Abstract

Information systems strategy (ISS) use is under-developed for, and under-researched in, small and medium sized enterprises (SMEs). This paper reviews existing approaches to ISS for SMEs, finding them now out-dated and technology-focussed. The paper develops an approach that reflects on the role of information as a strategic resource. It argues that ISS recommendations in small firms need to take account of organisational change issues as much as information system implementation. The revised approach to ISS for SMEs is demonstrated through its application to over 40 cases in the UK West Midlands. The influences from the processes on outcomes are discussed and the effectiveness of tools and techniques recommended is assessed. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Information systems strategy; Competitiveness; Small and medium sized enterprises

1. Introduction

The need for, and usefulness of, information systems strategies (ISS) in small and medium sized enterprises (SMEs) has been identified (Blili and Raymond, 1993). Blili and Raymond propose an ISS method for SMEs developed from the then prevailing perspectives on ISS, based on experiences from large firms. They recognise SMEs have characteristics that impact on their ability to develop an ISS, but they do not pursue these. Additionally, they focus on the introduction of information technology into SMEs to create strategic advantage. However, according to Hagmann and McCahon (1993) SMEs do not, for a variety of reasons, develop ISS.

This paper furthers the approach to ISS development for SMEs. The Blili and Raymond
method is advanced in two ways. First, the issues raised by Blili and Raymond that are likely to impact on SMEs development of ISS are analysed and incorporated. An ISS approach from an organisational and cultural perspective is developed as a means of addressing these. Second, the suitability of available analytical tools for ISS in the SME environment is discussed. The method described has been used in over 40 cases in the UK West Midlands to develop ISS for SMEs. Data from these cases are used to demonstrate the strengths of the method and to indicate further refinements that may be made.

This paper first reviews ISS development in SMEs. It then critiques current tools and techniques. The use of corporate ISS models in SMEs is synthesised which leads on to reflection on the nature of ISS. This highlights the need for a multi-paradigm approach to ISS for SMEs. Such an approach is then developed based on theory extension and case research.

2. ISS in SMEs

Blili and Raymond (1993) show that planning information systems (IS) in SMEs becomes more critical as technology becomes more central to the SMEs’ products and processes, and that planning needs to be integrated with business strategy. Yet, few SMEs plan their IS (Hagmann and McAhon, 1993). The limited planning that is undertaken tends to focus on operational systems to improve efficiency and effectiveness, and there is little concern with competitiveness. Premkumar and King (1991) argue that firms should reflect on the role of IS and adjust their IS planning process to match.

One reason for SMEs’ limited view of planning is that most invest in IS incrementally (Hashmi and Cuddy, 1990) usually in response to a specific identified need, particularly to improve basic administration and transaction processing. Naylor and Williams (1994) show that this often results in SMEs using simple IS for ‘more complex procedures than has previously been reported’ and, more importantly, once managers use the information available to consider strategic issues, benefits accrue. Once benefits arise, SMEs are more inclined to invest further in IS. Yetton et al. (1994) demonstrate this in Flower and Samios, a firm of Australian architects, in which the owner realised that survival was dependent upon IS investment. Subsequently, it transpired that IS was central to the future success and growth, and business strategy and IS strategy became intertwined. Indeed, SMEs that plan ahead and manage change are more likely to be successful in managing growth (Churchill and Lewis, 1983). They regard planning for systems ahead of the stage of growth for which they are required as particularly important. Additionally, highly competitive environments are also likely to drive SMEs to change business processes. Investment in IS increases survival rates of SMEs, supporting the contention that IS is vital to SMEs (Agarwal, 1998).

Hence, IS can have value for SMEs, and SMEs need to develop strategies for their IS. The key task for researchers and practitioners is to determine how SMEs may best develop ISS. While the field is under-researched, there is some work that has relevance. This research investigates this and builds upon it. It is vital that the outcome is an ISS development method that is both methodologically rigorous and also, crucially,
operationalisable in the SME context. The research here has two mutually supporting thrusts. The first is theoretical, critiquing existing ISS tools and developing new ones. The second is practical, using case analysis to test and amend the tools.

3. Critiquing current tools

Blili and Raymond (1993) present one of the better-developed frameworks for ISS in SMEs. They argue for a top–down process, as involvement of the SME owner is critical and that a strategic perspective is taken. Their framework comprises:

1. Analysis of external environment (competitive forces, PEST).
2. Analysis of the firm’s current business activities (transaction costs, value chain, business plan).
3. Analysis of current IT in the organisation (projects underway, equipment, staff, expenses, users, software).
4. Analysis of current business opportunities (SWOT, priority areas).
5. Analysis of alternatives (technical, economic, operational and human feasibility).
6. Evaluation and costs (budget forecasts, timetable, control, responsibility).
7. Implementation plan (short and long term).

The approach taken is similar to that used by those researching ISS in large firms who emphasise competitive advantage from information technology. The objective from use of their framework is to identify IT that will provide strategic advantage to the business. The strength of Blili and Raymond’s approach is the recognition of the need for SMEs to use IT as a means of integration within the industry supply chain. In addition to this more strategic objective, they recognise the role of IT in cost minimisation.

