Using Information Technology to give Competitive Advantage: an unusual Case Study

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Abstract
The owners of SMEs (small to medium enterprises, defined by the UK Government as 250 or less employees, with a turnover less than £50 million) have used many different ways of handling modern information technology (IT). This paper describes how one SME – Marston Lindsay Ross International – turned the challenge of new customer requirements in the IT field into a springboard for growth. The strategy they used was to develop their own systems, rather than using industry standard software, giving two advantages: first, that their systems were genuinely designed to meet their needs, and second, that the expertise developed in-house could be used as the basis for new business areas. This paper shows that the company is not typical of SMEs in its use of IT, explains how many other SMEs could follow its lead, and describes briefly where research in this area is headed.

Keywords
keywords

INTRODUCTION
Depending on the type of product supplied or manufactured by an SME, the number of entrepreneurs who set it up and their approach to management, the cost of the equipment needed for the business, and business decisions such as sales strategy, order administration, accounting and finance, many different approaches to management exist. This has been examined in detail in (Hanson et al., 1998), and the case discussed here is one of complete control by a single owner. Fortunately, this owner is hard working, technically aware and prepared to back his judgement with the resources to achieve competitive advantage from problems, rather than merely fire-fighting. Marston Lindsay Ross International (MLRI) was a printing consultancy in the UK, specialising in solving clients’ problems in the printing arena. From this base the company has expanded into the realm of information management for clients. The publishing process no longer ends when a journal or newsletter is printed. Increasingly, clients are looking to see their information recycled onto their websites or into a PDF document which can be circulated by e-mail. Marston Lindsay Ross International has therefore moved from the printing arena into the Information Solutions market.

The Company is a typical small SME. It employs no more than 15 people at its busiest times and has a turnover of just under £1.5m. Its primary business is in Digital Printing, but in the mid-1990s its major customer (the Royal Swedish Academy of Sciences) made it clear that they wished their Physics journal, *Physica Scripta*, to be available via the Web. This demanded the provision of abstracts free to all enquirers, full access free to subscribers and secure paid access available to others. Had MLRI not developed the skills required to build and host a complex website for this journal, there is little doubt that it would have lost the business. It has been established that one of the driving forces of IT uptake in SMEs is customer pressure (Ballantine, Levy & Powell, 1998), and that is certainly the case here. It is interesting that a recent Australian study of the effect of adopting electronic commerce in small to medium sized enterprises confirmed how few of them were very advanced in electronic commerce. MLRI is at least at the third phase of the four phases the authors put forward in that paper, and probably the fourth, with a high degree of organisational transformation conferring a high level of potential benefit (Chau and Turner, 2001). A less analytical study published in 2000 (Thomas *et al*., 2000) came to the same conclusions about the low level of IS usage in smaller companies in general. MLRI certainly does not fit this stereotype!

Review of Previous Work
A State of the Art Report on *Information Management in Competitive Success* in 1986 did not even consider the role of Information Systems (IS) in SMEs. There was a paper on PCs, but that dealt with their use by large companies (Griffiths, ed., 1986). This is not surprising, as at that time very few small companies used
computers of any sort for applications other than word-processing and spreadsheets. By comparison, Computer Weekly (CW) in the UK is running an ‘SME month’ throughout October 2003, including an opinion by Liz Grant that “...increased use of IT in itself will not provide real gains. For the impact of IT investment to be felt, it must be aligned to a process or structural changes.” In the same issue, the results of a study of 1,200 IT professionals undertaken by Computer Weekly with the help of British Telecom and others suggest that 49% of SMEs are using IT strategically, even though the cost of IT resources is holding back progress, as is internal resistance to change (Beckett, 2003 a).

First, why should we worry about SMEs? In the UK, they account for 95% of all VAT registrations (GST in Australia), 65% of the workforce (Storey, 1995) and 25% of GDP (Natwest, 1992). The figures in Australia are very similar – 95% of all enterprises and more than 50% of private sector employment (Chau and Turner, 2001). Second, can they be studied in the same way as larger companies? In the UK, 11% of all SMEs fail on average per year, while 80% of new SMEs fail within five years. This failure rate is six times higher than that for larger companies (Storey and Cressy, 1995). At the same time, CW in a later issue reports Kew Associates research showing that businesses with less than 500 staff increased IT spending by 6.8% last year, compared with a 3.5% increase in IT spending by companies with 500 staff or more (Beckett, 2003 b), so they are both important players in IT, and very vulnerable to failure.

