they handle all the functional duties, such as personnel, finance, and production. The case studies in particular point to an absence of human resource management which is largely related to establishing an appropriate performance and evaluation system and providing adequate end-user skills. Given the majority of the participating organisations are technology-oriented, a lack of IT literacy can significantly impede the organisation from production innovation and as a result, firms may rely excessively on the vendor's support, thereby resulting in loss of strategic control and flexibility.

In regard to IT use for BPR, the case studies provide a clear indication that IT has powerful capacities to eliminating time and distance to help the firms to achieve functional integration and improve across-company linkage. Several organisations, such as the Supersonic Machinery Manufacturing Company and the Telecoms Supplier, are applying IT largely to product innovation as these firms manufacture or provide technology-based products/services and, at the same time use IT to improve client and supplier relations. The Geodetic Surveying Company provides an example of expanding IT use to establishing a firm-client interface for mutual support and information sharing, although the successful implementation of such system is largely due to the similar IT infrastructure between the organisation and its clients. Either for functional linkage or inter-organisational co-operation, firms need to have sufficient funds for IT investment and provide required end-user training to ensure that

employees are capable of doing new tasks. Apart from the integrated system at the Automatic Assembling Retailer that combines ordering system, production, and client/supplier databases, the use of IT for 'process innovation' is relatively rare. It can thus be concluded that IT plays an essential supporting role in SMEs' re-engineering initiatives.

In conclusion, the case studies aimed to provide in-depth analysis of the findings from the survey (Kaplan and Duchon, 1988). This enabled the researcher to consider the circumstances of individual organisations and to capture the reality in greater detail, although as Galliers (1992) argues, the conclusions drawn may be specific to the particular organisations studied and may not be generalisable. However, the case studies have provided valuable insights into implementing BPR in the small business context and, a comparison with previous findings from the survey allowed the researcher to modify the framework of SMEs undertaking BPR. The revised framework outlines the BPR environments in SMEs and forms the basis for formulating BPR guidelines for SMEs presented in the conclusion chapter.



## **Chapter 7 Recommendations and Conclusions**

### **7.0 Introduction**

The findings of the study, as presented in chapters five and six, must be interpreted in the light of existing literature, the research objectives, and the research method. Business process re-engineering has been identified as an important management practice for organisations seeking radical process improvement. Despite an increasing body of literature in this field, there is a lack of large-scale empirical research, and the focus has been on the large organisations. Given the importance of small and medium-sized enterprises in economic development, there is a need to investigate SMEs in order to determine whether the same principles for BPR apply, or whether a different approach needs to be taken by a small business looking for radical change.

This study is based upon the assumption that re-engineering in SMEs is somewhat different from that in their larger counterparts. Therefore the own-managers of small firms require assistance that the existing BPR approaches and methodologies based on proprietary expertise or anecdotal evidence derived from larger firms cannot provide. It is clear that the behaviour of SMEs is different from that of larger firms due to their organisational attributes such as firm size, structure, resources and organisational culture. While it can be argued that SMEs may find undertaking BPR

easier due to their shorter lines of communications, empowered employees, and team-based orientation, it must be acknowledged that the problems associated with the human and financial capacities in SMEs are fundamentally different from those in large firms. On reflection, this study was based on a belief that process re-engineering is equally important for SMEs, and that BPR practice in smaller firms is significantly different from the principles given to larger organisations. However, the exact nature of this difference would emerge as much from the study as from the existing literature.

## **7.1 The Research Framework**

BPR emerged in the early 90s as an approach for organisations to competing in a globally competitive environment (Childe et al, 1994; Stalk and Hout, 1990; Rockart and Short, 1991). Labelled as radical business transformation, BPR is a customer driven, IT enabled, strategic approach (Hammer, 1990; Martinsons, 1995; Hyde et al, 1995) that contradicts the conventional functional specialisation (Harrington, 1991; Davenport and Short, 1990). While firms undertake BPR in order to increase efficiency, quality, innovation and speed (Hammer and Champy, 1993; Janson, 1993; Davenport and Short, 1990; Sheridan, 1991), the concepts of re-engineering have evolved from technology-focused to a holistic strategic planning that involves the whole dimensions of an organisation (Ghani, 1996; Hale and Cragg, 1996).

The importance of business process redesign as a management approach to

productivity improvement has been well recognised (Champy, 1993; Galliers et al, 1994; Edwards and Preece, 1994). However, the lack of precision with regard to how re-engineering is to be done and the misconception of the terminology, tools and techniques of re-engineering have caused BPR to be dismissed as merely a consulting fad (Webster and Black, 1998; Buchanan, 1997; Blackburn, 1996). The existing BPR literature is sparse (Demkes and Franken, 1996; Clark and Stoddard, 1996; Bartezzaghi et al, 1993) and focuses on the experiences from larger firms (Kettinger et al, 1995; Earl, 1994). There is little consideration for SMEs seeking to benefit from radical process improvement (Hale and Cragg, 1996). While many authors offer some prescriptive advice on BPR, the empirical support for this advice is questionable. The gap in the literature that this study focuses on is the absence of comprehensive BPR guidelines for SMEs. The specific research objective and questions, as aforementioned in chapter 3, are stated below.

### **7.1.1 Research Objective and Questions**

The overall research objective of this study is:

*to examine the extent to which BPR is applicable to SMEs and to determine an appropriate basis for the development of BPR guidelines for SMEs*

The purpose of this research is therefore to provide an empirical foundation for developing BPR guidelines for SMEs. Such an empirical base is necessary due to the

absence of existing literature focusing on this issue. The researcher considered it important to have an empirical basis for developing BPR guidelines as current experiences of BPR practice in SMEs would illuminate the areas where guidelines are required, and would illustrate how current efforts were working. The examination of BPR undertaking in SMEs can take place at two levels. The first level focuses on a high level examination of the experiences of a large number of organisations. The second level is a detailed examination of experiences of specific organisations.

Specifically, this study sought to answer the following questions:

- Do SMEs undertake BPR? Why and when do they undertake re-engineering initiatives?
- Can SMEs, as their large counterparts, benefit from process redesign and achieve better performance in cost reduction, shorter cycle time, higher product quality, and customers' satisfaction?
- Do SMEs have more flexibility, in terms of organisational culture, IT-use, management structure, market response, and cross-functional orientation, to carry out re-engineering projects; or do their limited financial and technological resources *inhibit* BPR results?

Based upon the above three research questions the main conclusions are drawn in 7.3. Before stating the conclusions, it is necessary to acknowledge the limitations of this research.

## 7.2 Limitations of the Research Strategy

The research strategy employed for this study is pluralistic, consisting of a survey and case studies. A major limitation of adopting this approach is that there is little documented evidence of the use of such a strategy (Gable, 1994). Smithson (1991) questions the appropriateness of combining positivist and interpretative approaches. Additionally, there is debate over which research methods are amenable to the pluralistic and in what order they should be combined (Gable, 1994). However, while such arguments exist, the researcher believes that the methods chosen are appropriate for the research undertaken here. This is because the study was exploratory in nature and aimed to map current experiences and practices. The survey was used first because it provides the ability to look at a far greater number of variables (Galliers, 1992). Then cases studies were undertaken to offer a more in-depth understanding of the propositions supported by the case study research (Bonoma, 1985).

Limitations exist with regard to survey questionnaires in that the design of the questionnaire can have a major effect on survey results. The manner in which questions are phrased, and the order in which they are asked, can affect the answer the respondent provides (Hufnagel and Conca, 1994; DeVaus, 1991). The questionnaire approach also suffers from the limitation that respondents may misinterpret or misunderstand questions, which may have influenced the results in the study. Attempts were made to minimise this limitation by carrying out pre-tests

of the questionnaire in order to remove ambiguities. There is also the added danger that the person who completed the questionnaire was not the person targeted. The study tried to control this limitation by addressing each questionnaire to the owner-managers or CEO responsible for their re-engineering initiatives. Additionally, Galliers (1992) argues that all survey research suffers from the limitation that it only provides a snap-shot of the situation at a certain time, which yields little information on the underlying meaning of the data. In order to overcome this a pluralistic research approach was undertaken which can reduce the limitations of a specific research method (Greene et al, 1989).

Case study research also has limitations. Specifically, its weaknesses include the lack of generalisability, the potential for bias by the researcher in interpreting the data and the difficulties in distinguishing between cause and effect (Yin, 1984).

Overall, the limitations of the research strategy are a culmination of the limitations of individual research approaches included in the study. They are inherent within the techniques wherever particular techniques are used, and have to be counteracted by the researcher. The adoption of a pluralistic approach allows a greater opportunity to counterbalance the limitations of an individual research method.

The limitations of the research strategy outlined above have consequential implications for the research findings. Primarily, the findings are not generalisable. The results of the survey relate to those organisations studied, and the case study

findings are limited to the specific SMEs that were investigated. However, given that there was a lack of rigorous empirical evidence in the area upon which to base this study, the method chosen was deemed most appropriate, and the limitations are considered acceptable in the circumstances. Further, the findings of the study have provided a valuable insight into how BPR and SMEs are connected and can form the basis of further research.

Having acknowledged the limitations of the research, the main conclusions from this study are stated below.

### **7.3 Conclusions**

The importance of BPR has been recognised by both practitioners and academics. However, despite the growing body of literature, there is a lack of larger scale empirical research in the field of BPR. This is especially so in the small firm arena. This study sought to examine the extent to which BPR is applicable to SMEs and to determine an appropriate basis for the development of BPR guidelines for SMEs. The conclusions are organised around the three questions derived from the research objective: (1) Do SMEs undertake BPR? Why and when do they take re-engineering initiatives? (2) Can SMEs, as their large counterparts, benefit from process redesign and achieve better performance in cost reduction, shorter cycle time, higher product quality, and customers' satisfaction? (3) Do SMEs have more flexibility, in terms of organisational culture, IT-use, management structure, market response, and cross-

functional orientation, to carry out re-engineering projects? Or with their limited financial and technological resources, inhibit the BPR performance?

*Do SMEs undertake BPR? Why and when do they take re-engineering initiatives?*

Approximately 53% of the sample SMEs claim to have undertaken or are undertaking BPR. Given that SMEs are generally considered to be less strategic thinking and limited in financial resources, this percentage is considered high. However, as noted in 4.6.4, this figure might be over-estimated since the participating respondents were more aware of the issue by attending management courses. A comparison of BPR SMEs and non-BPR SMEs reveals that BPR SMEs are more likely to be involved in BPR activities defined in this study, from both project management and strategic planning points of view. However, it should be noted that some non-BPR SMEs, although ignorant of the term, have been examining and redesigning the business processes. They are considered as potential BPR undertakers.

The assertion that, in SMEs, re-engineering is often a response to positive trends (Kinni, 1995) is empirically confirmed in the present study. Compared to newly established or declining, SMEs at rapid growth or mature status are more likely to commit themselves in re-engineering. These firms are characterised by fast business growth in a competitive market, good relationships with customers and other firms, and better business performance and efficiency. They are referred to as 'proactive



SMEs' in the case studies. Although the focuses are somewhat different, it was found in the case studies that both proactive and reactive SMEs can benefit from re-engineering, if their BPR initiatives are customer-driven and focused on 'core processes'.

With the majority of the respondents claiming to have had TQM experiences, 'enhancing product/service quality' is ranked as the top priority to re-engineer, compared to others such as keeping up with competitors and taking advantage of modern IT. 71% of the respondents consider their re-engineering as inter-functional. According to Venkatraman (1994), this implies that SMEs tend to use BPR as an approach to 'seeking efficiency' rather than 'enhancing capacities'. However, the potential of SMEs co-operating with other firms, both suppliers and customers, towards a higher position of business integration along the process re-engineering continuum, is evident in this study. This is supported by the results that SMEs located in industrially concentrated areas tend to benchmark their current workflow and business processes, and that seeking advice from outside, including management consultants, government institutes, or other SMEs, is common among BPR SMEs. Social ties are one of the factors that explain the SME network structure (Mitchell, 1973; Baker, 1990). Given the social and organisational structures, SMEs consider it easier to build up a business network where their BPR efforts can be based at both individual and network level. However, the problems with different IT infrastructures and the negotiation on 'core competencies' are to be overcome before such network can be realised.

