

Investigating the Implementation of a MIS Strategy in an Australian SME

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ABSTRACT: *IT system could fulfil strategic information needs provided the right system has been selected and implemented. Very often, however, the selection is far from the ideal one: tactical considerations dictate implementation of inferior systems, which in the long run costs organisations dearly. This paper describes lessons learnt in pursuit of improving IT strategy in an Australian manufacturing company. Initially, a MIS software, called ManuSoft, was introduced primarily on ad-hoc basis. Later, its utility to management was improved with the development of 20 interface programs. The whole IT system is now under threat of being replaced by a completely new system.*

Key words: IT implementation, MIS, Australian application.

INTRODUCTION

For competitive advantages organisations need to develop an effective information system strategy. The decision on the extent of organisational reliance on IS and the nature of IS system that would be implemented depends on many technical and practical considerations. Technical considerations such as capability, maintainability, adaptability etc are to be weigh against budgetary, human relations, management support and related considerations. From the perspective of short-term and long-term utilisation, the characteristics, such as user-friendliness, cost-effectiveness, technological robustness, etc., of the implemented MIS are also important (Lucas and Spitler, 1999; Taylor and Todd, 1995). Very often the decision in implementing a MIS is dictated by the limited perception of organisation's requirements. Technical superiorities are often compromised against short term financial considerations. This paper focuses on implementation problems, specifically on strategic considerations in the process of implementation of a MIS in an Australian SME.

The authors worked side by side with a medium size job shop manufacturing company in Australia over three years period (1995 - 1997) in developing and implementing an information strategy for the company. An IT solution was proposed and implemented. However, after two years of that implementation the company is now in the verge of abandoning the IS and rethinking its IS strategy. Though to a great extent it is to do with the restructuring of the company, the authors feel that the technological obsolescence is hastened due to faulty IS strategy adopted by the company in the first place.

The paper, first, presents a discussion on the need of IT systems in manufacturing organisations. Then, a description of the proposed IT system and its implementation details are given. The paper also discusses the specific benefits gained by the company from this IT system and future scopes of development.

INFORMATION TECHNOLOGY IN MANUFACTURING

Manufacturing companies across the board are struggling to keep in step with the developments in an aggressively dynamic computer industry. Apart from general hardware, the largest area of expenditure in the hardware field is client / server technology. A survey conducted in 1995 in the USA amongst 2,400 organisations showed that, of the many companies moving to client / server technology, 41 percent planned to increase mainframe purchases (Miles, 1995). The survey also showed that 49 percent of the responding companies that did not have client / server strategies planned to boost their purchases of mainframes.

There is a definite view in the manufacturing arena that it is necessary to remain up to date with evolving computer hardware technology, and that it is not clear as to what type of platform, client / server or mainframe, is best suited to MIS development. The roles of computer technology in manufacturing are evolving as the technology itself evolves.

There are a large number of commercial software packages geared towards the needs of manufacturing companies. But, the significant few are R/3(SAP), MAPICS XA, BPCS, Movex, Tritan (Baan IV), Manugistics, GEMMS and ManuSoft (Sweeney, 1997). Most of these packages are being programmed or re-programmed in

object-oriented languages and most now employ external databases. Majority of the larger applications can run on many different external databases such as Oracle, DB2, Informix, and SQL. The larger application developers place great importance on keeping up with the latest available technology, but smaller developers such as ManuSoft can often fall behind.

From the array of available products and solutions it is obvious that one-size software, or even one method of obtaining a software solution, can not fit all businesses. It is also unlikely that any single developer will meet all of a company's computing requirements.

One of the fastest ways to distinguish among systems and find a 'best fit' to an individual company is to find out what is required to adapt the software to a particular (and sometime peculiar) method of doing business. Flexibility translates into the ability to customise fields, screens and relationships of data. The systems by the large developers, offer full customisation of fields, screens and layout. As flexibility increases, price tends to go up. But low price does not always translate into loss of flexibility. Many systems at the low end of the price range have some flexibility. The names of miscellaneous fields may be changed, or perhaps unwanted items can be masked, and in some cases custom screens can be added. But, how much customisation does an organisation truly need? Today companies are forced to distinguish between "must have" requirements and "nice to have" components (O'Connell, 1995).

