

IT STRATEGIES IN SMEs

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November 30, 2004

IT Potentially More Critical for the SME Executive Summary

Small and medium size enterprises are growing at an exponential rate. With easy access to the internet, website templates, financial applications and customer relationship management software, starting a business can literally happen overnight with only a couple hundred dollars, an e-mail address and a connection to the internet.

Small and medium size enterprises (SMEs) are now a major market force in the United States, Europe, and Japan. Adoption of information technology (IT) is an important matter for these small businesses to be able to operate efficiently and economically.

We interviewed twenty local CEOs of SMEs and compared those results to the research data we gathered from various publications. The core differences we discovered from the data research and our live interviews were:

- 1. Our SMEs spent more than two times the amount on IT than the national average.**
- 2. Our manufacturing companies spent less than half of what a typical manufacture spends on IT.**
- 3. One hundred percent of our SMEs had a website and access to internet, whereas the national average indicated that only 80% of SMEs are connected.**

SMEs often adopt internet IT functions first and primarily use the internet as a marketing tool for e-mail and an informational website. If a company offers tangible products for sale, then e-commerce is typically the next step in the use of the internet as a way to sell products and services to an expanded global market. In fact, 95% of our SMEs are doing business on a national level and 35% are international.

Customer solutions are also a key element in the survival of a small or medium size company. One of our case studies, Host Analytics, is competing with a large company that provides the same product for five times as much. The larger company has the budget, the brand, and the reputation in the marketplace as the biggest and the best. Without some kind of customer tracking solution, Host CEO Jim Eberlin would not be able to deliver the high level of service his clients expect. Customer satisfaction, quick turn-around and price gain Host a competitive advantage. Our live data indicates that most of our SMEs are using some sort of over-the-counter customer relationship management (CRM) software which allows them the ability to track customers' information and communication. These over-the-counter solutions are affordable and are just as efficient as the large corporate packages. This is what allows SMEs to stay in the game with the larger companies.

In the past, enterprise resource planning (ERP) and knowledge management (KM) packages were underutilized tools of SMEs. Now, ERP developers are discovering that there is a huge market for bringing ERP to the SMEs. Our case study on Edge Manufacturing illustrates the process and implementation of ERP in their organization. Like customer relationship software, SMEs hope to create a competitive advantage, improve efficiency, and create value by investing in an ERP system.

Our research, case studies and interviews indicate that Knowledge Management was not a term that SMEs are familiar with, nor do they have the manpower to implement. However, we did find that some of the smaller companies are documenting their policies, procedures and “how-to’s” and developing Operations Manuals. This is one form of knowledge management transfer, but certainly not at the level the large companies are experiencing.

As large corporations downsize, merge, or shut down, more SMEs will begin to incubate. As one entrepreneur put it, **“I have more security building my own business than I do having a job. My ‘job’ could be gone tomorrow, however I can build a business that will create a residual income indefinitely.”** Therefore, it is imperative that software companies, application service providers, and educational institutions prepare to offer services and products to these emerging businesses.

An Introduction to SMEs

This paper illustrates the need for SMEs to adopt certain IT functions so they can become more efficient and competitive within their industries. It is impossible to discuss all of the potential IT functions available to SMEs, so we have elected to demonstrate some of the most adopted and most important functions that demand attention by these firms. There is an understandable lack of best practices due to the immense diversity of SMEs, so we have attempted to show a set of best practices for one of our case studies.

We relied on information from local CEOs about how they are operating their small business and the impact technology has on their business. We interviewed manufacturing firms, service firms and companies offering technology services to get live data on a variety of companies. We conducted two case studies on Edge Manufacturing and Host Analytics, which involved a face-to-face interview with their CEOs.

There is a shortage of information related to the impact of IT on small and medium size companies. The United Kingdom seems to take SMEs more seriously as a market force, and have conducted more studies and defined a SME more effectively. Our research found that the UK is more in harmony with the trends of the SMEs, where the US still bundles SMEs in the category of less than 500 employees. .

What is a SME?

A SME is a Small to Medium size Enterprise. **SMEs account for over 99% of all businesses in the United States, the European Union, and Japan.**¹ We have made an attempt to define the aspects of what makes up a small or medium size enterprise. Europe and the United States have a different understanding of the definition. In fact, there doesn't seem to be a definite set of criteria for defining the parameters of a small or medium size enterprise. The United States generally defines a SME as any organization with less than 500 employees.² In Europe a SME is defined in more detail. As found on the website of the Small Business Service, (the U.K. equivalent of the Small Business Administration in the U.S.) the U.K's Department of Trade and Industry defines SMEs this way:

- micro firm: 0 - 9 employees
- small firm: 0 - 49 employees (includes micro)
- medium firm: 50 - 249 employees
- large firm: over 250 employees²

The definition of a SME is not only related to the number of employees an organization possesses. The following figure shows other criteria used in the definition of a SME in the European model.²

Enterprise Category	Headcount	Turnover <or>	Balance Sheet Total
Medium-Sized	< 250	≤ \$92.8 million	≤ \$79.8 million
Small	< 50	≤ \$18.5 million	≤ \$18.5 million
Micro	< 10	≤ \$3.7 million	≤ \$3.7 million

Since the model Europe embraces is more detailed, we will characterize the businesses we have studied and interviewed in this manner.

Survey Results of SMEs in St. Louis

We conducted on-line interviews with 20 CEOs of local St. Louis companies. Of those companies interviewed, only one company, Deloro Stellite was considered a large enterprise based on the European standards, with over 1200 employees. We interviewed John Pawlokowski (the US President of Deloro) even though we knew his company was not a SME, but we felt that he was essentially operating as a small business with only 2 local employees in St. Louis. Because he did not have the corporate infrastructure in St. Louis, he chose to outsource his telephone answering and bookkeeping services. Although he had the support of the corporation, it was easier for him to maintain control of his local operations by outsourcing those basic administrative functions.