*Can SMEs, as their large counterparts, benefit from process redesign and achieve better performance in cost reduction, shorter cycle time, higher product quality, and customers' satisfaction?*

The majority of the respondents use business performance and organisational efficiency as two determinants in measuring BPR results. 72.5% of BPR respondents indicated that they are satisfied with their BPR initiatives. This demonstrates that SMEs have an equal opportunity as their bigger counterparts to succeed and largely benefit from BPR efforts. Specifically, better customer satisfaction and cost-efficiency are ranked by the sample BPR SMEs as two most significant improvements among others achieved. The study found that while IT has shown its powerful capacities in integrating functional units, the use of IT is highly correlated with top management support. This is understandable since the owner-managers usually play a decisive role in SMEs. This implies, though, that the enabling power of IT on BPR can be either escalated or inhibited, dependent upon the acceptance of IT use and perceived benefits by the owner-managers.

The responding organisations were also asked to rank the reasons that contribute to BPR failure. Despite the high level of satisfaction indicated by sample SMEs in this study, small firms are facing similar problems and pitfalls that have been identified in the BPR literature studied with larger organisations. These failure factors, as discussed in chapter five, are significantly related to the areas of project

management and strategic planning. They are inherent and intertwined. For example, the lack of a project team and pilot implementation are due in part to financial insufficiency, while SMEs that cannot afford to train their employees in-house usually lack BPR expertise and have poor understanding about BPR, resulting in a need of seeking advice from outside. While SMEs with previous TQM experiences were found to be in a better position to re-engineer, the major components of TQM, such as customer-focus, use of work team, and employee involvement, are very much under the project management and strategic planning domain. The lack of a strategic vision leads to an ignorance of the customer's needs as well as the firm's position in the market, which is linked to inappropriate selection of the business processes to re-engineer.

*Do SMEs have more flexibility, in terms of organisational culture, IT-use, management structure, market response, and cross-functional orientation, to carry out re-engineering projects? Or do their limited financial and technological resources inhibit the BPR performance?*

This study used number of employees as a criterion in determining the size of the firms, while level of management and span of control represent the organisational hierarchy. As management structures of small firms are relatively flat, thus they do not suffer from bureaucracy and cumbersome organisational systems (Lefebvre and Lefebvre, 1992). Increased flexibility and adaptability resulted from simpler structures enable Avison et al (1995) to argue that SMEs have better potential to

undertake BPR. However, none of the tests related to size and control variables attained the level of significance. Nevertheless, when SMEs grow and expand, and the organisational structure becomes more sophisticated, there is a tendency for SMEs to outsource their re-engineering projects and for functional managers to lead BPR, rather than upper level managers.

Although firm size may not directly influence re-engineering results, culture does. The culture dimension includes risk taking attitude, empowerment, and team-based orientation. The study has disputed the argument that BPR initiatives in SMEs have to be radical in nature. Forced change in a 'top-down' manner contradicts the co-operative environment in SMEs underlining the team-based relationship between owner-managers and knowledge workers. Although establishing a project team especially for BPR may not be practically feasible due to the often limited financial capacity of SMEs, this study reveals that empowerment that affords a fast response to internal problem-solving and external change, is significantly related to flexibility and BPR success. The owner-managers, in this regard, need to provide required skills training for BPR and foster a learning and innovative culture in tackling resistance often arising from the change issues, such as work overload and job loss.

66.7% of the BPR SMEs have been computerised for under 5 years, and only approximately half of the sample SMEs have used IT in redesigning workflow and processes. However, the study shows a positive correlation between IT use for process redesign and increased BPR satisfaction. Commonly used IT tools include

electronic messaging, telecommunications and networks, although they are restricted within the organisational context. Essentially, the innovative use of IT can deliver much better business performance via BPR, if the focus can be expanded from production innovation to network linkage. It is suggested that SMEs should take a broader view in re-engineering their IS function, and incorporate IT strategy with business strategy.

To conclude, this study has expanded the research literature on business process re-engineering in small and medium-sized enterprises by documenting, or mapping, current practice and proposing a basis from which BPR guidelines for SMEs may be developed. This study has illustrated that undertaking BPR in SMEs is somewhat different from its larger counterparts, and has delineated the organisational issues that result from these differences. The study was based on a supposition that such process change initiatives should not be technology-based within a functional level. The findings suggest that the owner-managers as well as employees play equally important roles in establishing a change culture and maintaining co-operation. It facilitates the development of a team-based operational environment, and is largely related to innovation and learning. These findings form the basis of the BPR guidelines for SMEs which are summarised in Table 7.1 and will be discussed in greater detail in the next section. These guidelines cover issues such as strategic BPR planning, implementing BPR as change projects, using IT for innovation and learning and co-ordinating BPR and existing quality/change initiatives.

*Table 7.1: Summary of the BPR guidelines for SMEs*

- 1 Processes need to be put in place to enable SMEs to investigate their core competencies and business opportunities, and to determine whether a radical process change is necessary.

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- 2 Organisational resources need to be examined to allow SMEs to evaluate their internal capacities in a manner that maps the current business processes, and identifies the core processes to be re-engineered.
- 3 There is a need to delineate the owner-manager's role in a manner that ensures consistency with the appropriate BPR environment

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- 4 There is a need to identify the changing roles of employees in a manner that is consistent with the requirements of the new processes
- 5 BPR implementation strategy should focus on tackling change issues at both organisational and technological level in a manner that is consistent with the BPR environment which is open, collaborative and team-based.

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- 6 A systematic approach must be established to facilitate a design of the BPR methodology for SMEs as an organisational change project which is embedded within existing quality initiatives.
- 7 An investigation of IT tools and applications is needed for determining the effects of IT use and the role of IS in facilitating process innovation.

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- 8 It is critical to co-ordinate the inputs from both internal professionals and external resources in a manner that ensures re-engineering is implemented on a continuous basis.

#### **7.4 BPR Guidelines for SMEs**

Based upon the revised framework of SMEs undertaking BPR (Figure 6.1), this section is organised around the major issues that emerged from the study that are

significant enough to require direction in the context of SMEs. These issues are presented as BPR implementing guidelines for SMEs, and are illustrated by suggestions of how such guidelines would operate in SMEs. The first section focuses on the strategic vision. It explains the necessity for re-engineering initiatives to be embedded within SMEs' strategic planning rather than trying to confine BPR endeavours within a functional setting. The nature of the process is role centred as discussed in the second section. Both the owner-managers and employees play an essential part in BPR implementation. The third section examines the need to consider change issues in dealing with resistance and impacts derived from radical process change. The fourth section is concerned with implementing issues, such as managing BPR as a project and applying IT for process innovation.

#### **7.4.1 Strategic BPR Planning**

The recognition of a holistic view on BPR planning in the SME environments as being the basis for BPR guidelines implies that the design of re-engineering processes must be based on such environments. Strategic perspective deals with strategic processes using resources to meet internal and external customers' needs (Tersine et al, 1997; Earl, 1994). The perspective is more comprehensive as it involves the entire business network including suppliers, customers, contractors and other firms. At the centre of this view is the strategic alignment of the BPR strategy adopted with the capabilities and technological solutions of the firm and the customer's service needs. The focus is on adjusting the business process portfolio to

accommodate the impacts derived from both external forces and internal capacities.

*Guideline 1: Processes need to be put in place to enable SMEs to investigate their core competencies and business opportunities, and to determine whether a radical process change is necessary.*

The focus of this guideline is on identifying the external forces from which the management recognise the need for change. The driving forces may come from feedback of a variety of sources, including customer demands and satisfaction analysis, a review of business trends, competitive analysis and benchmarking. It has been suggested that in re-engineering, the critical starting point is understanding what customers want and need (Hammer, and Champy, 1993; Cross et al, 1994). As small businesses tend to be closer to their customers (Brady and Voss, 1995), organisations can adopt a ‘bottom-up’ strategy, as illustrated in the Freight Shipping Company case, through front-line workers’ contacts with clients to obtain valuable information about customers and markets. Additionally, the organisation can identify improvement opportunities by documenting the strength of its competitors. For example, the Automatic Assembling Retailer is at a great advantage of being located in an industrially concentrated area, which permits an easier access to benchmarking. Thus, it is necessary to identify core competencies and key opportunities which can be transformed into strategic capabilities providing superior value to customers.



Having identified the organisation's core competencies, the own-managers need to establish the dimensions of the vision for the organisation. Specifically, a vision statement articulates the organisation's future and sets a focused strategic direction to fulfil customer needs. Buono (1997) and Pritsker (1995) acknowledge a lack of strategic vision in most BPR initiatives, and several authors have suggested that formal strategic planning is not common in small firms (e.g., Hall, 1995; Rice, 1983). The survey clearly indicates that lack of strategic vision is a significant factor in unsuccessful BPR. Failure to align the re-engineering efforts with the business strategy has made the Financial Institution and the Retail Grocery Organisation suffer from a loss of strategic control and increased costs. The BPR planning guidelines resulting from this situation would need to deal with the process of establishing a mechanism for evaluating whether an opportunity exists to improve the effectiveness, efficiency, and adaptability of the organisation, and the risks accompanied in pursuing BPR objectives.

*Guideline 2: Organisational resources need to be examined to allow SMEs to evaluate their internal capacities in a manner that maps the current business processes, and identifies the core processes to be re-engineered.*

The purpose of such an examination is to check the readiness of the organisation for change before embarking upon the re-engineering process. This provides a basis for identifying, assessing, and mapping the current levels of resource allocation with a view to selecting the processes to be re-engineered. The identification of critical

business processes is one element which has been found to be crucial to the probability of successful re-engineering (Cypress, 1994). This process is important in SMEs since they are usually limited in financial and human resources (Weinrauch et al, 1991; Watkins, 1983). Successful organisations are usually those whose re-engineering efforts only target at key processes. For example, the Geodetic Surveying Company's firm-client interface is largely involved with customer services and product development. The Automatic Assembling Retailer's integrated information system is comprised of three major operational processes: ordering system, client/supplier database and manufacturing process.

It is equally imperative for the organisation to examine the constraints of the existing process by performing a process-constraint analysis and a cultural-factor analysis of the process. The constraints may be derived from gaps between employee's current skills and those required in the new process settings (Guilford and Hubbard, 1995). In the situation where the focus of re-engineering is to pursue higher functional or inter-organisational linkage, IT-related skills are required for successful implementation of BPR. This is illustrated in the Geodetic Surveying Company and the Automatic Assembling Retailer cases. As Kettinger and Grover (1995) argue that an organisation's culture influences its ability to learn, share information, and make decisions, it is paramount to facilitate examining the extent to which the existing culture can accommodate the impacts of new performance standards and targets which may largely alter the job descriptions and how the work is done.

## 7.4.2 Roles in BPR Initiatives

This section is concerned with the human aspects of re-engineering. When organisations radically change orientation, individuals need to adapt not only to the organisational changes, but also to the personal transition they experience, in order to successfully reach a new equilibrium (Doherty and Horsted, 1995). Such transition in a re-engineering organisation involves fundamental changes of the roles and responsibilities of both the management and the employees. In the SME context, it has been suggested that every small business starts as an empowered team (Kinni, 1995), while in many cases decision-making is dominated by the CEO (Ghosh and Chan, 1994). When re-engineering efforts may lead to flatter and leaner organisation structure (Sia and Neo, 1996), the individuals in the organisation need to adapt themselves to the new culture and requirements. Consequently, human resource management must accommodate these changes in a manner that facilitates an integrative approach to tackling HR issues at both the management and employee level.