IS and IT evaluation has been handled in many ways, and this is well described in (Ballantine, Levy and Powell, 1998). For our purposes, we have used an analytical framework based on (Levy, Powell and Galliers, 1999) and (Phillips, 1984). This presents an analysis that recognises the importance of customer dominance and of strategic focus. The four competitive scenarios for SMEs are as shown in Framework 1 below.

![Framework 1](image)

Some have suggested that when an SME adopts a new technology as a result of pressure from a major customer it strengthens the dominance of that customer (Bili & Raymond, 1993). However, in the case of MLRI the opposite has applied. In order to develop its systems and the skills it needed to create the *Physica Scripta* website, Marston Lindsay Ross entered into a Government-sponsored TCS partnership with City University and later Middlesex University (due to staff movements between the universities), to make the necessary knowledge and technology available. As a result of these partnerships a whole range of new business areas have been opened up to the Company, from domain registration to web design. MLRI’s strategy has been to take advantage of adverse circumstances to diversify its business portfolio. This is backed up further by the fact that over the last few years the amount of electronic data that needs to be stored on the company’s systems has increased dramatically. Again the company has turned this to its advantage by getting on top of the problem and looking to use the skills it has gained from doing this to open up new revenue sources. Both (Levy, Powell and Yetton, 2001) and (Hall and Hanson, 1992) have described other cases in which forms of information systems have greatly benefited small companies, so MLRI is far from unique – but it is still one of relatively few SMEs to benefit dramatically. Again the company has turned this to its advantage by getting on top of the problem and looking to use the skills it has gained from doing this to open up new revenue sources. Both (Levy, Powell and Yetton, 2001) and (Hall and Hanson, 1992) have described other cases in which forms of information systems have greatly benefited small companies, so MLRI is far from unique – but it is still one of relatively few SMEs to benefit dramatically. In Framework 1 it fits, not in the ‘Collaboration’ quadrant – as it ‘should’ – but in the ‘Innovation’ quadrant. Significantly, the only one of the 26 cases discussed by (Levy, Powell and Yetton, 2001) to be assessed as lying in this ‘Innovation’ quadrant was an Australian architects office that was responding to loss of business due to inferior technology by updating that technology – a very similar story to that of MLRI.

**MANAGEMENT INFORMATION**

As part of the programme with City and Middlesex Universities, Marston Lindsay Ross has developed a Management Information System (MIS) in-house using MS Access. As a print based company MLRI is used to thinking of its work in terms of jobs. Each piece of work that comes in for a client is given a job number – ie. Job No. 15000 states ‘print 1000 A4 flyers for customer X’. This ensures that a customer’s work always gets completed and that two...
items of work for the same customer do not get mixed up. The first phase of the MIS was therefore to create a database in which all jobs would be logged, have their status updated, and contain important information such as number of copies to print and be marked as complete. This information is stored in a centrally located back-end, while all users on the company network have an Access/VB front end on their client machines. This has enabled all staff – not just those involved in handling this job - to easily be able to track active jobs and look up older ones through searches on variables such as customer and title. This is shown in Figure 1 below.

Figure 1: A Job Management Screenshot

The next stage of the development of the system is the introduction of an invoice creation/tracking module. This has been in development over the last year and is approaching the end of its beta testing phase (in which the developer has been performing the invoicing function to locate bugs in the system, and add any functionality that was left out of the specification).

Invoicing traditionally takes a long time at Marston Lindsay Ross International – the Managing Director or Production Manager creates the invoices, and then passes them to one of the company’s secretarial staff who types them up, using Corel WordPerfect (the company’s standard word processing software). After this they are checked, corrected and sent out. No one else is able to create invoices, as the company uses a variety of pricing scales for different customers. This latter point is an issue that will be addressed later in the development of the MIS.

