

IS Alignment in Small Firms: New Paths through the Maze

Margi Levy

Information Systems Research Unit,
Warwick Business School,
University of Warwick,
Coventry CV4 7AL, UK.

Tel: +44 (0)1203 524658, Fax: +44 (0)1203 524539

orsml@razor.wbs.warwick.ac.uk

Philip Powell

Centre for Information Management
School of Management
University of Bath
Bath BA2 7AY UK

Tel: +44 (0) 1225 323256, Fax: +44 (0) 1225 826473

mnspp@management.bath.ac.uk

Philip Yetton

Fujitsu Centre,
Australian Graduate School of Management,
University of New South Wales,
Sydney 2052, Australia,

Tel: 61 2 9931 9257, Fax: 61 2 9662 7621

p.yetton@unsw.edu.au

Abstract

Little is understood about the process of alignment of information systems (IS). While the MIT90s model presents one view of how various firm elements are involved in alignment, other research presents alternative paths. These paths are based on research in large businesses and none of the models have been applied to small firms (SMEs). Using multiple case data, this paper investigates alignment in SMEs through understanding how different groups of SMEs use IS. Four new paths are identified for SMEs. Three of these offer only partial alignment. This may partially explain why many SMEs fail to gain the benefits that might be expected from their IS investments. The implications of this for management and research are explored.

Keywords

Alignment, small firms, paths

1. Introduction

Information systems (IS) can automate to reduce cost and improve operational efficiency or may be employed to informate (Zuboff 1988). Many organizations now view investment in information as a way of adding value. To achieve this, they need an IS strategy that is an integral part of business strategy. However, for many firms, IS strategy is reactive to business strategy, and the potential advantages of using IS competitively are missed.

Alignment is about achieving synergy between strategy, organization, processes, technology and people in order to sustain the quality of 'interdependence' and thus achieve competitive advantage (Hsiao and Ormerod, 1998). Alignment of business strategy with, *inter alia*, IS strategy is problematic for firms and is a key concern of senior management. However, alignment may be a moderating variable between IS use and firm performance (Chan et al, 1997). Yet, little is known about the change processes in firms that lead to alignment or misalignment. The MIT90s model (Scott Morton 1991) identifies conceptual integration between the different change factors and demonstrates one 'classic' route that firms may follow. However, Yetton et al (1994) demonstrate three alternative paths while Ormerod and Hsiao (1998), taking a dynamic approach, suggest four further paths. However, there is little research that considers alignment issues in small and medium sized enterprises (SMEs).

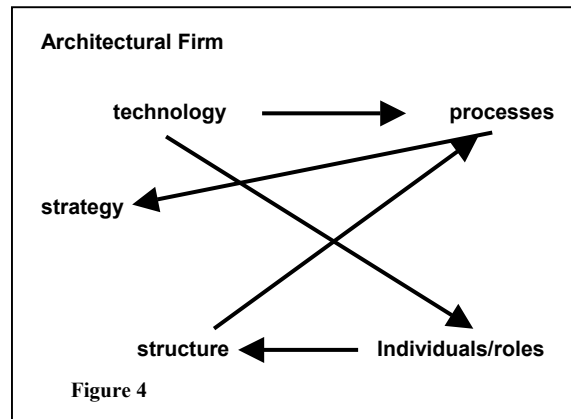
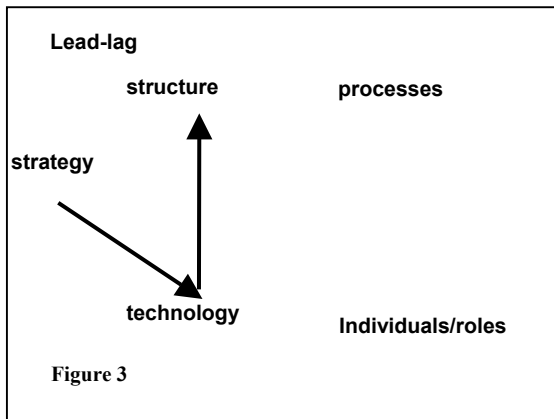
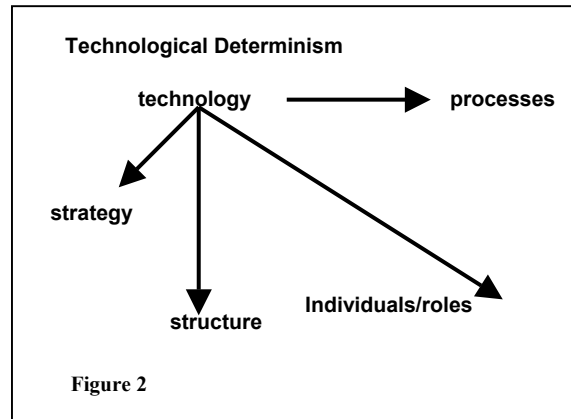
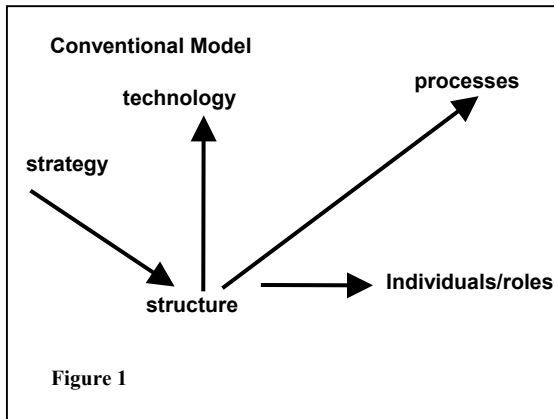
Using multiple case data, this paper investigates paths to alignment in SMEs. It first discusses why SMEs have been slow to reap rewards from IS investment and suggests one reason is that they fail to appreciate the need to align or to implement alignment successfully. The paper discusses the 'classic' alignment model and the alternatives offered by Yetton et al and Hsiao and Ormerod. Based on a model of IS use in SMEs, the focus-dominance model (Levy et al 2001), the paper then identifies four alignment paths for SMEs. These are neither the 'classic' model of alignment, nor the others suggested. The reasons for this mismatch are discussed and the paper concludes with the implications for management and research of the new paths through the alignment maze.

