

2006

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Recommended Citation

Change, Li-Jen; Levy, Margi; and Powell, Philip, "Process re-engineering success in small and medium-sized enterprises" (2006). *ECIS 2006 Proceedings*. 72.

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PROCESS RE-ENGINEERING SUCCESS IN SMALL AND MEDIUM SIZED ENTERPRISES

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Abstract

The factors that lead to business process re-engineering (BPR) success in small and medium-sized enterprises (SMEs) are not clearly understood. This paper reviews the main contributing factors to BPR success using a framework that considers culture, structure, technology and resource. Eight Taiwanese case studies are used to explore issues contributing to, or impeding, successful process re-engineering in small firms. The analysis shows that BPR success is empowered by innovation, employee empowerment, top management commitment and strategic direction and is dependent upon customer relations, IS involvement and financial resources.

Keywords: business process re-engineering, small and medium sized enterprises

1 INTRODUCTION

Competition and globalization have led enterprises to restructure to focus on managing change. Business process re-engineering (BPR) is an approach to business transformation that emphasizes customer-driven, process-oriented management practice, often enabled by IT. Raymond et al (1998) state that the literature focuses on BPR in large firms and pose the question as to whether BPR success factors are the same for SMEs (firms with fewer than 250 employees (SBS 2003)) as for large enterprises.

This paper investigates BPR success factors to identify the success and failure factors of BPR in small firms. The paper briefly outlines the nature of BPR. It then adapts Chang and Powell's (1998) framework to explore BPR in SMEs by focusing on culture, technology, structure and resources. The research explores, using a case approach, the BPR response of eight Taiwanese firms. This leads to understanding of the different success and failure factors for BPR in SMEs. A revised model for successful BPR in SMEs is then presented and the implications for theory and practice are discussed.

2 NATURE OF BPR

BPR is 'radical redesign of business processes to achieve dramatic improvements on critical measures of performance' (Hammer 1990). BPR emphasizes horizontal integration that crosses organizational boundaries - the analysis and design of work-flows and processes within and between organizations (Davenport 1993). The main elements of BPR are fundamental work process redesign, adding value to final customers, integration of cross-functional specialization, and exploitation of IT. The challenges of BPR initiatives are both technical and socio-cultural. It is technically problematic to develop radical process improvements. The socio-cultural challenge is in dealing with people's reactions to the likely serious organizational changes required (Reijers and Mansar 2005).

Many factors are inherent in successful BPR. First, top management commitment is important to ensure the initiative is maintained and focused. Second, re-engineering focuses on providing customers with greater value (Cameron and Braiden 2004). Third, re-engineering places a major emphasis on employees and their role in resolving problems (Larsen and Myers 1999). Process improvement involves changes to jobs and the social structure to increase motivation, reduce stress and improve performance by empowerment (Wastell et al. 1994). Fourth, IT is an *enabler* in creating and maintaining flexible business networks (Tinnila 1995). Finally, a BPR strategy is key, incorporating critical inputs from both corporate and IT planning (Teng et al 1994, Talwar 1993). However, as BPR involves changing the firm's competences, it is more likely to be successful if it is emergent, benefiting from organizational learning (Craig and Yetton 1997).

2.1 BPR In SMES

One of the few BPR studies in SMEs indicates that firms benefit if they respect the underlying principles of BPR. In particular, SMEs need to review business processes around customer requirements using IT more innovatively. Top management commitment and a methodological approach are essential (Ursic et al 2005). Involvement from employees is also beneficial (Raymond et al 1998). These principles are evident in Chang and Powell's (1998) SME BPR framework (Figure 1). This framework identifies four key criteria that affect SME BPR success: culture, structure, resources and technology.

Culture: BPR does not work without profound cultural change as it emphasizes leadership, teamwork, empowerment, entrepreneurship, and risk-taking (Tersine et al 1997, Ursic et al 2005). SMEs are often perceived as more innovative than larger firms (Carrier 1995) and employees are often given operational

responsibility (Brady and Voss 1995). Decision-making in SMEs is often dominated by the CEO: this may aid or hinder re-engineering.

