MEASURING THE ICT STRATEGY IMPROVEMENTS OF SMEs

DR. VAHID RANGRIZ*

*Economics and Co-operation Department, Mysore University, India.

ABSTRACT

A longitudinal study of eight SMEs was carried out over a two-year period, applying an ICT development scorecard which uses a Likert scale to measure changes during the study period. The paper finds that seven of the eight companies assessed during the period of the study showed improvements in their information and communication technology (ICT) development, with only one company showing negligible improvement. The company that made negligible development went into receivership 9 months after completion of the study. The key limitations were that only eight companies were prepared to contribute completely in the study, and the variety of type of company was large. The scorecard has practical implications in that instead of having to choose complicated ICT planning systems or pay high consultancy charges, SME owner managers can use the scorecard themselves at no cost and make informed decisions on ICT investments. This particular design of scorecard has not been used before, it is original, and will be of use for SME owner managers and ICT practitioners, as it provides an easy-to-use tool to help plan and measure ICT development within SMEs.

KEYWORDS: Continuous improvement, Corporate strategy, information and Communication technology (ICT), Small and medium-sized enterprises (SMEs).

INTRODUCTION

In order for SMEs to contest in this new digital economy they need to exploit ICT to the full. Customers are demanding earlier delivery, in detail the pressure for this is continuous and SMEs are finding themselves more and more reliant on technology as an enabler to improve productivity and distribution times. This in turn requires better supply chain planning, and the aptitude to predict and forecast customer needs reliably (Aggarwall, 2006). Since ICT is now more affordable, the use of ICT in SMEs is on the upsurge, enabling them to increase volumes of product and supply these over large geographic areas (Chacko and Harris, 2006). ICT is being used in a number of areas to benefit SMEs, including use for the growth of new products and services and assisting in managerial decision making. The growth of global competition mentioned earlier is compelling companies to improve their competitiveness and productivity, and research has shown a general focus of ICT on ‘business efficiencies’. The term ICT can have dissimilar meanings to different people, and yet the terms strategic information systems, and strategic information systems planning (SISP) are occasionally used interchangeably (Hagman and McCahon, 1993). Therefore there is little doubt of the growing importance of ICT in SMEs.
LITERATURE REVIEW

Despite the importance of ICT in SMEs shown above, it is a subject that has not been well investigated (King et al., 2000; Premkumar, 2003; Levy and Powell, 2005). In addition to the lack of ICT research in SMEs, management information systems (MIS) also for SMEs have had little investigation as noted by a number of authors including Levy et al. (1999) who point out that most research in SISP has been approved out in where the focus is on large companies and on the development of methods. Asian contributions have tended to distillate on developing frameworks that assist in classifying the position of SISP within the organisational environment and that:

To date, research interest in the role of Information Systems Strategy in SMEs in particular, is astonishingly sparse and underdeveloped (Levy et al., 1999).

This lack of research in MIS/ICT in SMEs has also been identified by numerous others, including Ward et al (2006), Duhan et al. (2005), Ortiz de Guinea et al (2005), Love et al (2005), Kyobe (2004) and Tabor (2004). Despite the lack of research, the work that has been carried out has identified some particular characteristics that distinguish ICT in SMEs compared to large organisations, for example when compared with large organisations, SMEs usually have a simpler structure, and poor human, financial and material resources (Ward et al., 2006). SMEs are clearly quite different to large organisations and this is summarised further in the statement that small firms are not climbed down versions of large firms (Levy and Powell, 2005). Large organisations typically have an ICT department with several ICT staff, while an SME is likely to have no ICT staff. Rather than plan their MIS/ICT, small businesses tend to invest incrementally (Hash and Cuddy, 1990) and when SMEs do plan MIS/ICT is usually just for transaction processing systems (Hagman and McCahon, 1993). Without people or a person to take on the responsibility for MIS/ICT, there is not this opportunity to decentralise the function, resulting in MIS/ICT choices in SMEs being typically reactive (Burns, 2001). With the lack of ICT planning competence, a means of at least ‘estimating’ ICT improvements in SMEs would go some way to helping their dilemma.