2. Opportunities for Strategic Alignment

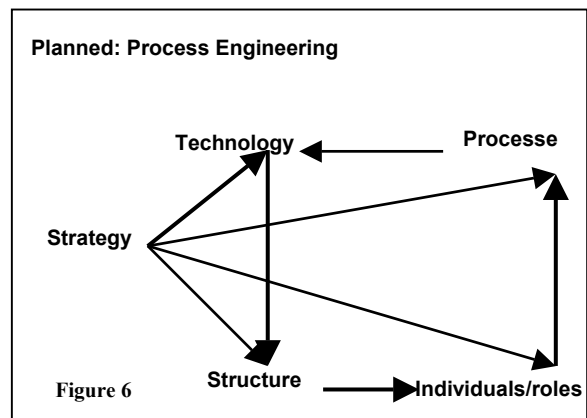
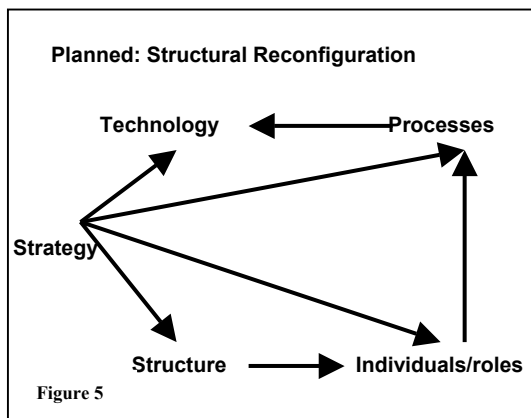
The MIT90s model argues that a successful organization has a high fit among its strategy, structure, roles and skills, management processes and technology, and between that configuration and its business environment (Scott Morton 1991). The 'classical' or conventional alignment model (Figure 1) starts with a change in strategy. This changes structure, which in turn leads to change in processes, technology and individuals and roles. While Scott Morton suggests that there is one path for strategic alignment, Yetton et al (1994) demonstrate that it is possible for technology to be the driver of change. For example, a firm of architects, Flower and Samios, transformed their business by adopting computer-aided design tools. Their path was to develop individuals, then change the management structure. The strategic vision evolved dynamically and grew out of the changes made. Yetton (1997) argues that the adoption of technology led Flower and Samios to identify other uses, in particular as a means of cost reduction and improving efficiency. Competitiveness may depend on organizations' abilities to derive new competencies as much as the determination of strategic direction enabled by IT (Craig and Yetton 1997).

