The Dynamics of SME Information Systems

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ABSTRACT. The process by which small firms (SMEs) invest in and gain benefit from information systems (IS) is little understood. This paper analyses two alternative models of IS-based strategic change – the Focus-Dominance model (Levy et al., 2001) and stages of growth models as applied to SMEs. An analysis of the outcomes of IS strategy development undertaken for 43 SMEs maps their IS use over time. The analysis supports the Focus-Dominance model, some parts of the stages of growth model and extends the critique of the latter. Further variances are explained by the entrepreneur/owner's values and experience. One structural variable, namely, the industry sector may also explain the variances. The implications for theory and practice are discussed.

Introduction

Information systems (IS) in large firms provide major opportunities for obtaining added value through exploitation of the information resource. IS are also a major driver of strategic change. There is less evidence of small and medium enterprises (SMEs) investing in information systems to capture similar benefits. While many SMEs have taken a reactive approach to investment in IS/IT, primarily focused on cost (Hagmann and McCahon, 1993), Yetton et al. (1994) describe the adoption of IS by an SME for strategic competitive advantage. More recently, Levy et al. (2001) report that SMEs do in fact align their IS strategy to the strategic context, as defined by the level of customer dominance, to capture both cost advantages and value added benefits.

Levy et al.'s model is one of fit between the business and IS strategies and their data is cross sectional. As such, the analytical framework is essentially comparative statics. Yet, embedded in their model is an implicit dynamic. Levy et al. assume that the initial strategic context of the typical SME is characterised by few customers and a focus on cost, with IS investment supporting a focus on efficiency using spreadsheet and accountancy packages. They then speculate that a successful SME follows one of two trajectories. In one, the customer base increases and the IS strategy changes from a focus on efficiency to one on co-ordination and IS investment in LANs and databases. In the other trajectory, the customer base does not increase significantly but collaboration between the firm and its few major customers improves, supported by IS investments in EDI.

In an earlier paper, Levy et al. (1998) offered two propositions about the dynamics or lack of dynamics concerning IS uses in SMEs. The first is that an embedded stages model for IS use may exist. The second is that many SMEs choose to compete in one market and this tends to ossify their use of IS. Storey (1994) is critical of applying stages models developed for large firms to the behaviour of SMEs. He agrees with Levy et al.'s second contention that many SMEs do not progress from their initial start up market position.

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When they do, Storey argues, growth is a function of the entrepreneur, the firm's industry sector, and structural characteristics such as location, rather than a progression through a series of predetermined stages as a response to emergent crises.

This paper analyses the evidence for the trajectories identified by Levy et al. (2001), examines whether the findings also support Levy et al.'s (1998) earlier contentions, and comments on Storey's (1994) arguments concerning the roles of the entrepreneur and the context. To do this, the paper first reviews the Focus-Dominance model developed by Levy et al. (2001). It then examines the application of the stages of growth model to SMEs and the basis of Storey's (1994) critique. An analysis of the outcomes of IS strategy (ISS) development undertaken for 43 U.K. SMEs follows which provides support for all three analytical frameworks. An integration is proposed and the implications for theory and practice are explored.

Theoretical framework

Focus-dominance model

Levy et al. (2001) develop an analytical framework to investigate the potential for SMEs to realise value from IS capabilities (Figure 1). The framework has two dimensions: strategic focus for IS/IT adoption and customer dominance. The first reflects the two main purposes of IS/IT adoption: cost reduction and adding value. Cost reduction represents the traditional use of IS/IT based on their incremental and reactive adoption (Hashmi and Cuddy, 1990; Blili and Raymond, 1993). Value-adding focuses on the adoption of IS/IT for competitiveness, which has been identified as a possible source of competitive advantage for SMEs (Yetton et al., 1994).

The second dimension, customer dominance, is a key issue for SMEs (Reid and Jacobsen, 1988). While all SMEs have few customers in the start-up phase, those SMEs that become a first tier supplier to a few major customers will always have only a few customers. In contrast, as other SMEs grow market share, their customer base increases and individual customers have less power.

The model identifies four approaches to IS/IT exploitation. The *efficiency* quadrant reflects the position of many start-up firms and those that effectively exploit simple systems to run their businesses efficiently (Naylor and Williams, 1994). These firms usually have basic accounting and word processing systems. The *co-ordination* quadrant recognises the needs of growing firms to manage their increasing customer base, often through the addition of a database. Internal networking of systems may begin here. Both these quadrants are cost-focused and provide SMEs with the facility to manage more efficiently and effectively.

The use of IS/IT to add value to SMEs is seen in the other quadrants. *Collaboration* starts to see the incorporation of emerging technologies, with the introduction of EDI to manage relationships with major customers. While this is mainly driven by customer push, there are benefits to SMEs in planning and managing production as well as developing a more collaborative relationship. The SMEs are closely allied to one or two major customers and focus on a particular business niche.

The *innovation* quadrant represents proactive

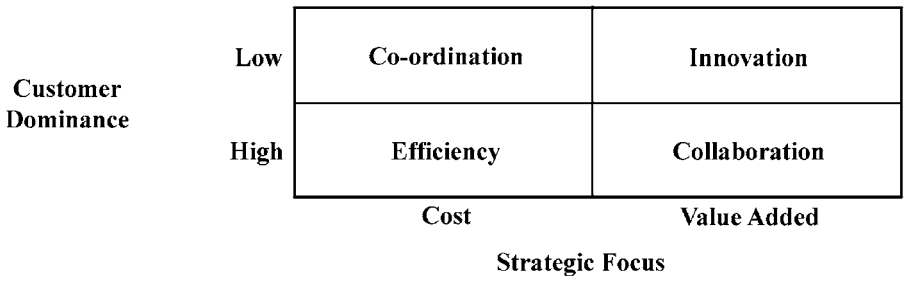


Figure 1. Four competitive scenarios for SMEs (*Source*: Levy et al., 2001).

introduction of IS/IT by SMEs. The owners recognise that the competitive market demands different ways of working and that IS/IT may provide the requisite tools. The Internet is a potential tool to exploit here. These firms contemplate growth and look to invest in IS to drive it.