Structure: Small businesses encourage team and cross-functional orientations (Kinni 1995). The lack of bureaucracy makes for efficient and informal internal communication networks to manage processes. SMEs are able to respond readily to changing customers' needs. Due to the lack of management layers, small businesses are closer to their customers (Brady and Voss 1995). Thus, SMEs should be well positioned for re-engineering with their focus on process

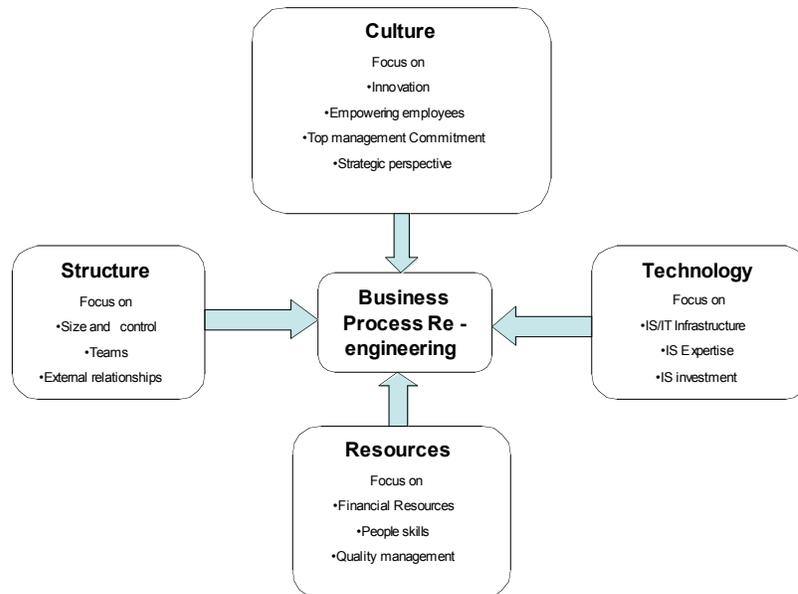


Figure 1. BPR Framework for SMEs (adapted from Chang and Powell 1998)

Resources: Two serious problems SMEs face when trying to implement quality management are the owner's lack of business experience and a lack of financial and human resources which may restrict growth (Haksaver 1996, Witherill and Kolak 1996). Thus, while survival is the first concern in SMEs, financial constraints may inhibit SMEs undertaking BPR.

Technology: IT infrastructure can be a significant enabler of, or barrier to, the practical options available to planning and changing processes for BPR (Grover et al 1993). Most re-engineering efforts are technology-driven, with the role of IT changing from producing data to integrating new technologies and assisting people as independent information gatherers (Ribbler 1996). However, SMEs are unlikely to employ IT staff, IS skills are limited and IS investment is often seen as a necessary evil.

This analysis leads to the research question: *what factors enable or inhibit BPR success in SMEs?*

3 RESEARCH APPROACH

There is little previous research available to investigate BPR success or failure factors. This research is therefore exploratory. Case studies are a powerful method for conducting exploratory research, as it is possible to pose reflective questions. Also, case research is effective when theory is relatively under-developed (Eisenhardt 1989). Particularly, when the research boundaries are unclear, there is a need to investigate the issue within a real life context, drawing on multiple views (Yin 1994). Multiple cases

ensure that common patterns are identified rather than being generalized from what might be chance occurrences (Eisenhardt 1989).

3.1 Research Background

In Taiwan, SMEs constitute 95% of all enterprises (Lee and Chen 1992) Taiwanese SMEs are confronting dramatic environmental changes. Export-oriented SMEs are restricted to labour-intensive and mature-technology industries that constrain technology upgrading, enlarging operations and marketing (Wu and Chou 1992). Labour shortages and rising wages have led to SMEs losing competitiveness. Financial problems are a major obstacle. Macro-environmental transition has forced SMEs to investigate their internal operations and management. Hence, approaches such as BPR have become popular.

Eight cases are considered (Table 1). In order to mitigate contextual bias, the cases include four SMEs in manufacturing and four in services. Three firms are small and five are medium-sized. Data was gathered through semi-structured interviews with the CEO/management team from each SME. SMEs' perceived BPR satisfaction is a determinant for BPR success. Interview questions were developed based on the themes presented in the BPR framework (Figure 1). SMEs' perceived BPR satisfaction is a surrogate for BPR success or failure. For each sector, two 'successful' and two 'failure' cases are selected to compare success and failure factors.

