
From low technology to high technology: a tale of two printing companies

A tale of
two printing
companies

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Introduction

Like most economies, Singapore's economy depends to a large extent on small and medium-sized enterprises (SMEs) which constitute 94 per cent of total establishments in the manufacturing, commerce and service sectors, and contribute about S\$51 billion of total exports (*The Straits Times*, 1997). Yet less than 50 per cent of SMEs survived for more than ten years after start-up (Tan, 1997). As the business environment gets more complex, it is interesting to note that for these enterprises to cope with the complexity, and yet be competitive, there is an increasing need for them to deploy information technology (IT) in their daily business operations to help them produce, market, and service their products. Further, as these organizations become more international in scope with more diversified products and services that have shorter and shorter life cycles, it is imperative for them to leverage IT to facilitate global communications with their suppliers, customers and distributors. The role of IT in enabling business transformation is a crucial one. Organizations are able to streamline and co-ordinate the massive flow of information by redesigning or re-engineering their business processes in order to improve productivity and enhance competitiveness (Northrop *et al.*, 1990; Venkatraman, 1994).

Business process redesign or re-engineering (BPR) advocates the examination and redesign of business processes, thus enabling corporations to be much leaner by streamlining their business operations through the use of IT (Davenport, 1993). Although there are many success stories, for example, at Ford and Wal-Mart, there are also high failure rates of BPR projects (Cafasso, 1993; Stanton *et al.*, 1993). However, BPR has also often been touted as being practices that are more suitable for larger organizations, especially for those multinational corporations to radically improve their organizations' performances. Bigger organizations being more complex in nature are often seen to be in a better position to embrace re-engineering as they have the necessary financial and human resources to undertake such re-engineering projects. In addition, larger corporations are more likely to deploy cutting edge IT to be more competitive.

It has been argued that small and medium-sized organizations, on the other hand, often lack resources and computer expertise. Consequently, they may be

unlikely to deploy new information technologies to enhance their competitive edge. Besides, small enterprises are operated by family members, and thus tend to have more conservative management styles. More important, small organizations often do not understand the need to redesign their processes, as by definition by being small, they tend to have a more flexible organizational structure, and are thus more adaptable (Hale and Cragg, 1996).

Although small enterprises may tend to adopt a “fire-fighting” approach in solving problems, it must be noted that, with more complex and competitive environment, there is now the need for them to adopt innovations that would enable them to develop more efficient production and distribution processes. Hence, one of the objectives of this paper is to show that the ability and need to redesign basic business processes are important not only to large enterprises, but also to SMEs.

This study illustrates the power of IT that enables two SMEs in the printing industry, namely Superskill and Xpress Print, to transform the traditional manual printing processes to become high technology printing processes. By doing so, they are now more agile in their production processes and more responsive to customers’ needs. It is interesting to note that these two local printing firms have not only redesigned their organizational processes, but have also consequently transformed the printing industry. Of course, the degree to which the firms make changes, whether radical or incremental improvements, depends on the owners’ propensity to take risks and their motivations to initiate changes in their business operations. This study also illustrates that the innovations that were adopted had high level management and organizational support.

The printing and publishing industry

The printing and publishing industry is one of the oldest established industries in Singapore. It is also one of the top ten local industries in terms of both value added and output. It comprises over 400 establishments employing more than 17,000 workers in Singapore. Over the last decade, the industry has grown at an average rate of 10.4 per cent with exports increasing at 10.1 per cent and domestic consumption increasing at 17.7 per cent. Its performance has been supported by increased capital expenditure that rose steadily from \$79 million in 1987 to \$229 million in 1991.

The printing and publishing industry has gone through an interesting revolution. A labour intensive low technology operation is now transformed into a high technology operation. Today, the printing industry operates very differently from those of a decade ago. The conventional printing industry is basically a fairly low skilled and labour intensive operation. Most tasks were manually driven, time consuming, often painfully and tediously crafted. For example, the print materials had to be typeset and arranged in the appropriate format using “cut and paste” techniques in order to come up with draft copies. Often, several drafts had to be produced before the final product was approved for printing. The workplace tended to be messy with lots of manual “cut and

paste” activities. Today, thanks to IT, most prints and type-settings are handled by desktop publishing (DTP) software where many different versions and layouts could be completed on a just-in-time basis before printing. The environment in the print shop is now clean, uncluttered, and air-conditioned. Sitting on the desks are personal computers, unlike the days of the past where sitting on the bench tops were numerous templates of typesets, scissors, glue, etc. used to prepare print drafts for final typesets. More significantly, the tasks are now less labour-intensive and the prints are practically error-free and of higher quality.

