



Identifying IT/IS Strategy Profiles in Manufacturing SMEs

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INTRODUCTION

The problem of alignment of business strategy to IT/IS strategy has been widely reported as one of the key concerns currently facing organisations. This alignment or linkage has been defined by (Reich and Benbasat 1999) Reich and Benbasat as “the degree to which the IT mission, objectives and plans support and are supported by the business mission, objectives and plans.” A number of studies focusing on this subject have reported on a range of issues such as the measurement of this linkage (Reich and Benbasat 1999), and the critical success factors involved (Teo and Ang 1999) and (King, Cragg et al. 2000). King et al (2000) (King, Cragg et al. 2000) and Gupta et al (2000) (Gupta, Karimi et al. 1997) report that where business strategy and IT/IS strategy are well aligned, organisational performance is enhanced. Much of this work tends to concentrate on larger organisations, with relatively little work undertaken in the SME community. Notable exceptions include Levy et al’s work (1999, 2001) (Levy, Powell et al. 1999) (Levy and Powell 2000) (Levy, Powell et al. 2001) assessing IT/IS strategy development frameworks within SMEs, and Bergeron’s application of a strategic matrix aiming to identify opportunities for implementing IT/IS for competitive advantage in SMEs (Bergeron and Raymond 1992).

This paper presents some case study research undertaken within five manufacturing SMEs in the north east of England, and describes part of a longer term study examining how SMEs plan IT/IS strategy, and what SME expectations are in terms of business benefits from their IT/IS investments. The empirical results from these case studies when compared with existing literature and strategies reveal the existence of a range of IT/IS strategy approaches in manufacturing SMEs. This is explored and presented via a proposed IT/IS strategy profile framework which is discussed and described using some of the case study examples.

METHODOLOGY

The broad research aim was an in-depth investigation of the issues associated with SME planning of business strategy and IT/IS investment. To achieve this, a qualitative, constructivist methodology was adopted, in line with a grounded theory approach (Strauss and Corbin 1990) (Strauss and Corbin 1998). Semi-structured interviews were conducted with key managers within each organisation to provide a rich organisational picture, and “produce rounded understandings” on the basis of this contextual data (Mason 1996). The interviews were conducted initially in the first three companies over a period of three to four months, with each interview being taped and transcribed for detailed analysis. The focus of the interviews was the company management of IT/IS planning and investment. In particular what the triggers were for IT/IS investments, and how company management identified proposed business benefits resulting from these investments. Each interview lasted for approximately an hour, and the interview data therefore provided as in-depth empirical data, including individual manager’s perceptions of these issues. The resulting transcribed data sets were coded and analysed, using a supporting software, to reveal a number of themes and factors influencing and affecting SME investment in IT/IS (Hillam and Edwards 2000). This coding process was lengthy and was

based upon the iterative process of constant comparison where emergent themes, properties and dimensions of the data were constantly identified and refined (Strauss and Corbin 1998) (Miles, 1994). The discussions outlined below are based largely upon the first three cases, with some reference to cases four and five where data collection and analysis is still ongoing, and based upon the developed theory from the earlier cases.

In addition to this grounded theory approach, the interviews were supported by the use of a questionnaire (adopted from the work done by Conant et al 1990) (Conant, Mokwa et al. 1990) to identify a strategy typology for each organisation according to the Miles and Snow typology (1978) (Miles and Snow 1978). Their work resulted in the identification of the following four strategy types:

- *Defenders* – organisations which have narrow product market domains, and by concentrating on this narrow focus seek to improve the efficiency of their existing operations.
- *Prospectors* – organisations with a strong interest in product or market innovation, who continually search for market opportunities. Such companies are often identified as instigators of change or uncertainty, and as such are not always deemed to be efficient operators.
- *Analysers* – organisations which may be operating in a variety of environments, but who monitor, analyse and respond to new ideas.
- *Reactors* – organisations in which managers observe and react to change and uncertainty, but do not always respond effectively to such change.

Subsequent studies (Parnell and Wright 1993) (Thomas, 1996) (Henderson 1998) have built upon and further validated the Miles and Snow strategy typology concept. The inclusion of the strategy typology tool in this current study was deliberate, in order to provide a baseline for the senior management perspective of each organisation’s strategy typology. Such data could then be appraised against existent literature and case studies according to the strategy types described above. Despite the limitation of selecting only five case studies, it is interesting to note that traits of each of the four strategic types were detected. However the only overall strategy type not to emerge as dominant was reactor.