The Focus-Dominance model explains performance as a function of the fit between the IS strategy and the SME's strategic context. Implicit in this model is that when an SME changes its strategic context – for example, increases its market penetration by expanding its customer base and moving from the *efficiency* to the *co-ordination* cell in Figure 1 – it also changes its IS strategy and develops databases and LANs. Either the business or IS strategy could be the lead initiative, but the end state is a new fit. Levy et al. (2001) present cross-sectional data to show that 23 of 27 SMEs were in fit. Here, that analysis is extended to examine the dynamics of such changes. The analysis looks back at the history of where the SMEs have come from and forward to where they are developing new fit outcomes.

Stages of growth

The concept that firms may develop following predictable, defined paths has been proposed for some time, and has attracted interest from those researching large organisations. Stages of growth models have also been proposed for SMEs. Churchill and Lewis (1983) propose a five-stage model of growth for successful SMEs. Stage I is existence – the owner has a clear business idea and closely manages all processes with a minimum of staff. Investment is made in systems and equipment to carry out operational activities. Stage II is survival – the business focuses on managing operational activities with a simple organisational structure. Funds are used to ensure there is sufficient stock to fulfil orders and replace equipment. The firm may close when the owner retires.

Stage III is defined as success. There are two parts to this stage. Stage IIID is disengagement – the firm is profitable and has a reasonable customer base. There may be some devolution of responsibility from the owner to functional managers and there may be basic management information systems in place. Owners may decide to stay at this stage either because of the scale of their market niche or because they look for a relatively risk-free future. Stage IIIG is growth – the owner has a clear strategy for growth. Investment is made in additional resources including information systems and personnel to support growth. The owner is closely involved in the planning and implementation strategies for growth.

The next stage, Stage IV is designated as take-off. The owner still exercises power, but has functional managers directing planning. Growth is likely to be rapid and cash flow is likely to be an issue as requirements for resources increase. Information systems are used to manage increasing business complexity. Stage V is maturity and represents a move to a corporate style business where ownership and management are distinct. The danger in this stage is that there may be little innovation and change and the firm may ossify.

Churchill and Lewis (1983) identify four firm-related success resources: financial, personnel, systems and business (including customer and supplier relations). A key message is the need to plan for systems ahead of the stage of growth for which they are required. They also identify four owner-related factors: business goals, operational skills, managerial ability and strategic abilities. However, it is not critical for SMEs to use all these skills at all stages. For example, owners' personal skills become less relevant as the firm grows. The importance of financial resources changes with business growth.

Scott and Bruce (1987) develop Churchill and Lewis' (1983) model. They identify six factors that influence growth: top management role, style, structure, product and market research, systems and controls, and sources of finance. They argue that movement to the next stage is occasioned by a crisis and suggest it is unlikely that firms require formal management systems until they reach maturity.

The entrepreneur and the context of the SME

Storey (1994) is critical of stages of growth models being applied to SMEs. He suggests that many firms do not move beyond Stage I. As they have no desire to progress, a stages model, which implies movement to the next stage as the result

of a crisis or other driver, is irrelevant. Instead, Storey proposes that SME growth is achieved by a combination of the characteristics of the entrepreneur, the firm and its context.

Cragg and King (1993) agree with Storey (1994) that the major factor driving growth in SMEs is owner enthusiasm. They investigate change in IS use over four years, revealing that hardware had not been updated by 45%, while others prefer to add to, rather than replace, existing hardware. Little change occurred in IS planning, although end-users were more involved in system selection. Some SMEs made IS/IT investments to improve operational effectiveness. However, any competitive advantage achieved was accidental, not planned. The major factor in increasing investment in IS/IT is owner enthusiasm.

Cragg and Zinatellli (1995) research 18 manufacturing SMEs over 8 years. The majority acquired new computers, although four did not. Most investment was in PCs and directly related to growth in employee numbers. Spreadsheets for management reporting were adopted, although more complex analysis for forward planning was not undertaken. Databases were uncommon and were dependent upon individual users rather than management policy. A lack of trust of external IS sources inhibited IS growth and evolution, as SMEs generally do not have in-house IS skills. Limited financial resources are also cited. Again, it is the interest and enthusiasm of owners that primarily contributes to IS adoption.

Business growth is regarded as important by two groups of owners, those planning to sell the business once it is highly valued and those who plan an enlarged empire (Hay and Kamshad, 1994). In addition, there is a group who are in business for perceived "lifestyle" advantages. This group is not interested in growing and stages of growth models are irrelevant. More non-owner managers regard business growth as important than do owners, and they are prepared to take greater risks to ensure growth than owners but it is also true that they have less at stake. Intensity of competition is the single most influential inhibitor of SME growth. Market uncertainty is high in SMEs as they generally have a small share of the market and are less able to influence price (Storey and Cressy, 1995). A further factor in SME growth is limitations of the management team, either it is too small, too busy, or does not have the requisite skills.

Entrepreneurs who run growing SMEs are likely to be older, better educated, have identified a business opportunity and are likely to have founded the firm with others (Storey, 1994). Younger firms grow faster than old ones and different sectors grow at different rates. Location is important, with accessible rural areas showing greater employment growth. While some firms grow in this manner, other firms only grow as much as is required to achieve either a "minimum efficient scale" or a target income. Hence, Storey suggests it is the relationship between the entrepreneur, the SME's strategy and its context that is important for growth.