Firms in the printing industry range from small stationery print shops to large commercial printers. Broadly, there are two types of printing operations and products: low-volume customized prints and high volume mass-produced publications. The former type of operations is often operated by small local firms, while the latter is mainly owned by foreign companies. This paper focuses on how two local firms in the first category, namely Superskill Graphics and Xpress Print, leverage IT to redesign the printing processes to build in quality in their print products. These two companies took the lead in transforming the printing industry from a low technology, labour-intensive industry into high technology intensive operations with their adoption of IT. Today both firms have become leaders in their respective printing market niches.

The following sections provide the background to the printing firms.

Superskill Graphics

Superskill Graphics Pte Ltd was established in 1978 as a modest typesetting firm by the husband and wife team, Mr Kelvin Tan and Mrs Tan Soo Buay. The company operated from a small office unit with a floor area of about 800 square feet. Typesetting was very much a manual process and Superskill's only investment in technology was an IBM electronic composer, a couple of Chinese typewriters, and a Compset phototypesetting machine. By 1983, the business had outgrown the space of the original shop, and it shifted to its present location with a space of 3,456 square feet.

Initially, Superskill started offering computer typesetting services some 16 years ago with a small revenue turnover of S\$2,000 a month. Today, Superskill has grown to become an international business and a market leader synonymous with excellence and innovation in desktop publishing (DTP). Its business growth, with assets worth over S\$4 million, is evident by the increasing number of off-shores offices in the region, especially, in Hong Kong, Taiwan and Malaysia. The growth is attributed to Superskill's determination to find the best technological solution to innovate the printing processes to provide the best quality and most cost effective service to her customers.

As the result of management's high risk-taking propensity to leverage information technology in the printing industry, Superskill has several applaudable achievements. In 1983, Superskill was the first printer in Singapore to accept electronic manuscripts for typesetting; in 1987, it installed the first

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desktop publishing system in Southeast Asia using the Linotronic 300 system in conjunction with the Apple Macintosh; in 1989, it took the lead as the first company selected by Autologic USA to install the world's fastest English and Chinese laser imaging system; and in 1990, it won the first national IT award under the small and medium enterprises category given by the National Computer Board for its innovative use of IT.

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Superskill's investments in IT included ten APL terminals linked to a Linotron 202 for fast, high quality typesetting, a Linotron 300 with 14 Macintosh II workstations, laser printers, communication modems and the latest DTP software. The extensive range of supporting facilities and services available at Superskill means that it is able to literally turn raw manuscripts into complete layout pages, in multiple colours all ready for printing within a day or sometimes within hours depending on the size of the job. Diskette format converters would convert nearly all types of computer input files to the final formats needed for the phototypesetting or desktop publishing.

With business growth, Superskill continued to invest in IT and explore new ways to make better use of its existing computer technologies. For instance, when the first digitized phototypesetting machine, the CRTronic, was introduced in Singapore in 1980, Superskill had purchased two of these machines by 1982 at a total cost of over S\$200,000. The machine was capable of storing texts on diskettes and had eight on-line type fonts. Superskill literally transformed the process of typesetting with these new machines. However, by 1983, the CRTronic machines could not keep up with increasing business demands. Mrs Tan soon realized that it was not cost effective to continue to buy the expensive standalone typesetting machines to increase its printing capacity.

New ways of typesetting had to be examined to solve the problem of its dependence on the CRTronics machines. In the search for a possible solution, Mrs Tan learned that Linotype had produced a powerful phototypesetting system with APL terminals at front ends. The APL terminals were actually Apple microcomputers that have been modified to link with the phototypesetter. She then decided to trade in all their CRTronic systems and buy the Linotype Linotron 202 phototypesetting system. It was a good strategy as Superskill had already invested heavily in Apple microcomputers for their DTP systems.