Another interviewee, Edge Manufacturing, has over 60 employees and is considered a medium size business. They were also one of three manufacturing companies that were interviewed. Five of the companies we interviewed employed between 10 and 49 people and were our small companies. These included Drumtech, Leapfrog Performance Services, CDM Fantasy Sports, Foundation Mortgage and Host Analytics. The other 13

companies interviewed had less than 9 employees and would be considered micro businesses. Below is a brief description of all of the companies interviewed.

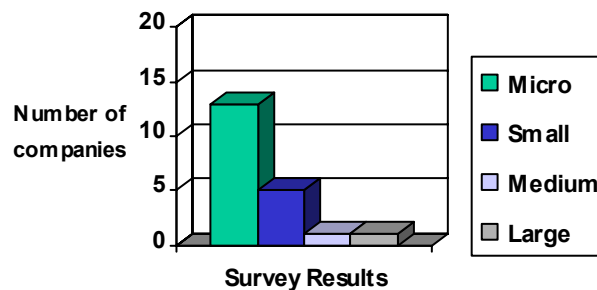
Interviewees

Company	Size of Company	Description
CDM Fantasy Sports	Small	Provider of fantasy sports products and services in North America - offers baseball, football, basketball, hockey, golf and auto racing games that can be played via a variety of methods, including phone, mail, e-mail, fax and the Internet.
Concierge Preferred Mag.	Micro	They supply concierges with a portable and user-friendly tool with which to serve the active visitors in the marketplace. They furnish visitors with maps and concierge driven editorial content covering dining, shopping, entertainment and attractions.
Deloro Setllite	Large	Producer of cobalt, nickel and iron alloy components and consumables
Drumtech	Small	Industrial Container Recycling With Proven Environmental Protection
Edge Manufacturing	Medium	Cutting tool manufacturer for the meat industry
Foundation Mortgage	Small	Missouri residential mortgage lender.
Host Analytics	Small	Business performance management solutions
Hostirian	Micro	Shared web hosting services and managed web hosting services
Leapfrog Performance Services	Small	Develop web-centric incentive programs which offers a solution for employee reward and recognition needs
OffiStart	Micro	Provides physical and virtual office space and support services to small businesses.
Pronett Solutions	Micro	Applications development
Rising Media	Micro	A network, resource and community for small business owners and entrepreneurs.
Riverbend Capital Group	Micro	Design customized equipment leasing solutions, ranging from \$5,000 to \$10,000,000, for businesses across industries.
Signs Now	Micro	Professional signs and graphics
Synergy Group	Micro	Public relations firm
US Net	Micro	Web hosting and Internet access services to small & medium-sized businesses
Venmar Solutions	Micro	Sales, support, training for phone systems
Vistawiz	Micro	Network security and flexible on-demand applications
WeTrak	Micro	Provide autograph and memorabilia security and state of the art inventory control and asset management solutions.
Zarchivist	Micro	

SMEs Have an IT Budget?

SMEs are the fastest growing purchasers of IT products. They led the spending growth versus large firms in 2004, and this trend is expected to continue through 2005.³ In 1999, a total of \$156 Billion was spent in the United States on IT products and services.³ SME's influence as a large purchaser of IT equipment and services has impacted the IT providers' market in many ways, which will be illustrated later.

A typical medium to large manufacturer spends an average of 2% of its budget on IT. The similar sized service company spends an average of 5% of their budget on IT. In contrast, the average SME in the US spends on the average 6.4% of their budget on IT.⁴ In 2005, the projected budget growth for small firms is 6.6%, and 10.8% for medium size firms.⁴ When looking at the discrepancy in figures between these large and small firms, one might ask, **“Why are there higher costs associated with IT for the small business?”** This is largely due to the fixed cost of infrastructure. The cost of personal computers, servers, web sites, software, and software licenses are significant costs for an organization of any size. When a company has few employees, with a small budget, the costs for this IT architecture is disproportional to that of a large firm. As a result, many of these SMEs feel squeezed by the cost of buying and maintaining systems. They are always looking for alternatives for buying expensive software packages, services, and new infrastructure. This has led to a shift in marketing strategies for large IT providers. They see this growth as a new opportunity to sell their products to a largely untapped market. We will discuss this further when we talk about new customer solutions later in this paper.



Our limited group of small companies revealed the average spending for IT was 14%. This number was considerably higher than the national average of 6.4%, however, 40% of the companies interviewed were companies that either sold software, hardware, technology services or IT consulting.

Our manufacturing companies represented 30% of those surveyed and their IT spending of 0.74%. This was lower than the national average of 2.2%.

Adopting IT – How and Why

IT has long been viewed as a way for a firm to maintain competitive advantage over another. But as seen with large firms, **SMEs are realizing that IT is no longer a driver of competitive advantage.** Instead, firms are finding that they must adopt IT just to keep pace with their competitors. Although competitive advantage may not necessarily be guaranteed, SMEs are finding that the adoption of IT can lead to enhanced entrepreneurship and more innovative workplace cultures.⁵

The integration of IT into SMEs' business practices can have many benefits. IT can reduce costs of the business by lowering personnel requirements and cost, reducing processing cost, and improving quality.⁹ Technology applications can also reduce delivery time, improve decision making and communications, and assist managers in strategy development.⁹

One of the first benefits seen by SMEs with their adoption of IT, is the impact on their marketing function. This seems to be one of the first steps firms take with their adoption of IT; made primarily through internet/website marketing. SMEs should adopt IT more heavily than in the marketing vein alone. They must adopt other functions into the organization, such as e-commerce solutions, customer management, financial management, knowledge management, and enterprise resource planning to effectively compete with large firms.

We cannot possibly discuss every IT function that a small or medium size enterprise might use, but we have decided to focus on the most popular implemented that seems to have the greatest return for these small firms.