Blili and Raymond show that investment in IS is a strategic decision, largely because it involves a heavy financial burden. They argue that existing strategic models are useful in developing the understanding required. Their framework draws on standard corporate models, but their worth to SMEs is not demonstrated. However, Levy et al. (1999) provide evidence for the usefulness of some of these models to SMEs. The most innovative part of the Blili and Raymond model is the inclusion of the use of transaction costs as a means of ensuring value throughout the industry value chain. The justification given for using them is that competitive systems are not merely intra-organisational but depend heavily on industry value chains.

A number of the key differences between SMEs and large companies are believed, by Blili and Raymond, to influence strategic IS. These issues are first, uncertainty regarding IT and competition, where the limited knowledge of owners makes decisions on strategic IS difficult. Second, SMEs may not be able to respond to the introduction of strategic IS due to limited resources, including implementation and training. Finally, SMEs may not identify the potential from IT due to their operational focus. These issues, Blili and Raymond argue, need to be addressed for successful use of IT for competitive advantage.

However, their method fails to capture the ‘softer’, more intangible issues. As stressed below, ISS has been recognised for some time to involve more than IT. There is a need to
consider the role of information as a strategic resource. The implication is that an ISS may need to include organisational change to improve information transmission, but may not always include information technology as its backbone. In addition, information may prove key in enabling competitive advantage by formalising the data exchanged by organisations in the value chain.

A useful starting point for developing a more comprehensive model is to investigate the worth of tools used in larger organisations as these have been validated through use, and to amend and refine these tools to produce an SME-orientated method.

4. Use of corporate ISS models in SMEs

A pilot study of four manufacturers in the UK West Midlands tested the feasibility of transferring the models used to develop ISS in the larger, corporate sector to SMEs (Levy et al., 2000). Earl’s (Earl, 1989) framework of frameworks underpins the study as it brings together a number of well-established approaches to analysing organisations to assist in the development of an ISS. There are three different foci identified by Earl. First, awareness which aims to provide an educative role to indicate the possibilities for IS within the industry. Second, opportunity that enables organisations to evaluate their use of IS relative to others in the industry. Third, positioning which provides an analysis of the quality of IS and management support within the firm.

Levy et al. (1999) conclude that the most relevant models to SMEs are opportunity frameworks (refocusing and scoping) and awareness frameworks (systems analysis and business strategy) (Table 1). The McFarlan and McKenney grid is also useful as a positioning framework. IS stages of growth models, as exemplified by Nolan (1979) and Galliers and Sutherland (1991) are of limited value to SMEs primarily due to the lack

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Opportunity</th>
<th>Positioning</th>
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<tr>
<td>Business strategy frameworks: <em>Exemplar</em>: Porters five forces model</td>
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Table 1
Useful frameworks for ISS for SMEs (source Levy et al., 1999; increase in depth of shading indicates reduction in usefulness of framework)
of an IS department and senior management involvement in IS decisions (Doukidis et al., 1996; Lybereas et al., 1993).

Essentially, the framework of frameworks recognises the need to look outward to the market when considering IS, as well as understanding the existing business strategy. The use of Porter and Millar’s (1985) information intensity matrix and value chain provide a means of considering the value of information to the organisation. The models identified through the study of Levy et al. provide evidence of the applicability of some of the corporate models identified by Blili and Raymond. However, these models and tools do not address the problem raised earlier, of limited organisational resources. The more recent ISS literature may provide tools and techniques that can be adapted to the SME context.

5. Nature of ISS

An ISS defines the IS that an organisation needs to be competitive (Earl, 1996; Galliers, 1991). This can range from systems to improve efficiency and effectiveness — internally focused — to those that lead directly to competitiveness, with an external focus (Earl, 1996; Sinclair, 1986).

Recent literature emphasises that an ISS should be an integral part of business planning (Earl, 1996; Galliers, 1991). Unless this is done it is likely that strategic systems will be developed in a piecemeal manner, neither contributing to strategic vision nor enhancing organisational flexibility to respond to market changes (Avison et al., 1998). Earl (1989) also argues that ISS needs to change in response to the business environment.

ISS need to encompass not only the systems that individual organisations require to compete in the market place, but also about those that provide the means to improve competitiveness along the industry value chain (Porter and Millar, 1985). Relationships with suppliers and customers improve through the exchange of information. Additionally, Kanter (1994) argues that organisations may look for collaborative advantage, and sharing of information and systems is a key part of the openness that is necessary for the development of such collaborative relationships. However, rapid technology change renders it often infeasible for firms to attempt to gain competitive advantage through the introduction of information technology (Feeny and Ives, 1990). Indeed, Feeny and Ives argue that firms should not base their competitive strategy on information technology unless they are confident it is not easily replicated.