At that time in the mid-1980s, microcomputers were becoming increasingly popular in Singapore. Although Superskill's clients could type their documents and save them on diskettes using word-processing software, the software format was incompatible with the typesetting machines. Thus, a hard copy is still needed from the customers in order to retype the manuscripts using the format required by the typesetting machines. This resulted in not only unnecessary duplication of work, but also in producing lower quality and reliability products since errors may inevitably be introduced during the retyping process.

In order to interface typesetting terminals to ordinary microcomputers, thereby eliminating the necessity of retyping and reproofreading, Superskill

engaged a software firm to develop a disk conversion system. The conversion system would then translate or convert the documents created with incompatible word-processing software to usable typesetting files that could be read by the typesetting machines. Hence, with the new disk conversion system, Superskill became the first typesetter in Singapore to accept manuscripts on diskettes. However, the disk conversion system was limited only in supporting the different types of software and hardware that were currently being used. This would be problematic when newer technology was introduced. In order not to be dependent solely on software consultants, Superskill set up its own in-house research and development unit to oversee the upgrading of the disk conversion systems in-house. Outside consultants were not engaged in the development owing to cost considerations and the proprietary nature of the software. In other words, it would be unwise to subcontract its strategic competences.

With the enhanced disk conversion facilities, Superskill encouraged its clients to submit manuscripts on diskettes which in turn would provide faster turnaround printing. Interestingly, in doing so Superskill has not only shifted the responsibility of data entry to the customers, but has also managed to eliminate or minimize the time-consuming tasks of retyping and reproof-reading manuscripts. Superskill only needed to convert and reformat the clients' data and key in the necessary codes for typesetting. In fact, major customers were even encouraged to key in the typesetting codes themselves. As a result, Superskill increased its productivity and reduced its operating costs. Superskill, subsequently, passed the savings to its clients in terms of reduced printing fees and providing faster turnaround time.

Deploying desktop publishing (DTP) system

In 1986, Apple introduced desktop publishing (DTP) on Macintosh in Singapore. Superskill was among the first to realize the potential of using computers to do phototypesetting. Mrs Tan, the proprietor of Superskill Graphics, although not formally trained in computer systems, realized that if pages could be output directly from imagesetters from the computers, the cost and time taken for phototypesetting could be drastically reduced. Thus, in 1987, Superskill installed the first DTP system for phototypesetting in Southeast Asia. Today, Superskill is well known as the pioneer as well as a specialist in DTP in the printing arena.

In line with its strategy to encourage manuscript submission on diskettes, Superskill installed ten Apple Macintosh computers at its major clients' sites. These clients were trained to handle both data entry and page layout on their own. However, they still needed to return to Superskill for value-added services in terms of typesetting requirements. To save time in sending diskettes, Superskill facilitates transmission of data electronically by providing modems in these clients' sites. In 1991, Superskill installed Integrated Services Digital Network (ISDN) lines at its premises to facilitate data transfer with some of its

overseas clients. Such strategy effectively locks-in customers to continue using its services.

Gradually, over time, Superskill became an expert in DTP technology and took proactive steps to build up long-term relationships with clients by selling them DTP systems. The rationale is that with the proliferation of PCs, it would be a matter of time before companies started investing in their own DTP system. In this regard, clients could reduce costs and time since they do data entry, returning to Superskill for casting off their final artworks on to high-end imagesetters. Superskill is, therefore, able to provide better services as it can focus on value-added imaging. Thus, by selling DTP systems to clients, Superskill managed to reduce costs as well as supplement its resources. Indeed, it was so successful in selling DTP systems that, in 1989, it became a value-added retailer (VAR) for the Macintosh computer. As a VAR, it enjoys significant discounts when it purchases Macintosh computers either for customers or itself. Furthermore, it enables Superskill to keep up to date with the latest DTP technology as well.

It came as no surprise that Superskill became the first company in Singapore to provide a fully computerized English-language typesetting service. However, since Singapore is a predominantly Chinese community, typesetting in Chinese characters is often required, especially for the small enterprises. In the conventional way, the typesetter literally typesets each of the 100,000 characters in the Chinese language, which is both very slow and labour-intensive. So, in 1989, Superskill launched the Chinese-character typesetting, which was a joint venture with Automation Applications Centre and Kompac Equipment Systems. Using personal computers to input Chinese character documents, the system drives a robot operating the typesetter. Unfortunately, the project failed after an expenditure of over S\$60,000. However, in 1990, the Chinese version of PageMaker was released, thereby eliminating the need to develop software for typesetting in Chinese.