Utilization of the Internet

In 2003, a published survey of SMEs found that 80% of firms were connected to the internet in some way.⁵ This is not to say that all firms had a website or an established web presence, but they at least had the ability to surf the web or use e-mail in some capacity.

More companies are finding the benefit of having more than the basic connection through their ISP. **The first step a company might take is to establish a web presence, primarily to help drive their marketing function.** This is often a way for firms to extend the efficiency and market reach that might not have been possible with their real-world resources. Using the internet as a vehicle, they can create virtual assets that include “information skills, digital resources and competencies for managing inter-firm relations and collaboration with other firms”.⁶ Virtual assets let SMEs extend their operating environment instead of operating at actual size. They are no longer confined to local settings, but have the ability to market nationwide and even internationally. Since the tangible resources needed to compete on a national or global scale are not easy to come by, a firm can use digital resources as a tool for growing their market-share.

Another benefit of the internet is that it allows for flexibility and the ability for strategic change in a marketing function. This flexibility was not as apparent with the ‘old world’ way of print and standard media communications. The internet also enables small businesses to create better marketing relationships with customers. They can publish a brochure online that a customer can view at any time, and include other functions like email links and response forms that allows prospective or established customers to be able to communicate with the firm easily, at any time.

Marketing strategies, costs, and other factors that make up the brick and mortar businesses can differ immensely online. Some potential problems with implementing internet enabled technologies are the costs of new infrastructure that can get expensive for a small business with a small IT budget. In addition, firms often lack the information skills to make their site usable, and lack the ability to gain good placement in search engines. The constant reconfiguration needed to keep a site relevant can be time consuming and expensive. This can mean a steep learning curve to build an effective marketing plan online, or an expensive outsourcing arrangement with someone who would better understand the intricacies of the medium.

The internet has truly become one of the driving forces behind the growth of SMEs, especially the micro business. Tools such as internet access, website hosting, e-mail, website templates, computer systems, and software have become so affordable and necessary for simply managing life, that it has allowed opportunities for individuals to start businesses within 24 hours of an idea.

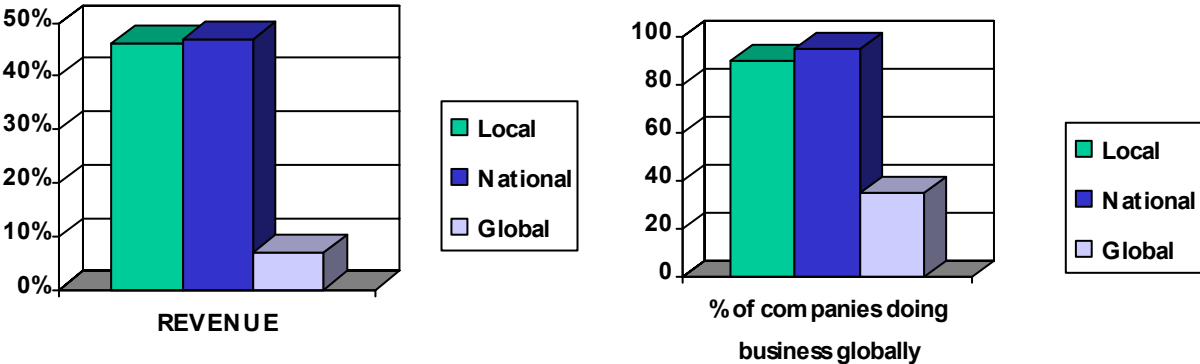
In fact, 70% of the companies we interviewed were launched within the last 5 years and were started from the home. Several of the companies still operate from a home office for most of their business activities.

Although having access to the internet has made it easier and faster to start a business, we found that without the internet, many of these small companies would cease to exist. They rely completely on their web presence, e-mail communication, and instant information, and without it, claim they would not have a business.

Where are SMEs Conducting Business?

It was not surprising that 100% of the companies interviewed are using the internet, have a website and are utilizing e-mail. However, it was surprising that 95% of the companies are doing business nationwide and 35% are conducting business on an international level. 90% of the companies are doing business locally. Edge Manufacturing, US Net, Riverbend Capital Group, CDM Fantasy Sports, Host Analytics and Deloro Stellite are doing 5% or less on a local level. US Net does not do business in Missouri at all.

Revenue income for these SMEs was 46% local, 47% national and 7% international.



Embracing E-commerce

Typically, the next step a firm will take in the adoption of IT is to adopt some form of e-commerce. **E-commerce is a benefit to a small firm by not only being able to communicate with organizations nation-wide and world-wide, but to be able to sell goods and services to this extended clientele.** This can mean immense growth potential for a firm that can abandon the traditional confines of operating only locally. This is achieved by breaking down the often cited barriers of competition like scale, location, and size. When a firm has the ability to make sales online, they can organize a distribution method using warehouses that do not necessarily have to be located at the point of contact with the customer.

Traditionally, a brick and mortar store must maintain inventory in the event a customer enters an order with an expectation to purchase goods. An e-commerce function manages customer expectations, because no one expects a product immediately when purchasing online. The ability to staff a customer center and use a warehouse to create a distribution network means the company can fulfill an order within hours. This can optimize efficiency and solidify a small firm's presence in the larger market, which was probably not available before the adoption of this e-commerce function.

The process of developing an e-commerce presence is much like starting a brick and mortar style business. One must first find the market position of competitors, to see at what capacity they need to operate to enter the market. Then the firm must build definite objectives and define critical success factors to help them achieve these objectives within a specified timeframe.⁷

It is important to adapt the firm's strategy to these critical success factors as they develop, and to have the ability to adapt the critical success factors as the situation might warrant. Due to the intense competition when entering a nationwide market, it is important for a new-comer to start in a niche market. It is difficult to compete against a large firm with an established market force online. Finding a niche market allows the SME to adapt to the inherently different business operation found online, as well as building brand name, loyalty, sales, and distribution that will allow them to enter more established markets and give them the ability to compete with the larger firms in the future.