Cases	Empl oyees	BPR Outcome	Industry	Strategy	Market	Sub-contract
Automatic Assembling	10	Success	Manu	Market Segmentation	Steady	Yes
Supersonic Machinery	40	Success	Manu	Diversification	Growing	Yes
Geodetic Surveying	15	Success	Service	Expansion	Steady	No
Freight Shipping	150	Success	Service	Market penetration	Competitive	No
Shoes Trading	100	Failure	Manu	Market penetration	Growing	Yes
Telecoms Supplier	300	Failure	Manu	Expansion	Competitive	No
Financial Institution	200	Failure	Service	Market Development	Steady	No
Retail Grocer	200	Failure	Service	Product develop	Competitive	No

Table 1. Characteristics of BPR Case Firms

Most of the SMEs are seeking to grow by business expansion. For example, Telecoms Supplier is enlarging its sales division to diversify into new markets with new products. Supersonic Machinery is developing technology to manufacture semiconductors. In contrast, Automatic Assembling and Freight Shipping tend to have steady orders and loyal clients. A feature of the SMEs is that their purpose in adopting BPR derives from a desire either to improve efficiency or to enhance capacities, rather than from a 'crisis situation' (Kinni, 1995) (Table 2).

Purpose of BPR	Case Firms	Number
Process Improvement	All Firms	8
Cost Reduction	Telecoms Supplier, Retail Grocer, Shoe Trading	3
Customer Satisfaction	Supersonic Machinery, Automatic Assembling, Freight Shipping, Financial Institution	4
Quality	Geodetic Survey, Freight Shipping, Financial Institution	3

Table 2: Purpose of BPR in case firms

4 CASE ANALYSIS

Case findings are organized around four criteria: structure, culture, resources, technology (Figure 1). The analysis investigates success/failure factors that influence BPR performance. Interview data are analysed to determine interviewee perspectives. Table 3 summarizes the findings discussed in detail below.

Criterion	Elements	Success factors	Failure factors
Culture	Innovation	<input type="checkbox"/> Product innovation [Supersonic Mach] <input type="checkbox"/> Innovative environment [Retail Grocer]	
	Empowering Employees	<input type="checkbox"/> High employee autonomy [Geodetic Surveying; Supersonic Machinery; Automatic Assembling]	<input type="checkbox"/> Autocratic management style [Financial Institution; Shoe Trading]
	Top Management Commitment	<input type="checkbox"/> Top-down approach [all cases expect Telecoms Supplier] <input type="checkbox"/> Direct involvement [Geodetic Surveying; Supersonic Machinery; Automatic Assembling] <input type="checkbox"/> Good top-down communication [Automatic Assembling]	<input type="checkbox"/> Lack of management support [Telecoms Suppliers] <input type="checkbox"/> Poor top-down communication [Retail Grocer; Financial Institution; Shoe Trading]
	Strategic Perspective	<input type="checkbox"/> Strategic thinking and customer focus [Geodetic Surveying; Supersonic Machinery]	<input type="checkbox"/> Lack of strategic vision [Financial Inst; Telecoms Supplier; Retail Grocer]
Structure	Process		<input type="checkbox"/> Formal hierarchy [Telecoms Sup]
	Teams	<input type="checkbox"/> Teamwork efficiency [Automatic Assembling; Geodetic Surveying]	
	External Relations	<input type="checkbox"/> Good relations with customers and suppliers [Supersonic Machinery] <input type="checkbox"/> Good relation with suppliers [Automatic Assembling] <input type="checkbox"/> Good relation with customers [Freight Shipping; Shoe Trading]	
Resources	Finance		<input type="checkbox"/> Lack of funds [Retail Grocer]
	People Skills	<input type="checkbox"/> Knowledge workers [Geodetic Surveying; Supersonic Machinery; Automatic Assembling]	<input type="checkbox"/> Lack of managerial skills [Telecoms Supplier; Retail Grocer; Financial Institution]
	Quality Management	<input type="checkbox"/> Integrating TQM and BPR within strategic context [Geodetic Surveying; Supersonic Machinery] <input type="checkbox"/> Organizational learning [Automatic Assembling]	<input type="checkbox"/> Lack of long-term business plans [Retail Grocer; Shoe Trading]
Technology	IT/IS infrastructure	<input type="checkbox"/> Applying IT to core processes [Freight Shipping; Automatic Assembling] <input type="checkbox"/> Inter-organizational co-operation [Geodetic Surveying]	<input type="checkbox"/> Lack of IT tools [Shoe Trading]
	IS Expertise	<input type="checkbox"/> Skill Training [Geodetic Surveying]	<input type="checkbox"/> Lack of IT expertise [Financial Institution; Shoe Trading]
	IS Investment	<input type="checkbox"/> High IT spending [Geodetic Surveying]	<input type="checkbox"/> Lack of funds for IT investment [Retail Grocer]