In Storey's model, strategy is "action taken by the firm once in business" (Storey, 1994). Market positioning, new product introduction and technological sophistication are the key drivers. Technological sophistication relates to product innovation and does not include management IS. The other two drivers that support growth are a willingness to borrow money to fund it and to devolve decisions to a management team. Both of these reinforce the importance of the owner's attitude towards growth.

A synthesis

An overview of existing research suggests there are a number of consistent criteria important for growth. In terms of the entrepreneur, clear business goals and management experience stand out as essential. As concerns strategy, market positioning, financial resources and devolution of decision-making are important. Unless these are executed effectively they will inhibit growth. Not only must they be executed well individually, they must be aligned with each other. It is the alignment of strategy, market positioning and IS investment that is the basis of the Focus-Dominance model of Levy et al. (2001).

The stages of growth models suggest that there are SMEs for whom the motivation is simply viability. There is little inclination to grow beyond the size required to ensure an acceptable level of profitability. In which case, IS investment is of limited importance. Only beyond this stage is there a requirement for IS systems to control the firm

as devolution begins. However, some firms view this stage as an opportunity to prepare for further growth. These firms start early to invest in IS for the future.

Most of the research reviewed concerns behavioural and strategic issues. However, some of the issues identified by Storey (1994) are structural. That is, the structure of the firm or of the industry or location enables or inhibits growth. Porter (1980) is archetypal of the structuralist school of competitive advantage. He argues that issues such as clustering may determine firm success. Firms that locate in a region where many similar firms are based will gain advantages over firms in remote regions. Similarly, there may be differences in SME success depending on their industrial sector, regardless of clustering. Other potential drivers include the role of IS/IT suppliers and the extent of formal sub-contracting networks to which an SMEs belongs. This paper investigates these issues as well as the behavioural ones pertaining to the owner/manager.

Method

The sample is 43 in-depth case studies of SMEs in the U.K. West Midlands, undertaken between 1995 and 2000. The EU recognises the following categories for SMEs: micro firms with fewer than 10 employees; small firms with 10–99 employees; and medium sized firms with 100–499 employees (Storey, 1994). The number of employees is thought to be a more appropriate measure because of the differences in organisational structures that occur with size (Storey, 1994). Tables I and II show the industry sectors and size of the firms.

This is a convenient rather than a random sample of SMEs. The majority of case firms are small. They are currently analysing their growth options, hence their involvement with university-run business growth programmes. These firms would be expected to exhibit an above-average interest in using IS to manage growth.

All firms on the business growth programme were invited to participate. The mix of firms in the sample is not intentional. There is no attempt to specifically select by industry groups. The focus of the research is on the role of information as a strategic resource, and that this is relevant to all industries. Analysis of the case material is based on Levy et al.'s (1999) work on the transferability of ISS frameworks from large firms to SMEs.

TABLE I
Size of case firms

Firm size	Number
0–9 employees	6
10–99 employees	29
100–499 employees	7

TABLE II
Industry groups of case firms

Industry groups	Number
Manufacturing	11
Wholesale and retail trade	10
Business services	12
Social Services and public administration	9

Each case study was conducted over a one week period during which the owner/managing director, the senior management team and other employees took part in a number of semi-structured interviews each lasting 1–2 hours. History, background, market material and interview outcomes are analysed. IS models are used to identify the role of IS in each SME. For example, the IS strategic grid identifies the way systems are used. 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) five forces model is applied to investigate strategic possibilities from IS/IT. Additionally, organisational maps are drawn to identify whether IS contributed to efficiency and effectiveness.

The interviews identify the history of IS development and also the future potential for IS adoption. This latter issue was discussed with owners in line with the recognition of Cragg and Zinatelli's (1995) findings. The 7S model (Waterman et al., 1991) is used to determine the SMEs' strategy, structure, style, systems, staff, skills and super-ordinate goals. Their strategy is further understood by the use of Ansoff's (1965) matrix to identify if the firm is looking to sell to new markets, develop new products or to diversify.

In order to explore the potential importance of structural issues, the interviewees were asked

about their relationships with IS/IT suppliers, their formal sub-contracting relationships and networks with other firms and the extent to which firms in their industry are clustered or geographically dispersed. In addition, the firms are classified by industry, though the fluid and entrepreneurial nature of some small firms makes discrete classification problematic. Pertinent issues were reported back to participants to provoke further discussion and to refine findings.

Contact has been maintained with the case firms. Further investigations include repeat analyses of the SMEs using the same models; focus groups bringing selections of the owner-managers and other senior staff together to discuss IS and business issues; and regular phone and personal contact. This longitudinal analysis provides a rich dataset of the firms' past, present and intended uses of IS. The lengthy contact period enables the SMEs' plans to come to fruition and outcomes to be studied.

The case study firms are analysed according to their adoption and use of information systems as identified by Levy et al. (2001). This model shows the different types of information system that are found in each quadrant. Figure 2 indicates the different systems used. Levy et al. (2001) establishes these systems as being representative of these quadrants, and it provides a theoretical and empirical justification for this categorisation. This paper attempts further validation as a by-product of examining growth. It is recognised that these IS constitute a wide variety of types. However, these IS are not "compared", they are a manifestation of the SMEs' past, current and future uses and it is unsurprising that firms will use a variety of IT types as they grow.

Analysis

The past and the current state are presented in Figure 3. One element of the case analysis is the identification of future opportunities from IS/IT, some of which have now come to pass. Other opportunities are based on an understanding of the SMEs' future strategic growth plans and their IS requirements. These outcomes were discussed with the firms, enabling mapping of the growth paths for the 43 SMEs over the past five years and the next five years. These are presented in Figure 4.