CONSTRUCTION OF A SCORECARD TO MEASURE ICT DEVELOPMENT IN SMEs

The first step in the construction of the dimension system was the identification of ‘what’ ICT should be measured, i.e. what are the particular ICT opportunities that SMEs could use. A number of investigators have highlighted popular ICT opportunities with SMEs and the author has combined these with those from personal case study experience (Williams and Rowlands, 2007). Some authors have recognised basic ICT that can be used by SMEs, e.g. word processing and automated production systems (Levy et al., 1999). In addition, databases have been recognised as used by SMEs to provide management support (Naylor and Williams, 1994).
In instruction to measure the developments in any ICT opportunity in an SME, a Likert scale was used to give a semi-quantitative measure of the level of ICT growth. The Likert scales were assembled to appropriate three levels of ICT growth i.e. a low level, a medium level, and a high level. The levels were based on making valuations of the levels of development of hardware, software, staff skills and support as follows:

- For the high level, an evaluation of the hardware and software was made based on how recent the skill was, i.e. if two-thirds or more was recent knowledge and approximately two-thirds or more of the operate had conventional ICT training then the ICT growth was measured above average and a score of between 7 and 10 was given.

- For the medium level, where the assessment of hardware and software showed it to be approximately two to three years old and only one-to two-thirds of the operate had conventional ICT training, then the ICT growth was considered to be average and would receive a score of between 4 and 6.

- For the low level, where the assessment of hardware and software showed it to be over three years old and less than one third of the operate had conventional ICT training, then the ICT growth would be considered below average, and receive a score of between 1 and 3.

METHODOLOGY

Eight companies agreed to contribute in the study, and since all the companies designated that they would need to budget for ICT improvements, it was agreed to take the scorecard capacities at three points i.e. an initial scorecard measurement at the start, a second scorecard measurement a year later (when funds may have been budgeted and allocated to ICT), and a final scorecard measurement a year later (to see if ICT development was continuing or not). The eight case studies used comprise the following:

1. A healthcare charity – providing palliative care (pain relieving treatments, etc.) to the terminally-ill, e.g. cancer patients. The charity employs nursing staff, who are talented to treat patients in their own homes, allowing them to see out their remaining days in an environment that is far less ‘clinical’ than if they were with other patients on a hospital ward.

2. A manufacturer of park homes – for use as retirement homes, holiday homes and alternatives to traditional brick houses. This company manufactures the complete park home from ground up, with a substantial range of choices for the customers, they can even assistance find a site to place the completed home on and arrange final delivery to that site.

3. A manufacturer of men’s neckties – supplying the India retail main chains such as Marks & Spencer, Debenhams, etc. Founded over 100 years ago the company makes ranges from the low cost end to the luxury brands and a lot of the work is still
approved out by hand. The company is looking to add some other speciality lines to shape its range, e.g. waistcoats.

4. A solicitor’s practice – which is divided between three separate offices in order to serve three towns. Each practice has between four and five solicitors and between them all professional areas are enclosed including marital law, consumer law, etc.

5. A timber frame building manufacturer – the company carries out a wide range of projects and has built custom design houses for individuals through to a complete school. All stages are covered from initial design stipulations through production and onsite assembly.

6. An educational charity – providing occupational training with varied subjects allowing people to study a wide range of topics from pottery to art.

7. A specialist food manufacturer – the company is motionless run by the original family that set it up as a manufacturer of goat’s cheese. Nowadays the crops are cheeses of various types that are sold to the leading supermarket chains. A supplier of basic skills training, particularly numeracy and literacy, for adults who have had trouble in gaining service. There are large numbers of grown-ups who for one reason or another had very little schooling, and this company is bridging this educational needs gap.