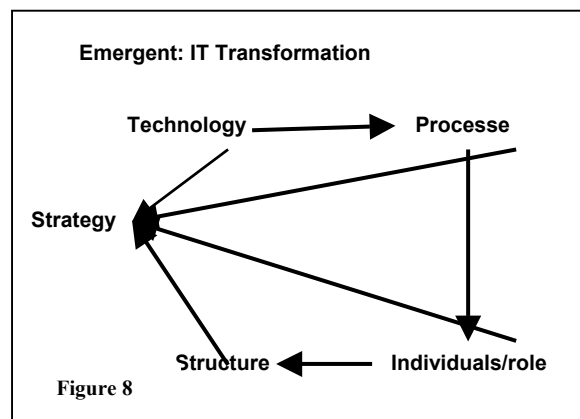
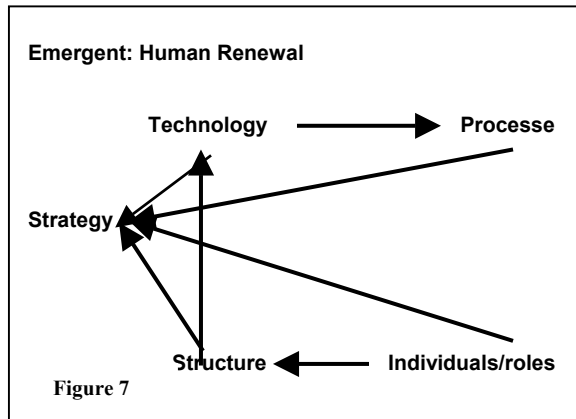
Yetton et al (1994) demonstrate three paths through the alignment elements. The first, technological determinism, commences with a change in technology that forces change in the other four elements (Figure 2). The lead-lag model (Figure 3) involves change in strategy,

technology and structure but leaves processes and individuals and roles untouched. Finally, there is the path found at the architectural practice model (Figure 4)



However, in one of the other major studies of alignment paths Hsiao and Ormerod (1998) find four different paths. Two planned paths emphasize the centrality of strategy – structural reconfiguration (Figure 5) and process engineering (Figure 6)- while the other two emergent paths – human renewal (Figure 7) and IT transformation (Figure 8) – lead with individuals and technology respectively.





While Flower and Samios is an SME, all the other research is the result of work in large firms. This paper investigates if, how and why alignment is obtained in SMEs. The next section reviews SME use of IS and presents a model used to understand SME alignment paths.

3. SMEs and IS

The introduction of IS into SMEs tends to be fragmented, supporting operations and transactions (Foong 1999). Owner-manager interest and enthusiasm is a prime driver of adoption (Premkumar and Roberts 1999) but it is often unplanned. Successful small businesses plan their growth and plan the systems required to manage that growth (Levy and Powell 2000). Planning is also important for mature SMEs as formal systems are required (Reid 1999) and sometimes these firms have systems available in advance of their next stage of growth (Churchill and Lewis 1983).

There is little management information systems use in SMEs (Premkumar and Roberts 1999) and often these provide no performance benefits (Cragg and King 1992). Further, firms with more sophisticated IS perform worse than those with more limited systems as poor IS knowledge and skills precludes them from taking advantage of strategic information. SMEs that make strategic IS investments do not obtain strategic benefits unless it is seen as integral to business strategy. However, firms that adopt a low-cost strategy are less likely to use IS strategically (Lesjak and Lynn 2000).

SMEs invest incrementally in IS and while Hashmi and Cuddy (1990) state this inhibits effective IS use, where incremental investment is tied in with organizational learning it can be a means of increasing competitiveness (Yetton et al 1997). SMEs are relatively inflexible in their use of IS and view IS as long-term investments for operational support rather than for strategic success (Levy and Powell 1997).

Thus, IS investment in SMEs has two modes. On one hand, it is a low cost investment to provide efficiency savings. This perspective is taken by SMEs for which IT is not central to their business, with scarce resources, and where the owners' experience of IT is limited. Here IT is focused on transaction processing. On the other hand, IT investment is a strategic response either driven by necessity or by innovative growth-seeking owners. IT investment is more innovative with greater emphasis on management information.