Levy et al. (2001) argue that the efficiency

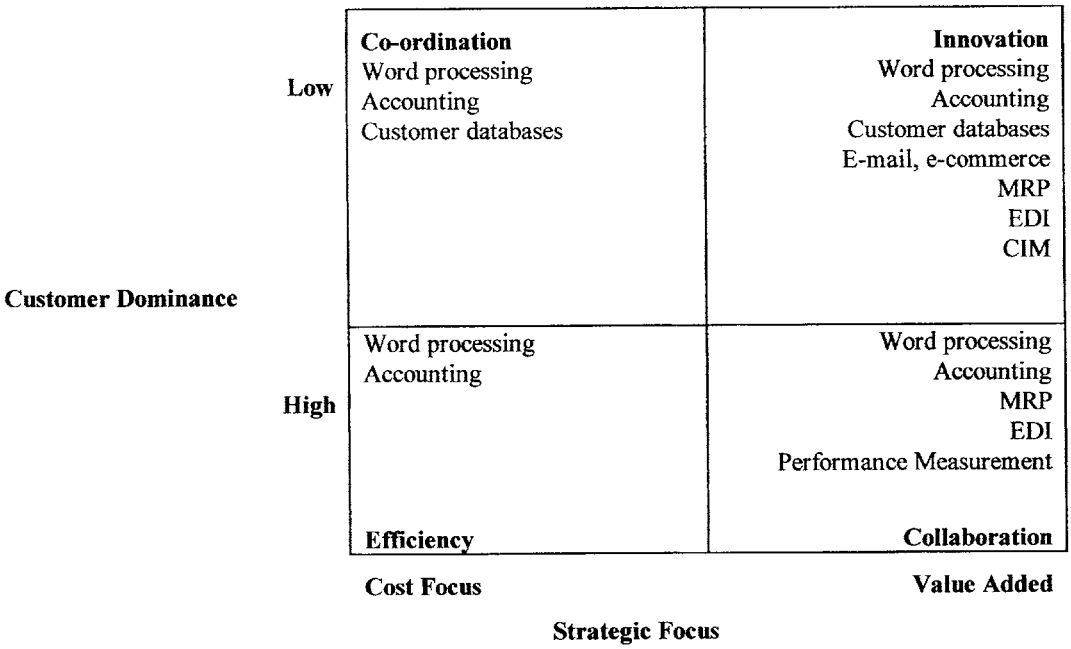


Figure 2. Information Systems Used by SMEs (Adapted from Levy et al., 2001).

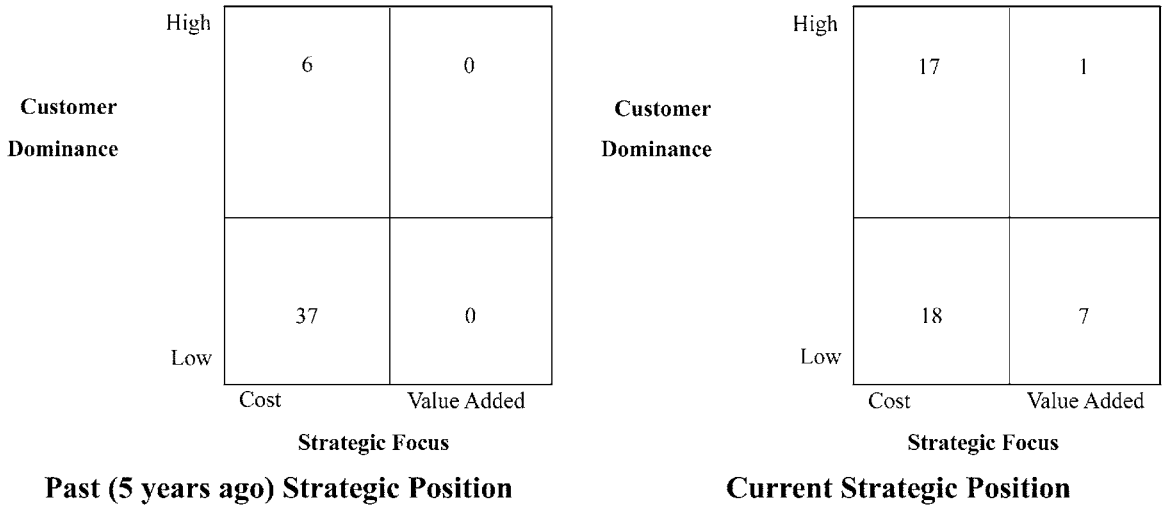


Figure 3. Strategic position.

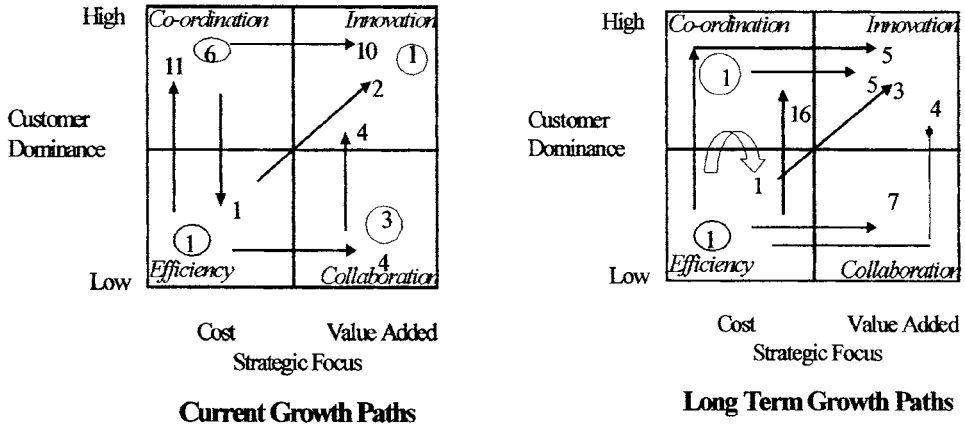


Figure 4. Growth paths.

quadrant represents the starting point for the most SMEs for whom IS/IT provides basic operational level support. Thirty-seven of the cases were located in the *efficiency* cell five years ago (Figure 3). The focus of IS/IT is primarily on cost reduction using IS/IT to improve management processes. There is no link with business strategy, and owners show little awareness of the wider possibilities from IS/IT. Only one SME chooses to stay in this quadrant using simple systems, as suggested by Naylor and Williams (1994).