Table 3. Success and Failure Factors for BPR

4.1 Culture

Owner-led SMEs with ambitious strategies that focus on product innovation and empowering employees are more likely to benefit from BPR than those with limited top management commitment, an autocratic management style with little top-down communication.

Innovation is primarily seen in rapid growth firms. In these firms product innovation takes precedence over process innovation. Since the case rapid growth firms, are technology-oriented, use of the latest IT tools and applications to support product innovation is common supporting Wind and West's (1991) observation that innovation is fostered in decentralised, integrated, informal organizations. The cases suggest that innovation is positively correlated with a team-based orientation. For example, Retail Grocer encouraged 'unconventional ideas' among project members when creating the firm's new image.

Empowering employees is recognized as critical for successful BPR (Janson 1993, Larsen and Myers 1999). Higher employee autonomy is more likely in decentralised SMEs, such as Automatic Assembling and Supersonic Machinery. These firms demonstrate that small businesses operate as an empowered team (Kinni, 1995) where knowledge workers are involved in decisions and product discussion.

Top management commitment, coupled with good top-down communication, is considered by all SMEs as the most critical factor in BPR success (Stevenson, 1993, McKeown and Philip, 2003), highlighting the need for direct CEO involvement. Automatic Assembling represents a 'top-down' approach to BPR. The owner-manager oversees several functions - personnel, finance and accounting. His enthusiastic involvement ensured the re-engineering project encountered few difficulties. Such direct involvement tends to occur in smaller firms where structures are less formal and communication lines shorter. In Geodetic Surveying the owner participated in building its network with clients that was instrumental in BPR success.

The only BPR initiative that was not CEO-led was Telecoms Suppliers, it derived from departmental managers. When the R&D director was asked about the owner's attitude to BPR, he replied: '*We're thinking some good ideas, but the owner's just not interested*'. Limited top management support meant they could not find sufficient financial backup to launch process change.

A *strategic perspective* tends to be lacking in many SMEs. Re-engineering firms' core processes into strategic capabilities increases the chances of BPR success (Wastell et al 1994, Hale and Cragg 1996). Five case firms are re-engineering their core processes, which suggests some recognition of the need for strategic thinking. For example, Geodetic Surveying's firm-client interface is largely involved with customer services and product development. Automatic Assembling's integrated IS comprises three major processes: ordering, client/supplier database and manufacturing. Most of the unsuccessful cases demonstrate a lack of strategic vision. For example, Telecoms Supplier focused on distribution channel expansion and improving sales network efficiency rather than competition issues. Retail Grocer focused on business image, ignoring quality issues. They lost competitive advantage due to a focus on short-term pay-off and failure to implement continuous process change. Shoe Trading's BPR, which focused on process improvement was also limited. They put this down to their lack of competitive power due to their position as a sub-contractor.

Similarly, Financial Institution launched its Internet banking without considering client resistance about security concerns. The on-line banking system was created by external IT support without careful planning and management backup. The Investment Manager recalls: '*The initial idea was to reduce the workload of operators and to simplify the banking procedures. Clients only need to install the software provided and key in their usernames and passwords. 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 concerns*'. A similar situation is seen at Telecoms Suppliers. The R&D director notes: '*We did not consider the feasibility of the on-line ordering system while creating our web site. Because of the nature of our products, customers are used to buying with sales staff's assistance*'.