*Guideline 3: There is a need to delineate the owner-manager's role in a manner that ensures consistency with the appropriate BPR environment.*

This would focus on identifying the role and responsibilities of the owner-manager in the process of re-engineering. It is advocated that BPR is a top-down approach in that the processes being addressed usually span across different functional areas and

only the top management have the broad perspective to identify the core processes and to possess the political power to force collaboration and mandate the breath of changes (Hammer and Champy, 1993; Moss, 1993; Drucker, 1996; Stoddard et al, 1996). The roles emerging from BPR include coaching leader, process owner, steering committee and project manager (Hammer and Champy, 1993). These roles in SMEs, as found in the study, are often the owner-managers themselves. Top management support is considered as the most critical factor to a successful re-engineering. The Automatic Assembling Retailer attributes their BPR success to the owner's direct involvement, while the Telecoms Suppliers could not obtain the financial back-up due to the absence of management commitment.

Apart from as a BPR champion, the owner-manager needs to be a synergiser and a harmoniser, orchestrating resources and motivating people, providing employees with support and encouragement and allowing them to realise the potential of re-engineering. These responsibilities derived from process re-engineering are largely related to HRM. However, owners of small firms are caught up in day-to-day operations (Woods, 1996) and in smaller firms that the areas of accounting, finance, production, and marketing usually take precedence over HRM (McEvoy, 1984). In order to successfully play these multi-faceted roles and fulfil the underlying responsibilities, the management must stress the need for adopting a top-down communication strategy and creating a team-based and collaborative environment, and establish a change model that describes all dimensions necessary for successful BPR implementation. This may include approaches to motivating people and

establishing a proper reward system.

*Guideline 4: There is a need to identify the changing roles of employees in a manner that is consistent with the requirements of the new processes.*

Such a guideline focuses on identifying the changing roles of employees and the new ways of working in a re-engineering organisation. Bergman (1994) believes that the streamlining of processes and centralising certain equipment will create multi-skilled workers from a re-engineering effort. The findings of the study reinforce this view, suggesting that this is especially the case when the firm's re-engineering project is focused upon large-scale functional integration to decrease wastes and administrative costs. When adopted as a cost cutting strategy, BPR may result in job losses. For example, the Shoe Trading Company combined its design and ordering divisions, creating a new job title called 'case manager'. Hence, by de-emphasising division of labour, BPR recasts work design from a 'simple jobs, complex processes' set-up to one focused on 'complex jobs, simple processes' (Thompson, 1967). Upon this transition, the employees need greater depth of job knowledge and breadth of task expertise in order to fulfil their new roles and responsibilities. As illustrated in the Shoe Trading Company case, most knowledge workers are no longer solely 'shoe designers'. Rather, they are asked to take greater responsibilities for managerial tasks, which may bring new job challenges but also a heavier workload, resulting in stress and depression. The company failed to overcome the HR issues because of the latter. Consequently, BPR guidelines for SMEs must be designed

that accommodate these scenarios in a manner that facilitates an integrative approach to tackling HR issues. This may need to borrow HRM techniques, such as job redesign, job rotation, motivation and evaluation and reward structures.

### **7.4.3 BPR and Organisational Change**

The above two guidelines have highlighted the changing roles and responsibilities of the CEO and the employees. This section will look beyond the human aspects of re-engineering and expand change issues to include the entire organisation in terms of culture, structure, and technology. While it has been suggested that organisational change does not occur without people changing (Bohl et al, 1996), Coleman (1997) reports that many re-engineering efforts fail not due to technology but cultural difficulties. These cultural difficulties, as identified in the study, include autocratic management styles, reluctance to relinquish power, and poor top-down communication. An organisation can be limited to the extent that it is 'culturally ready' for fundamental rethinking and radical change (Kettinger and Grover, 1995).

In the structural context, the survey has suggested that teamwork is the most desirable environment for SMEs implementing BPR, while the case studies have further indicated that team-based operations tend to create an open, collaborative environment for innovation and learning. Teamwork has been identified as an intervention to initiate change and proposed as an approach to managing resistance to change (Grover et al, 1995). Tools and techniques are required to enable

individual organisations to examine the current organisational structure in a manner that is consistent with the re-engineering environments.

In relation to IT use as a change lever for BPR, the study has illustrated that IT plays an important supporting role in functional and inter-organisational integration. However, in keeping with previous studies (Eid and Moghrabi, 1995; Naylor and William, 1994), IT utilisation among SMEs is still low. Many BPR efforts use computing and telecommunication technologies, e.g. knowledge-based systems, imaging, and wide-area networks which are new to the organisation. As the potential of IT use from a re-engineering effort on a firm-wide basis among SMEs is evident in the case studies, tools and techniques are required for identifying the need and risks of adopting new IT tools in a manner that is consistent with BPR goals and objectives, and for repositioning the role of IS to manage complex BPR project and maintain a technological vision in support of BPR.

*Guideline 5: BPR implementation strategy should focus on tackling change issues at both organisational and technological level in a manner that is consistent with the BPR environment which is open, collaborative and team-based.*

The BPR methodology should focus on tackling change issues derived from process change in a socio-technical manner. At the organisational level, culture and structure are two critical traits that determine that extent to which the organisation can create an adequate environment for BPR. Organisational culture embodies the deeply held,

shared beliefs of an organisation (Schein, 1985). Freed (1996) suggests that culture represents the current state that must be 'unfrozen' before transformation can occur, while the transformation in the context of BPR is referred to the move from a traditional command and control mentality to a style that features leadership, teamwork and empowerment (Tersine et al, 1997). Several organisations in the case studies, such as Financial Institution and Shoe Trading Company, indicate that decision-making in SMEs is usually dominated by the CEO, which may hinder top-down communication. When owner-managers adopt a highly centralising, autocratic stance, it will be difficult to produce a conducive environment in which to re-engineer (Hirschfield, 1994). In regard to organisational structure, the Telecoms Suppliers case has illustrated that a formal and hierarchical structure may impede the organisation from successful BPR implementation. An open, collaborative, and team-based environment tends to encourage innovation and learning. Such an environment is usually found in smaller organisations, such as Geodetic Surveying Company and Automatic Assembling Retailer. The BPR guidelines would need to build on the identification of both the CEO and the employees' roles and responsibilities, in undertaking an examination of the organisation's currently culture and structure. In the situations where the owner-manager adopts an autocratic management style or the organisational environment is indifferent and individually-based, the guidelines would need to look for options in order to 'unfreeze' these constraints before embarking upon re-engineering.

At the technological level, BPR tools and techniques must be designed to combine



the results from the examination of internal resources and capacities to determine first the sufficiency and adequacy of current IT infrastructure. This would then need to deal with the impacts from IT-related change issues ranging from the introduction of new information systems, end-user training, to IT outsourcing. In keeping with the notion that integrated information systems can facilitate and support value-added business processes by eliminating time and distance constraints (Martinsons, 1995), the participating organisations in the case studies are largely using IT for functional integration. However, attempts to adopt new information systems without acquiring the skills at Shoe Trading Company only met resistance because they threatened the status quo. Lack of in-house technical experts to deal with new developments forced the Financial Institution to rely heavily on vendor support and misunderstand their own information requirements. Consequently, it needs to deal with the process of establishing a mechanism for evaluating the benefits, costs, and risks of introducing new or enhancing existing IT tools in a manner that is consistent with BPR objectives.

#### **7.4.4 BPR Implementation**

This section deals with the implementation issues. Lack of specific theories and models on BPR have resulted in borrowing existing techniques and tools (Raymond, 1994; Kettinger et al, 1997). Although there is little agreement between the various methods published in the literature, it is argued that BPR should be managed as a project (Narasimhan and Jayaram, 1997; Coulson-Thomas, 1992; McElroy, 1996).

Since a large proportion of SMEs have had quality management experiences, the complementary but not mutually exclusive nature of BPR and TQM implementation becomes an important issue in SMEs. It is imperative to establish a systematic approach for SMEs to determining which techniques and tools are the most appropriate, given that human resources in SMEs are usually limited (Nash and Rock, 1996). It is obvious from the study that SMEs often lack BPR expertise in terms of using IT for process innovation, managing BPR as a project, and carrying out process change on a continuous basis. This has resulted in using external business consultants in support of BPR. The following guidelines are put forward to enable the organisation to identify an appropriate BPR methodology and co-ordinate the inputs from internal and external resources in a view to creating a learning organisation.

*Guideline 6: A systematic approach must be established to facilitate the design of a BPR methodology for SMEs as an organisational change project which is embedded within existing quality initiatives.*

This focuses on selecting an appropriate BPR methodology with techniques and tools in a manner that is consistent with strategic goals and objectives. Dealing with the issues of the technical part of re-engineering, the management have to choose a re-engineering method and manage BPR as a change project. The importance of these issues is illustrated in the study that the participating organisations scarcely have a BPR methodology, which result in three pitfalls: lack of focus, short of

management support, and discontinuous improvement (Heygate, 1993). There has been a proliferation of methods, techniques and tools for conducting business process change projects suggested in the literature and by business consultants (Ives, 1994). As aforementioned, lack of specific theories and models on BPR has resulted in borrowing existing techniques and tools (Raymond, 1994; Silvestro et al, 1992; Kettinger et al, 1997), such as operational research methods (Cypress, 1994), and industrial engineering tools (Klein, 1993).

The study found that BPR interventions in SMEs, in general, are tactical rather than strategic, based on intuition instead of systematic analysis. The knowledge about business processes and the methods for redesigning them are limited in SMEs. Accordingly, the emphasis must be on facilitating a systematic approach that helps SMEs to understand better business processes and subsequently to redesign them. This would involve techniques such as work study using scientific methods of observation to analyse workflow or office operations for optimal utilisation, or systems engineering and analysis in which flow diagrams define the operation of procedures and computers and telecommunications equipment are used to affect some or all of the process.

In order to increase the efficiency and effectiveness of BPR, a systematic approach must be adopted to focus on facilitating project management techniques and provide a method for tracking the performance of each critical process. Once the organisation decides that a re-engineering opportunity exists, the management must

also decide whether the benefits outweigh the costs of change. A lack of cost-benefit analysis is illustrated in the Retail Grocery Organisation where the management only found out later the business gains from re-engineering could not justify the costs incurred. Such an approach will need to focus on determining whether the increases in efficiency, effectiveness, and adaptability exceed the cost of the resources the re-engineering effort will consume. Additionally, given that a large proportion of SMEs are familiar with TQM techniques and tools, managing BPR as projects enables organisations to re-evaluate the appropriateness of whether a radical process re-engineering is still necessary or the continuous process improvement programme to be used in a complementary manner in order to sustain and build on the improvements gained through re-engineering.

*Guideline 7: An investigation of IT tools and applications is needed for determining the effects of IT use and the role of IS in facilitating process innovation.*

Such an investigation is to provide SMEs with a framework for identifying the IT opportunities and constraints for BPR in the context of strategic IT planning. While the survey indicates that BPR SMEs tend to use workflow software and imaging applications in support of BPR, the majority of the responding organisations still restrict their IT use to word-processing and databases and much of the consideration is placed on replacement or reduction of human labour in a process. In the case studies, technology-oriented firms, such as Automatic Assembling Retailer and Supersonic Machinery Manufacturing Company, are mostly using

telecommunications technologies to increase the amount and effectiveness of collaboration with existing structures and suppliers/customers. However, the use of advanced IT applications, such as distributed computing using client/server database systems, electronic data interchange (EDI), open systems and Integrated Computer Aided Software Engineering (I-CASE) tools in SMEs are rare. Stoddard et al (1996) propose that BPR is often constrained by the existing 'legacy systems'. According to a divisional manager at Shoe Trading Company and the investment manager at Financial Institution, the relatively low utilisation of IT use for BPR among SMEs is due to lack of management support and financial insufficiency.

While manufacturing processes are the most likely source of innovation and process excellence in several participating organisations, e.g., Telecoms Supplier and Supersonic Machinery Manufacturing Company, many authors assert that the enabling power of IT for BPR lies in its capacities to offer a mechanism for process innovation (e.g., Davenport and Short, 1990; Clark and Stoddard, 1996). Innovative use of IT would inevitably lead the organisation to develop new, co-ordinated intensive structures, in line with those within their suppliers and clients. The potential of using IT for inter-organisational linkage is illustrated in the Geodetic Surveying Company, although this is achieved when the network participants have similar or compatible IT infrastructure. There is a need to stress these issues in a view to building process-oriented architecture, emphasising interfacing systems and integrating communications. This may include technology impact analysis, critical success factor analysis, and linkage analysis embedded within firms' strategic

planning. However, it is imperative to note that for all the alternative re-engineering paths, IT is only a potential enabler. The characteristics of the owner-manager's attitude to IT, capacity to innovate, and IT knowledge have been shown to be significant determinants of IT adoption.