A set of growth paths emerges from the mapping exercise (Figure 4). The simplest "path" is no change – the SME is content, or unable to move. Other growth paths are vertical, horizontal, or both. The concern here is not only with the start and end point, but with the routes taken. Thus, the innovation quadrant can be reached from the efficiency quadrant directly, or via co-ordination, or via collaboration. The implications of each interim move are considered later in their role as potential stepping-stones to the final destination.

No change. One SME is comfortable remaining in the efficiency quadrant. CROW is a small charity, training people with special needs. For them, IS are for basic administration, and there is no further role for the information resources. There is a constant concern over viability and confusion over strategy. However, the owners do not want to

change. They enjoy controlling the operation and have limited resources. They have word processing and spreadsheets but neither is really used. They are in Stage II of the Churchill and Lewis model and are likely to remain there until the owners close the business.

Efficiency to co-ordination. The largest category is those SMEs moving from the efficiency quadrant to the co-ordination quadrant. These are firms that focus on increasing market share, and need to manage a large number of customers as they grow. Thus, in addition to existing efficiency-focused systems, they develop customer databases and recognise the need to improve internal communications. Local area networks begin to appear. For example, Regional Travel Agents, a travel agency specializing in independent travel, maintains a database to inform clients of holiday opportunities. Owners still look for operational improvement but recognize that IS/IT may enable a change in structure. There are limited links with business strategy in this move. Queensway Photographic Design recognises the need to co-ordinate processing of jobs between departments as critical to survival. Communication is central to their systems requirements. Finally, Landrover Repair Co. have developed a customer database and job costing system to manage both its large customer base and its day-to-day operations more effectively.

Most of these firms are in Stage III-D of the Churchill and Lewis typology. For example, the owner of the Regional Travel Agents has appointed functional managers. There is cash for expansion, but the owners want to keep control and use the business to ensure their financial security. Landrover Repair Co. has gone in a different route using a MIS to refocus management requirements on key personnel. Yet, the aim is to keep control of the firm as a retirement plan. A moderately innovative strategy acknowledges limited resources. The key focus for IS is increasing efficiency and effectiveness. Queensway Photographic Design is a niche firm that employs a management team for day-to-day operation, but is closely managed by the owner. Controlling IS are being implemented for efficiency.

Co-ordination to innovation. These firms are looking for growth, but demonstrate Stage III-G characteristics currently. Stage IV (Take off) is being planned. Biotechnology Products is revisiting its IS to enable them to manage growth more effectively. The owner is closely involved in growth planning and there is an emphasis on hiring effective managers. Henley Coaches is looking at investment in IS to manage future growth. They have invested in a new building with networking capabilities. The owners perceive a future use of the Internet as critical to their business. They are in Stage IIID currently, looking to move to Stage IV.

Efficiency to collaboration. Efficiency to collaboration is a route taken mainly by manufacturing SMEs with one or two major customers. This is often the result of customer-pull. However, it does require a strategic decision by SME owners to make the necessary investments. Collaboration involves the addition of inter-organisational systems, particularly EDI, to communicate with customers. A consequence here is limited systems flexibility caused by SMEs developing systems to support one major customer. Other customers have different systems requirements that may be incompatible.

There is little evidence that the introduction of the inter-organisational systems changes the structure or staff roles. For example, while Heath Springs, a manufacturer of coiled products, receives orders electronically, production planning is carried out manually rather than automatically entered into the MRP system. Garden Health Care, a nursing home, sees the future as developing electronic links with medical practitioners and local pharmacists. This group of firms has a particular market niche that means that they tend to have a small number of major customers. Management looks to maintain and develop the relationships. Growth is sufficient to satisfy customer demands. Hence they are also likely to be in Stage III-D.

Collaboration to innovation. These SMEs have already developed inter-organisational systems. Use of emerging technologies, such as the Internet, to extend and grow markets is seen as a natural growth path. Four SMEs are following this

path. Energy Usage Co. analyses clients' gas and electricity use and provides advice on reducing consumption. They currently receive data electronically from the monopoly transmission supplier, National Grid. This data is analysed using IS/IT. IS/IT will allow them to work with customers fully electronically and they have invested heavily in IS. The interesting issue here is that the owner sees the Internet as a means of maintaining control. This raises questions over the stages model's insistence on devolution of power as important.

Efficiency to innovation. A further path has been identified – moving from efficiency directly to innovation. This is evidenced in two cases. Model Toy Importers act as brokers between manufacturers and designers of models and customers. They recognise IS/IT will change the nature of the business and enable them to be more responsive to customers and are moving to Internet selling of models. Radio Mast Surveyors identify radio mast sites for mobile phone firms. They believe that customers value their ability to receive and act on information sent electronically. The managing director has invested heavily in IS/IT. The innovation here is in investment in a knowledge management system to change business processes. These firms are attempting to move to Stage IV with a brief stay in Stage III-G. Their focus is on the owner maintaining control through the use of e-commerce.