Although benefits of adopting an e-commerce function are attractive, the costs and barriers to do so may be substantial. The in-depth knowledge needed to successfully develop, launch, and market this function can be difficult to obtain and finance. A small business owner often lacks the technical proficiency and understanding to start an e-commerce function.

Outsourcing partners must be solicited to create the interface, process payments, arrange shipping, and optimize search engine placement, which can become expensive very quickly. Managing the new financial and time commitments is costly due to the additional infrastructure, additional services and outsourcers needed. The time needed to manage, which is in effect a whole other business, can be a substantial barrier for small business owners to overcome. Most owners are consumed with day-to-day operations

that do not allow for such time and cost consuming activities. This is why it is important to develop the business model, specific objectives, and critical success factors mentioned before, to manage the potential downfalls that can arise with the adoption of the e-commerce function.

The results showed that 30% of the small businesses we interviewed are using e-commerce on their sites and 50% are using their website as an information source only. Twenty five percent of our interviewees are using the site to support their customer support options.

Customer Solutions: The Key to a Competitive Advantage

The advantage of a SME versus a large company has long been the personalized customer service that a SME can provide. The last decade has found large companies changing this dynamic through their adoption of expansive Customer Relationship Management (CRM) packages. CRM packages give companies the ability to track customer information, orders, communications, and histories; allowing them to give the appearance that they can provide the same level of care to the customer that small businesses have traditionally provided. In doing this, the large organizations have raised the standard that customers expect from companies both large and small. Many feel personalized customer service may be one of few ways SMEs can create a competitive advantage over large firms. This means SMEs must adopt similar customer solutions that can identify customers and deliver new business value to them, while maintaining the small business atmosphere that can give them the personal advantage.⁸ The challenge is that the cost and scope of CRM packages used by large companies have traditionally remained outside the realm of SMEs budgets.

Customer solutions that SME's are able to afford and adopt have been difficult to find until recently. What is enabling SMEs to finally obtain affordable customer solutions? The economic downturn brought about by the bursting bubble of tech stocks in recent years, has left large IT service and product providers with a deflated market. The providers were focused on selling all-encompassing, CRM packages to large organizations. When these companies had to stop purchasing these expensive packages due to the economic downturn, the focus for the providers was shifted to SMEs. The needs of small firms forced the IT providers to develop industry specific and custom packages for them at reasonable prices and/or monthly rates. This means SMEs no longer need to invest in overall CRM solutions that might be overkill for a small business both functionally and financially. SMEs can now utilize systems more efficiently and at a lower cost than before.

The benefits reaped by this change in the market focus have been very good for small and medium size businesses. The new customer solutions have a higher degree of flexibility. **These systems are configurable, intuitive, customizable, industry specific, and are able to be integrated with existing architecture and legacy systems.**⁸ The traditional strength of the SME to deliver personalized customer service has been coupled with a unified view of customers that the large companies have been using. Small companies are now able to communicate in any manner (phone, fax, email, etc.) with no impact on the quality of service. Whether the method of communication is incoming or outgoing, the customers (with the use of customer solutions) can be routed through the appropriate channels effectively. This may be the enabler for small firms to maintain or regain the competitive advantage they once enjoyed over large firms when dealing with customers.

Some examples of software that is catering to the SMEs include ACT! and Goldmine (produced by Frontrange Solutions). Both software packages are business and customer relationship management solutions that can help SMEs improve sales processes, shorten sales cycles, and manage contacts. Both packages provide:

- Instant access to their centralized customer and contact information, including complete histories
- Time management capabilities
- Marketing automation which allows for mass mailings by easily generating targeted, personalized e-mail, letters and faxes from a central location and also track results
- Opportunity tracking with immediate updates for sales pipeline and track products, prospects, revenue potential, and closing dates in real time
- Team-based collaboration which allows team members to share critical information across the whole team, inside and outside the office
- Reporting and analysis of leads, sales, and marketing
- Forecasting by sorting sales by product or probability and see weekly, monthly, quarterly, and yearly quotas
- Synchronization with PDAs and other handheld devices.

These software products range in price from \$150-\$250 for one user license, up to \$2000 for 5 or more licenses. These types of products allow the SMEs to provide the personalized service that their customers have been accustomed to, but with more efficiency and in less time.

When asked what services he was using to assist his clients and how he was using the website to reach prospects and clients, President of US Net, Tom Jordan, responded:

“Our website is used:

- 1. To brochure our products and services**
- 2. To enable new customers to purchase services online with a credit card**
- 3. For real time sales and technical support through online java-based chat**
- 4. To enable an existing or prospective customer to initiate e-mail or form contact with customer support or sales**
- 5. To facilitate new sales partners through our channel partner programs**
- 6. To provide password protected access to tools that we provide our customers**
- 7. To enable existing customers to make changes to their existing services**
- 8. To enable existing customers to update their address and billing information**
- 9. To communicate promotional information and offerings**
- 10. To answer frequently asked questions**
- 11. To provide an overview of the company**
- 12. To provide a list of contact information and numbers**
- 13. To provide existing customers access to webmail.”**

US Net has only 2 employees and outsources the operations of their businesses to the equivalent of 6 employees. US Net provides web hosting and internet access to small and medium sized businesses. When asked what his biggest technology challenge is, Mr. Jordan stated, “Since our business is providing technology based services, the major challenge is commoditization eroding pricing power. Otherwise, we are faced with the

ongoing challenge of investing in and invoking new technologies to continue to have a competitive offering.”

In contrast to US Net, the drum recycling company known as Drumtech finds its biggest technology challenge is creating the time and money to overhaul its accounting software, server, and PC operating systems. A continuing challenge for the firm is redesigning their website to make it more interactive. Drumtech only spends .05% of their annual revenue on IT and US Net spends about 80%. Both are SMEs and both have a critical need for their hardware, software, and systems; yet use IT in different ways.