DISCUSSION

Background information and detail on the case study analysis has been reported in a previous paper (Hillam, Edwards et al. 2002). Table One identifies the individual case study companies, in terms of basic organisational information, a summary of the company IT/IS and the strategy typology determined from the questionnaire.

The following discussion outlines the difficulties facing SMEs in planning and formalising their IT/IS strategies, and justifying IT/IS investments. The IT/IS strategy profile framework that has been developed during the data analysis phase of the work is also illustrated and described. The overview of this strategy profile is illustrated in Table Two, and the following discussion will briefly clarify each of the profile headers as well as providing an overview of some of the company data leading to the identification of these themes. As such some insight is provided to the development of the coding and analysis of the overall study.

Table 1: Overview of case study companies

Co.	Product	Customers	Turnover and no of employees	Management / Ownership	Overview of IT/IS	Strategy Typology
1.	Steel coils and steel blanks	50% supplied to one key automotive customer, 50% to non-automotive sector	£27 million pa 90 empl	Joint financial venture between Japanese company and UK company	Finance and stock system purchased by sister company 8 years ago – most recent IT/IS investments relate to specific, individual PC-based applications: QA system System links to customers EDI links with automotive customer	Analysers with some Prospector and Reactor traits
2.	Industrial fuses	Large customer base of OEMs and wholesalers	£4 million pa 70 empl	Family owned	Recently implemented (Oct 2001) ERP system covering accounts, stock control, MRP and Works Order Processing. Facility for developing web-based marketing. PC based applications (spreadsheets) developed by users	Strong defender traits
3.	Industrial filters	Range of large European OEMs, mostly in the automotive sector	£4 million pa 85 empl	Family owned	Finance, stock control, MRP system purchased and implemented over 8 years ago. PC based applications using Access and Excel Have developed interactive product database for potential customer use – not as yet implemented	Analysers with some defender and prospector traits
4.	Interior automotive components (door panels)	One key automotive customer	£24 million pa 250 empl	Joint financial venture between Japanese company and UK company	Main IT/IS implemented ten years ago. Still in place but currently being reviewed for upgrade or replacement. Number of additional applications covering Quality, production control, customer EDI links – PC based. Additional spreadsheet developments by individual users	Strong defender traits
5.	Soft furnishings, cushions.	Range of 6-8 key UK based retail outlets	£2.4 million pa 45 empl	Family owned	Accounting, stock and MRP system – in place for last five years, not used to full potential, with much of the data input done retrospectively to support the financial, accounting needs. Limited user base, some use of Excel applications. EDI links with major customers.	Strong prospector traits

A FRAMEWORK FOR IDENTIFYING IT/IS STRATEGY PROFILES IN SMES

Strategy Focus

The first four headers illustrated in the profile can be discussed together and are grouped under the broader heading of strategy focus. The Miles and Snow strategy typology results in the identification of one of four types. Whilst these are not linked explicitly to IT/IS strategy, the results of the five cases are interesting when compared with the strategic focus of each organisation's IT/IS investment. The strategic focus of the IT/IS investment in this instance is defined according to Levy (Levy, Powell et al. 2001) as being orientated predominantly towards cost reduction or value added business activities. Detailed analysis of company data revealed that specific IT/IS investments within the same company could have either a value added or cost reducing focus. However in there was evidence to support some linkages between these

two headers. One example of this is Company Two which exhibited strong defender characteristics, largely based upon recent market and customer influences. IT/IS investments within this organisation were mostly based around controlling and improving internal business processes. This contrasted with Companies One and Five which both demonstrated prospector strategy traits, and therefore would be expected to concentrate on developing new market opportunities. Interestingly both organisations have used planned and recent IT/IS investments as part of their sales strategy to develop new and existing business. Both cases cited and reported achieved increased sales figures as justification for the investment.

Ballantine (Ballantine, Levy et al. 1998) observed that SMEs were under increased pressure from customers to adopt IT/IS. Whilst the observed number of cases in this study is too small to make general statements that would support this view or otherwise, there were several interesting examples cited by interviewees. These included examples that suggested that much of the initiative of these investments came from the SMEs themselves rather than the customers. Companies One and Five in particular showed evidence of some innovative business and IT/IS developments, geared towards either further developing a customer partnership, or supporting and developing customer communication links. These included system links for sales forecasting, provision of scheduling information related to customer orders, as well as systems with a rather more speculative objective of targeting new customer business. In both cases, the 'smaller supplier' company took the development and investment initiative.