Levy et al (2001) find that a key inhibitor or enabler of IS use in SMEs is competitiveness. Often customer power is high. Market uncertainty is high as SMEs tend to have small market shares, a few major customers and are less able to influence price. Small numbers of

customers with considerable power dominate SMEs. Such customer power is a critical determinant of the way SMEs use IS. The purposes for which IS may be used range from cost reduction to value-adding. These two dimensions define the strategic context, creating four competitive scenarios for IS investment in SMEs - efficiency, co-ordination, collaboration and repositioning (Figure 9) in the focus-dominance model. The model has been validated and developed in a programme of research (Levy and Powell, 2000, Levy et al., 2001, 2002).

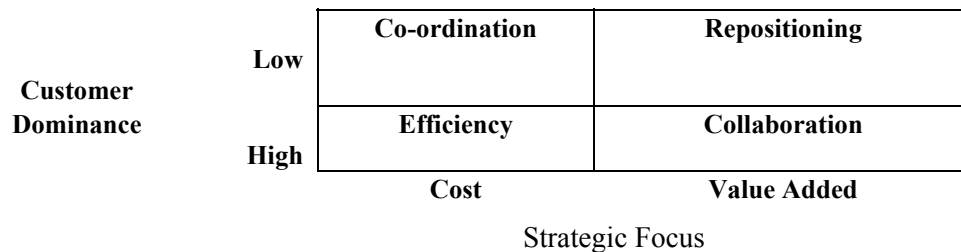


Figure 9. Focus-Dominance model for SMEs

This framework provides a means of analyzing the current role of IS in SMEs within the strategic context of the business.

The focus of IS use in the *efficiency* quadrant is control. IS improve the efficiency of internal processes. The SME may have a simple web site. IS are viewed as a cost.

In the *co-ordination* quadrant the main additional use of IS is to maintain relationships in the larger customer base. Customer databases are used often supported by a LAN. Internet access is common with e-mail exchanged with customers. The objective of IS to improve effectiveness of processes, but the focus is still internal. Again, IS are viewed as a cost, a necessity as manual systems cannot cope as customer numbers increase.

In the *collaboration* quadrant system sophistication increases. SMEs need to exchange information with customers cost efficiently, hence there is more extensive use of e-mail and EDI. Manufacturing SMEs may be part of an Extranet. Often, customers are the driving force behind the introduction of new IS. SMEs begin to see the benefits of better management information particularly when negotiating terms with their customers. IS strategy is reactive to business strategy as SMEs attempt to ensure that some value accrues from having appropriate information when negotiating with major customers

The final quadrant is *repositioning* - the integration of IS with business strategy. Here IS are an integral and tightly woven part of business strategy. Therefore, IS influence business strategy as well as react to it. Strategic benefits only occur when IS is seen as part of business strategy.

This model provides a useful lens through which to consider alignment paths.

4. Method

Case studies are a useful approach to exploratory research such as this as it is possible to pose reflective questions. Additionally, case research is effective when theory is relatively underdeveloped (Eisenhardt 1989). In particular, when the boundaries of the research are not clear, there is a need to investigate the issue within a real life context, drawing on the views of a number of sources (Yin 1994). Multiple cases ensure that common patterns are identified rather than generalized from what might be chance occurrences (Eisenhardt 1989). Interviews are a key feature of successful cases.

This research uses 25 longitudinal case studies undertaken from 1995-2001 on SMEs in the UK West Midlands in order to assess the role of IS. The case firms were not selected by industry, as research suggests that there is little difference in strategic IS adoption between industries (Levy and Powell 2000).

Analysis of the case material is based on Levy and Powell's (2000) approach to the development of organizational information strategies for SMEs. Each case was conducted over one week during which the owner, senior management team and other employees took part in a number of semi-structured interviews of 1-2 hours. History, background, market material and interview outcomes are analyzed. A range of IS models are used to demonstrate the role of IS in each SME. For example, the purpose for which IS/IT is used, whether it is for production, management information or customer support is mapped (Earl 1989). Porter's (1980) 5 forces model is applied to investigate strategic possibilities from IS/IT. Additionally, organizational maps are drawn to identify whether IS contributed to efficiency and effectiveness. Soft Systems Methodology provides a framework for investigating information flow and business process issue. The McKinsey Seven S model is used to identify the relationship between the owners' goals, staff skills and IS use. The interviews identify the history of IS development and also the future potential for IS adoption. Pertinent issues are reported back to participants to provoke further discussion and to refine findings.

5. Data Analysis

The 25 case SMEs use a wide range of IS; of interest here are those that provide management with opportunities to use information strategically. All the SMEs have word processing systems, many have accounting systems, while fewer have more sophisticated systems such as customer databases. Planning and monitoring systems are less prevalent. Customer-focused systems are limited, with some SMEs using the Internet. This data allows allocation of the SMEs within the focus-dominance model (Figure 10).