A number of Enterprise Resources Planning (ERP) software packages are available commercially. But, their use is being impeded by the fact that in most application situations, the generic software can not directly address the organisation's specific requirements (Mandal and Baliga, 2000).

Along with the operation of the MIS, companies must decide which MIS tools are important (e.g. financial management, materials control, personnel management or production control), and choose or develop a MIS that suits their specific needs. It must also always be kept in mind that a MIS is a management information solution, not a management solution.

A SUGGESTED INFORMATION SYSTEM SOLUTION

The Case Study

A Melbourne based medium size job shop manufacturing company, named here as ABC Engineering Company, felt the need of implementing an ERP system which would enable the company to manage information resources and help in decision making. In 1993 the ABC Engineering installed ManuSoft, a MIS package, as one of its drives towards becoming technologically (information area) advanced. The decision of implementing ManuSoft was primarily controlled by cost consideration (less expensive compared to other packages) and access (ManuSoft is designed, developed and marketed by an Australian company). But, ManuSoft remained underutilised for various reasons: the prominent reason being the lack of computer technical support in the company, and the inflexibility of the ManuSoft package itself. It seems the introduction of ManuSoft was a mistake and the company should have been more careful in deciding an information system.

Clearly, ManuSoft was inadequate in meeting the information requirements of ABC Engineering (see for technical details below). The company is a precision job shop manufacturing company and it provides machining, fabrication, toolmaking and assembly services to a wide range of industries. The company employs over 120 personnel and had a turnover of A\$18 million in 1996. The company makes parts as per customer orders. It provides machining services to many types of industry including the aerospace, jigs and tools industry. The eleven product streams (for business control and reporting purpose) of the company are canning and packaging, wire cutting, large machining, small machining, jigs and fixtures, large press tools, small press tools, mould tools, refurbishment and repairs, design only, and major projects. Approximately 65% of parts are produced on a one-off basis. To satisfy the information requirements of such a dynamic company a much more flexible and technically superior system than ManuSoft was needed.

Technical Details of ManuSoft Package

ManuSoft is a modular package similar to its larger competitors R/3, MAPICS XA and BPCS. There are five modules in the complete ManuSoft package: *Quoting and Estimating System* (QES), *Production Scheduling and Control* system (PSC), *Manufacturing Control System* (MCS), *Manufacturing Inventory Control* package (MIC), and *Materials Requirements Planning* package (MRP).

When all five modules are implemented the system presents a fully integrated MRPII system, with information control from order to despatch. The system can be installed in total or in separate modules. The modules used will be dependent on the requirements of the user.

The ManuSoft system is designed specifically for the DOS operating system. When recording data it locks only individual records for update so the rest of the file is open for multiple user access. This overcomes multiple user difficulties that can be encountered by programs running on DOS. Any IBM compatible PC with

4Mb memory and an 80386 processing chip (or higher) can handle its operation. To operate in the multi-user configuration it is preferable to run from a more powerful computer, although this is not a requirement, only a recommendation. The most important technology for ManuSoft with respect to operating speed is the server hard-drive. This is because the ManuSoft system, to allow multiple users to operate simultaneously in the DOS environment, must write all transactions that may cause changes in the state of its database directly to disk.

As with any system, memory is a valuable asset, in ManuSoft's case specifically for output operations. When compiling reports, the ManuSoft system writes and sorts many temporary files in order to organise data. As these files and the output reporting functions do not make any changes to the database files, the system can make use of main memory for these processes.