While the strategic focus dominated ISS research in the 1980s, an organisational perspective is now evident. ISS need to fit with the predominant organisational culture, hence there is a need to appreciate the underlying ethos and values in developing a suitable ISS (Earl, 1996). Checkland and Holwell (1998) argue that understanding the relationships in an organisation are critical to the adoption of successful IS. Walsham (1993) shows the importance of recognising the difference between the ‘intended’ ISS identified from the business strategy and the ‘realised’ ISS which depends on appreciating organisational issues that inhibit success.

Galliers (1991) sees information as key to the development of ISS. He identifies the need to measure the success of the business strategy and this can only be done through identification of relevant information. This information forms the basis of the ISS. Galliers
and Swan (1997) extend this, suggesting that ISS should ‘place much greater emphasis on informal as well as formal information flows, both within and outside organisational boundaries’.

Thus, while the focus of ISS is on alignment with business strategy, there is also recognition of the need to take account of culture and the role of information. These findings, while derived from research into large organisations, are relevant to SMEs. Crucially, ISS may provide a way to unlock the information available to SMEs and provide them with the means to be more competitive.

6. A multi-paradigm approach to ISS for SMEs

ISS is integral to business strategy, but an approach developed for SMEs needs to take account of their informal approach to business strategy (McKiernan and Morris, 1994). As indicated by Blili and Raymond, SME owners usually have an implicit strategy but it is often not shared with other members of the management team. SMEs tend to be organic with informal management structures built around small management teams (Gupta and Cawthorn, 1996; Naylor and Williams, 1994) and this needs to be reflected in any approach to ISS. Strategic information is usually held informally within that team. This suggests that any ISS approach for SMEs needs to take account of this informality. Therefore, a focus on information requirements is likely to be more appropriate than concentrating on information technology requirements.

SMEs are generally regarded as flexible organisations that can respond quickly to customers’ requirements. However, flexibility does not extend to IS adoption or use (Levy and Powell, 1998). SMEs that adopt IS without considering strategy are unlikely to gain business benefits (Levy et al., 1998), due primarily to the perception of IT as a drain on limited SME resources rather than as an opportunity for growth. Another reason is the failure to recognise the need for changes in organisational and management structures that may be required by IT adoption. Hence, an ISS approach needs to take a more inclusive view of these aspects.

The main thrust of the refined approach is to provide the management with information to enable them to monitor efficiency and effectiveness, and to provide them with insights as to potential competitive advantage from use of IS. However, as discussed, ISS cannot be considered in a vacuum; business strategy and organisational structure need to be an integral part of the process (Galliers, 1991). Organisational issues relate to the roles of individuals and their capacity for change, particularly when faced with the potentially radical change implied by the introduction of IS (Yetton et al., 1994).

Walsham (1993) suggests a means to achieve this and to consider the wider social, cultural and political environment of the organisation may also influence the development of an ISS. He proposes looking at the organisation from various perspectives that add richness to the analysis, leading to more acceptable solutions as ISS, as a process of change that must consider the social context and social process. It is the linkage between the two that ensures an effective solution. The third element Walsham considers is the role of IS in the firm, both organisational and technological. He draws on the work of Pettigrew in
developing this model. Ormerod (1995), too, advocates the use of Pettigrew’s model in ISS development.

Both Earl’s framework of frameworks and Walsham’s social context/social process/content model assist in the development of an ISS for SMEs. The framework of frameworks helps in identifying the technology opportunities that are available to the industry and are applicable to the SME. Walsham’s model provides the organisational understanding essential for the successful adoption of IS through the vision of the owner, the social background of the firm and the industry and the firm’s capacity to change.

These approaches to ISS are developed from different research paradigms. Earl’s work draws on models that come from a positivistic stance, while Walsham is firmly located within an interpretive perspective. The question must be posed as to whether it is possible to use such different methods. Galliers and Swan (1997) suggest that IS research approaches fall into four categories that range from objective to subjective along one axis and unitary to pluralist along the other. They argue that strategic planning has tended to be in the unitary/objective sector. Pluralist/informal approaches are proposed to address the need to understand the wider, possibly, more informal information flows. Critically, Galliers and Swan suggest that the different approaches should not be seen as conflicting, but as providing a means to understand the multi-faceted nature of information requirements in organisations. Mingers (1997) supports this, arguing that complex, multi-dimensional research situations require a ‘blend of methods from different paradigms’. He argues that ‘paradigm incommensurability’ is no longer thought to be quite so firm and there are thought to be some bridges that can be made. This is particularly the case in IS research and Mingers proposes a new paradigm, ‘critical pluralist’ that suggests that multi-paradigm research focuses on three aspects. First, the ‘research content system’ provides the real world situation within the research project. Second, the ‘intellectual resources system’ enables researchers to draw upon the various theories and methods. The third aspect of the approach is the ‘research intervention system’ recognises that researchers’ use and approach to techniques may influence their use. This ‘critical pluralist’ approach is used here to develop ISS for SMEs as it recognises the need to deal with the formality of the competitive environment while recognising the informality of management and organisation within SMEs.

7. A refined model for ISS in SMEs

This section considers the stages of the ISS approach in detail. Section 8 reports on experiences and outcomes of using the framework in the case studies. The activities undertaken when developing the ISS are discussed. Feed-back is sought and made explicit at all stages to review, enhance and monitor recommendations.