8. A provider of basic skills training – for adults who did not complete their school education and need basic skills development, including numeracy and literacy.

The company provides actual applied help and advice, and where possible gives tuition on a one to one basis as the needs of each person can vary considerably.

**DATA COLLECTION**

The procedure required that data be collected by the managers responsible for the dissimilar aspects of the company’s value chain. A detailed debate between the author and the managers for each company ensured that they fully understood the procedure for data collection. In each case, this require the managing director and finance director to collect data for substructure, HRM and obtaining, while the processes director and sales director collected data for inbound/outbound logistics, operations, sales and service. Using the Likert scale described earlier with the scorecard, a value was allocated for each ICT opportunity in each individual element of the value chain, thus enabling an indication of where ICT was industrialised and to what level and also where there was little or no ICT development.

This gave three scorecards in total, and allowed an opportunity to consider three particular aspects:
1. To see how much, if any, each company industrialised their ICT from the initial base score.

2. To consider if any one ICT opportunity lead the way in terms of overall increased use during the two years.

3. To consider if any one element of the value chain showed more ICT development than any other.

INDIVIDUAL AND GROUP FINDINGS

Each case study findings are summarised individually, followed by a collective discussion and analysis of the findings as a group:

- **Company one.** It was felt that since company one was an aid, that the ICT growth would be low, and stay low due to limited funding, but it turned out that this was not the case. Some of the enhancements include the setting up of a server and network, which enabled e-mail, and centralised databases, with the nurses being issued with laptops and given remote access to pick up e-mail, contact medical specialists, etc.

- **Company two.** The owners of this company had already identified a lack of ICT development in the operations area, which was attributed to the lack of trust of ICT by the production manager. This showed to be of assistance to the owners in undoubted the production manager to move with the times, as operations was now clearly standing out as one of the weak areas of the business.

- **Company three.** While this company did appear to have a sensible level of ICT growth at the start, the owners were keen to make ICT valuations, to determine where they could make further improvements. Improvements included new hardware, new operations software and operate training.

- **Company four.** Of the eight companies that participated in the study, it is company four that made the biggest ICT improvements over the two years. This company was a legal practice, with three regional offices and several attorneys working in each. Even though it was an SME, it was relatively old (over 100 years), and conquered by paper procedures and systems, with an occasional personal computer in one of the younger lawyers office. There was substantial commitment by the partners to bring the business up to date, and budget distribution for ICT in major changes, including setting up a server, internal network, e-mail, customer databases etc.

- **Company five.** The company is a manufacturer of timber enclosed buildings. While they were not able to make much development in year one (as with most of the
others) it was during year two that the owners were able to announce funds for ICT development. Particular improvements showed up for hardware and operate training, which occurred due to the replacement of several pc’s and the addition of a new server.

- Company six. As with company one, this organisation is an aid, and therefore has to rely on donations and government grants in order to survive. Allowing a number of ICT improvements to be made, including operate training, e-mail and web development.

- Company seven. This food manufacturer was possessed by one family, and they wanted to make developments in ICT. Their interest resulted in funds being owed for new hardware, operate training, and the recruitment of an in-house ‘ICT staff member’ to facilitate database development and become an onsite knowledge resource.

- Company eight. This company was a training provider, with courses to help adults who had missed out on a good high school education. The dependence on administration grants made finances very limited, and as a result there was very little ICT improvement made.

When likened across the eight companies, there is substantial variation in their scorecards, and this is also the case when considering each company’s initial scorecard with its final scorecard. This can be illustrated well by likening the company with the highest improvements in their scorecard (company four) with the company with the lowest improvements (company eight). These are shown as diagrams for comparison in Figures 1 and 2 as the initial and final scorecards for company four, and Figures 3 and 4 as the initial and final scorecards for company eight.
FIGURE 1: COMPANY FOUR INITIAL SCORECARD CHART
FIGURE 2: COMPANY FOUR YEAR TWO SCORECARD CHART

FIGURE 3: COMPANY EIGHT INITIAL SCORECARD CHART
The marked development in scorecard measurements for company four is clearly exemplified when comparing its initial score with its final score – Figures 1 and 2. In contrast to the marked improvements in company four above, company eight shows little improvement as exemplified when comparing company eight initial scorecard chart in Figure 3 with the final chart in Figure 4.