Superskill then became the first company selected by Autologic USA to install the world's fastest English and Chinese laser imaging system. Through continual software and hardware upgrade, it now has the capability to provide typesetting in a variety of languages including Chinese, Malay, Tamil, Thai, Japanese, Korean, Russian, French, German and Spanish. Superskill's DTP systems can also mix easily different languages on a single page compared with the tedious manual process if traditional machines were used.

Specializing in pre-press colour separation

Colour separation is an important specialized activity in the printing industry. Basically, colour separation is the stage that prepares the films, after the page design, for printing. It is interesting to note that Superskill also specializes in this activity besides DTP typesetting. Over S\$1 million was invested in the computerized colour scanning and separation equipment. These machines enable Superskill to do desktop colour separation that was previously the domain of colour separation houses. With these machines, Superskill

established itself as one of the leading typesetting firms that provide colour separation services and consulting. By being the first company to install a new model of Macintosh to incorporate colour graphics and images into DTP systems, Superskill once again demonstrated its technological leadership in the printing industry. Mr Kelvin Tan, the executive director, best expresses the versatility of Superskill's services:

We can retain our customers and attract new ones because we can take on a job at any stage.

Colour separation is the stage that prepares the films for printing once the text or graphic objects are designed. The output of the design stage comes in colour films. However, depending on the colour requirements, the films can come in three or four basic colours. The number of sets of films output depends on a number of factors, for example, the number of different text format and/or the number of different colours. At the colour separation stage, essentially the task is to lay out and overlay each different text and/or colour on each film, and this process is called "stripping". Stripping, a term used in the printing industry, is defined as the process of combining textual and graphical films into a single set of film for printing.

The computerized machines would enable an operator to strip 20 sets of pictures a day, as opposed to four sets using the traditional, labour-intensive method. The colour separation process is a tedious task that requires intense concentration for the following reasons. First, films with the least graphical objects or textual content have to be stripped and pasted to those which have more. This requires precision for alignment. Second, films are sensitive to dirt; therefore, the lighted glass top has to be constantly clean and the films blown to remove any particles. Third, cutting must be precise to facilitate pasting and recasting on the plate. The process is dramatically simplified in the DTP environment. It is now easy to overlay objects and colour on each other, and have it digitally printed on a colour printer.

Impact of information technology

To date, Superskill has invested about S\$5 million in IT. Its impacts resulted in reduced operating costs and increased productivity owing to higher accuracy and faster layouts of typesets, thus also providing better quality of publications. Its overseas jobs have increased tenfold from 3 per cent in 1990 to more than 30 per cent in 1995. With increased computerized applications to the many print processes, Superskill was able to cope with increased volume without any significant increase in the number of staff. Interestingly, Superskill introduced DTP to Xpress Print, and is also its consultant for colour separation.

Superskill's emphasis on both quality and speed in order to compete successfully locally as well as regionally is best summarized by Mrs Tan:

In this line, the margins are small. We can't charge much lower rates, but we can do things better, and faster, for our customers. To them, that's money saved.

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As an illustration of how IT has fundamentally transformed the typesetting process at Superskill, let us consider the time taken to print a 200-page book. Using a conventional typesetting machine, it would take about five days. With DTP, the same job can be done within three hours. Furthermore, the quality of the print is high and is consistent unlike that of the conventional typeset that depends on manual skills and moods of the typesetter.

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In 1990, Superskill had about 40 employees with a revenue of about S\$1 million. In 1995, the staff strength had increased by 25 per cent, to 50 employees but its revenue had increased by 400 per cent to S\$5 million, and “with a lot less headache” according to Mrs Tan. This growth is even more impressive if we consider that in 1978, its revenue was only about S\$10,000 and its staff strength was fewer than five employees. By 1992, Superskill had captured 20 per cent of the \$25 million DTP and typesetting business and 80 per cent of the Singapore publishing market. Its clients include Federal Publications, Times, Longman, and Butterworth, just to name a few.

Future challenges: deploying the Internet to extend market reach

The latest advancements in the Internet have further expanded Superskill's reach to the worldwide market. Superskill is currently developing services on the Internet. By transmitting information rapidly and cheaply via the Internet, it is better able to serve its international customers. Clients worldwide can easily send their jobs over the Internet to Superskill. As a result, overseas companies can take advantage of the lower costs of printing in Singapore, without sacrificing quality and timely delivery.