6. Alignment Paths

The longitudinal case data allows understanding of the alignment paths taken by the case SMEs. Alignment in the cost-focused SMEs is process-driven. In contrast, alignment in value-added-focused SMEs tends to be strategy-driven. Looking at the other axis, low customer dominated SMEs use IS to restructure, highly dominated SMEs cannot do this.

The efficiency quadrant demonstrates a path from management processes to technology adoption (Figure 11). There is no link between IS and strategy. The path in the co-ordination quadrant is management processes to technology with changes in organization structure following (Figure 12). Again, there is no link between IS and strategy. Both the efficiency and co-ordination quadrants reflect a low cost strategic focus with IS purely employed for efficiency improvements. As SMEs grow there may be move from efficiency to co-ordination.

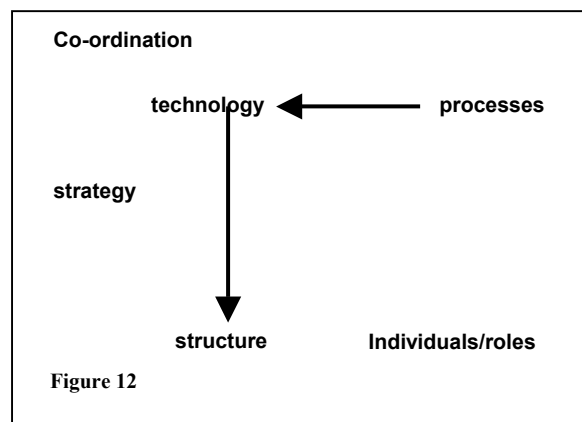
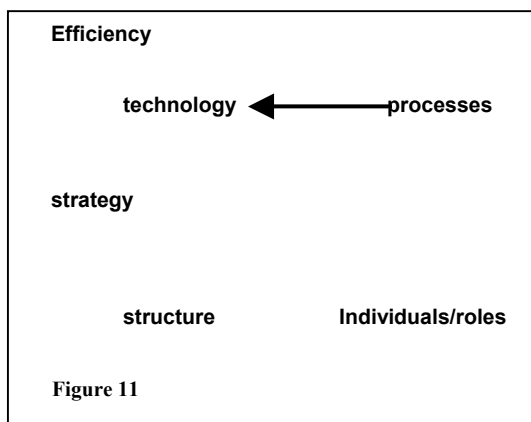
The level of complexity in the configurational fit required in the collaboration quadrant is the same as for co-ordination, but it takes a different form. Here, the critical issue is to respond to the needs of major customers for production and quality control systems including, for example, EDI links and CAD. In this quadrant, the link is not across departments but via strategy. So the fit configuration spans strategy, management processes and technology (Figure 13).

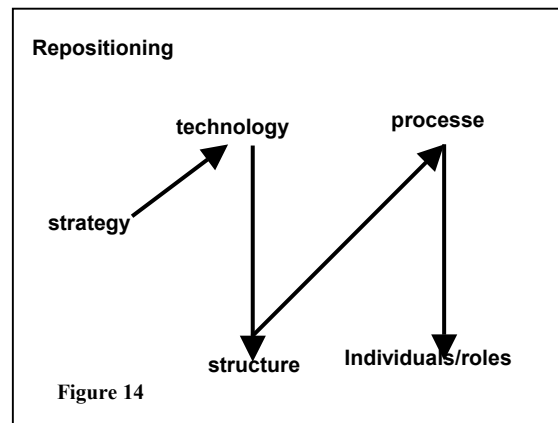
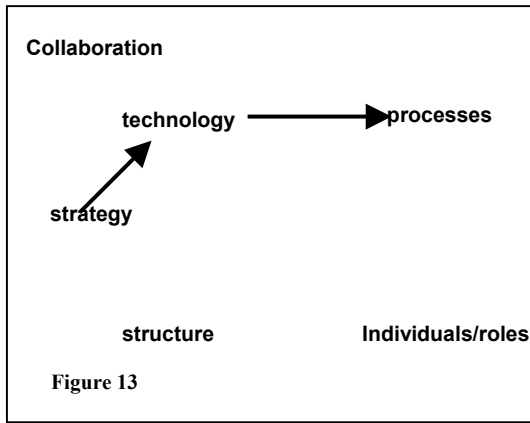
Customer Dominance	Low	<p>Co-ordination</p> <ul style="list-style-type: none"> • University Arts Centre • Regional Travel Services • Warwick Training Brokerage • Seven Stars Printers • Coventry Events Management • Landfill Gas Extraction Co. • Coventry Training Co. • Queensway Photographic Designers • Landrover Repair Co. 	<p style="text-align: right;">Repositioning</p> <ul style="list-style-type: none"> • Model Car Importers • Corporate Gift Co. • Radio Mast Surveyors
	High	<ul style="list-style-type: none"> • Garden Health Care • Tree House Health Care • Car Tubes Co. • Recycling And Training Co. • Chemical Analysis Co. • Bird Designs • Family Solicitors • Electrical Accreditation Institute • Precision Tool Manufacturers • Energy Waste Management Services 	<ul style="list-style-type: none"> • Birmingham Clutches • Stratford Designers • Heath Springs • Solihull Lighting Co. • Car Paint Co.
		Efficiency	Collaboration
		Cost Focus	Value Added
Strategic Focus			