*Guideline 8: It is critical to co-ordinate the inputs from both internal professionals and external resources in a manner that ensures re-engineering is implemented on a continuous basis.*

The techniques and tools addressed in the guideline with respect to strategic management, process redesign, innovative use of IT and change methods which deal with human and organisational complexity can be an extraordinarily difficult undertaking for SMEs. Small businesses typically have fewer trained in-house technical experts due in part to the lack of sophisticated management support in SMEs that knowledge workers often find in larger organisations (Mackinnon, 1996). Outsourcing is an alternative strategy. This may include seeking advice from various sources, e.g. IT vendors and professionals, business consultants, and BPR experts. Kobelius (1996) has identified the benefits of outsourcing, such as reducing operational costs, giving access to technical expertise and keeping pace with rapid technological change, while risks, as McLellan and Marcolin (1994) point out, include loss of strategic control, stripping technology skill and limiting of long-term flexibility. The only organisations in the case studies, Financial Institution, appear to have confirmed the latter.

Consequently, the management may look for options based on cost-benefit analysis in identifying the effects of each method for the best interests of the organisation. These options may include assistance programmes provided by universities and the government. Other alternative approaches include the Automatic Assembling Retailer enriching process change experiences by documenting each training and consulting session for future reference and the Supersonic Machinery Manufacturing Company employing job rotation to increase involvement and challenge. As SMEs are trying to do more with less, it is imperative for these guidelines to focus on coordinating the inputs from both internal and external resources in a view to implementing process change on a continuous basis, instead of a one-off endeavour.

#### **7.4.5 The application of the guidelines to BPR practice in SMEs**

It is worth reflecting on the discussion in chapter 2 concerning the current BPR guidelines and experiences mainly from larger organisations, and the appropriateness of BPR principles applied to SMEs. It was concluded in chapter 2 that the existing BPR literature, which is oriented to applicability of various BPR elements in large firms, may not serve the needs of small firms. This was justified from the case studies where it was found that a less radical approach may be adopted in SMEs. It is clear from an examination of the BPR guidelines in Table 7.1 that the majority of the issues that arise in the context of re-engineering in SMEs are generally organisational rather than technical. Human issues are extensively pursued by recent BPR researchers (e.g., Grover et al, 1995; Earl, 1994, Dixon et al, 1994; Knights and

McCabe, 1998). While the existing BPR principles for general organisations are obviously helpful, they are insufficient as SMEs operate differently from their larger counterparts in an organisational context. A framework of SMEs undertaking BPR is proposed in this study in an effort to identify the organisational factors which are relevant to SMEs undertaking BPR, such as owner-manager's perceived benefits towards BPR and IT use.

BPR, strategic planning, organisational change and project management are obviously intertwined. As argued in Chapter two, a lack of specific theories and models on BPR have resulted in borrowing existing techniques and tools from various management disciplines (e.g., Raymond, 1994; Silvestro et al, 1992; Kettinger et al, 1997). This further adds to the complexity of implementing BPR in the small business domain, given their limited organisational resources and lack of strategic and project thinking. The refined framework of SMEs implementing BPR provides insights into establishing a re-engineering environment in the small business context which outlines the critical issues significant enough to influence BPR success/failure. While own-managers' managerial skills, employee empowerment, and previous quality management experiences facilitate re-engineering undertaken as a change initiative, the innovative use of IT demonstrates its potential in integrating functional units at both individual organisation and business network levels. The findings suggest that SMEs should establish a sound relationship with their suppliers, customers, and other firms, and build standardised IT infrastructure in order that a higher business process integration along the process



improvement continuum can be realised. This is the next challenge facing SMEs in the evolution of process management. It must be undertaken in order to ensure that BPR project efficiency is achieved and the benefits are identified. The guidelines need further research in order to test and refine them. Recommendations for further research are discussed in the next section

## **7.5 Recommendations for Further Research**

This study has demonstrated the viability of studying the connection between business process re-engineering and small and medium-sized enterprises. However, it was exploratory in intent. Given the exploratory nature of the study, propositions rather than hypotheses were used to expand the proposed research questions. The findings derived from this study are restricted by the limitations of the chosen research strategy which are primarily concerned with the adoption of a pluralistic method and the drawbacks of individual research approaches. This includes the survey, only providing a snap-shot of the situation and the case study, from which the issues being researched cannot be generalised. Further research of an explanatory and confirmatory nature is required to develop the findings.

Firstly and perhaps the most importantly, this study needs to be duplicated as part of the process of validating its findings. The replication would facilitate the replacement of propositions by hypotheses. This would be possible as the new study would not be exploratory in nature and thus would be able to formulate hypotheses

based on the findings of this study. In addition, the findings of the study could be refined by extending the number of organisational factors that are considered to influence BPR being undertaken by SMEs.

The mapping of BPR activities as presented in chapters five and six was based on a purposive sample (Taiwanese SMEs) and specific case studies. A study that includes both SMEs and larger firms would enable a further comparison given the same organisational factors within a particular period of time. Besides, there is a need to test the findings on a wider population to increase the generalisability of the findings. Comparative research in another country could be undertaken using the research instruments from this study to investigate BPR in the context of SMEs.

Further research could extend this study by exploring the cause and effect relationships between re-engineering and SMEs, and organisational factors and BPR. Such a study is longitudinal in nature (Franz and Robey, 1987). The BPR proposals for SMEs derived from the study provide the conceptual framework that will form the basis of further research into the measurement of BPR performance in SMEs. There is a need to test such proposals by studying each of the issues further. Action research is considered suitable as it enables a continuous interaction between theory and practice (Checkland, 1991). Action research requires the co-operation of a number of organisations in allowing a team of researchers to experiment with different BPR approaches and to observe the outcomes over time. This would provide a more complete understanding of the cause and effect relationships

between the different variables. This is a time-consuming task and is beyond the scope of the present study. However, it is an important step in the development of BPR guidelines for SMEs.

## **7.6 Summary**

Since BPR emerged in the early 1990s, it has been advocated as a management method to radically redesign business processes for organisations to survive in a globally competitive environment. Despite of the criticism derived from the high failure rate, BPR has been recognised as an important approach to business success. However, the existing BPR literature, which is derived from the experiences of large organisations, may not serve the needs of small businesses. This study sought to investigate the connection between BPR and SMEs with a view to finding a basis from which BPR guidelines for SMEs can be developed. In doing so, the important role of process re-engineering in SMEs has been uncovered, and the need for BPR guidelines for SMEs has been established. This study, however, was exploratory and the proposal, for developing BPR guidelines for SMEs that form the basis of its findings need further investigation. This study has attempted to create a basis for a coherent approach to undertaking BPR in SMEs and found support for the propositions. A need now exists to test them more formally.

## Appendix I: The Questionnaire



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## *Business Process Re-engineering Survey*

*(To be completed by the owner or firm manager)*

The results will be treated entirely confidentially. Individual respondents and organisations will not be named in the report. Participants will receive a complimentary copy of the final report

## **Instructions to Respondent**

BPR refers to *'the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed'*. It is a customer-oriented approach to reducing unnecessary tasks, simplifying and streamlining business processes, and redesigning workflow, technology, and people. This is usually accompanied by some organisational changes, such as more empowered employees, less centralised structures, and different performance metrics and incentive systems. Information technology (IT) is used as a powerful tool to realise such business transformation. A BPR project can range from simplifying certain activities, through re-engineering certain processes, to re-engineering the entire business.

**Important:** Please answer all questions with respect to your most recent BPR experience. If you answer **Yes** to *Question 2*, please continue to answer all the questions; if **No**, please complete all the questions in Part III.

Many of the questions require you to circle a five point scale. Please indicate the degree to which you agree/disagree that the issue is currently being addressed within your organisation.

*Example:*

Q13. After BPR, what change to the following have you achieved? (1=none; 5=a lot)

13. Better relations with customers	1	2	3	4	5
-------------------------------------	---	---	---	---	---

The response to this question indicates that after BPR the organisation has largely improved its relationship with customers.

**Please answer the questions starting from next page**

Part I Motivation, design, and implementation

Q1. Have you done (or are doing) any of the following?

- 1.1 Examining current workflow and business processes
- 1.2 Examining firm resources and environment - employee skills, technology, financial situation, and relations with other firms
- 1.3 Carrying out market surveys to know customers' needs
- 1.4 Developing strategies involving employees' participation
- 1.5 Establishing a new business vision and objectives
- 1.6 Setting out a BPR plan with goals for each process
- 1.7 Informing employees for possible change during BPR
- 1.8 Forming a team to carry out BPR projects
- 1.9 Using information technology (IT) for process redesign
- 1.10 Purchasing new IT applications
- 1.11 Setting new performance standards and targets
- 1.12 Redesigning the workflow and processes
- 1.13 Setting time schedule
- 1.14 Training employees for newly required skills, e.g. IT skills
- 1.15 Conducting a comprehensive pilot of the new design
- 1.16 Measuring BPR result regularly during implementation
- 1.17 Refining BPR goals, objectives, and implementing methods after each assessment
- 1.18 Outsourcing the whole BPR project

Q2. Is your organisation undertaking BPR?

- Yes  No, because (choose one or more)
- 2.1 we have never heard of BPR
- 2.2 lots of BPR projects fail
- 2.3 it costs too much
- 2.4 we don't have BPR expertise
- 2.5 it is just a management fad
- 2.6 it requires advanced information technology
- 2.7 we will do it in the future
- 2.8 Other (please specify) \_\_\_\_\_

( Please go to *Part III*)

Q3. By doing BPR, do you aim to

- 3.1 improve current workflow and business processes
- 3.2 take advantage of modern information technology
- 3.3 decrease costs
- 3.4 shorten time of finishing/delivering a product/service
- 3.5 enhance product/service quality
- 3.6 improve customer satisfaction
- 3.7 keep up with competitors

Q4. In what business situation did you initiate BPR?

4.1 Business performance	Poor	1	2	3	4	5	Excellent
4.2 Market competition	Not intense	1	2	3	4	5	Very intense
4.3 Business growth	Slow	1	2	3	4	5	Fast
4.4 Efficiency admin or production	Poor	1	2	3	4	5	Very good
4.5 Relationship with customers	Poor	1	2	3	4	5	Very good
4.6 Relationship with other firms	Poor	1	2	3	4	5	Very good

Q5. Who leads the BPR efforts?

- 5.11 CEO/president/owner of the firm
- 5.12 Senior executive
- 5.13 Outside BPR experts/consultants
- 5.14 Functional managers
- 5.15 IS/IT director/professionals
- 5.16 Others: \_\_\_\_\_

because they

- 5.21 have better understanding of business/processes
- 5.22 have better knowledge of process improvement
- 5.23 have better knowledge of IT-use
- 5.24 have more experiences of process improvement
- 5.25 have the authority
- 5.26 Other: \_\_\_\_\_

Q6. Is your BPR project

- 6.1 within a functional area/business unit?
- 6.2 spanning across functional area?
- 6.3 spanning across organisations?

Q7. What level of the processes are involved?

- 7.1 *Managerial* - product design/technology development, market survey, communication and control, etc.
- 7.2 *Operational* - order system, production and distribution, etc.
- 7.3 *Supporting* - accounting, personnel, facilities, etc.

Q8. Who participates in the BPR project and at what stages?

	Planning	Process redesign	Implementation	Evaluation
<input type="checkbox"/> 8.1 Owner/top management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 8.2 IS/IT professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 8.3 Business consultants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 8.4 BPR experts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 8.5 External IS/IT professional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> 8.6 Employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q9. Do you have a special budget for BPR?