Xpress Print

Let us look at another printing company to illustrate how IT impacts on Xpress Print. In 1976, Mr K.K. Fong started a small and low-volume customized printing shop (which was eventually called Xpress Print) whose main business was printing instant business name cards. The jobs were often small and required a fast turnaround time. Xpress's main business objective, in the early days, was very simple – only to increase its market share in the instant printing business by providing good services at competitive prices to his local customers. Although the business grew over time, its growth was limited by the small market size in Singapore.

As the business environment was starting to be competitive, the survival of many printers was threatened by new entrants in the relatively “low setup cost” and “low skill” type of industry. Also, since the nature of the job is relatively low skilled and mundane, labour turnover was high. This situation was further aggravated by the tight labour position in Singapore due to rapid economic growth in the manufacturing industries. Xpress realized that it needed to seek new methods to increase operational efficiency and reduce the dependence for labour.

However, Mr Fong had a new vision to create a market niche by printing time sensitive financial reports for the brokerage firms that were beginning to locate

in Singapore. These financial firms were beginning to set up offices in Singapore as it was fast becoming a financial hub in Southeast Asia owing to its strategic geographic location and infrastructure. As these brokerage firms needed to provide timely research reports for their clients in order to effectively take advantage of any opportunities that might arise in the financial markets, it was therefore natural to cater for such niche clients.

Deploying DTP, telecommunication and video-conferencing

With his new business vision, Mr Fong, the proprietor of Xpress, used IT to re-engineer its printing operations for two main purposes. First, to cater to the needs of the brokerage firms which rely on time sensitive reports, and second, to reduce the dependence on the high turnover of its unskilled workers. Mr Fong engaged Mrs Tan of Superskill Graphics to help him implement the relatively new DTP technology in providing the firm with a more efficient approach to its labour-intensive "cut and paste" jobs.

So in 1987, with over ten years' experience in the printing industry and a vision to create a market niche, Xpress invested in DTP technology to run a 24-hour printing service that prints time-sensitive financial reports that cater to brokerage and financial houses. Xpress was able to create this market niche because larger printing companies avoided competing in this segment as most print runs were too small (typically 1,000 copies or less) with a required fast turnaround time of 24 hours or less. So, starting off with only one client, James Capel, a well known stockbroking research company, Xpress has since captured more than 90 per cent of the market share in printing time-sensitive financial reports in Singapore. Rather impressively, it has also captured more than 50 per cent of the global market share (Chan *et al.*, 1995).

Xpress prides itself in introducing electronic communication extensively with his clients although Superskill was the first printing company in Singapore to use dedicated ISDN lines to communicate with its clients. The use of ISDN enabled raw text and content to be received from clients in a fast, efficient, and secure manner. However, for those customers without ISDN, Xpress provides two disk faxes to receive their documents. Alternatively, the facsimile is used and the documents are then scanned electronically into the computer systems.

The use of such telecommunications devices essentially transfers the responsibility of accurate data inputs to its clients, thereby eliminating complaints due to errors made during retyping. With the clients producing the initial input, Xpress only needs to provide high value-adding facilities to finalize the reports. Similar to Superskill, Xpress provides modems, PCs and ISDN lines to clients to facilitate the transmission of files round the clock. In addition, like Superskill, Xpress provides training on the use of DTP software to its clients so as to further increase the efficiency in pre-press work. The DTP system also customizes the translation software to convert documents into English, Mandarin, or even Japanese. According to Mr Fong, Xpress is the

world's only printer in the industry capable of printing reports in Japanese, in full colour, and in less than 24 hours (Wong, 1994).

As each financial house has its own format of presentation, the text from each client is then converted to the desired template with the assistance of the creative team. Xpress then uses desk-top video-conferencing and screen-sharing systems that enable clients to view the changes and the final draft on screen while communicating with Xpress' in-house graphic designers. The desktop video-conferencing system facilitates face-to-face, real-time discussions on the pre-press designs. Corrections, adjustments, and modifications are readily made on the electronic drawing board and discussed simultaneously during the video-conferencing meetings. The sessions can also be taped so that the changes are documented, thereby reducing liabilities due to miscommunication.