Long term growth paths

Twenty-six of the 43 SMEs have adopted a co-ordination strategy, either as an end state or, for ten cases, as a pathway on the way to innovation as an end state. Few SMEs, only two, are attempting to move directly from the *efficiency* quadrant to the *innovation* quadrant in Figure 1. Eleven SMEs have migrated or are intending to migrate from the *efficiency* to the *collaboration* quadrant with four planning the *innovation* quadrant as their end state. The paper shows below that these eleven are all manufacturers and suppliers to the automotive industry. It would appear that the *efficiency* to *co-ordination* with a further option to migrate to the *innovation* quadrant is the dominant general growth path. The stages of growth model does not distinguish between these different IS developments and alternative SME strategic pathways.

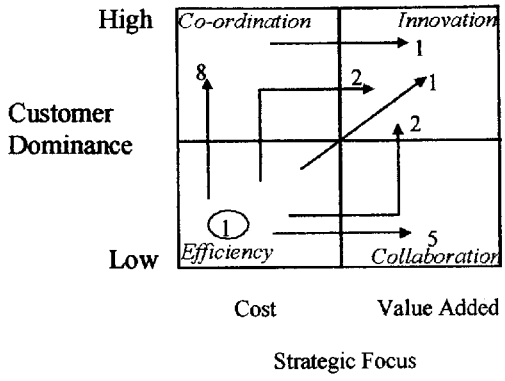
Structural differences

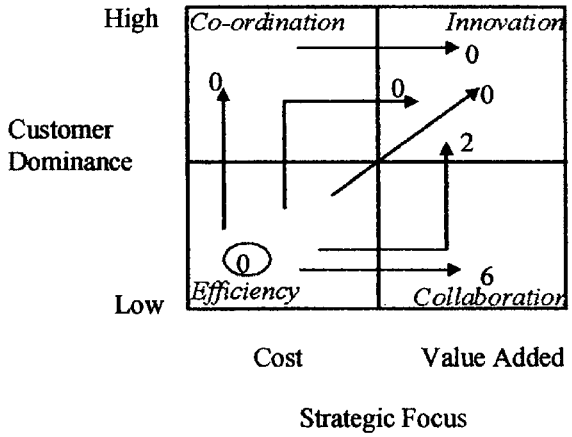
In addition to the factors discussed above, Storey (1994) identifies structural issues including industry groupings, clustering, IS/IT suppliers and sub-contracting networks as critical drivers or inhibitors of growth. This secondary analysis begins by examining the influence of the industry sector on the dynamics of growth. Figure 5 dichotomises the sample into service sector organisations comprising business services, and social and public administration, and manufacturing and retailing. Manufacturing and retailing are combined as many of these SMEs engage in both or share similar characteristics. While the small numbers and many paths through the Focus-Dominance model preclude any formal tests for difference, inspection of the figures reveals that there is little difference between the two sectors.

Industry clusters is a second potential structural driver. Only the small number of manufacturing SMEs that supply the automotive sector may be considered to be located in a cluster. Extracting these from the full sample shows that all the clustered firms collaborate with customers and only two are planning to migrate to the innovation quadrant. Here, it is unclear whether the factor is clustering or being a member of the automotive supply sector. Alternatively, it could be the relationship between the auto assemblers and their suppliers.

Third, strategic intent was assessed by the 7S model and by Ansoff's matrix. Ansoff considers strategies involving staying in the current market (market penetration), selling the same product to new markets (market development), selling new products to the same market (product development), and diversification. Figure 7 shows these four sub-groups for the case SMEs.

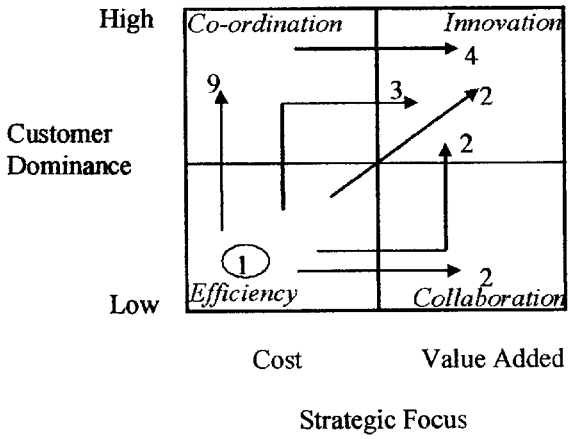
This analysis shows that firms with market penetration as their strategic intent, expect to move from the *efficiency* quadrant to the *co-ordination* quadrant as they expand their market and cope





Service SMEs

Non clustered SMEs



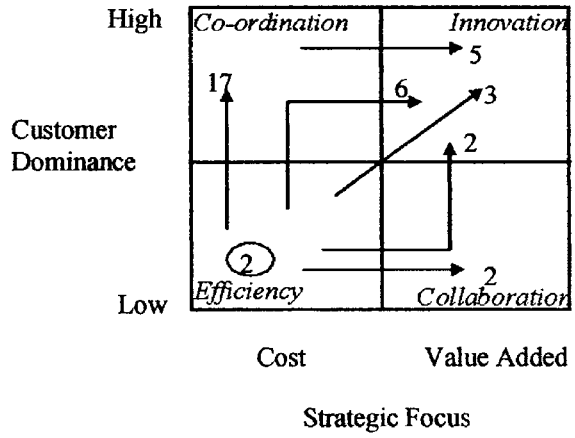


Figure 5. Sector effects on growth paths.

Figure 6. Joint sector and clustering effects on growth paths.

with more, similar customers. A few firms are planning to go on to *innovation*, but the dominant strategy is *co-ordination*. SMEs whose strategic intent is market development become innovators. These firms account for 12 of the 43 subject firms and 7 out of the 17 potential innovators. Conversely, product development as a strategic intent does not appear to be part of an innovation strategy. This is possibly because they are selling into known markets and to known customers who are unlikely to require radical changes. Lastly, diversification as a strategic intent tends to move the firms towards innovation.