- No
- Yes used mainly on
  - 9.1 business consultants/BPR experts
  - 9.2 IS/IT applications
  - 9.3 employee training
  - 9.4 Other: \_\_\_\_\_

Q10. Have you ever done (or are you doing) Total Quality Management (TQM)?

- No
- Yes

If yes, how does it help your BPR efforts? (1=not at all; 5=very)

10.1 Management by process	1	2	3	4	5
10.2 Concern for customers	1	2	3	4	5
10.3 Use of work teams	1	2	3	4	5
10.4 Employee involvement	1	2	3	4	5
10.5 Quality improvement	1	2	3	4	5
10.6 Others(please specify):	1	2	3	4	5



Q11. Do you use any IT tools?

No (Please go to *Part II*)

Yes, and they are

11.11 electronic messaging, e.g. E-mail

11.12 work-flow software and imaging

11.13 knowledge-based or expert systems

11.14 telecommunications and networks

11.15 shared databases

11.16 Others: \_\_\_\_\_

In what ways do they support BPR?

11.21 Everyday transactions

11.22 Replacement or reduction of human labour in a process

11.23 Capture and dissemination of knowledge and expertise to improve the process

11.24 Detailed tracking of task status, inputs and outputs

11.25 Connection among functional units, suppliers or customers

11.26 Other: \_\_\_\_\_

*Part II Evaluation and organisational issues*

Q12. How do you measure the success/failure of BPR?

12.1 By business performance

12.2 By efficiency of the organisation

12.3 By project team effectiveness

12.4 Others: (please specify) \_\_\_\_\_

Q13. After BPR, what change to the following have you achieved? (1=none; 5=a lot)

13.1 Independent departments to more functionally-integrated departments	1	2	3	4	5
13.2 Management intensive to more team-based	1	2	3	4	5
13.3 More responsive to market	1	2	3	4	5
13.4 More flexible procedures, i.e. more streamlined office work	1	2	3	4	5
13.5 More process focused operation	1	2	3	4	5
13.6 More process-based management	1	2	3	4	5
13.7 More common source of information	1	2	3	4	5

13.8 More graphical user interface	1	2	3	4	5
13.9 Better understanding of customers' needs	1	2	3	4	5
13.10 Better cost-efficiency	1	2	3	4	5
13.11 Better understanding of technological change	1	2	3	4	5
13.12 More employee involvement in decision-making	1	2	3	4	5
13.13 Better relations with customers	1	2	3	4	5
13.14 Better sales and market share	1	2	3	4	5
13.15 Better customer satisfaction	1	2	3	4	5
13.16 Improvement in delivery and response time	1	2	3	4	5
13.17 Better relations with suppliers	1	2	3	4	5
13.18 Increasing product and service quality	1	2	3	4	5
13.19 Reduction in cycle time (production time)	1	2	3	4	5
13.20 Better motivated and independent employees	1	2	3	4	5
13.21 Better top-down communication	1	2	3	4	5
13.22 Highly specialised to more generally skilled employees	1	2	3	4	5
13.23 General satisfaction (1=unsatisfied;5=very satisfied)	1	2	3	4	5

Q14. Time spent on your BPR project?

\_\_\_\_\_ months \_\_\_\_\_ years

Q15. Which of the following are success factors and how relevant are they to success? (1=not at all; 5=very)

15.1 Owner/top management support	1	2	3	4	5
15.2 Teamwork efficiency	1	2	3	4	5
15.3 Good IT-use	1	2	3	4	5
15.4 External IT/IS assistance	1	2	3	4	5
15.5 Business consultants assistance	1	2	3	4	5
15.6 Good top-down communication and employees co-operation	1	2	3	4	5
15.7 BPR experts assistance	1	2	3	4	5
15.8 Good BPR planning	1	2	3	4	5
15.9 Good skill training	1	2	3	4	5
15.10 Change management	1	2	3	4	5
15.11 Result management	1	2	3	4	5
15.12 Other:	1	2	3	4	5

Q16. Which of the following are failure factors and how relevant are they to failure?(1=not at all; 5=very)

16.1 Lack of top management support	1	2	3	4	5
16.2 Poor understanding about BPR	1	2	3	4	5
16.3 Lack of project team	1	2	3	4	5
16.4 Limited IT/IS available for use	1	2	3	4	5
16.5 Lack of internal IT/IS expertise	1	2	3	4	5
16.6 Lack of market information	1	2	3	4	5
16.7 Financial difficulties	1	2	3	4	5
16.8 Non-standardised IT/IS inhibits information sharing	1	2	3	4	5
16.9 Absence of proper training for BPR team members	1	2	3	4	5
16.10 Failure to understand customers needs	1	2	3	4	5
16.11 Absence of external BPR consultants	1	2	3	4	5
16.12 Failure to manage organisational change	1	2	3	4	5
16.13 Poor top-down communication	1	2	3	4	5
16.14 Lack of appropriate BPR methodology	1	2	3	4	5
16.15 Lack of pilot implementation	1	2	3	4	5
16.16 Inappropriate time scheduling	1	2	3	4	5
16.17 Failure to effectively monitor progress	1	2	3	4	5
16.18 Failure to deal with employee work overload	1	2	3	4	5
16.19 Failure to provide necessary skills	1	2	3	4	5
16.20 Inappropriate result assessment	1	2	3	4	5
16.21 Poor BPR planning	1	2	3	4	5
16.22 Lack of required incentive system	1	2	3	4	5
16.23 Inappropriate priority of business processes	1	2	3	4	5
16.24 Processes chosen too narrow	1	2	3	4	5
16.25 Other:	1	2	3	4	5

Q17. Did you encounter any crucial problems, even if you consider your project successful?

No

Yes \_\_\_\_\_

Q18. Will you undertake BPR again?

yes  no

Part III Firm details

- Q19 19.1 Name of the firm \_\_\_\_\_  
19.2 No. of employees \_\_\_\_\_  
19.3 Registered capital \_\_\_\_\_NTD  
19.4 Level of management \_\_\_\_\_  
19.5 Span of management: \_\_\_\_\_ people  
19.6 Your position: \_\_\_\_\_

Q20. Firm status

- 20.1 Start-up 20.2 Growth 20.3 Mature 20.4 Declining

Q21. Which best describes your organisation?

*Industry sector*

- 21.1 Public sector Private company

*Manufacturing* 21.101 Electronics, information, or transmission

21.102 Petrochemistry, plastics, or pharmacy

21.103 Clothing or shoes

21.104 Metalwork/machinery

21.105 Food, cleaning or cosmetic

21.106 Farm, fishing or forest

21.107 Others: \_\_\_\_\_

*Services*

22.108 Commerce 22.109 Distribution 22.110 Retail

22.111 Entertainment 22.112 Health

22.113 Others: \_\_\_\_\_

*Firm type*

21.21 Owner/manager 21.22 Family business 21.23 Partnership

21.24 Entrepreneurship

*Operation (one or more)*

21.301 We are in a very competitive market

21.302 We have limited capital

21.303 We are contracted to bigger companies

21.304 We have steady market segment and some loyal customers

21.305 Diversification is our current product policy

21.306 We have our own IT director/professionals

- 21.307 Operating efficiency is more important than management skills
- 21.308 We always seeks management knowledge from the government, SME institutes, or management consultants
- 21.309 We outsource some/all of our IT/IS
- 21.310 We purchase software packages for use
- 21.311 Our firm is located in industrially concentrated area
- 21.312 The owner is responsible for both purchasing and sales
- 21.313 Business relies mainly on the owner's sales skills and operation knowledge

Q22. To what extent do you agree with the following? (1=disagree; 5=agree)

22.1 We have a good relationship with other similar SMEs for mutual support and information sharing	1	2	3	4	5
22.2 Cost reduction is our prime concern	1	2	3	4	5
22.3 The firm has good human resource management for employing, promotion, and performance standards	1	2	3	4	5
22.4 The firm has formal organisational structure and clear job descriptions and responsibilities with each position	1	2	3	4	5
22.5 Short-term cost-profit trade-off is more important than long-term investment	1	2	3	4	5
22.6 Our employees are all skilled workers so no extra training is needed	1	2	3	4	5
22.7 We are willing to make a radical change to improve our business if necessary	1	2	3	4	5
22.8 We are dedicated to creating a creative and innovative organisational environment	1	2	3	4	5
22.9 We always compare our business performance with competitors in the same industry	1	2	3	4	5
22.10 We can afford our own research and development	1	2	3	4	5

Q23. Which best describes your firm's organisational climate?

23.1 Business strategy	Cautious	1	2	3	4	5	Ambitious
23.2 Top-down communication	Easy	1	2	3	4	5	Very difficult
23.3 Organisational structure	Centralised	1	2	3	4	5	Decentralised
23.4 Business policy	Conservative	1	2	3	4	5	Risk-taking
23.5 Employee autonomy	Low	1	2	3	4	5	High
23.6 IT tools	Poor	1	2	3	4	5	Sufficient

23.7 IT performance	Poor	1	2	3	4	5	Satisfactory
23.8 End-user skills	Poor	1	2	3	4	5	Sufficient
23.9 IT spending	Low	1	2	3	4	5	Too high
23.10 Response to market changes	Slow	1	2	3	4	5	Quick
23.11 Organisational regulations	Unreasonable	1	2	3	4	5	Reasonable

Q24. Do you use any of the following IT/IS tools?

24.1 Years of computerisation: \_\_\_\_\_ years

24.2 Do you have following facilities?

*Hardware*

24.21 Mainframe computers  24.22 PCs

24.23 Telecommunications (i.e. telephone, fax machine)

*Software*

24.24 Word-processing packages  24.25 Electronic mail

24.26 Databases  24.27 Software to support decision-making

24.28 Image processing  24.29 Software to support production

24.30 Others: \_\_\_\_\_

24.3 What do you use them for?

24.301 production development  24.302 computer-integrated manufacturing

24.303 network with firms/customers  24.304 quality control

24.305 word-processing  24.306 functional communication/integration

24.307 marketing, i.e. sales forecasting/product analysis

24.308 maintenance scheduling  24.309 employee databases

24.310 inventory management  24.311 sales and purchasing

24.312 decision-making  24.313 payroll

24.314 Others: \_\_\_\_\_

## Appendix II: Non-response bias test

<i>Question 2: Reasons not to re-engineer</i>	Significance Level
We have never heard of BPR	0.5873
Lots of BPR projects fail	0.2034
It costs too much	0.4983
We don't have BPR expertise	0.3489
It is just a management fad	0.5498
It requires advanced information technology	0.4988
We will do it in the future	0.4344

<i>Question 3: Purposes of re-engineering</i>	Significance Level
To improve current workflow and business processes	0.5987
To take advantage of modern information technology	0.1298
To decrease costs	0.4198
To shorten time of finishing/delivering a product/service	0.2345
To enhance product/service quality	0.3445
To improve customer satisfaction	0.5776
To keep up with competitors	0.2987

<i>Question 13: BPR achievements</i>	Significance Level
1. More functionally-integrated departments	0.1287
2. Management intensive to more team-based	0.4872
3. More responsive to market	0.1559
4. More flexible procedures	0.1009
5. More process focused operation	0.5777
6. More process-based management	0.1987
7. More common source of information	0.4387
8. More graphical user interface	0.3487
9. Better understanding of customers' needs	0.2598
10. Better cost-efficiency	0.4332
11. Better understanding of technological change	0.1215
12. More employee involvement in decision-making	0.5817
13. Better relations with customers	0.4481
14. Better sales and market share	0.2772
15. Better customer satisfaction	0.2387
16. Improvement in delivery and response time	0.4310
17. Better relations with suppliers	0.2002
18. Increasing product and service quality	0.1143
19. Reduction in cycle time (production time)	0.4401
20. Better motivated and independent employees	0.6454
21. Better top-down communication	0.2756
22. Highly specialised to more generally skilled employees	0.2587
23. General satisfaction	0.4387

## **Appendix III: Semi-structured interview guide**

*1. General information regarding the firm's BPR project – with a focus on the following issues:*