Forging strategic alliances

In order to compete more effectively, Xpress forged strategic alliances with complementary companies to deliver their products. The first alliance was formed in its early days with Superskill to fill in a gap in their expertise on DTP and colour separation. Occasionally, Xpress subcontracts additional typesetting, casting of films, scanning, and making of slides to Superskill. By outsourcing some of its work, Xpress frees its resources to concentrate on its core competences of creating and designing reports for their customers. Seeing that Superskill had the expertise in colour separation, the alliance provides Superskill with additional business, as well as enhancing its reputation as the leading printer that provides colour separation services. Although both printers could be considered competitors, it is worth noting that they are able to complement each other's skills and services as they compete in different market segments.

The second alliance is forged with DHL, a multinational courier corporation, also a National IT award recipient in 1990 for its innovative use of IT. This alliance is necessary in ensuring that the time sensitive financial reports are delivered to clients in the quickest possible and most efficient manner. It would not be useful for Xpress to be able to print time sensitive financial reports but not to be able to deliver them in a timely manner. Thus, evidence of the strong nature of this alliance can be seen from the fact that DHL has an office space set up at Xpress OHQ to customize shipping schedules and co-ordinate the shipping of the printed reports.

Xpress benefits greatly from this alliance since it is now able to concentrate on its core competence in printing the reports rather than diluting its financial resources and manpower in setting up its own transport and delivery network. Furthermore, this alliance gives clients the confidence that the financial reports will be delivered in a timely manner. This is because clients could make use of DHL tracking system to check and monitor the location of the financial reports which are in transit to them.

Impact of information technology

The importance of IT in Xpress is best expressed by Mr K.K. Fong, its CEO:

We firmly believe that our success lies in keeping abreast of IT innovations in desktop publishing. We are committed to exploit IT even further to boost our competitive advantage.

This family-run business which started with a modest sum of S\$8,000 in 1976 is now worth over S\$60 million in 1996. Currently, Xpress has a staff of 150, with sales growing at an average of about 50 per cent per annum and revenue is expected to surpass the S\$25 million mark in 1996. In Singapore, Xpress commands about 95 per cent market share of the time-sensitive financial reports; in the Asia Pacific region, its share is about 80 per cent, while globally, it commands about 55 per cent of the lucrative world market (Tan, 1995; *The Straits Times*, 1994a).

Xpress is currently capable of handling 60 projects of 32-64 pages a day with a turnaround time of 24 hours in contrast with other printers' turnaround time of one week. In the period from 1991 to 1995, Xpress' revenue has increased sixfold from S\$4 million to S\$25 million. Such performance is remarkable considering that there was only about a twofold increase in the number of employees during that period. Similar to Superskill, Xpress' dramatic growth in market share without a proportional increase in the use of expensive labour resources was made possible through the strategic use of IT. It is clear that Xpress has harnessed IT in facilitating the growth of its business from a low technology, labour-intensive sweatshop into a high technology, world class printing house with global clientele. In recognition of its achievement, Xpress received the National IT award for the Small and Medium Enterprise category in 1994 (*Business Times*, 1994).

Future challenges: Print 2000

Xpress is currently embarking on a project called "Print 2000" to boost further its leadership position. Print 2000 aims to fully automate the entire printing process by integrating the communications infrastructure with state-of-the-art digital print technology. The objective is to assimilate the pre-press services into a one-stop-shop concept with remote and on demand printing technology, thereby further reducing turnaround time for printing.

About S\$60 million will be invested in the Print 2000 project. This project is poised to alter greatly the pace of competition with its new standard of global excellence in terms of both quality of output and turnaround time. Xpress is the first company in the Asia Pacific and the second company in the world to acquire the latest Direct Imaging Printing (DIP) machines from Germany. DIP systems allow digital data to be sent directly to the printing press. These machines provide an integrated solution in publishing and printing, as direct printing from diskettes eliminates the need for all intermediate processes like colour separation, film making and print plate making. Data files can be transferred directly on to the plate, thereby facilitating remote printing.

Implications and lessons learned

This paper illustrates how two local companies in the printing and publishing industry have moved away from the “sunset industry” of labour-intensive low technology printing by adopting IT to re-engineer and streamline the printing processes. There are several reasons for their success which serve as important lessons for other companies.