IMPROVEMENTS OF INDIVIDUAL ICT OPPORTUNITIES

For the individual ICT opportunities, the first baseline capacities presented that the ‘Support’ of ICT is in the number one location, followed by ‘Word-processing’ in second place and ‘Hardware’ in third place. This suggests the initial emphasis for ICT is on good support facilities (Figure 5).
The top three were ‘ICT support’, ‘Word-processing’ and ‘Hardware’ i.e. no position alteration to the ‘initial’ scores. The positions changed, with ‘Hardware’ in the lead, followed by ‘ICT Support’ and ‘E-mail’ at position three (Figure 6).
In difference, the bottom three continue nearly unchanged with video conferencing and e-commerce in the same spot, but DTP is now also in the bottom three. Founded on these findings, no general management of a solitary ICT opportunity can be allocated.

COMPARISON OF OVERALL ICT IMPROVEMENTS FOR THE EIGHT COMPANIES

The data from all the scorecards were planned to give a chart showing the percentage increase for each company for year one and year two. This is shown in Figure 7.

![Figure 7: Chart of Percentage Improvements in ICT Opportunities for All Case Studies](image-url)

The chart in Figure 7 shows a substantial variation in improvements from the baseline scores. When comparing the baseline to year one improvements, the lowest improvement is company eight at only 2 per cent, while company one is the highest at 120 per cent. When the year two figures are likened, company eight still shows the lowest improvements, with 14 per cent improvement over the baseline score and 13 per cent improvement over year one. The highest improvements are with company four, with 479 per cent improvement over the baseline score and 419 per cent improvement over year one. The baseline scores analysis designates simply that the level of ICT development is further advanced in some company studies and less in others, whereas the subsequent scores
indicate the level of improvement by individual company’s against their own baseline. The lack of development in most of the companies (except company one) during year one is clarified by the fact that at the start of the study the companies did not have an ICT budget, and then had to wait until year two to assign funds and make an ICT growth spend. Company one, which is a charity, was fortunate to have some funds donated that were allocated to ICT. Only company eight failed to make an ICT investment, and this is imitated in its low scores at year one and two.

**IMPROVEMENTS OF ICT IN INDIVIDUAL VALUE CHAIN ELEMENTS**

For the value chain rudiments initial scores, the top three were ‘Service’ followed by ‘Infrastructure’ and ‘Procurement’. In difference, the lowermost three were ‘R&D’, ‘HRM’ and ‘Operations’. These figures appear to indicate that Service is using the most ICT (Figure 8).
FIGURE 8: CHART OF INITIAL ICT DEVELOPMENT TOTALS FOR VALUE CHAIN ELEMENTS

The top score is again for ‘Service’, but now ‘Sales and marketing’ take second position, followed by ‘Infrastructure’. The lowest scores locations are unaffected with ‘R&D’, ‘HRM’ and ‘Operations’ at the bottom. Though, the top score is ‘Infrastructure’, followed by ‘Sales and marketing’ and ‘Service’ is currently in third place. The lowest locations are motionless R&D, HRM and operations (Figure 9). Based on these findings there is no clear foremost value chain element.