The ISS framework (see Fig. 1) adapts Walsham’s (1993) themes for IS strategy. There are three perspectives. First, the business context provides the understanding of the business environment within which the SME operates. This focuses particularly on the market and relationships with customers and suppliers. The owner’s strategy for the business is elicited to aid identification of critical success factors (CSFs). These provide the basis for strategic information requirements. The second perspective is business process. This
focuses on understanding the work processes in the SME to appreciate whether information flows inhibit business activities, and also to identify changes that might be made as a result of the introduction of IS. Additionally, information available to the SME is identified. Finally, the strategic content embodies the vision for change from the owner and the practicality of its introduction given organisational circumstances.

7.1. Business context

There are three main aspects to the first part of the ISS development. First the business strategy and objectives are identified. Second, the business environment of the SME is reviewed. Finally, the competitive environment is assessed.

A key issue for SMEs is their lack of an explicit business strategy but the owners’ objectives are critical to the process of ISS (Blili and Raymond, 1993). Yet, many owners do have an implicit strategy and this can often be elicited (Levy et al., 2000). Boynton and Zmud (1984) offer CSFs as a useful approach to determining whether strategic objectives have been met. Kaplan and Norton (1996) propose the use of the balanced business scorecard as a means of assessing whether a business has considered strategic objectives from customer, financial, organisational and growth perspectives. The CSFs identified using this approach provide a guide whether a business is meeting its objectives.

The business environment is assessed using standard models such as PESTEL for the overall context, while Porter and Millar’s (1985) Information Intensity matrix provides a guide to the importance of information. Strategic opportunities from IS, including emerging technologies, available to the industry in terms of production support (e.g. MRP) management support (e.g. financial analysis) and customer support (e.g. EDI) are useful to clarify this. Competitive forces analysis provides the basis for understanding the pressures on SMEs.

The business environment part of the framework encompasses industry awareness and an understanding of the firm’s competitive position together with the vision of the owner.
7.2. Business process

The three activities in the business process element of the framework are: first, understanding the value-adding processes that contribute to the business. Second, identifying whether the SME has the relevant systems to support both the business objectives and the value-adding processes. Finally, the extant information technology is assessed.

The main issue here is to identify value-adding activities. To enrich understanding of these activities both the organisational environment and the roles of the players involved need to be understood. The value chain identifies the key value-adding activities and the information flows between them. However, as discussed, ISS benefits from organisational fit. Soft systems methodology (SSM) (Checkland, 1981) provides a means of analysing organisational information flows and a comparison with the value chain. This comparison gives the means of appreciating how much of what the organisation does adds value. The SSM analysis identifies issues in the organisation that may need to be resolved for the value-adding activities to be effective. As Checkland and Holwell (1998) indicate, organisational culture may determine the most appropriate IS. The analysis is undertaken through semi-structured interviews with the senior managers and the staff responsible for operations.

The main outcome from this analysis is the key business activities essential to achieving the business objectives. Organisational inhibitors and enablers are identified. The information requirements for the business are also derived from this analysis.

Existing IS needs to be assessed. This may be of more importance than for large organisations as SMEs’ propensity to invest in IS is much lower. If current systems provide the organisation with useful information there may be no need to change them and manual systems may be all that is required. The McFarlan (1984) strategic grid assesses the business value of the SMEs IS. As Earl (1989) argues, organisations should regularly review their IS to see whether they continue to support the business objectives.

Information technology is also a critical part of an ISS (Earl, 1989). However, as Levy and Powell (1997) find, information technology in many SMEs inhibit precisely the flexibility for which SMEs are renowned. Most SMEs expect their information technology to have a longer life than in larger firms, which means that many are locked into systems developed using third generation tools that may be unsupported or, at the very least, incompatible with current industry standards.

7.3. Strategic content

The strategic content stage compares the business strategy requirements with the organisational analysis to generate an understanding of the capacity of the organisation to grow and develop from the use of IS. At this stage MIT’90s model considerations come into play (Scott Morton, 1991). There is a need to balance the ability of the organisation to cope with change with the need to make strategic decisions on the use of IS. The owner’s vision is revisited at this stage to ensure that recommendations fit. The 3D model of IS success (Ballantine et al., 1996) provides a means for considering the ability of the SME to manage the relationships between technical development, deployment within the organisation and delivery of business objectives.
Choice means the determination of systems that the SME really needs (as resources are tight) and their priority. Systems may be organisational or computer-based. The analysis considers the contribution of systems to the business, the likely financial return from the systems and the difficulty of implementation (Ormerod, 1998). Systems are evaluated to ensure that they support achievement of the business strategy or that proposals are integrated into changes in the business strategy. The objective is to develop a set of recommendations that are practical, feasible and realistic in the SME context. The tools used are presented in Fig. 2.