The new system creates the invoices from a template using the data in the system. This means that it will be possible for either of the invoice creators to enter the information and print a proof for checking. The secretary who previously had to type each invoice in WordPerfect, now only needs to proof read the invoice, and print the various copies of the invoice that are required when it has been finalised (for example the customer’s copy and the accounts copy). This system, when implemented, will save a lot of time for senior staff and speed up the invoicing process (vital in SMEs which are heavily cashflow dependent). It will also relieve pressure on the company’s network resources (a line in an SQL database is at most 1kb in size versus 25kb for a WordPerfect file). The time saving aspect of this development is probably the most important as it will remove one of the barriers to expansion by making invoicing more efficient. Of more long term benefit is the fact that invoice information will build up in the database, and it will be possible to analyse this data in due course.
Further improvements are planned – such as an overhaul of the Job number tracking system that will make it able to be used as a tool in managing print jobs and distributing work between members of the production. The company has many needs in terms of managing stock for printing, and the current stock management software is insufficient for the task; therefore it is planned that an MIS module to deal with stock will be designed and built. It is also the company’s intention to build a marketing module for the system, to allow the company to keep track of what contact has been made with customers. These developments will steadily move the MIS from being a tool of reference into a fully-fledged ERP/CRM tool. Enterprise Resource Planning as a buzzword is losing popularity now that most major companies have adopted these systems, so the consulting professionals have moved on to Customer Relationship Management. Very few SMEs have ERP systems, however, so the development of the MIS as an ERP system is still relevant in this case.

Marston Lindsay Ross International frequently needs to issue potential customers with estimates for printing work. This is not an easy task since not two print jobs are the same. The situation is further complicated by the fact that estimates need to be priced correctly, as even a slightly too high price will lose the work (the print industry is an example of a market that approaches perfect competition due to large numbers of companies with small market shares) while too low a price will wipe out the company’s profit margin. Estimates therefore take a lot of time and again can only be created by the Managing Director or the Production Manager. This means that, as with invoicing, there is a knowledge bottleneck. It is anticipated that an Estimating Module will be built into the MIS, along with a costing module as well. This will initially have the same effect as the invoicing system – streamlining the use of time, and the dramatic benefits such a system can provide were described in (Hall and Hanson, 1992). However, it is the company’s intention to use the Estimating / Costing / Invoicing modules over time to develop a knowledge management strategy, and to ensure that other staff can give estimates and create invoices. This will be possible, as analysing the data that builds up in the system will allow the company to steadily make its pricing structure more effective, and more uniform between customers.

The MIS is intended to give the Company a competitive advantage, by allowing it to run more efficiently – thus it can do more work with fewer staff than competitors. These effects are already being seen – for instance, the invoicing module has given one member of staff the equivalent of four extra days a month in freed up time. This sort of benefit translates into extra capacity for more work. The benefits that will be felt when the later stages of the MIS are added will be better still (assuming that everything proceeds more or less to plan). The company will be in a position to know how much each piece of work it has done actually cost – information that many companies much larger than Marston Lindsay Ross have no way of obtaining. This will allow the marketing team to concentrate on profitable types of work. As the Estimating / Costing system becomes more and more integrated, senior staff will find they have to spend less time on tasks such as estimating, and invoicing jobs will become more straightforward. Over time, the data in the invoicing module will enable the marketing team to tell which customers have bad payment records, which work is most valuable to the Company, and many other useful items of knowledge.

This development has come at a price. It has involved a permanent member of staff for the past few years (although for much of that time that staff member has been dealing with other issues and customer requests). Therefore, the total cost of the MIS has so far been somewhere in the region of £50,000. However, it is the...
company’s intention to double or treble turnover over the next few years, and if it does so it will in part be due to the MIS. Under those circumstances the investment will definitely have been worth it.

Data management

Over the past few years there has been an exponential growth in the amount of data passing through the company’s systems. This has put extra pressures on the company since it must find disk space to hold this data. In addition to this the company has invested in backup technology because the loss of a customer’s data would be catastrophic. As the amount of data on the company’s systems has grown, so has the backup requirement.