IT in Small Business, Case Study: Host Analytics



We had the opportunity to interview Jim Eberlin, the CEO of Host Analytics, to find out how he is operating his business, what challenges he faces, and how IT works within his business functions. Host Analytics provides business performance management solutions which include: financial budgeting and planning, forecasting software, sales forecasting and sales budgeting software, financial consolidation and reporting software, and balanced scorecarding and dashboarding.

Host has 35 employees located in St. Louis, Texas, and India, where their technology center is located. They spend 6% of their annual revenue on expenses related to internal technology.

They use Salesforce.com and a web analytic application as their customer relationship management system. The architecture of the firm includes Microsoft OS2000, 4 servers, 26 workstations, and they are currently utilizing the Windows XP operating system. Their website is used as a brochure, inquiry tool for prospects to submit criteria via an on-line form, and also provides general customer support information for existing clients. Only 5% of their revenue comes from local customers, while 80% is national and 15% is international.

Host's biggest technology challenge is that all of their expenses go to support sales, service and product development. They do not employ their own developers, but borrow from the service contractors to assist on internal projects. This system works fine for them right now, but eventually they believe there will be a need to invest in an internal infrastructure.

Their competitive advantage comes from their customer solutions. They focus their efforts on the small to medium sized companies. They reduce costs wherever possible so they can offer an affordable product. **The analytic application they market, sells for around \$100,000, whereas the "large" competitor charges \$500,000 for an application with the same functionality.** The difference is that money is not an obstacle for the larger company. They spend outrageous amounts on advertising, branding, salaries and bricks and mortar, which drives up cost for their products. They are relying on their brand name recognition to continue bringing in new customers.

Host Analytics opened their doors about 6 months before the dive in the IT industry. However, Jim was able to stay afloat because he used the proceeds from the sale of a former business to fund Host Analytics. He also leased office space in a shared executive suite that included furniture, phones, internet, shared conference room, kitchen and office support. He chose a flexible lease term so he could easily expand, contract, or leave as needed. Other start-up companies during that time were spending millions on new furniture, tenant improvements to their offices space, phone systems, support staff, etc. By spending frugally, using his service providers to support internal needs and by focusing purely on customer satisfaction, he now has a business where 100% of his clients would refer him to other prospects. He has 40 customers and his competitor has 400, but he serves a market that his competitors are not interested in...the SMEs.

Knowledge is Power: Adoption of Knowledge Management

Do SMEs really need knowledge management in their organizations? The adoption of KM can contribute to the overall performance of the company; and as we have illustrated, small firms often do not possess the resources needed to compete directly with large firms. If they can organize their knowledge pool, they may be able to create a competitive advantage against the larger firms.

Traditionally, large firms have had the ability to use knowledge management to internalize knowledge from employees, systems, and processes to be mined later by others in the company. This may be even more important in a small business setting. When one individual leaves a minute workforce, their knowledge leaves with them. In a large firm, a manager or co-worker might have some idea of that last employee's duties and processes. If a small company can retain the learned knowledge of an existing employee, it can greatly reduce the cost of training a new one.

There are benefits to implementing KM when you are a small or medium size enterprise. The smaller structures make it easier to implement change. The shorter and more direct communication channels makes for faster implementation of KM (or any business process). In large firms, employees might fall prey to 'departmental mindset'. Instead of striving to achieve the mission statement of a corporation, they might be focused on the status of the individual within a team, or the vitality of their specific department. Small firms' employees have more of a 'corporate mindset' that often keeps the goal of the organization as a whole, as the driving force behind their actions. This helps an employee understand the importance of something like KM, which makes for a smoother transition in its adoption. Another benefit of being a SME in adoption of KM, would be the thin layer of management that makes decision control more centralized. When dealing with one figure-head, the lack of boards and committees to stop or slow progress and to build overly complex structures, is eliminated.

The small nature of a SME can be detrimental in the adoption of knowledge management as well. SMEs tend to take a more mechanistic approach with the process, due to their inexperience and lack of other managerial influences. Small firms are not as used to the concepts and vocabulary associated with KM that large firms may have. Employees may also resist the implementation of a KM program. This may be seen as an annoyance or a waste of time that distracts them from their day-to-day duties. Employees in a SME may also be used to the informal culture and may reject the formality needed to make a KM system work correctly. The low specialization of employees can be an issue as well. Multi-faceted employees have a lack of thorough comprehension of a specific task, making that knowledge harder to harness and pass along.⁹ Management is often consumed with the daily operations of a business and the implementation of KM might slip to the bottom of the to-do list. KM takes much planning, foresight, and time which equals money.

Knowledge management is a complex and difficult function for SMEs to implement. The process is often foreign and painfully formal, but the payoff can be immense. This is an important IT strategy for small businesses to implement, and can significantly help them gain competitive advantage over other firms.

ERP Systems and Why They Work in SMEs

When discussing highly sophisticated ERP packages, one thinks of large companies, linked with large suppliers of ERP packages, with lots of money changing hands. In the past, many companies with revenues under \$100 million were ignored because vendors did not want to deal with poor IT infrastructure, but today more suppliers are looking at the SME market for growth.¹⁰ Companies with less than \$30 million dollars in revenue increased ERP spending 14% from 2002 to 2003. While larger companies with \$30 million to \$1 billion dollars in revenue, ERP spending was flat.¹¹ SMEs are starting to have more options and more ERP suppliers are trying to take advantage of this growing market. IDC estimates that in Canada spending on midsized ERP packages was \$325 million in 2002 and will be \$389 million in 2007.¹² This illustrates that ERP is being implemented in smaller and smaller businesses.