Figure 10. Current Position of Case Firms

Finally, the repositioning quadrant demonstrates the need for all aspects of the MIT90s framework to be integrated to ensure success (Figure 14). The issue of critical importance is the knowledge of the owner about the opportunities from IS and the potential to exploit it.

Both the collaboration and innovation quadrants demonstrate a strategic focus to IS adoption, whether from an external driver, as in the collaboration quadrant, or internally, based on the owners' knowledge, as seen in the innovation quadrant.





The differences are best illustrated by superimposing the focus-dominance classification upon the MIT90s model to highlight how the different SMEs use different elements (Figure 15).

The key now, having mapped the two models together and identified the paths, is to understand why these paths are evident and their consequences. This relates to the issues that affect IS adoption in the SMEs and the strengths and weaknesses therein.

Repositioning

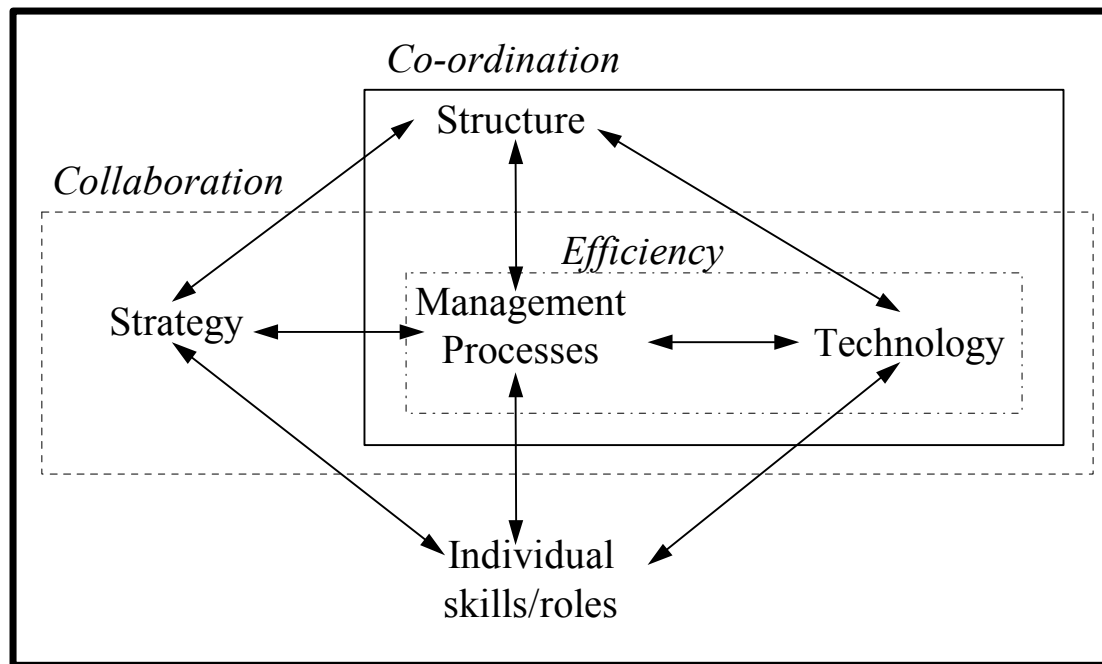


Figure 15. Understanding SME classification through the MIT'90s model

7. Issues Affecting IS Adoption in Case SMEs

The literature suggests that resource constraints, management issues, and owners' attitude to IS and growth are the main drivers of IS adoption. The McKinsey 7S model and Porter's 5 forces model determine if and how these issues effect IS adoption in the case SMEs. This analysis identifies the strengths and weaknesses in each quadrant that enable or inhibit IS use (Figure 16). The efficiency quadrant strengths are improved control through simple IS, while the main weaknesses are the lack of any link to business strategy and the internal and operational focus. However, it is appropriate for some SMEs to use IS in this limited way.