As a printing company with a lot of repeat customers, the company has to store old job files in an accessible place where they can be called back for amendment or reprinting months (or even years) later. This requirement has shaped the backup and archiving strategy. The company runs a standard twenty tape backup system. This involves full backup once a week, with daily differential backups. Each weekly tape is stored off site. In addition, the last weekly backup each month is put onto a monthly tape and stored off site for a year. This procedure protects the 50Gb of data that is live on the company systems at any one time. When a section of the network starts to become too full, the files on it are backed up to an archive tape, and then moved to a data stacker that is not protected by the backup regime. This is acceptable, since the files that are moved onto this are finished with and if required again will be copied back onto the protected section of the drive. Thus in the event of a catastrophic data loss, they could be restored from the archive tape they are on. In addition the data stacker is protected by a RAID array of two drives operating in parallel. This minimises the risk of a disk failure losing the data. These procedures are illustrated in Figure 3.
Figure 3: The Data Archiving Process.

Recently the company replaced its Primary Domain Controller server as it was getting old, and was running out of room on its hard drives. At a cost of around £1500 the server box has been cleaned out and the drives replaced with 75Gb drives on a RAID5 array. This gives the company a server capable of storing 220Gb of data (minus a system partition), thus, for only £1500, the company has been able to upgrade its storage potential to a quarter of a Terabyte at a fraction of the cost quoted by the major IT suppliers.

Having learnt how to manage its own and customers’ printing data, the company is now actively moving into the Data Warehousing field. Initially it intends to offer this service to existing customers, but in time intends to start offering online storage to anyone via the web. There are already a number of players in this market - for example: Storagepoint (http://www.storagepoint.com), Big Vault (http://www.bigvault.com) and FilesontheNet.com (http://www.filesonthenet.com). - and it seems likely that Lindsay Ross International’s involvement in this market will be dealing with SMEs or other organisations that often need a helping hand with the technology. This would fit with the company’s culture of excellent customer service, that is even reflected in details such as answering all telephone calls before the third ring.

CONCLUSIONS

Lindsay Ross International Ltd has a corporate strategy that is based upon always being open to new ways of thinking and new tools for improving working efficiency. This basic business strategy has influenced the company’s IT thinking so that the company does not just solve problems, it often creates new operating options out of problems it encounters. Thus, when the company had to develop a web capability for one customer, it was able to move into the web hosting market. Similarly, Lindsay Ross International Ltd has used the skills it has learned for its own security in terms of backup and archiving to open up a potentially lucrative new market. In combination with this, the company has thought about how it can improve its internal processes through the use of technology and has been prepared to invest heavily in order to achieve these goals, which are now paying off. This is a useful extension to the case-studies described in (Hanson and Hall, 1996), in which the strategies used by SMEs to gain advantage from IT were examined in the light of Porter’s five forces (Porter, 1985).

The absence of strategic thinking in many SMEs has been established (for example in Bili & Raymond, 1993), (Beckett, 2003 a), but this case clearly shows that it is perfectly possible for an SME to use strategic thinking to influence IT strategy and illustrates some of the benefits that can bring. How an SME builds the systems for supporting its business strategy is likely to vary from company to company, but it should be noted that there are a large number of high tech small businesses whose main market is designing information systems and databases for SME style customers. This has the effect of bringing information systems’ costs down to the level that SMEs can begin to make the sort of investment and cost savings that major companies have been making over the last 20 years. The fact that investment in IT is now so high in UK SMEs underlines this very clearly – despite the risks to survival that extra costs are likely to bring, investment by SMEs is growing more rapidly than in the more secure large company sector (Beckett, 2003 b).

DIRECTIONS OF FUTURE SME SECTOR RESEARCH

This case study has illustrated that SMEs can make use of strategic thinking in IT policy, and that it can be beneficial to them when they do. Further research will be carried out to find out how many SMEs are using strategic thinking, how they are going about it and how beneficial it is. Once this information is collected and analysed it should be possible to model what strategies SMEs are using in relation to IT Policy and IS Adoption. Plans have been made to follow this work with more detailed studies.

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