Informal network relations, sub-contracting and IS/IT suppliers

Three other structural variables, network relations, sub-contracting and IS/IT suppliers, which are important factors in the growth strategies oflarge firms, are reviewed here. Only three of the case SMEs have informal network relationships with other firms. The SMEs in the *innovation* and *collaboration* cells have formal networks with customers. For example, Warwick Training Brokers has a partnership with a university, and Regional Travel Agents provides conference travel services to another sample firm, Events Management Co. In no case are these relationships

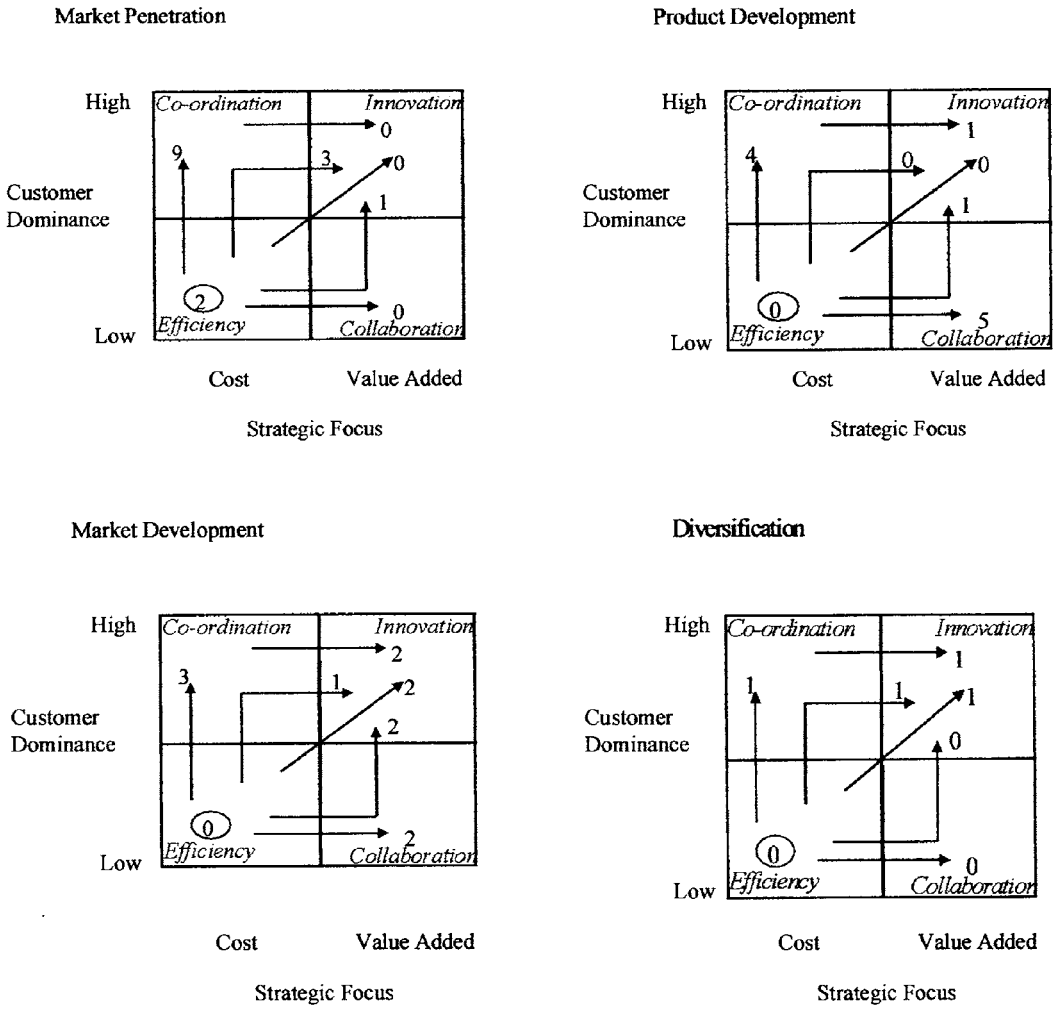


Figure 7. Effects of strategic intent on growth paths.

IS-supported. Similarly, while there are formal supplier relationships, often preferred supplier status involving collaborators, only one other SME in the *innovation* quadrant, Radio Mast Surveyors, is a sub-contractor. This suggests that it is difficult to be both an SME collaborating with a major customer and to pursue an innovation strategy.

Lastly, all the SMEs are serviced by reactive rather than proactive IS/IT suppliers. In some cases, this is in-house or from very small suppliers, mostly involving software packages. Even where the supplier is large, no strategic advice is offered in addition to satisfying the technical requirements. Hence, the role of the IS/IT supplier are not linked to movements within the Focus-Dominance model or changes in the stage of growth.

Discussion

The analysis here shows that many SMEs make one move only, from *efficiency* to *co-ordination*, or from *efficiency* to *collaboration*. These SME owners do not want to lose control and choose to remain in their current markets. This is particularly evident for firms in the *collaboration* quadrant that have a well-defined market niche.

The business strategy is directed at survival, possibly to ensure a retirement fund. There is

some devolution of power, with functional managers employed for day-to-day operations in close liaison with the owner. There is evidence that for this group, Storey (1994) may be correct – there is little relevance to consider a "stages of growth" model for these SMEs. The implications for IS is that they will look for the minimum necessary to improve efficiency and effectiveness, but are unlikely to see the value of IS as a means of growing. As Landrover Repair Co. shows, IS may help reduce overheads.

Only 17 of the 43 case firms wish to move to an innovative use of IS/IT. There are a number of reasons for this. The first concerns the SMEs' stage of development. There are a number of subsidiary processes involved in growth here. A key issue that affects IS/IT investment is the owner's objectives. Strategy development requires thinking about the future and this process may reveal a need for collaboration or co-ordination. It also means that the SME becomes aware of what others are doing by formal or informal environmental scanning – and may become sensitised to "best practice". SMEs that have a well developed and up-to-date business strategy are developing effective management teams that are involved in managing growth.