Customer Dominance

Linked with the strategic focus and typology is the degree of customer dominance. Here this is defined simply in terms of the level of influence that customers exert upon the SME. Again contrasting examples are provided by two of the case study companies. Company Four works exclusively with one customer. In this instance customer dominance is clearly high, resulting in company strategy being focussed upon this one customer's needs and requirements. Company Three however had a wide and varied customer base, with no one customer dominating the overall customer profile. Customer dominance was therefore defined as low for this organisation, it being unlikely that any one customer would be in a strong position to "pressure" the supplier into IT/IS development or investment. Consequently in Company Three, beyond general efficiency issues in managing the customer base, there was little evidence of specific IT/IS development or investment geared towards improving and developing customer partnerships.

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INTEGRATION OF IT/IS APPLICATIONS.

Using a similar case study approach, Levy mapped the IT/IS applications found within the case study companies according to two factors (Levy, Powell et al. 2001). Firstly whether the application is seen predominantly to have an internal (based around internal business processes) or external focus (supporting external business processes with customers or suppliers). The second dimension to Levy's model is the degree of integration. Here the degree of integration would be identified as low where stand alone spreadsheets formed a significant part of the IT/IS in the organisation, and high if the organisation was working with a well integrated ERP system. As in Levy's study, the degree of IT/IS integration also emerged from this investigation as being a significant factor. All five organisations had integrated manufacturing control packages, all used in very varying degrees. Company Two had recently

Table 2: Outline for SME IT/IS Strategy Profile.

Miles and Snow Business Strategy Typology			
Defender	Analysar	Prospector	Reactor
Strategic Focus of IT/IS			
Value-added		Cost reduction	
Customer Dominance			
High		Low	
Focus of IT/IS investment			
External with customer focus		Internal with operational focus	
Control of IT/IS investment costs			
High		Low	
Identification of proposed business benefits from IT/IS investment			
Detailed and formal		Little detail/informal	
IT/IS applications integrated			
Well integrated and centralised		Not well integrated – isolated IT/IS applications	
IT/IS responsibility			
IT/IS manager’s position stable		IT/IS manager/department personnel frequently changes	
IT/IS expertise (IT/IS Manager)			
High		Low	
IT/IS expertise (Users generally)			
High		Low	

(Note that IT/IS expertise here is understood to include both technical and well as application understanding).

implemented an ERP system and this system supported the main business activities, with very little evidence of other applications being used or developed. Companies One, Three and Four all ran integrated systems that had been in place for a long time. Although each company experience was clearly different, the common themes amongst them were that the basic financial and stock modules were used and that the systems in all three companies do support the basic business functions. User and manager perceptions in Companies Three and Four indicated a broad dissatisfaction with the system, and a perceived need to replace the system to improve basic management information such as stock holding accuracy. This was also true of Company One except that recent IT/IS investments geared around stand alone applications, led managers to state that they were reasonably happy with the current IT/IS support and developments, and saw no urgent need to review the company-wide integrated stock system. Company Five owned a little-used integrated manufacturing package inherited from a previous management regime, and was embarking upon a major review and investment in an integrated package to support current needs.

SME MANAGEMENT DECISION MAKING AND INVESTMENT JUSTIFICATION.

The problems of justifying investments in IT/IS are well documented (Ballantine, Levy et al. 1998) (Ballantine and Stray 1998) (Hochstrasser 1992) (Hogbin and Thomas 1994) (Farbey, Land et al. 1993) (Symons 1994). This justification process is clearly a huge problem and needs to be analysed and considered using a systematic approach that takes account of the complexity of IT/IS spend.

Cost was identified by most interviewed as one of the most (if not the most) dominant factors influencing their decision making process when investing in IT/IS. However despite the level of agreement on the need to keep costs down, the interview data analysis showed a number of conflicting patterns of behaviour regarding cost control and level of spend. The following summaries provide examples of these:

- A clear rigorous process for costing IT/IS spend, followed by an informal doubling of this precise costing for budgetary purposes.
- Conflicting evidence of the level of spend for a recent IT/IS, quoted by managers (sometimes the same manager but at different times in the interview schedule) at completely different spending levels. The order of magnitude difference being in the region of over eight times the cost originally quoted.
- Evidence of considerable effort and investment made in an IT/IS development with no proven use or benefit – this perceived by the researcher as a “political development”.