- the current business strategy adopted – growth? cost-cutting? or competing?
- people involved – the owner/manager, employees, or external IT/business consultants
- tools and techniques used – IT related, process redesign, or training
- time frame, budget and result management

*2. The owner-manager's personal attitudes and values – this is concerned with*

- proactive or reactive in strategic thinking, seeking management knowledge and pursuing personal goals
- management style – autocratic or democratic
- management skills – project management and human resource management
- top-down communication strategy

*3. The potential of inter-organisational business integration in SMEs – focused issues including:*

- social ties with local business community and SME networks
- subcontracting
- relationships with customer, suppliers, larger firms, competitors and other SMEs
- the role of IT in linking across-functional and inter-organisational boundaries
- problems – differentiated skills, non-standardised IS platforms, negotiation



4. *Innovative use of IT in process redesign and product development – investigation into how IT/IS facilitate BPR, including issues:*

- IT/IS investment for BPR
- IT infrastructure, R&D, innovation and product innovation
- in-house IS development or outsourcing? Problems with outsourcing to be identified

5. *Training and learning – how to implement BPR efficiently and effectively*

- training programmes for BPR – IT expertise? End-user computing? Or process redesign?
- does the firm make the best use of organisational resources?
- focusing on core processes
- BPR methodology used
- learning from experience – especially past quality management programmes

6. *Change issues – this will cover the issues:*

- problems encountered – work overload? downsizing? Morale loss?
- approaches to dealing with employee resistance, lack of proper skills and mentality
- new job definitions and the impacts on the newly re-engineered organisation
- New relationship between owner-managers and employees

## Appendix V: Profile of Organisations in the Case Study

### Case 1: Telecoms Supplier

Date: Sunday, The 12<sup>th</sup> of April, 1998

Time and Duration: 4pm-5:30pm, 90 mins

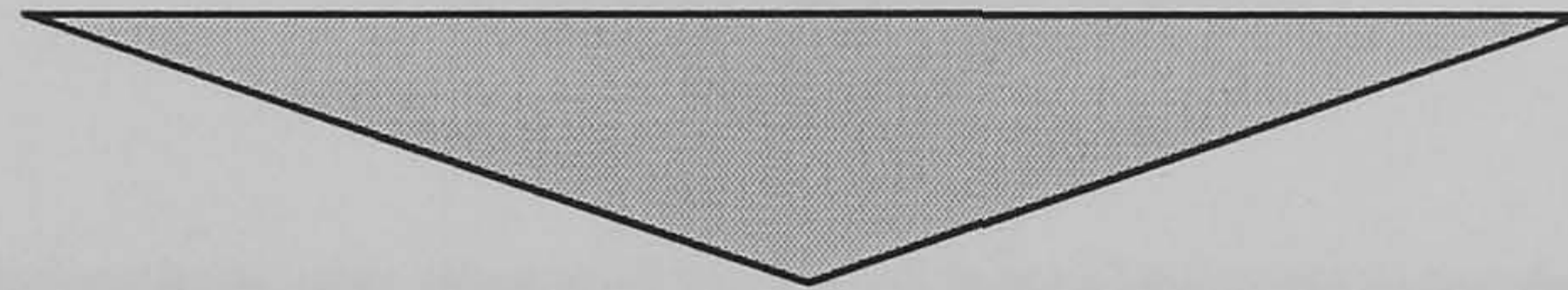
Interviewee: R&D director

#### Context

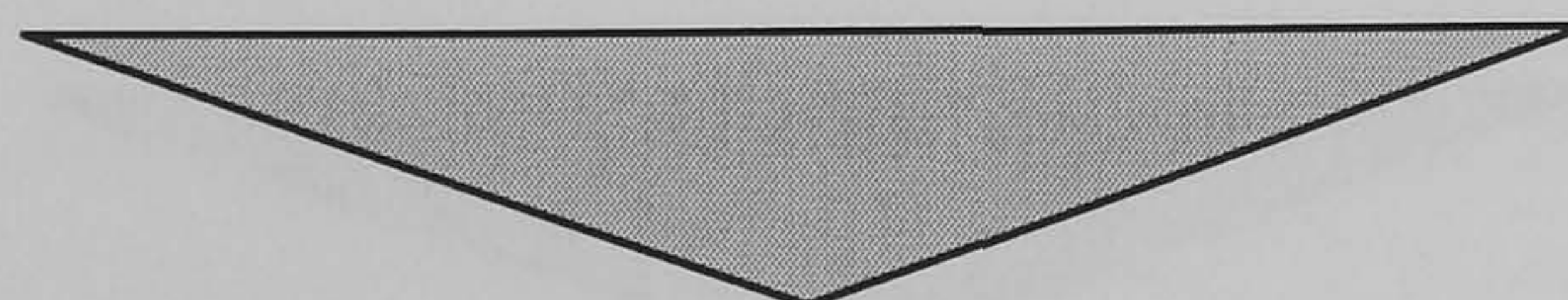
- This company operates in the telecommunication industry, selling various electronic communication equipment ranging from fax machine to mobile phone.
- It is a distributor of several well known brands, including Orange and Motorola, and a supplier of cellular accessories and services.
- Currently employing 300 full-time staff, this company is medium-sized with a turnover about £24 million.

#### Goals

- The major objectives of the firm's re-engineering project were to cut down its hand-offs and to reduce administrative costs.



	Successful Elements	Challenges/Pitfalls
Structure	<ul style="list-style-type: none"> <li>• The company has a sophisticated organisational structure, including an IT division and R&amp;D.</li> </ul>	
Culture		<ul style="list-style-type: none"> <li>• The ideas of re-engineering was not supported by top-management or CEO.</li> <li>• Business strategy is cautious</li> </ul>
Resources	<ul style="list-style-type: none"> <li>• With its own R&amp;D, the company also produces customised electronic products under it's own brand name.</li> </ul>	
Technology	<ul style="list-style-type: none"> <li>• IT has been widely used for product innovation since the purchase of its first PC 7 years ago.</li> </ul>	<ul style="list-style-type: none"> <li>• IT has yet been used for functional integration of process innovation</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• The ideas of process change, such as streamlining workflow and office work, eliminating non value added activities, e.g. unnecessary hierarchical approval were suggested by departmental managers.</li> </ul>	<ul style="list-style-type: none"> <li>• The employees were not well informed about the possible changes and BPR.</li> <li>• BPR was perceived as equated with downsizing</li> </ul>



#### Results

- The lack of a strategic vision resulted in the focus of firm's re-engineering efforts being placed merely on internal efficiency rather than core competencies.

## Case 2: Geodetic Surveying Company

Date: Tuesday, The 28<sup>th</sup> of April, 1998  
 Time and Duration: 2pm-3:10pm, 70 mins

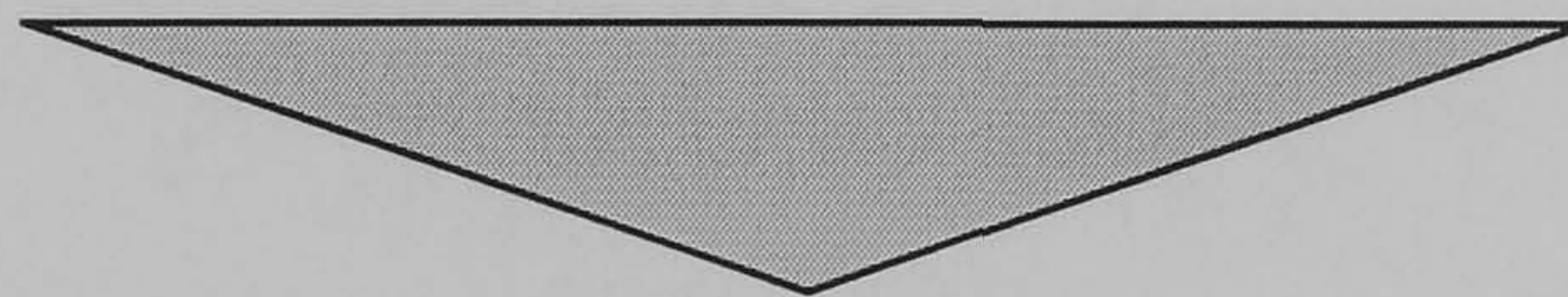
Interviewee: Owner

### Context

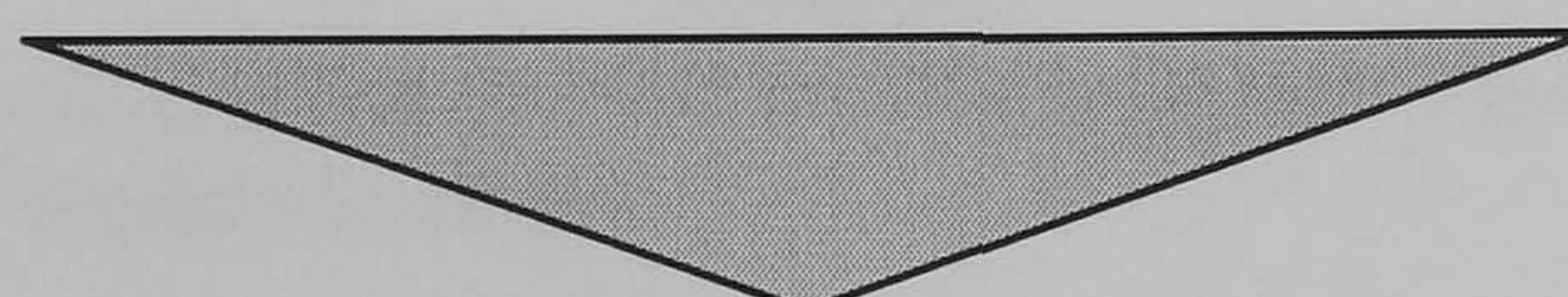
- The company operates in a rare industrial sector where only about 10 firms compete in Taiwan
- This company provides geodetic services relating landscape surveying, cadastral and boundary and minerals.
- With the owner-manager being in the business for over 10 years, this company has a good reputation and steady customers.
- Annual turnover £11 million

### Goals

The firm's BPR aimed to build up an integrated system with its clients.



	Successful Elements	Challenges/Pitfalls
Structure	<ul style="list-style-type: none"> <li>• It is a small enterprise that currently hires 15 employees.</li> </ul>	
Culture	<ul style="list-style-type: none"> <li>• A stable market share does not keep this company from pursuing higher level of professional knowledge and operational efficiency.</li> </ul>	
Resources	<ul style="list-style-type: none"> <li>• Most of the employees are professionals in this field</li> </ul>	
Technology	<ul style="list-style-type: none"> <li>• This firm has experienced over 10 years of computerisation, due in part to its technological orientation.</li> <li>• The owner has been conscious of technological advances and largely investing on required software applications.</li> <li>• The firm provides updated tools and techniques of geodetic surveying to its clients.</li> </ul>	<ul style="list-style-type: none"> <li>• Differentiated IS platforms had to be overcome.</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• The employees are given proper skill training to ensure that they are capable of performing new tasks and familiar with the state of the art.</li> </ul>	



### Results

- This firm demonstrates a successful case of SME using IT in linking its business processes with its clients and providing necessary technical support.