8. Application of the ISS approach to SMEs

Since 1995 ISS have been developed for over 40 SMEs in the UK West Midlands using this approach. This, predominantly manufacturing, region has seen a decline in the past 20 years or so. However, the regional economy is beginning to recover and the focus of this recovery is the SME sector, particularly automotive suppliers. The region has additionally seen a strong growth in other industry sectors and structural funds available from the European Union have helped many firms start, particularly those specialising in IT products. The firms for which an ISS has been developed are a self-selecting group, mainly
being drawn from participants in a university-led Business Growth programme. They are likely to be more innovative and open than typical SMEs.

8.1. Background to the case SMEs

Tables 2 and 3 show the industry sectors and size of firms for which ISS have been developed.

The European community suggests 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). The majority of case firms are small. They are currently in the position of considering their growth potential, hence their involvement with business growth programmes. These firms may have interest in using IS to manage growth.

All firms on the business growth programme were invited to participate. The balance of firms in the sample is not intentional. There is no attempt to specifically select by industry groups. The contention of the ISS model presented here is that the focus of ISS is primarily the role of information as a strategic resource, and that this is relevant to all industries.

8.2. The process

The process was undertaken in three parts as indicated by the SME ISS model defined above. Each organisation has an ISS developed by a small group of analysts under the guidance of the developers of the method. To ensure consistency and to guide the process each group of analysts uses the same set of outline questions. These questions are based on the outcomes from Levy et al. (1999) and the requirements of each of the models identified in the SME ISS model. Each case was conducted over a 1 week period during which the

<table>
<thead>
<tr>
<th>Firm size</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>0–9 employees</td>
<td>6</td>
</tr>
<tr>
<td>10–99 employees</td>
<td>29</td>
</tr>
<tr>
<td>100–499 employees</td>
<td>7</td>
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<table>
<thead>
<tr>
<th>Industry groups</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>11</td>
</tr>
<tr>
<td>Wholesale and retail trade</td>
<td>10</td>
</tr>
<tr>
<td>Business services</td>
<td>12</td>
</tr>
<tr>
<td>Social services and public administration</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 2
Size of case firms

Table 3
Industry groups of case firms
owner-manager, the senior management team and other employees took part in a number of semi-structured interviews each lasting for between 1 and 2 hours.

First, the business context was addressed. The owner-manager and senior management team were interviewed to identify the strategic objectives of the organisation and its competitive position in the market. This information was then analysed using the models identified in the business context section of the model. The analysis was reported back to the participants to provoke further discussion and to ensure that a view, consistent with management understanding, was achieved.

The second stage of the process was to model the current business processes in the organisation. This was achieved through further interviews with managers and operatives. In addition, a review of the current systems and technology was undertaken with staff in the organisation. The models used to analyse this part of the process were those identified in the business process section of the model. A key component of this modelling is the inclusion of social, cultural, organisational and political perspectives, and informal systems. The SSM analysis provides much of the information to assist understanding. This analysis is then reviewed with SME management and staff to check its validity. There is considerable value in being able to relate the organisational and informational flows with the value-adding activities in order to determine the IS that will work in the each SME.

The final stage of the process is identifying the strategic content. This is essentially a process of reviewing the strategic objectives and comparing them with current information provision. The ability of IS and technology to support the objectives is also reviewed. The business processes are assessed to identify whether it is possible to simplify them to enable information to flow more effectively. IS recommendations are made to achieve this, where appropriate. Again, recommendations are fed back to senior management to determine whether they are consistent with their objectives.

The outcome to the businesses is a report outlining recommendations for changes that are based on a detailed analysis of the business using the tools identified in the SME ISS model.

9. Outcomes from the ISS

For many SMEs the process of developing an ISS is, in itself, of value. Most SME owners do not have time for activities outside the day-to-day running of their operation (Hagmann and McCahon, 1993). However, having to articulate issues for the analysts gives owners the opportunity to reflect on their strategies to meet their objectives. Many owners recognise that growth means that they needed to systematise processes as suggested by Churchill and Lewis (1983). The following discussion considers the outcomes that this research has identified in the context of issues that have been identified in the literature. These are, first, the operational focus of planning for IS as identified by Hagmann and McCahon (1993). Second, Blili and Raymond (1993) suggest the use of IT to improve competitiveness is an issue that SMEs should consider. Third, the relationship between the owner and strategy is important for growth (Storey, 1994). Finally, organisational culture may impact on the ISS as indicated by Walsham (1993).
9.1. Operational focus to IS

Fig. 3 shows clearly that the emphasis for IS in SMEs is directed to production operation systems and support for these activities. These could be quite sophisticated, for example, a design firm uses computerised designs linked to printing processes. However, often they are not used effectively. Manufacturers have been encouraged to purchase MRP systems by their customers. Yet, these SMEs have not changed their operational processes to use MRP effectively. Levy and Powell (1997) demonstrate this in the case of a spring manufacturer, Heath Springs. The outcomes of the ISS in this study suggest the vision for IS is firmly directed at improving the operation with limited appreciation of the value of strategic information.

The analysis of the cases also indicates that there is little support for managers to measure the success of their business. For example, while the majority of the SMEs in the study have accounting packages, financial analysis is not carried out. There is no evidence of the wider measures advocated by Kaplan and Norton (1996) to monitor firm performance. For example, few SMEs monitor customer satisfaction formally, review employee satisfaction or consider innovation.