Examples for which the move to innovation makes business sense include Warwick Training Brokerage that is developing relationships with SE Asia to broker training with U.K. institutions. Stratford Signage Co. designs signs for the automotive sector and has clients that demand fast turnaround, but they are also looking to expand their customer base. They see use of the Internet as satisfying both goals. Corporate Designs, located in a rural business park, designs and manufactures corporate gifts and has geographically dispersed customers and many overseas suppliers. These factors convinced them that innovative use of IS is the only way to grow successfully. Most of these firms show evidence of growth by stages, in both their business and in their use of IS.

A small interesting group is the three SMEs that are moving directly to innovation. The owners see IS as a means of radically changing their business while maintaining close control over strategy and operation. Model Toy Importers do not see the need to expand their staff or change their structure with their current move to a Web-based organisation. Radio Mast Surveyors is using Lotus notes internally to improve knowledge management and the Internet to work more closely with its customer base. The owner is intimately involved with managing these changes. The management team is involved in some operational implementation but has no responsibility for the vision for growth. It is difficult to define a stage model for these, as they appear to bypass the planning for growth stage. In contrast, they do exhibit the key characteristics identified by Storey (1994) for success. The owners are older, well-educated, with some knowledge of the potential of IS. They have clear goals and are experienced managers. They are aware of the need to look at the competitive environment to position themselves to take advantage of it. They are prepared to invest for growth. The only issue is that they may not be as keen on devolving power to a management team.

In terms of the analysis of structural variables, these seem to be dominated by the behavioural ones. IS/IT supplier, informal networks, and industry groupings appear to have no impact on the sample. The effects of industry clusters and sub-contracting are similar. These variables only affect collaborating firms that are manufacturers and suppliers to the automotive industry.

The analysis of strategic intent is interesting. Market penetrators tend to adopt a co-ordination pathway. Six of the SMEs adopting a collaboration pathway also have adopted a product development strategic intent. Market development strategy is not associated with the adoption of particular pathways, while diversification is associated with innovation.

The above findings are subject to one major and one minor validity threat. The former is that the future pathways are strategic intentions that may not be implemented either due to internal or market constraints. In which case, the pathways developed here, while theoretically attractive are not practically feasible. The minor validity threat is that this sample is biased towards those SMEs which intend to grow and that therefore little can be said about those that are either content to stay small or that cannot grow. This may be the case for the majority of SMEs. It is therefore possible to say little about the propensity to adopt a growth strategy by the typical SME.

Implications for theory

The findings reported here support in part all three models of strategic dynamics described at the beginning of this paper, namely the Focus-Dominance model, the stages of growth model and Storey's criticism of the stages model (Storey, 1994), labelled here the entrepreneur and the strategic context. The weakest support is for a stages of growth model. While up to 30 percent of the SMEs are following some kind of a stage model, it does not seem to explain either the enablers or the barriers to change. Furthermore, it is only the transition from Stage II to Stages IIID and IIIG that appear to be relevant. Both the predictive and prescriptive value of the theory applied to these SMEs appears weak.

The Focus-Dominance model does identify important strategic choices, and their IS components, that need to be made if a growth path is to be implemented. An analysis of the role played by IS suppliers suggests that an SME would need to build its own IS capability to support growth. The analysis within Storey's (1994) framework suggests that growth will depend on the owner's values and experience. In particular here, the owner's IS experience is a critical factor underpinning successful growth.

An analysis of industry sectors and strategic intent, as suggested by Storey (1994), identified the tendency for manufacturing suppliers to the automotive industry to follow a collaboration pathway and expand their initial efficiency strategy to include product development. Growth is then limited by the strategic agenda of the major assemblers who focus on capturing cost benefits from their small suppliers. Chatfield and Yetton's (2000) analysis of Honda shows that this is not a dominant strategy for the industry sector but a strategic choice by a major customer.

Implications for management

The messages from this analysis are mixed. First, there is a large group for whom business growth is not an issue. However, these wish to maximise their profitability within the narrow bounds of the current business. Such SMEs are willing to introduce IS to control and manage operational activities. There is a need to review the operational processes with the owner to consider the best form these systems can take. As Levy and Powell (2000) argue, there is a need for some business process change prior to introduction of IS. Yet, there is a dearth of independent advice for SMEs in this position. It might be possible to develop a checklist for them to review their requirements.

Approximately one third of the sample are following a limited stages model of growth and investing cautiously to manage future growth. They are aware of the need to invest in advance of the stage of growth and are introducing IS to manage that growth. The owners recognise IS can change the way they compete, but are seeking incremental investment rather than a major push. For example, Regional Travel Agents has developed a Web page with a booking form, but is not actively encouraging clients to book this way. The owners are reviewing business processes, but they need advice on IS capabilities before they will invest. The Focus-Dominance model suggests both IS investment guidelines and the elements to go on the above checklist.

The third group, those moving to innovation, change perceptions of growth somewhat. Growth does mean more staff to run day-to-day operation, but the owner is closely involved with strategy and decisions on the direction of the business. The owner's knowledge is critical for development of innovative information solutions, but they must match the vision and strategy for growth.

Conclusions

This paper has attempted to shed light on the process by which SMEs invest in, and gain benefit from, information systems as they grow. This paper investigated if an embedded stages model for IS use exists and, for SMEs choosing to compete in one market, if this leads to ossification in their IS use or whether SMEs followed the implicit pathways suggested by Levy et al. (2001). An analysis of the outcomes of IS strategy development undertaken for 43 SMEs provides weak and incomplete support for a stages of growth model. The evidence is stronger for the critique by Storey (1994) of a stages of growth model and of the differential pathways identified by extending Levy et al.'s Focus-Dominance model.

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