FIGURE 9: CHART OF YEAR TWO ICT DEVELOPMENT TOTALS FOR VALUE CHAIN ELEMENTS

DISCUSSION AND CONCLUSIONS

There is a need not only for small business to use ICT to help their business survive, but if they are to gauge their success in ICT then some means of measuring ICT development is desirable. This paper has shown the development of an ICT opportunities list, to help identify which ICT aspects of SMEs should be measured. In addition, a
scorecard to make semi quantitative measures of ICT development was constructed by plotting the ICT opportunities list against a value chain model. The results presented that there was substantial variation in the scorecards for the eight companies. For the initial scorecards, this simply proposes that the companies were at dissimilar levels in their acceptance of ICT, and this is to be expected (the companies come from a wide diversity of business and industry) (Figure 10). This finding is reinforced when we see that some of the companies used a lot of paper-based systems and consequently had corresponding low initial scorecard figures (Figure 10).

![Figure 10: ICT Development Initial Scores vs. Year One and Year Two for All Cases](image)

In contrast, case three had much higher figures, and this was the result of them having most of their systems ICT based. Not only was there variation in the initial scorecards, but there was also variation in ICT development over the two-year period. The variations were explained by the fact that seven of the companies did not have an economical to recover ICT, which resulted in little change between the initial scorecard measurement and measurements. The exclusion was company one, which was a charity organisation, who received a donation for processor systems. This is tinted clearly in Figure 7, which shows their actual year one improvement of 120 per cent over their initial scores. While company one showed the best improvement in year one, it was company four that showed the biggest percentage improvement by the end of year two, with an improvement of 479 per cent over its start point (Figure 7). This was clarified by the dependence on paper-based systems giving it a low score initially, but good ICT investment in year two.
augmented the scorecard figures significantly (Figure 7). General, it is consequently company four that made the most significant improvements, while company eight made the lowest improvements. Only in this case study (company eight) did the company fail to make any real progress in their ICT, and this company went into receivership one year after the study was completed, while all the rest continue to do business. With regard to the individual ICT opportunities and value chain rudiments it was hoped that a clear leader would emerge for a particular ICT opportunity and value chain component, but this was not so for the companies in this study.

Further study using SMEs in similar industries and/or at a similar level of ICT development may help to clarify these possibilities. The scorecard can be used not only by SME owner/managers, but also by ICT practitioners as both stand to benefit. The scorecard helps SMEs in a number of ways, e.g. to the SME having an easy to use tool will help them decide where the focus of their ICT development should occur. SMEs typically have limited cash, human resources and time, and the scorecard contributes to easing the situation of all three of these elements. The scorecard also will save money because an SME owner/manager can use the scorecard without having to buy in luxurious ICT consulting advice, and the analysis from the scorecard means they can capitalise only in ICT that the scorecard has shown to be lacking. The scorecard does not need a team of people to implement it, it can be carried out by one person, so does not add to the burden of a limited number of operate present in SMEs. Application of the scorecard is a comparatively easy task, only requiring the manager/practitioner to make a valuation of a score for each of the ICT opportunities in each value chain element using the Likert scoring system detailed earlier in the paper. A score falling into the ‘high band’ suggests that ICT development for that particular ICT opportunity/value chain element is above average, with no immediate need for improvement. A score at the opposite end i.e. in the ‘low band’ suggests that ICT development for that particular ICT opportunity/value chain element is in need of review with two possible outcomes:

1. The score is low because the particular ICT opportunity/value chain element is underdeveloped and needs investment.

2. The score is low because development is not suitable or valuable for the value chain element/type of business concerned.

A score falling in the ‘middle band’ suggests a essential for review ‘after’ the ‘low band’ scores have been dealt with first, this way safeguards that a logical priority for growth is followed. As a work investigating ICT in SMEs this paper contributes and is complimentary to the work of others including Ward et al. (2006), Duhan et al. (2005), Love et al. (2005) who have pointed out the need for more investigation into ICT in SMEs. The scorecard enables better informed decisions on where in an SME to capitalise in ICT, which contributes to the work of Love et al. (2005) who found that the lack of ICT investment can have a negative effect on profitability. The key limitation of the study is the fact that only eight companies were prepared to take part, and the companies that did take
part were from very different types of business, all of which were also at varying stages of ICT development.

REFERENCES