<table>
<thead>
<tr>
<th>Strategic</th>
<th>Turnaround</th>
</tr>
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<tbody>
<tr>
<td>Customer Databases (8)</td>
<td>Word Processing (42)</td>
</tr>
<tr>
<td>EDI (2)</td>
<td>Accounting (21)</td>
</tr>
<tr>
<td>E-Mail (1)</td>
<td></td>
</tr>
<tr>
<td>Order Processing (8)</td>
<td></td>
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<td>CAD (8)</td>
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<td>MRP (3)</td>
<td></td>
</tr>
<tr>
<td>Fund-holding Systems (3)</td>
<td></td>
</tr>
<tr>
<td>Job Tracking (3)</td>
<td></td>
</tr>
<tr>
<td>Job Costing (2)</td>
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<td>Stock Control (1)</td>
<td></td>
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<td>Factory Support</td>
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</table>

Fig. 3. Distribution of IS in case firms using the McFarlan Strategic Grid.

### Table 4
Competitiveness of case firms

<table>
<thead>
<tr>
<th>Competitiveness</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>32</td>
</tr>
<tr>
<td>Medium</td>
<td>1</td>
</tr>
<tr>
<td>Low</td>
<td>9</td>
</tr>
</tbody>
</table>
9.2. Competitiveness

Porter’s (Porter, 1980) five forces model is used to assess competitiveness. The results reflect the perceptions of the owners together with additional research on the industry sector. The outcomes were discussed with the owners. Thirty-two of the SMEs are in highly competitive industries with both local and national competition (see Table 4).

Customer power in the majority of these cases (29) is also high (see Table 5). The pressures from customers tend to be for better quality products and reduced prices.

<table>
<thead>
<tr>
<th>Customer power</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>29</td>
</tr>
<tr>
<td>Medium</td>
<td>3</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
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</table>

Table 5
Customer power in case firms

<table>
<thead>
<tr>
<th>Company</th>
<th>Production Management support</th>
<th>Customer relations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perforated Tubes Co.</td>
<td>Labelling system</td>
<td></td>
</tr>
<tr>
<td>Wooden Pallet Co.</td>
<td>OPERA order processing and production management</td>
<td>Accounting</td>
</tr>
<tr>
<td>Birmingham Clutches</td>
<td>MRP, CAD</td>
<td>EDI</td>
</tr>
</tbody>
</table>

Wholesale and retail trade

| Enamel Jewellery Maker       | Production control and information sales order processing | Accounting |
| Model Car Importers          | Customer database            |                     |
| Bird Designs                 | Accounting (SAGE); Sales order processing | |

Business services

<table>
<thead>
<tr>
<th>Regional Travel Agent Production Systems</th>
<th>Ticket booking customer database</th>
<th>Accounting; work progress monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Mast Surveyors</td>
<td>CAD for plans Photo manipulation software</td>
<td></td>
</tr>
<tr>
<td>Chemical Analysis co.</td>
<td>Report production Laboratory analysis</td>
<td></td>
</tr>
</tbody>
</table>

Social services and public administration

| Wolverhampton Surgery               | Fund-holding system Medical system | E-mail; sales system; finance system Accounting |
| IT Education Charity                | Project planning (needs review)    | Contact database, events database |
| Tree House Health Care              | Nurse call                         | |

Table 6
Examples of current systems in case firms by function
Table 7
Examples of potential systems identified from ISS

<table>
<thead>
<tr>
<th>Company</th>
<th>Production</th>
<th>Management support</th>
<th>Customer relations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perforated Tubes co.</td>
<td>Costing system; stock control; scheduling delivery</td>
<td>Financial monitoring; personnel performance monitoring</td>
<td></td>
</tr>
<tr>
<td>Wooden Pallet co.</td>
<td>Costing system; CAD; part cost database</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birmingham Clutches</td>
<td></td>
<td>Performance measurement; costing system; forecasting; skills database</td>
<td></td>
</tr>
<tr>
<td><strong>Wholesale and retail trade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enamel jewellery maker</td>
<td>Production scheduling; raw material planning; quality tracking; work-in-progress tracking; stock control</td>
<td>Sales costing; Sales forecasting</td>
<td>Market information</td>
</tr>
<tr>
<td>Model car importers</td>
<td>Stock control</td>
<td>Financial controls</td>
<td>Electronic mail; internet</td>
</tr>
<tr>
<td>Bird designs</td>
<td>CAD for design of new products</td>
<td>Performance monitoring</td>
<td>Integrated customer database and helpline</td>
</tr>
<tr>
<td><strong>Business services</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Travel Agent</td>
<td>Accounting; electronic bulletin; tour design</td>
<td>Management reports; performance monitoring; travel information system</td>
<td>Customer feedback system</td>
</tr>
<tr>
<td>Radio Mast Surveyors</td>
<td></td>
<td>Resource planning; project management</td>
<td>Customer contact monitoring</td>
</tr>
<tr>
<td>Chemical Analysis co.</td>
<td>project control; invoicing; inventory control; geological database</td>
<td>Tendering; resource utilisation; forecasting; quality standards</td>
<td>market intelligence; credit control; internet</td>
</tr>
</tbody>
</table>
Table 7 (continued)