ManuSoft recommends the program be run on an Ethernet Local Area Network (LAN), controlled by Novell Network software. ManuSoft's original design was for this platform, although use of most networking systems is conceivable. Earlier versions of ManuSoft would not run on Windows networking systems, NT or Windows 95. The powerful caching tools of these systems over-rode the record locking facilities of the MIS causing system failure. ManuSoft has overcome these difficulties in later versions but only through robust, proprietary programming measures. Unfortunately these measures also slow down the system.

ManuSoft system has certain disadvantages:

- The structure of the data files makes it necessary to write specific operation programs for every data file. It also means that users are presented with a partially rather than fully integrated relational database.
- The operation of the index system makes it impossible for a user to define or restructure the search priorities or configure specific tracking of items.
- The combination of the Ethernet networking and the DOS operating system makes it unlikely that ManuSoft will ever run advanced data collection and distribution routines using CAD data for example.
- The user interface for system operation is inflexible forcing users to follow specified steps to produce outputs whether or not the user requires the steps.
- The structure of the data files make comprehensive and flexible reporting to management requirements very difficult to achieve. The system's inability to arrange and convey required information inhibits its ability to meet the information requirements of a MIS.

The inflexible output of the ManuSoft system is typical of modular MIS development. The authors did not have any say in the introduction of ManuSoft: it was introduced into the organisation long before the authors offered their help in solving the information management problems. The authors proposed to overcome the problem through the development of a set of interface programs that would provide company specific report to all levels of management in the job shop company.

Interfaces to Meet Management Requirements

To improve utilisation of ManuSoft the authors proposed and implemented a project to design a number of interfacing programs, which will extract information from ManuSoft databases and generate reports as required at various levels within the organisation. Staffs at ABC Engineering were interviewed to discuss reporting requirements and preferences at strategic, planning and operation levels. The requests for information showed that the ManuSoft system caters well for the operations level of the business, but the strategic and planning levels required a great deal of work.

In total 20 program files were developed to meet the information requirements. The details of the programs were published in Mandal and Baliga (2000).

HOW THE INTERFACES PERFORMED?

This section discusses the usefulness of the interface programs. For illustration, only three interface programs are described here.

Delivery Performance Interface

The delivery performance program, which is an example of interface program development in the early stage of the project, simplified the report generation immensely. Prior to the commencement of this project, ABC Engineering had no measurement of delivery performance. Developing a management interface capable of such measurement was, therefore, a high priority. The importance of delivery performance measurement was reflected in a survey of customers carried out in 1995 by ABC Engineering's General Manager. The report ranked 'on-time' delivery as the number one attribute, required from a good manufacturer.

Delivery performance is an area that is important to companies' world wide, not only small job shops. Surveys of manufacturing executives in large successful companies in Europe, the USA and Japan repeatedly rank dependable and fast delivery among their top five competitive priorities (Smith, 1997).

The problem of tardy deliveries can be tackled on many levels - company wide, by product type or on an individual job by job basis. The frequency of reports varies depending on which level the report is aimed at. As there was no delivery performance measurement available at ABC Engineering before this project the global delivery reporting task was priority. The reports are required on a monthly basis. Figure 1 is a delivery trend line showing the percentage of 'on time' deliveries on a monthly basis, which is generated by the interface program.