1. Willingness to learn and adopt new technologies

It is interesting to note that neither Mrs Tan of Superskill Graphics nor Mr Fong of Xpress Print shy away from adopting new computer systems in their organizations even though their knowledge of computers was minimal. Instead, they went through a self-taught period of learning the “nuts and bolts” of what information technologies are all about. In our interviews with them, they worked very long hours and their willingness to learn new technologies by attending basic courses, and constantly reading trade journals and visiting trade shows to increase their knowledge, paved the way to easier adoption. Their enthusiasm in learning new IT tools was also influenced by the many computerization programmes that the Singapore government was trying to promote at that time. To inspire confidence in the new tools, the IT vendors who were trying to promote desktop publishing systems were very supportive. Thus, coupled with their faith that IT would help them to create the necessary competitive edge for their businesses, the adoption of IT has enabled Superskill and Xpress to increase the quality of print outputs. IT has also provided the economies of scale and scope for them to compete in the global markets; a market which they would not have had, had they just relied on the conventional print processes. More important, IT has enabled them to expand their businesses overseas without the exponential increase in operating costs.

2. Risk taking and continued investment in IT

It has been noted from past research that entrepreneurs tend to have greater risk propensity to adopt technology in order to catch up with the bigger players. They are, therefore, more innovative in deploying the latest techniques or at least in trying out the latest methods to improve the firms’ competitive edge. Such visions to adopt and leverage cutting edge technologies appear to be the qualities of the owners of Superskill Graphics and Xpress Print. The motivations for both firms to improve their operations were fairly similar. They both adopted IT in response to problems that they were encountering and then, having adopted the technology and realized the benefits, they made bolder investments to pursue their growth strategies. Indeed, their subsequent IT strategies helped them to enhance external flexibility to respond to customers’ requirements, while at the same time pursuing more internal efficiency for product quality.

3. Leverage IT to redesign business processes

In terms of the changes in the print processes, it seemed that both entrepreneurs made innovative changes by deploying DTP and ISDN technologies to prepare the prepress processes for printing, especially in the data entry and transmission of files for print design and layout. DTP revolutionizes the printing processes with direct text input into the computer from the customers, thereby enabling both companies to farm out expensive high labour intensive data entry works to their clients. This strategy enables Superskill and Xpress to concentrate on the high value-added activities of design and layout. The clients benefit from this arrangement since errors due to retyping are eliminated, which in turn provides cost savings in terms of reduced turnaround time and printing fees. The use of telecommunication networks enabled Superskill and Xpress to edit the files online and finalize their clients' report requirements quickly and accurately. Using the strategy where data entry is handled by the clients allows both firms to increase their clientele not only locally but also worldwide yet without having to increase manpower. These radical changes in the printing processes have enabled Superskill and Xpress to make dramatic improvements in productivity and quality of products. Consequently, both companies have become significant players in the global market.

4. Find a suitable market niche

Superskill and Xpress can be viewed as role models (*The Straits Times*, 1994b) for other printing companies. For Superskill, IT has enabled it to become one of the leading typesetting firms that provide colour separation services. For Xpress, IT has enabled it to establish a market niche in printing time-sensitive financial reports, by drastically reducing the lead time for printing financial reports from seven days to only one day. With DIP technology, the lead time can be further reduced to 12 hours. Both companies have also made substantial investments in ISDN for communication with overseas clients. Superskill uses the Internet for communication while Xpress invested in video-conferencing systems for similar purposes, with remote printing in the near future.

Past research has shown that, in this era of global competition, continued environmental surveillance and keeping up with new technology is necessary to maintain market leadership (Kettinger *et al.*, 1994). Hence, by staying at the forefront of technology through continued investment in IT, Superskill and Xpress are better able to maintain their leadership and pre-empt any competition in the niche market for colour separation and printing time-sensitive financial reports respectively.