<table>
<thead>
<tr>
<th>Company</th>
<th>Production</th>
<th>Management support</th>
<th>Customer relations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social services and public administration</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wolverhampton Surgery</td>
<td></td>
<td>Electronic patient records; room planning (external consultants and services); personnel system to assist better skills knowledge and training recognition</td>
<td>EDI link to FHSA; EDI link to hospitals</td>
</tr>
<tr>
<td>IT Education Charity</td>
<td>Stock management; project tracking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tree House Health Care</td>
<td>Drug administration</td>
<td>Client database; quality/ performance measurement</td>
<td>Competitor/market intelligence</td>
</tr>
</tbody>
</table>
Most of the SMEs are constantly striving to achieve this, although only two (Coventry Designs and Radio Mast Surveyors) see a need to change business processes. This contradicts findings by Reid and Smith (1999). The reasons may be that most of the SMEs have owner-managers who tend to be more risk averse than general managers or empire builders (Hay and Kamshad, 1994).

Most owners do not think of using IS as a competitive weapon, as identified by Ryan and Hepworth (1998). Primarily in the manufacturing cases, customer influence is critical to their approach to IS. In most of the others the response is to work harder at finding new customers and, to a lesser extent, to obtain more business from existing customers.

9.3. Owners

In a minority of cases the vision of the SME owner does extend to using IS as an integral way of running the business (Radio Mast and Coventry Designs). These owners are innovative and knowledgeable about IS potential and are prepared to take risks to achieve the objectives (Hay and Kamshad, 1994). They appear to be planning their systems to manage future growth as suggested by Churchill and Lewis (1983). However, most owners acknowledge their limited knowledge of IS. This often leads to concerns over whether they are being given good advice on IS. Hence there is a reluctance to spend limited resources in an area over which many feel they do not have control.

Most owners focus on management IS that will help them control the operational process rather than grow. Using the Benjamin et al. strategic opportunities framework, as adapted by Earl (1989), Table 6 illustrates the limited management support provided by IS. These examples from the cases indicate that accounting systems provide the main management support.

However, as can be seen in Table 7, the ISS process may elicit a number of other systems that owners believe will help them manage their business better. However, it is interesting to note that these systems are still focused on supporting the effectiveness of the firm rather than competitiveness as identified through customer focus. For example, there is an emphasis on forecasting and sales order processing for many of the SMEs. Financial analysis is also recognised as important for managing future growth.

9.4. Organisation culture

Two models provide insights into organisational and cultural issues. Soft systems methodology provides insights into information flows within SMEs and the way relationships in the firm enhance or inhibit this flow. McKinsey’s Seven-S model is used to analyse the owner’s objectives and the ability of staff to respond to these. The ISS reports almost unanimously highlight organisational changes to improve business processes. Sometimes the changes are critical to survival as financial resources are involved. In the following cases, Burring Engineers, Regional Airport, Coventry Training Co., Family Solicitors, Daventry Surgery, Solihull Surgery, Coventry Events Management, no computerised IS was identified. The recommendations in these cases are to make organisational changes to ensure that existing IS are used better to transmit information through the firm. Owners’ attitudes to controlling their business also have a marked influence on
organisational culture. Those who are prepared to trust their management teams and operatives use IS more effectively than those who try to keep full control.

The style of management in most of the SMEs tends to be very directive, with the owner clearly leading the organisation. The business and social services organisations differ slightly where professional staff have more autonomy, although administrative staff tend to be treated in the more directive way seen in the other case firms. The structure of the SMEs tends to emphasise the management-operative divide. However, in the majority of cases staff are both loyal and flexible in the tasks they undertake. The strength of this approach is that the staff can address many tasks in the organisation. For example, both the garage staff and the administrative staff at the Landrover Repair Co. are encouraged to develop customer relationship skills. The weakness of this flexible attitude can be seen in the Warwick Training Brokerage where all staff answer queries from existing and potential students, but only one or two people enter the information in the computer system, and information is lost through a plethora of informal notes.

Organisational structures and personnel tend to inhibit information flows. SSM rich pictures provided graphic representations of where information blockages occurred. An example of an organisational inhibitor is the Electrical Accreditation Agent where separate systems were set up in individual departments to record accreditation results that were also needed by another department. The information was printed out and sent to the second department who had to re-key the data. An example of personnel inhibiting information flows is in Solihull Lighting, where the operative in the warehouse did not see the value of keying in information about goods leaving the warehouse. Hence, the factory systems showed more finished items than there really were, causing production problems. While other staff were fully committed to the system and relied on it, this individual was not involved in the reasons for needing the information.

9.5. Resources

Limited financial resources are a factor in final recommendations in many of the ISS developed. The social content aspect of the analysis identifies that only the more visionary owners are prepared to commit financial resources to strategic systems. The main objective for managers is to spend available financial resources on supporting management systems that would improve day-to-day operations.