The efficiency quadrant includes a number of SMEs whose owners are not interested in growth. Their objective is to manage the firm such that they can maintain control and enjoy doing what they are good at (Hay and Kamshad).

SMEs in the co-ordination quadrant use IS to improve communication and customer care, leading to improved operational effectiveness. The weaknesses here are limited integration with business strategy, and staff needing better IS skills to work with more complex systems. This quadrant is made up of SMEs whose owners are interested in growth, but are less knowledgeable about IS and see it primarily as a means of improving efficiency in order to keep costs down as customer numbers increase. Again, IS are not seen as important to business strategy.

The collaboration quadrant presents the first opportunity for a value-added focus for IS use. Business strategy is a driver here, although the main weakness is that customers primarily drive strategy. The focus is on external relations with the small group of customers for whom these SMEs provide goods. A potential strength for these SMEs, particularly because of the adoption of performance measurement systems, is that better information may give them some support to limit customer demands for cost reduction. However, a major constraint for these SMEs is the system cost, which may lead to inflexibility, as limited resources inhibit replacement. Investment in the collaboration quadrant does add value to the SMEs. However, it is reactive to the strategy of being a preferred supplier to a major manufacturer.

Segment	Strengths	Weaknesses
Efficiency	<ul style="list-style-type: none"> ○ Control ○ cost reduction ○ simple systems 	<ul style="list-style-type: none"> ○ operational focus ○ internal focus ○ no business strategy link
Co-ordination	<ul style="list-style-type: none"> ○ improved internal communication ○ improved customer care ○ Increased operational effectiveness 	<ul style="list-style-type: none"> ○ Internal focus ○ Limited business strategy integration ○ Improve staff training
Collaboration	<ul style="list-style-type: none"> ○ integration with business strategy ○ improved customer relations ○ external focus ○ ultimately reduces customer power 	<ul style="list-style-type: none"> ○ customers determine IS requirements ○ cost ○ systems flexibility
Repositioning	<ul style="list-style-type: none"> ○ changes/changed by business strategy ○ external focus ○ changes business processes ○ changes employee profile 	<ul style="list-style-type: none"> ○ cost ○ flexibility needed ○ knowledgeable CEO needed

Figure 16. Strengths and Weaknesses of IS Strategies as a Function of Strategic Context

Repositioning demonstrates strengths of integrated IS and business strategy that includes both an internal and external perspective to the business. The owner is aware of IS and the opportunities for changes in business processes. The weaknesses seen here are the potential cost to the business of the IS investment and its relationship to the business requirements, and the need for flexibility in order to manage continual change. The importance of the owners' knowledge of IS coupled with their ability to integrate this with the business strategy is only understood by a few SMEs.

8. Discussion and Conclusions

IS investment in SMEs be seen as either a low cost response to provide efficiency savings, or as a strategic response either driven by necessity or due to innovative owners seeking growth. A major barrier to the use of IS to support innovation is the leadership and technical knowledge of the owner and/or management team.

SME management has insufficient time to spend on future business developments, and management teams have little experience, skills or interest in exploiting technology (Rothwell and Beesley 1988). There is often little attention paid to developing products or services as firms are comfortable with existing market situations. Hence, there is a tendency for SMEs to invest only in the IS necessary to carry out individual activities, particularly those that involve basic administration and transaction processing. Few SMEs have the motivation and/or capacity to introduce the integrated systems needed to support IS-based innovation. Developing these capabilities in top management groups in SMEs is a critical pre-cursor to long term success of a repositioning strategy.