4.2 Structure

The cases show that the structural factors that influence BPR success are team-working and effective external relations. However, formal hierarchies inhibit success.

Team-based operations bring greater involvement and motivation (Sellers 1997). These are more likely in smaller businesses, e.g. Automatic Assembling and Geodetic Surveying due to their decentralised structure and shorter lines of communication. In SMEs, a major benefit from team-based operations is to bring greater involvement, increased motivation and communication, and enhanced job performance. The owner of Geodetic Surveying believes: *'All our employees are professionals. They are talented and responsible. There's only about 15 of us and we work as a team. We respect each other and this is the best way to get things done. I never feel superior because I am the boss'*.

The importance of *External relations* is seen with customers and suppliers. Unusually for SMEs, which usually cluster near customers (Brady and Voss 1995), most of the case firms operate internationally. For example, Supersonic Machinery sells in SE Asia. Shoe Trading's clients are US and Australian. Thus, using IT as an enabler of re-engineering is likely to be beneficial. Cross-functional integration can be expanded to inter-organizational co-operation (Davidow and Malone, 1992). For example, the focus of Shoe Trading's BPR was improving communication with its 150 contracted manufacturers while building up relationships with foreign clients to secure regular orders.

Geodetic Surveying built an integrated IS with a customer interface to facilitate mutual information sharing, technical support and the latest information about surveying tools. Their clients, mainly civil-engineers, have similar IT infrastructure. Otherwise, costs for establishing such a network would be prohibitive. When asked how they use IT inter-organizationally, the owner replied: *'We are one of the few firms that use computers in geodetic surveying. It's different from traditional manual drawing and the quality is significantly improved. Recently we've built a network system linking to our clients' computers. This on-line network saves time and costs'*.

Automatic Assembling is subcontracted to several major clients while at the same time acting as a subcontractor for about 50 satellite manufacturers. Their re-engineering project is designed to reduce the complexity of business processes by integrating its ordering system, production line and supplier/clients databases. A senior technician describes their current relations with clients/customers/contractors: *'We have been trying to maintain a sound relationship with our clients and down-stream satellite plants. And we're at an advantage of being located in an industrial park where we get 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'*.

The cases reinforce the view that strategic behaviour is the main reason for building relations. Geodetic Surveying's client-oriented interface and Automatic Assembling's integrated ordering system are related to their core processes.

The cases show that *size and control*, particularly in more formal and hierarchical structures may inhibit BPR. This occurs in larger firms, such as Telecoms Supplier, where the main purpose of BPR is to de-emphasize divisions of labour to streamline processes and reduce administrative costs. A reason for this is that processes in SMEs are often lean and owners may not accept the need to change, even within a BPR exercise.

4.3 Resources

Success factors in the cases include skilled staff, an emphasis on quality management, and recognition of the value of organizational learning. Failure factors are primarily limited financial resources, limited managerial skills and short term strategic planning.

Limited capital *financial resources* are a major constraint on SMEs' BPR efforts. Financial deficiency restricted Shoe Trading and Retail Grocer from advanced use of IT for functional integration and inter-organisational linkage. Retail Grocer's Planning Manager notes: *'The main reason for adopting BPR was to reduce administrative costs and increase internal efficiency. The owner is not good at financial planning. We had no idea about the return on investment. It's not easy to get the capital we need. So we haven't even gone half-way though our BPR project. Survival is more important'*.

The cases suggest that the amount SMEs spend on IT for BPR depends on the owner-manager's perceived benefits to individuals and the firm (Cragg and King, 1993). For example, the use of IT for BPR at Geodetic Surveying results from the owner's awareness of technological advances enabling better client service.

People skills are important in re-engineering success. This is seen in case firms that are technology-oriented and employ skilled staff (Geodetic Surveying, Supersonic Machinery and Automatic Assembling). However, limited people skills, particularly poor IT understanding, also restrict success. The Design Manager from Shoe Trading states: *'We built a web site on which the photos of our latest designs are exhibited. However, because of security concerns, on-line ordering has not been feasible. The designers are still drawing manually, which takes much longer, but they seem to be happy with what they are doing.. Although we have installed 3D software that aids design, few people are able to use it'*

SMEs' managerial skills are often limited and may not provide support for radical process change. For example, Shoe Trading had difficulties in retaining its talented designers. The Design Manager describes this it: *'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'*.