5. Top management vision and commitment

In addition to continued innovation, management vision, support and commitment for the use of IT is crucial, as these criteria of success will determine how organizational resources are deployed (Cummings and Davies, 1994). Interestingly, although both Mrs Tan and Mr Fong have no formal training in the use of IT, they both ardently believe that investments in IT will

enable them to compete more effectively. With such strong belief and commitment from the proprietors, Superskill was among the first to realize the potential of IT to reduce or eliminate low value-added work (e.g. data entry). As a result, Superskill was the first typesetting company in Singapore to accept manuscript on diskettes. This “manuscript on disk” concept gradually became widespread in Singapore. Conversely, Xpress was the first printing company in Singapore to realize the potential of video-conferencing to facilitate fast and accurate editing and secure communication with overseas clients. Currently, several other printing companies have taken a similar approach to use ISDN to communicate with their clients. The illustrations clearly demonstrate that when management plays a proactive role in deploying IT, maximum benefits can be obtained (e.g. Jarvenpaa and Ives, 1991).

Further, both proprietors seem to have the visionary foresight as well as high risk-taking propensity to use IT to innovate their print processes. Their abilities to recognize and capitalize on opportunities offered by new technologies to solve problems (e.g. DTP was used to solve the problem of errors made during retyping) are examples of their foresight. By catering to market demands (e.g. time-sensitive printing for the brokerage firms), Xpress created a market niche that other printers were not interested in.

6. Build barriers to entry using advanced technologies and electronic links

Similar to airline reservation systems that raised barriers to entry in the airline industry (Copeland and McKenney, 1988), the entry barriers for venturing into the printing industry have also been raised. For instance, the use of sophisticated information technologies, namely computerized colour separation machines for Superskill and DIP machines and remote printing for Xpress, created entry barriers for firms without the necessary IT resources and infrastructure from competing with them. In order to compete effectively with Superskill, competitors need to invest heavily in colour separation machines. Similarly, competitors that strive to venture into the niche market for printing time-sensitive reports will need to invest in DIP machines in order to compete effectively with Xpress.

In addition, the case also illustrates that by forging electronic linkages with their clients, both firms have also made it more difficult for their respective clients to switch to other printing companies. The decision to provide the clients with computers and modems is a typical example of an attempt to lock-in clients and build a long-term relationship with them (Venkatraman and Short, 1992). Although clients can easily switch to other printing companies, most of them would not do so owing to the effective customer service and competitive pricing provided by Superskill and Xpress.

7. Forge strategic alliances for mutual benefits

It is never easy to form business alliances with firms or competitors in the same industry. However, if the alliance is for a common good and each firm is able to differentiate itself from the others, the business alliance should be embraced.

For this case, the alliance between Superskill and Xpress is seen to be mutually beneficial – Superskill benefits from increased business opportunities, and added revenue from Xpress, with a reputation as one of the leading printers that provides colour separation services; and Xpress benefits from tapping into Superskill's expertise in areas in which they are currently weak, hence reducing the learning curve. Although the alliance with Superskill was essential in the early years, however, with the implementation of Print 2000 and the use of DIP technology, there will be little need for Xpress to subcontract part of its colour separation process to Superskill. DIP technology effectively shortens the steps in the printing value chain. Forging alliances for mutual benefits (e.g. the alliance between Superskill and Xpress) led both companies to be more successful than other printing firms which are relatively slow in responding to environmental needs and changes.

In another form of business alliance, Xpress has an alliance with DHL for it to customize couriers for the delivery of financial reports. As this alliance is formed with an organization from another industry but with a synergistic approach, DHL's dedicated service to co-ordinate special delivery of the financial reports has helped to ensure timely delivery of time sensitive financial reports. In terms of benefits, every added customer of Xpress means another job for DHL, which in turn increases its revenue. For Xpress, its timely delivery through DHL encourages customer loyalty, hence enabling it to build up and maintain its large market share.

8. Persistence and continued innovation

What sets Superskill and Xpress apart from other printing companies are combinations of various factors ranging from the entrepreneurial spirit of the owners to the ability to be flexible while capitalizing on market opportunities. Both founders' pursuit of success is commendable. Although they faced many difficulties in the early years, such as shortage of labour, high labour turnover, slow, error prone and poor print processes, and high operating costs, they persisted in finding new ways to innovate and re-engineer their printing processes.

Superskill's and Xpress' performances have contributed significantly to the economy of Singapore, in terms of the growth of the local printing, shipping, and telecommunications industries. Both organizations play a secondary role in the establishment of Singapore as a regional hub by making it easier and convenient for businesses to obtain quality printing at competitive prices and delivery schedules. A lesson that young entrepreneurs ought to learn from this study is that both founders overcame the difficulties by continually looking at new avenues to improve their business.

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