## Case 3: Financial Institution

Date: Friday, The 1<sup>st</sup> of May, 1998

Time and Duration: 2:40pm-4:10pm, 90 mins

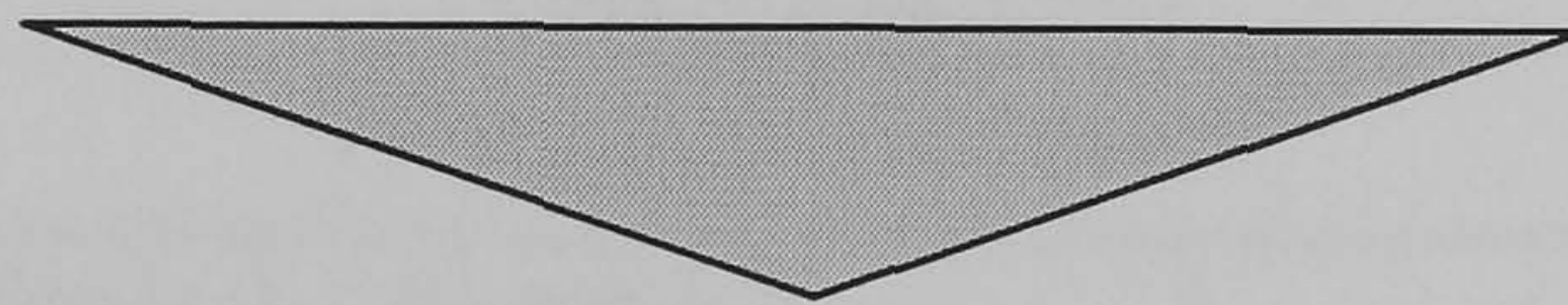
Interviewee: Investment Manager

### Context

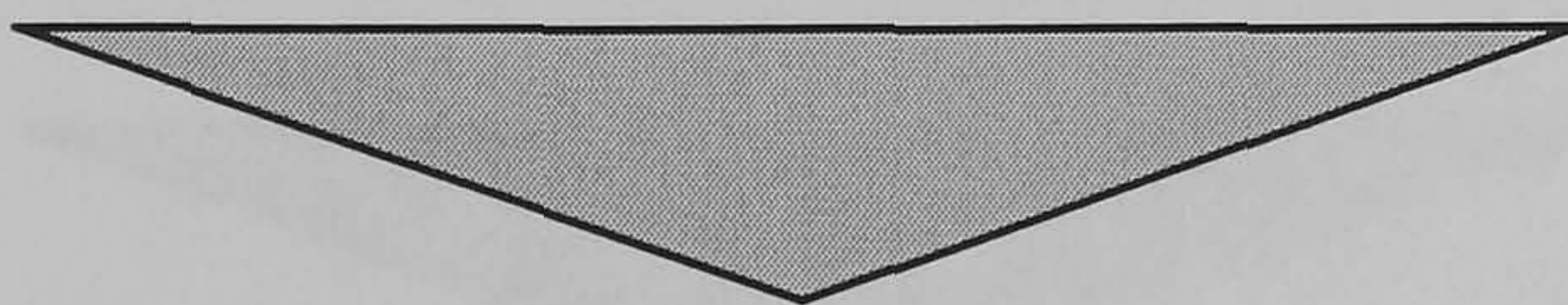
- The company was found after the bank privatisation in 1992.
- Equivalent to a building society, this company provides cash and deposit services, while investing on various long-term or short-term bonds.
- The main branch being interviewed currently employs 200 full-time staff.
- With an annual turnover of £50 million, this company grows steadily in an intensely competitive environment

### Goals

- The firm's major objective of adopting a BPR strategy is to simplify the banking system and streamline the banking process.



	Successful Elements	Challenges/Pitfalls
Structure		
Culture		<ul style="list-style-type: none"> <li>• The company's business strategy and policy are relatively conservative.</li> <li>• There was a lack of full management commitment.</li> <li>• Top management has been contented with the firm's business performance and prefer to stay the status quo.</li> </ul>
Resources		<ul style="list-style-type: none"> <li>• The firm's management skills are relatively poor.</li> </ul>
Technology		<ul style="list-style-type: none"> <li>• Without its own IT professionals, the firm heavily relies on external IT support and business consultants.</li> </ul>
Implementation		<ul style="list-style-type: none"> <li>• The BPR project was initiated by a suggestion from a consulting company and their re-engineering efforts tend to be fragmented and derived from intuition.</li> </ul>



### Results

- The absence of customer focus resulted in their on-line banking system not being able to deliver its value to customers and gain expected results.

**Case 4: Supersonic Machinery  
Manufacturing Company**

**Date:** Monday, The 11<sup>th</sup> of May, 1998  
**Time and Duration:** 11am-12:10pm, 70 mins

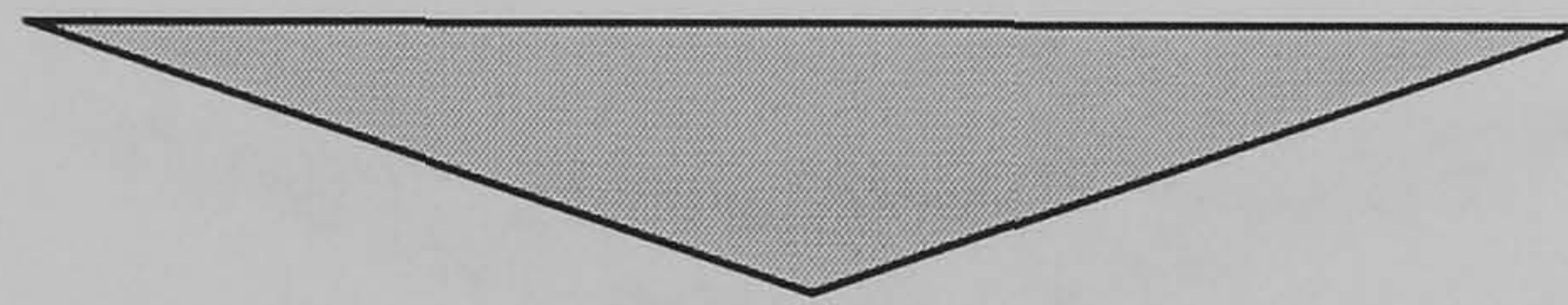
**Interviewee:** General Manager

**Context**

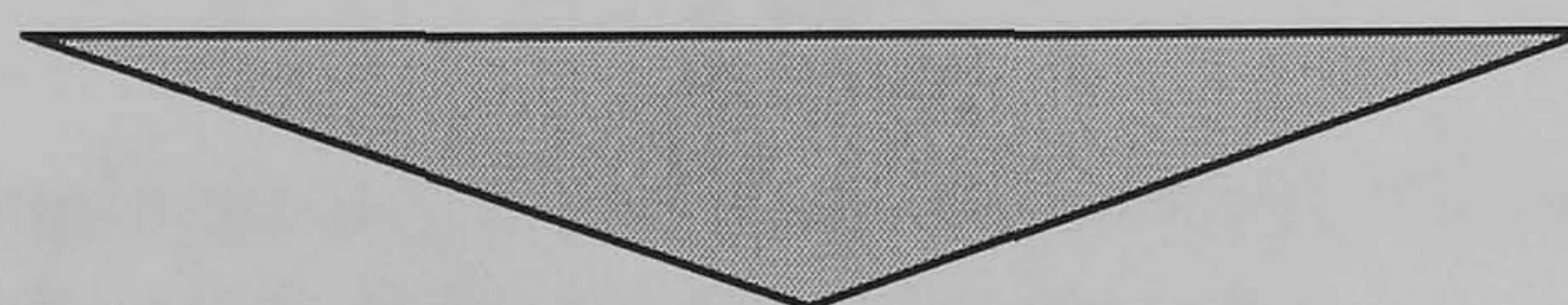
- The company operates in the manufacturing/production sector, assembling and selling supersonic parts.
- It currently employs 40 full-time workers.
- Annual turnover £13 million
- This company has steady customers and is adopting a diversification strategy aimed at expanding the business to semi-conduct market

**Goals**

- Reduce cost
- Target customers better
- Develop products that consistently win over buyers and retailers



	Successful Elements	Challenges/Pitfalls
Structure	<ul style="list-style-type: none"> <li>• The firm has made the best use of its distribution channels and developed good relations with its suppliers and customers, which substantially reduced costs on marketing.</li> </ul>	
Culture	<ul style="list-style-type: none"> <li>• Although the owner-manager is the main decision-maker, the organisational climate is flexible and creative</li> <li>• Employees are largely involved in strategy formulation and product discussion.</li> </ul>	
Resources	<ul style="list-style-type: none"> <li>• Most of the employees are technicians in the field.</li> </ul>	
Technology	<ul style="list-style-type: none"> <li>• IT has been used for inter-functional communications and product innovation.</li> </ul>	
Implementation	<ul style="list-style-type: none"> <li>• The company's BPR project is guided by its long-term strategic vision, with a focus on customers and core competencies.</li> </ul>	



**Results**

- Having successfully re-engineered its ordering system by combining sales and finance divisions without downsizing which reduced several unnecessary 'windows', the firm is currently engaged in establishing a customer network with its 200 satellite plants.

## Case 5: Shoes Trading Company

Date: Thursday, The 14<sup>th</sup> of May, 1998  
 Time and Duration: 1:30pm-3:10pm, 100 mins

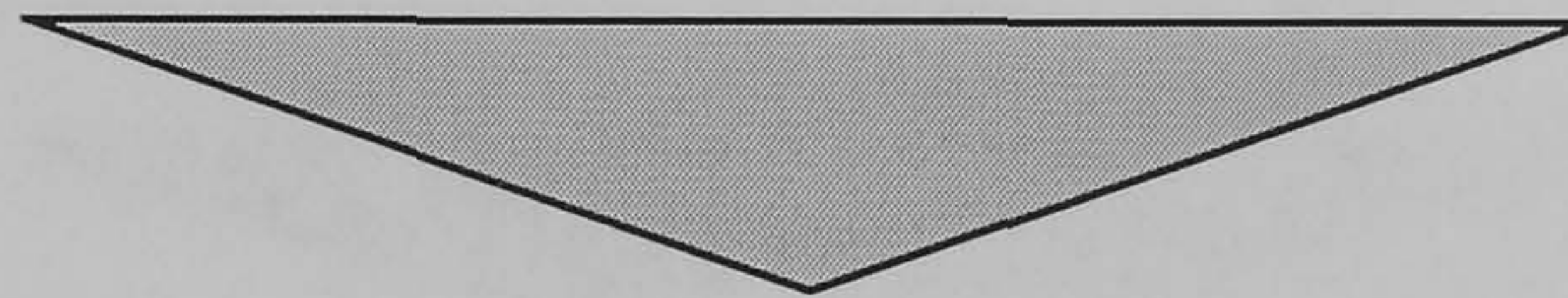
Interviewee: Design Division Manager

### Context

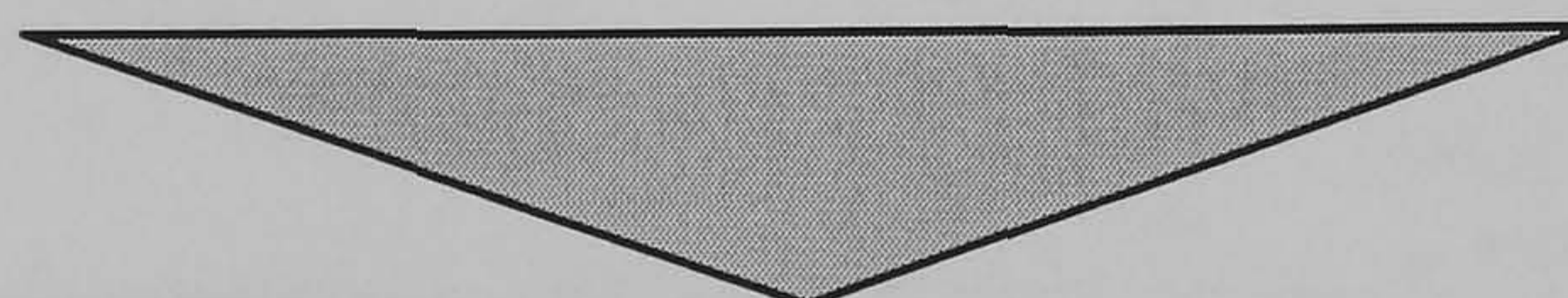
- The shoe trading company currently employees 100 full-time staff.
- The firm has over 150 contracted satellite factories which manufacture various types of shoes
- This company has stable market share in the US and is currently expanding to include the Australian and European markets.

### Goals

- BPR was initiated from a desire to eliminate both human and administrative wastes and streamline workflow and processes.