Such patterns of behaviour may seem to fall in line with claims that the resource poverty (Thong and Yap 1995) (Yap, Soh et al. 1992) existing within many SMEs often results in an environment characterised by lack of conscious, strategic planning (Cragg and King 1993). As a result IT/IS investment in SMEs has often been considered to be impulsive and lacking in systematic planning. The research findings from this work indicate that there is a strong need to control costs and spend, but that the resource limitations facing most SMEs may often result in the lack of a formal IT/IS strategy.

As a consequence, it is believed that the further development and application of such a framework will help to formalise within an organisation the strategic focus and may also assist SMEs with the review or identification of potential IT/IS opportunities and their associated business benefits. This led to the inclusion of two further factors in the framework described above – namely company approach to cost control of IT/IS investments, and degree to which proposed business benefits are formalised and recorded.

IT/IS RESPONSIBILITY AND EXPERTISE IN SMES.

Past work by Fink (Fink 1998) in SMEs summarised a number of factors as being significant in facilitating the adoption of IT/IS in SMEs. These include the Managing Director's attitude to IT/IS and knowledge

of IT/IS capability. (King and Teo 1994) (Cragg and King 1993) also suggest that strong technical support and expertise are significant factors in facilitating successful introduction of IT/IS in SMEs. It was therefore interesting to note that all five case study organisations had recently (within the previous two years) taken the decision to establish a level of IT/IS expertise in-house. At its lowest level this provided technical support to deal with the increased level of PC usage, and to provide some basic hardware and networking support. At this level alone the implication of this decision is important because of the associated cost implications to the average SME, essentially raising the level of company investment in IT/IS quite significantly.

Other issues of note were how stable the IT/IS management role had been within each organisation. In Companies One and Two the responsibility for IT/IS had remained with the same manager/department for a lengthy period, with differing results. On one hand a rather more autocratic approach to IT/IS strategy formulation appeared to have been taken, whilst on the other a more consultative approach was employed. With the latter consultative approach it was also evident that communication and understanding of the resulting IT/IS plans was good.

Conversely in Companies Three and Four, responsibility for IT/IS had changed several times in recent years. In both examples the respective management teams claimed that this had not affected IT/IS developments. However the interview data revealed a number of conflicting statements that indicated that these recent changes did have an impact upon IT/IS strategy, and there were a number of "political" issues that emerged from these discussions. This corresponds with the need to balance power between the user and the IT/IS department (McFarlan and McKenney 1983). Although McFarlan's comments are clearly based around larger organisations and data processing departments, the essential points remain relevant – that the balance of power between management and users needs careful management in order to avoid any conflict between innovative IT/IS developments and the need for control. These observations lead to the inclusion of IT/IS responsibility and the stability of this position in the company, and the level of IT/IS expertise in the company, to be identified as an importance element in the IT/IS strategy profile. Company Five at the outset stated that they wished to establish and develop IT/IS expertise on-site to support a major planned investment in IT/IS.

CONCLUSION

The IT/IS strategy profile presented here has been developed from a study undertaken within a small sample of manufacturing SMEs in the north east of England. The framework is intended to support SMEs in formalising their approach to IT/IS planning and investment. Ongoing data collection and analysis is currently being conducted in the final two case study companies to further develop and validate this framework, and the findings from the first stage of the study.