Reasons for Adoption of ERP Systems

Why would SMEs invest in ERP systems? It is a first step towards a comprehensive knowledge management system. Some of the reasons to invest in ERP systems would be the same as investing in a knowledge management system, which was discussed in the previous section. SMEs hope to create a competitive advantage, improve efficiency, and create value by investing in an ERP system.

Can SMEs implement an ERP system to create a competitive advantage and what factors determine success? Mario Caldeira applied resource based theory to answer this question. Caldeira conducted case studies of 12 Portuguese manufacturing SMEs. He determined their success was related to 15 factors. Two of which he called determinate factors. Determinate factors are factors that were related to successful IS/IT adoption. **These determinant factors were IS/IT competencies and management perspectives.**¹³ The reason these two factors stand out is not hard to explain. The amount of IS/IT competence in SME manufacturing firms can vary greatly. Also, talent that is developed may be easily lured away. Therefore, a SME that has in house IS/IT competencies that are familiar with the goals of the business would have a resource that is valuable, rare, imperfect imitable, and non-substitutable. Management perspective creates a competitive advantage for similar reasons. Many managers in small SMEs are not going to have enough IS/IT background to be able to leverage a competitive advantage in the IS/IT arena. Therefore, if a SME has such a manager, they will be able to adopt IS/IT in such a way that gives the company a competitive advantage. Caldeira also found that the more integrated a SME was, the higher level of satisfaction they had. This can be explained by the IS/IT competency and the superior management perspective allowed those companies to integrate their IT and control their destiny better.

When a company integrates their data into an integrated ERP system, they are either combining data that previously was stored in separated systems or are adding data that previously did not exist. Therefore, users of the system can find the data that is important to them, faster. More data is at the users fingertips and readily accessible. This improves efficiency of the entire company.

Value creation follows the same logic as improving efficiency.

Issues to Consider Before Adoption of ERP

When a SME is considering implementing or upgrading an ERP package, there are a few things they should consider. First, find the right supplier. Second, what are the critical success factors? Finally, how will ERP disrupt existing management and business practices?¹⁴

Supplier. When implementing an ERP package, finding the right supplier is very important for a SME. Not only should you find a supplier with the right software package for your needs, but you should find a supplier that fills your technical needs, can train you, and has experience in your market. Few things could be worse than having to train your supplier throughout an implementation. Although a great deal of time will need to be spent bringing your supplier up to speed on your business practices during the planning stage. **The choice of the right supplier is critical** as you do not want to go through an implementation more than once.

Critical Success Factors. Knowing what you want to get out of your ERP implementation is invaluable information. It will help you select the proper software package and supplier. A well focused implementation will save time during the implementation. Therefore, **determining your critical success factors needs to be considered before ERP adoption.**

Review Business Practices. **Determining how ERP adoption will disrupt your existing management and business practices will also help select your supplier and software selection.** Defining the critical success factors will help you review the areas that will be affected. A detailed analysis with your supplier is needed to uncover any potential problems before they occur. For the vast majority of companies, it is not if your processes will change, but figuring out how many will change and how to implement these changes.

Case Study: ERP at Edge Manufacturing, Inc.



A case study on the upgrade of an ERP system was conducted on a small manufacturing firm, Edge Manufacturing. Edge Manufacturing is a cutting tool manufacturer for the meat industry with approximately 60 employees. Their products include band saw blades, circle saw blades, and hack saw blades all for cutting meat. Recently, Edge was diversifying by making band saw blades for the pallet/lumber industry and manufacturing equipment for the band saw industry. When Edge started their business 11 years ago they became the 4th major manufacturer of meat band saw blades in North America and Europe. In recent history a 5th major, Mexican manufacturer entered the market place. Another major competitor moved their high labor welding operation to Mexico. This recent shift in the industry led to significant downward pressure on the price of a meat band saw blade. Edge sells their meat band saw blades for about 60% less today compared to when they started the business. Edge had sales of over \$7 million in 2003 and their profits were \$30,000. These profits were in spite of the lower pricing and the added cost of diversifying into two new product lines. Sales and profits look very similar for 2004. Edge is in the unique position that their stockholders are currently more interested in diversifying the company than insisting that they earn a high rate of return. Edge spent approximately 1.2% on IT in 2003.

Reasons for ERP Integration at Edge

Late in 2002 and early 2003 Edge started looking at upgrading their current accounting software which already included purchase order, order entry, and inventory management modules. Edge wanted to integrate its manufacturing data into Macola, a modular ERP software. Edge would add modules such as Bill of Material, Standard Product Routing, Shop Floor Control, Manufacturing Cost Accounting, and Material Requirement Planning (MRP). The reasons for upgrading this software was to have better inventory control, update cost faster and more often, assist with production planning, reduce tribal knowledge, and reduce the time to close out the month.

Better inventory control would allow Edge to serve their customers better. They would have more accurate numbers on what products were in stock and how much was in stock. Knowing this information was the starting point for Edge to meet another one of its goals; to assist with production planning. Another benefit of improved inventory control would be more accurate financials. For a company running thin profit margins it was important to have accurate financial data throughout the year.

The benefit of updating costs faster would allow Edge to remain competitive. With two competitors making all or part of their product in Mexico, Edge is not the lowest priced manufacturer in the market place. Therefore, Edge must continually reevaluate their pricing as process improvement lowers the cost to manufacture product and as their customers come to them asking them to meet lower prices.

Production planning and reducing tribal knowledge go hand in hand. A typical production planning meeting at Edge would consist of managers sharing information that

no one else had access to, because it was stored in their head. Therefore, it was impossible for multiple people to look at the same information objectively because the person disseminating the information has already filtered it to match their conclusions. Also, Edge would be at risk if certain managers took jobs elsewhere or were unavailable for other reasons.

Reducing time to close out the month allows everyone in the company to have more time with live and accurate data. This is a necessity of a highly integrated ERP system.

Most of these goals or critical success factors were aimed at creating value or improving efficiency, two of the main reasons why companies implement or upgrade ERP packages. A discussion on competitive advantage will be conducted after the upgrade at Edge is discussed in more detail.