	Successful Elements	Challenges/Pitfalls
Structure		<ul style="list-style-type: none"> <li>• Departments are independent and isolated.</li> </ul>
Culture		<ul style="list-style-type: none"> <li>• The owner-manager adopts autocratic management style.</li> </ul>
Resources		
Technology	<ul style="list-style-type: none"> <li>• Recently, the firm started using software packages such as AutoCAD in support of designing and using telecommunications to contact its clients abroad and inform them of the company's latest products.</li> </ul>	<ul style="list-style-type: none"> <li>• The company has a very short history of computer use, and IT is mainly used for only word-processing and E-mailing.</li> </ul>
Implementation		<ul style="list-style-type: none"> <li>• Combine operating and designing departments</li> <li>• Ignore some important aspects of human resource management while implementing BPR.</li> </ul>



### Results

- BPR led to job losses and employee work overload. As a result, the firm had problems retaining its major designers and the results of its BPR efforts were limited.

## Case 6: Retail Grocery Organisation

Date: Friday, The 15<sup>th</sup> of May, 1998  
Time and Duration: 2:20pm-3:00pm, 40 mins

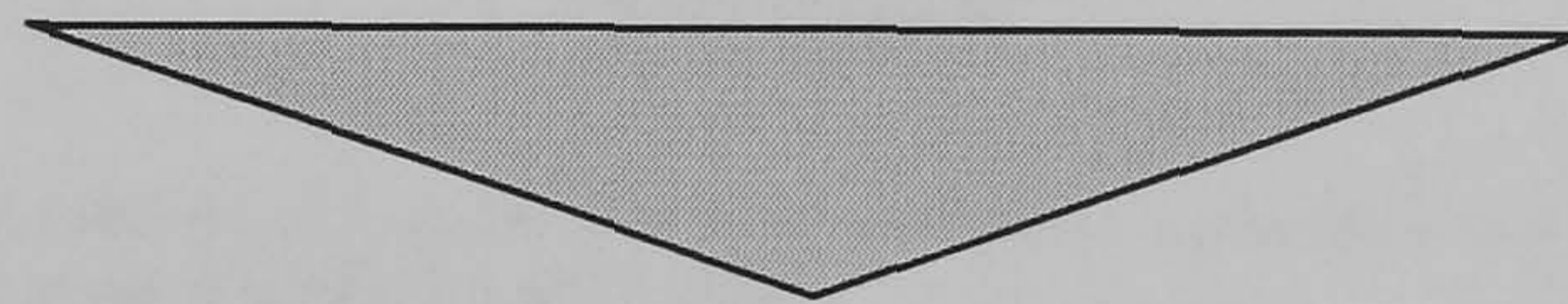
Interviewee: Planning Manager

### Context

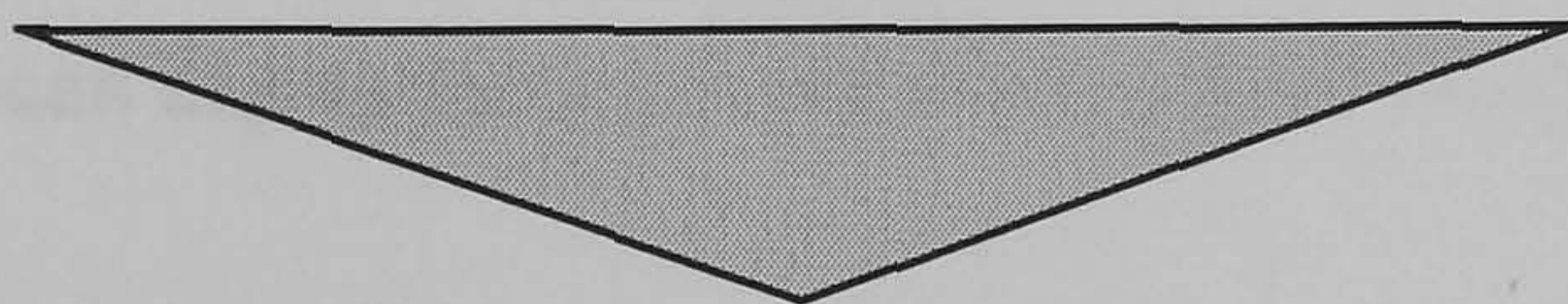
- This company operates in the retail industry, with teenagers as their customer target.
- It is a medium-sized firm with about 200 full-time staff.
- The owner took over the shop in 1992 and radically changed its image and the way of doing business.
- Three business units were combined which resulted in a reduction of about 40 positions.
- The competition has been severe.

### Goals

A main goal for the Retail Grocery Organisation to implement BPR is to cut down administrative costs.



	Successful Elements	Challenges/Pitfalls
<i>Structure</i>		
Culture	<ul style="list-style-type: none"> <li>• The owner has been open to suggestions and committed to creating an innovative work environment.</li> <li>• Due to a lack of a long-term business plan, much of the concern has been placed on the short period payback.</li> </ul>	
Resources		<ul style="list-style-type: none"> <li>• The firm suffered from several financial problems which were derived primarily from 'the owner's lack of managerial skills'.</li> </ul>
Technology		<ul style="list-style-type: none"> <li>• Firm has been using old 'legacy systems'.</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>• Employees were well informed about the change.</li> </ul>	<ul style="list-style-type: none"> <li>• The company were busy about creating its new images to attract the youngsters, the management paid less attention to the quality and costs and what the customers really wanted.</li> </ul>



### Results

- Short-term vision inhibited the firm from re-engineering on a continuous basis.

## Case 7: Automatic Assembling Retailer

Date: Friday, The 22<sup>nd</sup> of May, 1998

Time and Duration: 1:45pm-3:00pm, 75 mins

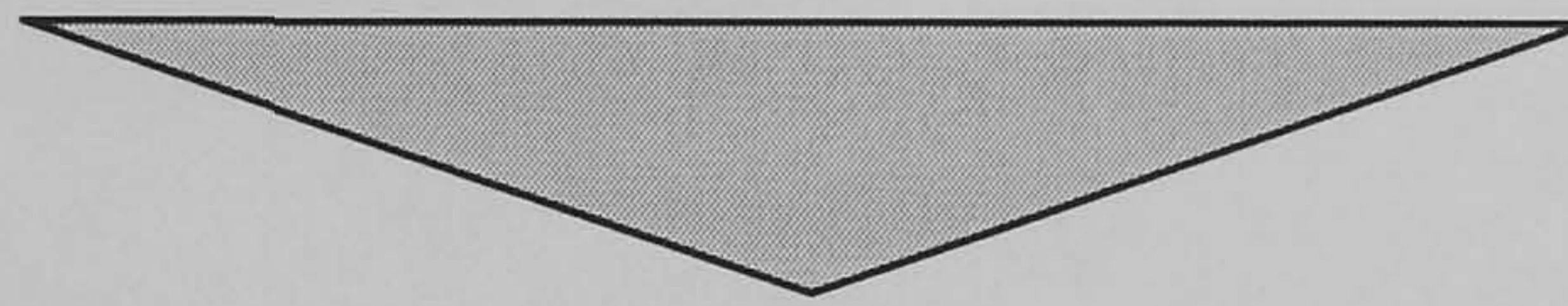
Interviewee: Senior Technician

### Context

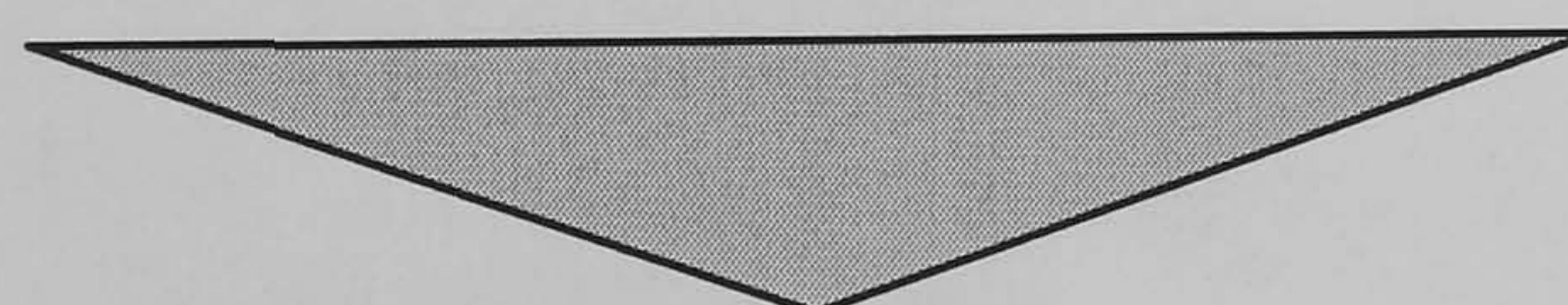
- The company operates in the automatic parts industry, specialising in the designing and manufacturing of automatic assembly systems, e.g. tooling systems and transfer automatic systems.
- The company currently employs only 10 full-time staff, with an annual turnover of about £11 million.

### Goals

- The main objectives of BPR were to cut down costs and simplify manufacturing process.



	Successful Elements	Challenges/Pitfalls
Structure	<ul style="list-style-type: none"> <li>• The combination of this system with other operational processes resulted in an increased flexibility.</li> </ul>	
Culture	<ul style="list-style-type: none"> <li>• Good top-down communication.</li> <li>• Good teamwork efficiency</li> </ul>	
Resources	<ul style="list-style-type: none"> <li>• Proper skill training</li> </ul>	
Technology	<ul style="list-style-type: none"> <li>• Having used IT for nearly 10 years, it is only recently that an automated information system was introduced to aid production and link its production line to the inventory and ordering system.</li> </ul>	
Implementation	<ul style="list-style-type: none"> <li>• Satellite manufacturers are numbered and detailed in a database linking to the ordering system. This has greatly improved the speed and quality, while meeting customers' specific needs.</li> </ul>	



### Results

- Functional integration has been expanded to enhance the company's communication with customers and satellite manufacturers.



## Case 8: Freight Shipping Company

Date: Monday, The 1<sup>st</sup> of June, 1998

Time and Duration: 2:50pm-3:40pm, 50 mins

Interviewee: Owner

### Context

- This company provides world-wide ocean freight services. Like a travel agency, it makes arrangements for objects rather than people to transport shipments.
- Customer's criteria of satisfaction usually include security, speed, instant messaging of transportation and updated knowledge about regulations related to customers and shipments.
- The company currently employs about 150 staff, including on-board workers and administrative staff.
- Annual turnover of £17 million.
- The firm has a steady market share. Clients are mainly exporting/importing enterprises.

### Goals

- The company initiated BPR 3 years ago aimed at reducing administrative costs and enhancing efficiency. BPR is perceived to be as an on-going change programme which is important to firm's survival.

	Successful Elements	Challenges/Pitfalls
Structure	<ul style="list-style-type: none"> <li>• Employee 'bottom-up' undertaking as they convey customer's opinions through the front-line staff to the central.</li> </ul>	
Culture	<ul style="list-style-type: none"> <li>• Re-engineering initiative has been a customer-driven.</li> <li>• Good top-down communication</li> <li>• Proper reward system enhances BPR</li> </ul>	
Resources	<ul style="list-style-type: none"> <li>• Employees are provided with skills training</li> <li>• The company has been in the freight industry for over 15 years</li> </ul>	
Technology	<ul style="list-style-type: none"> <li>• IT plays an important supporting role in the following areas: connecting to clients world-wide, planning routes and monitoring transportation</li> </ul>	
Implementation	<ul style="list-style-type: none"> <li>• The firm did not experience much resistance from its re-engineering initiative largely due to its sound human resource management</li> <li>• Implementation involves employees participation</li> </ul>	

### Results

- BPR achieved cost-efficiency. Combined with its existing quality programme, BPR has been undertaken on a continuous basis.

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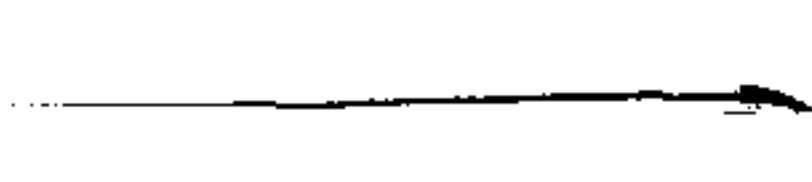


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