Strategic use of IS is becoming more important in flexible and dynamic markets (Ciborra 1997). Improvisation is a way of responding to this market and the innovative use of resources, such as IT, is critical (Ciborra 1997). However, while SMEs are an innovative sector, their use of IS is relatively inflexible (Levy and Powell 1997). This tends to lead to a fairly traditional view of IS where it is used as a means of support (Yetton and Sauer 1997). For SMEs, the use of IS in cost-focused strategies mainly supports existing management processes with little strategic input. This is a different path from those identified by previous researchers and may reflect the limited strategy of SMEs, particularly those in business for lifestyle reasons. The need to develop new competencies is a driver for change. For many cost-focused SMEs, their market niche may not be under threat and therefore change is unnecessary beyond efficiency improvement. However, the Internet may impact on this as larger firms are enabled to threaten these niches as e-commerce systems make it easier for them to deal directly with customers (Rhodes and Carter 2000). However, Croteau et al (2001) suggest that this type of firm adopts a strategic choice that inhibits the effective use of IS. For efficiency-focused SMEs, as demonstrated by the MIT90s model, technology may support existing management processes, but there is likely to be little influence on strategy, organizational change, or individuals' roles and skills. Mapping co-ordination-focused SMEs to the MIT90s model suggests that the adoption of technology will, in addition to supporting management processes, have some effect on organizational structures as information exchange is improved. Strategy might be influenced to a limited extent, but different skills are not a requirement.

The value-adding strategic focus shows closer similarities to paths that have been identified previously. The difference between collaboration and repositioning may depend on the ability to improvise in varying market situations. The more formal response of the collaboration quadrant is a result of the SMEs close links with major customers. Therefore strategic IS responses are planned top-down. SMEs are locked into relationships that make it unlikely that they will be in a position to, or will need to, develop new competencies. Hence, there is little emphasis in developing individuals' roles and skills. The difference between SMEs and larger firms is that the former are not changing their structure to take advantage of the strategic value from IT. This may be because these SMEs tend to be manufacturers and have fairly defined activities. For collaboration-focused SMEs Yetton and Sauer (1997) suggest that traditional IS planning follows the MIT90s path of strategy, management process change to technology; it ignores culture. For repositioning SMEs, success is only

likely to be assured providing the SME considers changes across all the elements of the MIT90s model.

The development of new competencies as a strategic response is seen in the repositioning quadrant. Owners here appear to fulfill Ciborra's observation of the need to be aware of the dynamic market. New competencies are developed that are enabled by IT thus supporting Craig and Yetton's contention that competing differently requires all aspects of the MIT90s model to be considered.

For growth-minded SMEs the strategic use of IS is important. However, most SMEs start in the efficiency quadrant. Growth may move them to the co-ordination quadrant, but further moves may well depend upon the owner's attitude to change and their knowledge of IS.

Hsiao and Ormerod (1998) identify four archetypes and for each change path there are three major components, a driver, two levers and an impact on the MIT90s elements. They identify two modes planned and emergent. In focus-dominance terms collaboration and repositioning map onto planned modes as both are strategy driven. Efficiency and co-ordination are emergent. However, none of the four quadrants demonstrate the paths suggested by Hsiao and Ormerod. As only one SME path, repositioning, employs all the elements of the MIT90s model, SMEs do not have drivers, levers and impacts. In efficiency there is a driver, processes, that has an impact on technology but the levers are missing. Similarly in co-ordination, the driver is process change and this is leveraged by technology that has an impact on structure. However a second lever is missing, presumably damping down the effects of the technology lever. Again, in collaboration, the single lever is technology driven by a change in strategy affecting processes. Only in repositioning are two levers employed.

The lack of levers may help to explain why SMEs fail to get the benefits expected from IS. Hsiao and Ormerod suggest firms need to manage strategic coherence and synergy relationships. Strategic coherence involves technical and organizational coherence. Technical coherence maintains an appropriate fit between technology and management processes while organizational coherence requires symmetry between structure and people. They further maintain that strategic synergy is achieved through alignment of another two relationships – synergy of internal and external infrastructure. Synergy of internal infrastructure refers to integration of management processes and people while synergy of external infrastructure demands the integration of technology and structure. SMEs, in most instances, are not managing coherence or synergy. This results in either little, or wasted, investment in IS. One of Hsiao and Ormerod implications is that if firms use a planned mode of change they need to bring together the four change elements (technology, structure, people, and processes) under the guidance of business strategy. Here only repositioning firms do this.

This paper has sought to understand how alignment works in SMEs. It identified a number of paths through the elements of the MIT90s model. Using case data and the focus-dominance model as a sensitizing device, four different paths are shown to exist for SMEs. The reasons for, and implications of this were presented.

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