Edge's Approach to 'Issues to Consider'

Supplier. Edge initially used a different supplier for this software. The first supplier was not a good match. The supplier could not be counted on to keep appointments and was limited in their knowledge and resources to implement or upgrade the software package. A couple of years before Edge considered the upgrade, they changed suppliers. The new supplier had more resources and knowledge of manufacturing to help Edge implement upgrades. Edge was also fortunate to find a second supplier in the same geographic area. Such upgrades would not have been possible without this new supplier, so this reinforces the concept that selecting the right supplier is an important factor for ERP implementation within a SME.

Critical Success Factors. Defining critical success factors was completed at Edge prior to the beginning of the project. Several meetings were held with the supplier to formulate a plan. Could the software meet Edge's requirements? What modules would be required? As previously discussed, Edge was trying to integrate their accounting, order entry, and purchasing with their manufacturing data. Edge was adding modules such as bill of material, standard product routing, shop floor control, and manufacturing cost accounting. At a later date, Edge determined they would need material requirement planning for the equipment side of their business. Once it was determined that Edge's requirements could be met and what modules were required, Edge and the supplier could then review business and management processes for required changes.

Review Business Practices. During the review of the business processes, the supplier recommended and explained how several processes would have to change. This included both changes in how raw material and product was transported throughout the facility, and the data collected during manufacturing. Also, changes in office, accounting, and management procedures were needed. Edge implemented the recommended changes, added the modules, and upgraded the software. Employees were trained and a physical inventory was conducted before 'going live' on the new system.

After implementation, some problems began to surface. The majority of problems came from two sources. First, the process for making band saw coil stock had no method of

measuring the length of a coil within the system. Edge would weigh coils stacked on a skid and convert this weight into a length. This was not accurate enough for Edge's needs. The second issue was that no one realized how mistake-prone people would be. There were too many steps while recording and keying information into the system. Numerous errors would be found by the accounting department while doing some very time consuming detective work. In the second half on 2003, Edge gained 200,000 feet of coil stock in inventory. While this error was slightly more than 2% of the coil produced during that time, it accounted for a \$40,000 write-off at the end of the year. This write-off cut Edge's profit in half for the year. Edge and the supplier overlooked two critical areas in need of reengineering. Edge is now reengineering to solve these two issues. This example shows how important the proper reviews of all business and management processes are, and how they can be attributed to the success of an ERP implementation or upgrade.

Did Edge Gain a Competitive Advantage?

How did Edge do on the two determinant factors for creating a competitive advantage by adopting IS/IT. Edge's management attitudes towards IT will eventually net them a successful IS/IT implementation. Edge's management is committed to making the project work, even though it was not an instant success, by redesigning the necessary processes. The IS/IT competencies were solid by both the supplier and Edge. The problems with the upgrade were related to business process reengineering. Two major problems were overlooked until after the upgrade was complete. Edge may still be able to gain a competitive advantage, but it will take them longer to do so. These delays may cause Edge to lose their chance to gain a competitive advantage.

Best Practices for ERP Adoption by SMEs

To develop a set of best practices for ERP adoption by SMEs, a review of studies on best practices for IS/IT adoption for all corporations was completed. This list of general best practices will be reviewed in light of the research and case study presented on SMEs adoption of ERP systems. There is always more information, studies, etc. available on large corporations. Two studies were used for this comparison. Subramanian and Lacity conducted the first study; and Brown and Vessey conducted the second one. A combined list of best practices from both studies was created for this discussion. The best practices for review are:

- Support of Top Management
- Veteran Project Leaders
- Redesign the Business Process Prior to Implementation
- Change Management Goes Hand in Hand with Project Management
- Do not Underestimate the Cost of Training, Maintenance, and Support
- Insource the Development
- Implement Incrementally
- Include Business Users on Development Team
- A Satisficing Mindset Prevails.^{15,16}

Support of Top Management. The support of top management has already been discussed. The study by Caldeira includes it as a determinant factor for success in obtaining a competitive advantage. If Edge's management was not determined, their project could have been ended. Therefore, **the support of top management is as critical for SMEs** as it is for large corporations.

Veteran Project Leaders. The need for veteran project leaders is important for SMEs also. Could the two problems that Edge faced have been resolved by having more veteran leadership? The supplier sent Edge a young implementer with only two years of experience with this software and less overseeing the implementation in a manufacturing environment. Edge did not have any experience with an ERP upgrade this large. Therefore, the conclusion can be drawn that **more veteran leaders could have helped Edge's chances for success.**

Redesign the Business Process Prior to Implementation. **Redesigning the business process prior to implementation has been shown to be important.** During Edge's upgrade, a couple of processes were overlooked for redesign until after the implementation. It will take Edge more resources to complete the implementation to a satisfactory level because they have extensive upkeep of the system in its current state. This was brought up earlier when we discussed issues to consider prior to an ERP implementation. Therefore, this best practice is important for SMEs

Change Management goes with Project Management. Change management going hand in hand with project management did not come up in either the research or the case study. This is an important item to keep in mind for a SME going through an ERP implementation.

Do not Underestimate the Cost of Training, Maintenance, and Support. There has not been any information uncovered during the research or the case study to determine whether underestimating training, maintenance, and support is a major issue with SMEs. Therefore no conclusion can be drawn, but one would definitely want to consider this information prior to starting an ERP project.

Insource the Development. **Insourcing the development is not practical for most SMEs.** Maybe IS/IT firms or larger SMEs will have the IT resources to do this, but most SMEs will not. Therefore, vendor development becomes critical. It can even get tougher for SMEs if they do not have someone that can speak the IT language with the vendor or vice versa. This would not be a best practice for a SME. A SME will need to have a capable supplier.