Quality management is seen by the case firms as important to demonstrate the provision of excellent service to customers. Quality management is only of value when it contributes to organizational learning. Automatic Assembling is an example of empowering and training employees to create ownership and develop the knowledge base. A senior technician stated: *'We care very much about the process by which new employees learn from the senior technicians. We can't afford lots of time for training. Thanks to IT, we are now able to standardize our products. This is the most efficient way to accumulate our experiences and knowledge. It saves time and simplifies the ordering process'*.

The lack of strategic direction in most case firms limits the benefits from quality initiatives. Retail Grocer had difficulty 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 led to Shoe Trading being unable to deal with the consequences of radical process change. A major problem was its inability to retain the firm's main designers, since it could not provide sufficient support and establish a proper reward system to deal with workload.

4 Technology

In growing SMEs, IT is most likely to be applied to product development, usually coupled with R&D. Innovation in SMEs is significantly related to team-based operations and efficiency supported by a good IT infrastructure. Concomitant are sufficient IS skills in the firm. The role of IT in BPR is illustrated by

the general manager from Supersonic Machinery: *'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'*.

An effective *IS/IT infrastructure* plays an important supportive role as a tool in eliminating time and distance for process integration (Carr and Johansson, 1995). The Internet is extensively used for linking firms with customers, suppliers and others. The case firms use IT widely for process integration and product innovation. Applications, such as spreadsheets, databases, and document imaging for inter-organizational linkage are evident. IT

Automatic Assembling combined three major functions: ordering system, clients/supplier databases, and production lines. This was achieved by several IT tools such as spreadsheets and workflow software. These tools have increased speed and flexibility in customized production and improved customer satisfaction through efficient communication with 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 firm's products are standardised and numbered. This simplifies the ordering process and results in increased flexibility in catering for customers' needs'*.

However, a lack of IT tools, as in Financial Institution and Shoe Trading, inhibits functional integration. Similarly, the use of non-standardized IT platforms between Supersonic Machinery and its 200 contracted satellite firms demonstrates an obstacle to successful implementation.

IS Expertise is often limited in SMEs, with few in-house experts able to undertake new developments (Ferrell 1996). Financial Institution sought assistance from consultants due to a lack of IT skills, but relying too much on external IT vendors resulted in a loss of control.

IS investment is often constrained by limited finances, as in Retail Grocer. The cases reinforce that IT investment should be aligned with firms' strategic IT planning and business strategy. For example, investment in IT for Internet banking at Financial Institution was suggested by consultants rather than the firm, only to reveal that the time and costs could not be justified.

5 ISSUES FOR MANAGEMENT

SMEs need to examine whether they 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 strategic direction. Employee motivation and empowerment is essential to effective internal communication and responsiveness to customers. Training is useful in enhancing managerial knowledge as well as inter-functional work skills. The IS function has to be repositioned to facilitate BPR by investing in IT tools and provide required end-user skills. Change issues, such as resistance and lack of required skills needs to be managed strategically at two levels: organizational and technological. 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 efficiency.

Despite much debate on whether IT is a necessity for BPR, this research shows the powerful potential of IT in re-engineering. The role of IT/IS has evolved from automating existing outdated processes to providing firms with an array of opportunities by shortening communication lines and eliminating space and time. This is achieved, in essence, by the innovative use of IT. Alignment of IT strategy and BPR strategy derived from a strategic vision is critical. This is to ensure that IT investment and any required end-user training can be evaluated by internal and external customers, or 'process outputs,' rather than by functional performance or cost savings. Given limited financial and human resources, 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.

6 ISSUES FOR RESEARCH

Process re-engineering was introduced as requiring top management support, customer focus, IT, employee empowerment and strategic direction. The cases demonstrate that the main issues for success in BPR for SMEs are the strategic direction of the firm, top management commitment and external relations with customers.