10. Review of the ISS approach

The three-stage process has proved to provide a good framework for a thorough analysis of ISS requirements for SMEs based on feedback from users and SMEs. The main problem for the analysts is the difficulty in separating strategic from operational issues. The nature of SMEs means that the owner is intimately involved with all aspects of the business. The analysts have to unravel the different aspects. It is not uncommon for operational issues to impact upon discussions of business strategy and competitiveness. Models provide some clarity for the analysts. The positivistic or structural models (five forces, value chain) providing clear boundaries can be reflected back easily to the SME to confirm understanding of strategic issues. Most owners had an implicit strategy, and analysts worked
with them to elicit CSFs. Standard models such as PESTEL and SWOT are useful to reflect back issues and understanding to owners. The strategic opportunities framework is particularly useful (see Tables 3 and 4). However, the information intensity matrix is of limited value, merely flagging up the importance of information to the SME, but providing few other insights unavailable from other models.

Business process modelling proves to be more variable. There is more dependence upon the researchers’ understanding of the available tools. Generally SSM is used in a partial manner to understand the problem situation, rich pictures being very informative. The later stages of SSM are used variably depending on the knowledge of the analysts. Value chain analysis is sufficient in many cases to identify systems requirements. In most cases, unlike large corporations, SMEs business processes are directly linked to value-adding activities with few superfluous activities. Thus, the problem becomes one of identifying systems to support existing processes, rather than devising new ones. Additionally, industry sector differences lead to some difficulties with use of tools. This is found particularly in knowledge intensive industries. Resource-based models such as core competences may be more relevant to these organisations (Duhan et al., 2000). The McFarlan–McKenney strategic grid provides some assistance to analysts in recognising the limited role of IS in the SMEs and acts as a means of reflecting on the potential use of systems for business growth.

The use of CSFs, particularly when linked to the balanced business scorecard, is a means of demonstrating the management support systems requirements recommendations and their fit with organisational objectives. The 3D model is also useful as a means of reviewing the links between technical delivery, organisational deployment and strategic delivery to ensure that recommendations are practical and consistent. Ormerod’s approach to determining systems priorities is appropriate and helpful when determining systems priorities. However, it is clear that where the owner is closely involved with the final recommendations and action plan there is greater acceptance of the conclusions.

The SMEs involved in this research have been revisited 6 months and 1 year after the ISS process was carried out. This reveals that the SMEs are using the recommendations from the ISS analysis in various ways. The ISS was used by the general manager of a printing firm to persuade the board that IS investment was required. A reluctant owner decided after 2 years that a networked management information system would free him up to continue the development of his vehicle renovation business. He has now reduced management staff as a result of the system. After two ISS reports a solicitors’ partnership with a potentially fatal level of debtors recognised that organisation change was required. It was clear that their IS were sufficient, but the partners were required to act as debt collectors — a role they found incompatible with their activity as legal advisers. The ISS recommended that debt collection be given to the accounts department and debt level reduced considerably.

The framework is robust, though unsurprisingly, models and tools used to analyse the situation are dependent upon the knowledge and stance of the analyst. There may be other tools that provide greater understanding in knowledge-based organisations. The involvement of the owner in the process enriches the understanding of both the owner and the analyst.
11. Conclusions

This paper developed an approach to ISS in SMEs that builds on earlier work. It has addressed the need for an effective ISS to focus on information and organisational issues, not merely IT. The approach taken is one of ‘critical pluralism’ enabling the adoption of tools and techniques from multiple research paradigms. The ISS approach has been tested in 42 cases. The over-arching framework is supported, although there may be a need to review tools used within each aspect according to the knowledge of the analyst. The flexibility of such an approach suggests that it can be adopted in a wide range of different SMEs.

This research has practical implications for three groups — SME owner-managers, bodies (usually government-funded) that seek to assist SMEs and SME scholars. The practical implications of the ISS process as described for the first group are threefold. First, it provides an opportunity for owners and senior managers to review their strategic direction and to identify their information needs. The owners in many of the SMEs have commented specifically on the value of the opportunity to articulate their strategy and the problems they perceive for their business. Second, business processes that inhibit the flow of information can become embedded in SMEs, as in larger organisations. The process has helped to identify those processes and propose alternatives. Finally, ISs that provide the means of obtaining information to manage the business more effectively and competitively are identified. One of the main conditions in proposing new investment to SMEs is to recognise that they have resource constraints as well as limited expertise in IS. The implications for SME bodies mirror some of those mentioned, but rest primarily on the demonstration that ISS in SMEs can be undertaken and has value when it is undertaken. However, as with most such interventions, they require the active participation of an external analyst — it is unlikely that owner-managers will have the skills or the time and motivation to take on the ISS development task. Finally, this research highlights the paucity of IS research in SMEs and the dangers of assuming that current ISS models are of the ‘one size fits all’ variety. SMEs embody a different set of difficulties in ISS development that renders many ‘large firm’ processes inappropriate. Further research to refine and extend the model presented here would be of value.

References