Implement Incrementally. Edge chose to implement incrementally. MRP was not part of the original implementation. It was added about nine months later, and as Edge's equipment business grows, they will need to add the master scheduling module to control part flow through the equipment in the production machine shop. **Implementing incrementally makes good sense especially for resource strapped SMEs.**

Include Business Users on Development Team. Including business users on the development team is probably a given in a SME. SMEs have trouble putting together a team without a business user on it. **For most SMEs, business users will be part of the team;** especially because most owner/presidents are highly involved in every part of the organization.

Satisficing Mindset Prevails. A satisficing mindset must prevail in a SME just as it would need to in a large company. An example of this is a discussion that had taken place with Edge's accounting/HR manager. A handful of items had been received into the wrong account and she was asking about the problem. While the conversation was going on, it was realized that they were talking about a half dozen fasteners and a couple of small springs. The total value of everything could not have been more than \$3, but she wanted to make sure that the \$3 was expensed to the correct account. This is not an example of a satisficing mind set. Edge also has another issue; their first 6 months after implementation they built up just 2% in excess inventory. Edge has reduced that number to just around 1% in 2004, but because their profit margin is so narrow, and it had such an impact on the profit realized in 2003, it is a major issue. How close is close enough? Maybe Edge should skew their measurement to underestimate inventory by 1%. The point being **a satisficing mind set is very important.**

The following **list of best practices** can be drawn from the previous discussion. Most of the best practices are applicable for both large and small corporations and span from specific ERP implementation to more general IS/IT adoption.

- **Support of Top Management**
- **Veteran Project Leaders**
- **Redesign the Business Processes prior to Implementation**

- **Change Management must be a Part of Project Management**
- **Do not Underestimate the Cost of Training, Maintenance, and Support**
- **Choose your Supplier Wisely**
- **Implement Incrementally**
- **A Satisficing Mindset must Prevail**

Two practices were changed or dropped from the original list. Insourcing the development was changed to put the focus on the supplier. Including business users on the development team was dropped because business users are central in the process for a SME.

Summary of Strategies used by SMEs

Our interviews and research indicated that the following strategies are helping SMEs experience growth and establish a competitive advantage:

- SMEs maximize the use of the website to market, manage inquiries, take care of clients, sell products and services and handle general service needs.
- When competing with the larger companies, SMEs collaborate rather than compete by using their competitor as a resource OR they focus on serving the smaller companies who can't afford the products offered by larger companies.
- They utilize employees in several areas of the business and outsource what they don't know - for example: networking, web maintenance, telephone maintenance, etc.
- SMEs DO invest in contact management software that can grow with the company and that allows employees to track history of e-mails, correspondence, marketing, financials, and projects.
- The most successful SMEs were developing documented systems in order to transfer and document knowledge.

Conclusions

- As mentioned at the beginning of the paper, our survey data did not coincide with the research data on how much SMEs spend on IS/IT. The manufacturing segment spent less than expected when compared with published research, but overall the SMEs we examined spent more than was indicated by an examination of available literature.
- Most SMEs are 'connected', and both independent research and our survey confirmed that a great majority of SMEs have adopted IT.
- It seems that e-commerce helps some SMEs get started, but far from a majority of small businesses take advantage of e-commerce.
- SMEs that are adopting ERP and KM systems are creating a growing market. These solutions may not be applicable for the smallest SMEs.
- Due to the wide range of types of SMEs, it is not possible to come up with a general list of best practices for IS/IT adoption for them. One SME may have 2 employees while another may have 200. One SME may be in the food service while another is in manufacturing, while yet another provides IS/IT service. The IS/IT issues for these companies are going to be considerably different. Therefore it is not possible to come up with a general set of best practices. We have shown that it is possible to limit the scope of the best practices, as we did with a medium sized manufacturing SME. When developing best practices for SME, one cannot take the macro-view of markets. They must look specifically at their firm's needs and abilities to decide which IT functions to implement.

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Interviewees

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- Lynn Potts, Publisher, Concierge Preferred Magazine, interview by e-mail by Angela Lieb October 19-November 1, 2004 www.conciergepreferred.com
- John Pawlikowski, President USA, Deloro Stellite, interview by e-mail by Angela Lieb October 19-November 1, 2004 www.stellite.com
- Chris Shocklee, VP, Drumtech, interview by e-mail by Angela Lieb October 19-November 1, 2004 www.drumtechus.com
- Jim Campbell, Edge Manufacturing, www.edgemfg.com
- Erman Ramos, CEO, Foundation Mortgage, interview by e-mail by Angela Lieb October 19-November 1, 2004 www.foundationmortgagellc.com
- Jim Eberlin, CEO, Host Analytics, interviewed in person November 1, 2004 www.hostanalytics.com
- Ken Cox, Director Internal Operations, Hostirian, interview by e-mail by Angela Lieb October 19-November 1, 2004 www.hostirian.com
- Donald Ficken, CEO, Leapfrog Performance Services, interview by e-mail by Angela Lieb October 19-November 1, 2004 www.ileapfrog.com
- OffiStart Business Centers, Angela Lieb, Founder, www.offistart.com

- David Prouhet, CEO, Pronett Solutions, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.pronettsolutions.com
- Ken Lauer, CEO, Rising Media, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.risingmedia.net
- Tom Sears, CEO, Riverbend Capital Group, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.riverbendcapitalgroup.com
- DJ Monzyk, Signs Now, www.signsnow.com
- Mary Schanuel, CEO, Synergy Group, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.synergy-pr.com
- Tom Jordan, CEO, US Net, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.us.net
- Mark Giannotti, VP, Venmar Solutions, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.venmar.com
- Craig McCallum, COO, Vistawiz, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.vistawiz.com
- Toni Davis, Partner, Wetrak, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.wetrak.com
- Shannon Brewer, CEO, Zarchivist, interview by e-mail by Angela Lieb October October 19-November 1, 2004 www.zarchivist.com