The cases suggest that those SMEs with a positive attitude to risk are more likely to benefit from BPR. SMEs tend to engage in more incremental process change methods to cope with reality rather than adopting a radical approach as recommended by many BPR proponents (Johansson et al, 1993). However, strong commitment from top management is essential. In keeping with Tushman et al (1986), the cases indicate that direct involvement is strongly related to strategic control and project efficiency. Lack of owner support or an autocratic style, as in Financial Institution and Shoe Trading, can hinder re-engineering. However, size and control is possibly less relevant due to SMEs' inherent flexibility. In contrast, greater success is found where top management commitment extends to empowering employees to take greater responsibilities and adapt to new performance standards and requirements.

IS investment integrated with strategic direction is necessary for success. The cases indicate that IT has powerful capacities to eliminating time and distance to help firms to achieve functional integration and improve cross-company linkage. Supersonic Machinery and the Telecom Supplier, apply IT to both product innovation and improving client/supplier relations. Geodetic Surveying is expanding IT use to establish a firm-client interface for mutual support and information sharing, success is helped by their clients' similar IT infrastructure. For either functional linkage or inter-organizational co-operation, firms need to have sufficient IT investment and provide training for employees. Apart from the integrated system at the Automatic Assembling that combines ordering system, production, and client/supplier databases, the use of IT for 'process innovation' is relatively rare. IT provides essential support for SMEs' re-engineering. The other technology factors are less important. Financial resources are the main constraint or SMEs. The other resource issues are not as influential on BPR in SMEs. This leads to a revised model to consider BPR in SMEs (Figure 4).

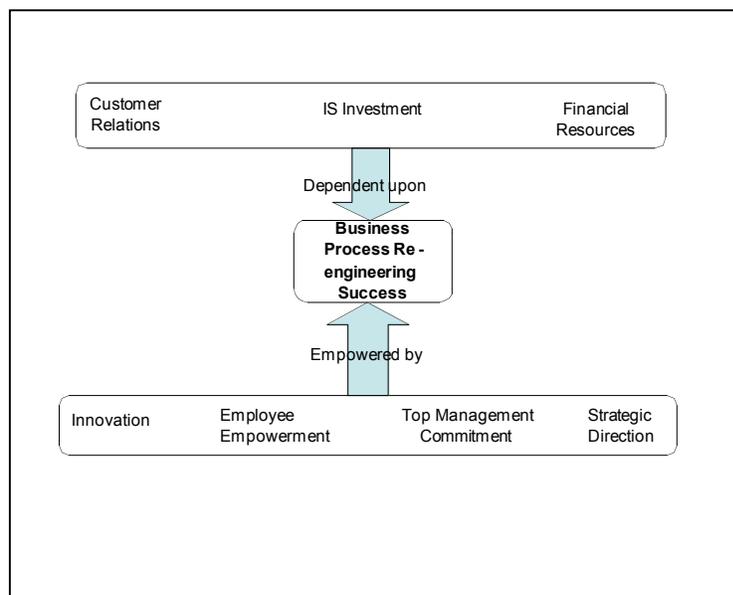


Figure 4. Revised Model for BPR in SMEs

7 CONCLUSIONS

The motivations and purposes for SMEs to re-engineer may be different from those for larger firms. In SMEs re-engineering is often a response to positive trends - they tend to re-engineer from a position of strength (Kinni 1995). First, small firms are 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. Second, the by-products of success - rapidly increasing volume, straining processes, and increased profits are the impetus for small companies to re-engineer. They need to counter fast growth with processes improvement. Firms pursuing a growth strategy tend to re-engineer in order to enhance their external flexibility, relations with customers and suppliers, and internal efficiency, quality and production.

BPR initiatives are classified by two dimensions: scope and scale (Levene and Braganza 1996). *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-organizational. Broadbent et al (1994) contrast approaches to process redesign as simplification and innovation. Based on the strategic nature and radical orientation, 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 minimize risk factors, higher levels of BPR, such as business integration, involve organizational and job redesign and new developments in IT. The higher levels of BPR are, in turn, viewed as more strategic and radical with the potential for substantial gains. Therefore, BPR projects in SMEs will involve lower scale and less scope, e.g. individual/group improvement and process simplification, as SMEs' policies are more conservative and owners try to avoid risks.

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