REFERENCES

- Ballantine, J., M. Levy, et al. (1998). "Evaluating information systems in small and medium-sized enterprises: issues and evidence." *European Journal of Information Systems* 7: 241-251.
- Ballantine, J. and S. Stray (1998). "Financial appraisal and the IS/IT investment decision making process." *Journal of Information Technology* 13: 3-14.
- Bergeron, F. and L. Raymond (1992). "Planning of information systems to gain a competitive edge." *Journal of Small Business Management* 30(January): 21-26.
- Conant, J. S., M. P. Mokwa, et al. (1990). "Strategic Types, distinctive marketing competencies and organisational performance: a multiple measures-based study." *Strategic Management Journal* 11: 365-383.
- Cragg, P. B. and M. King (1993). "Small firm computing: motivators and inhibitors." *MIS Quarterly* March: 47-60.
- Farbey, B., F. Land, et al. (1993). *How to assess your IT investment*, Butterworth-Heinemann.
- Fink, D. (1998). "Guidelines for the successful adoption of Information Technology in Small and Medium Enterprises." *International Journal of Information Management* 18(4): 243-253.
- Gupta, Y. P., J. Karimi, et al. (1997). "Alignment of a firm's competitive strategy and Information Technology sophistication: the missing link." *IEEE Transactions on Engineering Management* 44(4): 399-413.
- Henderson, I. (1998). *An analysis of the Latent Typology of Miles and Snow*. British Academy of Management Annual Conference, University of Nottingham.
- Hillam, C. and H. M. Edwards (2000). *Company Approaches to IT/IS Investment and the Resulting Evaluation*. 7th European Conference in Information Technology Evaluation, Trinity College Dublin, Ireland, MCIL.
- Hillam, C., H. M. Edwards, et al. (2002). *The Link Between Company Typology and IT/IS Investment in SMEs: A View from the Trenches*. Ninth European Conference on Information Technology Evaluation, Université Paris-Dauphine, France, MCIL.
- Hochstrasser, B. (1992). *Justifying IT Investments*. Advanced Information Systems: The new Technology in today's business environment, UK.
- Hogbin, G. and D. V. Thomas (1994). *Investing in Information Technology: managing the decision-making process*, McGraw-Hill.
- King, M., P. Cragg, et al. (2000). *IT alignment and organisational performance in small firms*. 8th European Conference on Information Systems.
- King, W. R. and T. S. H. Teo (1994). "Facilitators and inhibitors for the strategic use of information technology." *Information and Management* 27: 71-87.
- Levy, M. and P. Powell (2000). "Information systems strategy for small and medium sized enterprises: an organisational perspective." *Journal of Strategic Information Systems* 9: 63-84.
- Levy, M., P. Powell, et al. (1999). "Assessing Information systems strategy development frameworks in SMEs." *Information and Management* 36: 247-261.
- Levy, M., P. Powell, et al. (2001). "SMEs: aligning IS and the strategic context." *Journal of Information Technology* 16: 133-144.
- Mason, J. (1996). *Qualitative Research*. London, Sage Publications Ltd.
- McFarlan, F. W. and J. L. McKenney (1983). "The information archipelago - governing the new world." *Harvard Business Review* (July - August): 91-99.
- Miles, M. and A. M. Huberman (1994). *Qualitative data analysis*, Sage Publications.
- Miles, R. E. and C. C. Snow (1978). *Organisational strategy, structure and process*, McGraw-Hill.
- Parnell, J. A. and P. Wright (1993). "Generic Strategy and Performance: an Empirical Test of the Miles and Snow Typology." *British Journal of Management* 4: 29-36.
- Reich, B. H. and I. Benbasat (1999). Measuring the Information Systems-Business Strategy relationship. *Strategic Information Systems Management*. R. D. Galliers, D. E. Leidner and B. S. Baker, Butterworth Heinemann: 329-366.
- Strauss, A. and J. Corbin (1990). *Basics of qualitative research: Grounded theory procedures and techniques*, Sage Publications Ltd.
- Strauss, A. L. and J. Corbin (1998). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. London, Sage Publications Ltd.
- Symons, V. J. (1994). Evaluation of Information Systems investment: towards multiple perspectives. *Information Management: the evaluation of information systems investments*. L. Willcocks, Chapman & Hall: 253-268.
- Teo, T. S. and J. S. Ang (1999). "Critical success factors in the alignment of IS plans with business plans." *International Journal of Information Management* 19: 173-185.
- Thomas, A. S. and K. Ramasawamy (1996). "Matching managers to strategy: further tests of the Miles and Snow typology." *British Journal of Management* 7: 247-261.
- Thong, J. Y. L. and C. S. Yap (1995). "CEO characteristics, Organisational Characteristics and Information Technology Adoption in Small Businesses." *Omega International Journal of Management Science* 23(4): 429-442.
- Yap, C. S., C. C. P. Soh, et al. (1992). "Information systems success factors in small businesses." *International Journal of Management Science* 20(5/6): 597-609.

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