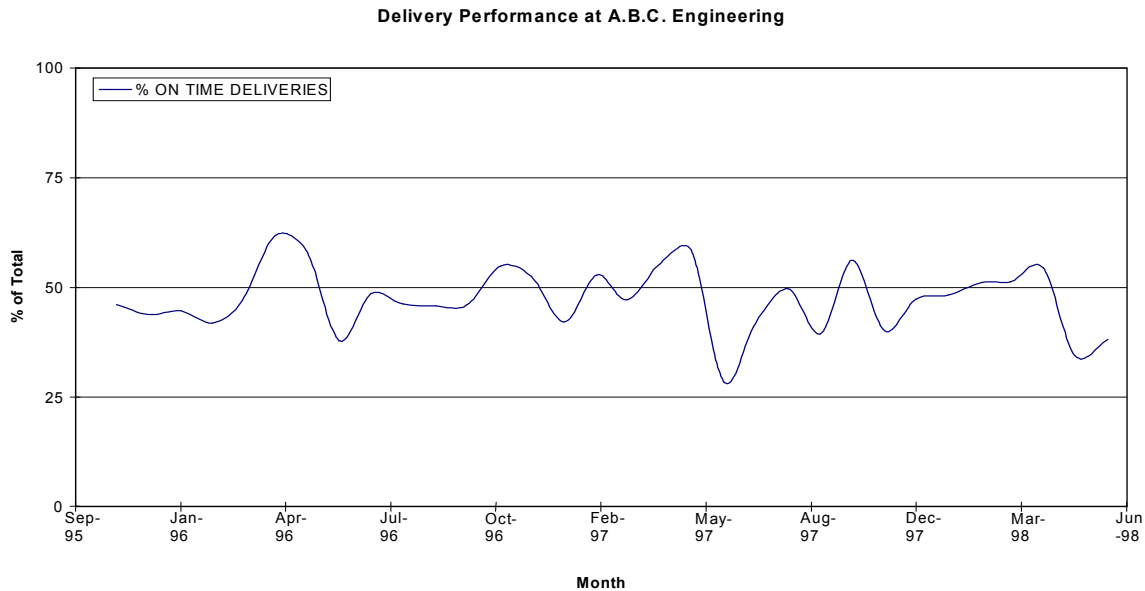


Figure 1: On time deliveries at ABC Engineering

Production by Cost Centre Interface

The production by cost centre report was one of the first 'direct access' interfaces developed. The user is not required to interface with the ManuSoft system at all. The program accesses the complex JOBCOST.DAT file directly and extracts data from the file to the appropriate areas on the final report. It is important for the accounting department at ABC Engineering to be able to keep track of hours worked at various cost centres on the shopfloor between set dates. This allows a labour recovery value to be assigned to each work centre for that period, and also forms a part of the performance evaluation of the individual cost centres.

Various management divisions such as the Board of Directors or General Manager/CEO require data from the accounts department on cost centre hours for performance evaluation purposes. This data may be required at any time depending on its application, and in most cases may be required instantly. Often, the accounts department is tasked with providing evaluations for specific time periods, with durations varying from a few days to even a few years.

The production report provides data for each workcentre. All data required for this report is contained in the ManuSoft JOBCOST.DAT file and as such requires only a simple program to extract the data. There is not even a need to use the ManuSoft indexing system. To gather the information from the ManuSoft system would have required the running of 27 reports (one for each cost centre) from the job cost reporting section. This data would then have required transfer to a spreadsheet. Each report from that particular section of ManuSoft takes approximately 15 minutes to run (a total of approximately 7 hours). The new interface developed as part of this project could do the same task in a maximum of 15 minutes.

The logic of the program is simple. It compares the operation dates recorded in the jobcost file, for each of nine possible operations, in every jobcost record. If a date falls between the user defined reporting dates, the program then records the work centre of operation and converts the time, recorded in base 90 code, to hours. Finally the work centre is located on the report spreadsheet and the converted time is added to any time previously recorded.

Invoicing Performance Interface

The invoicing performance report reflects the development of auxiliary programs allowing the design of interfaces that automatically access a number of the ManuSoft data files. This program draws on data from three different data files, sorts, summarises and presents the final report through a 'one-touch' interface.

The senior management of a jobbing shop requires data from the invoice reporting system to help answer many important questions. For example, is there enough money this period to pay everyone? Is there a strong market for product C, or should the business concentrate on product D?

The data on invoicing alone can not answer all of the questions, but it can provide information on money due to come into the business. This information can then be compared with data from cost reporting systems to give an indication of the cash flow situation.

In the old system, to gather information required by management at ABC Engineering for the monthly invoice report through the ManuSoft system required the generation of 12 reports from the selective invoice file printout. Such reports required approximately 5 min each followed by manual data transfer to a spreadsheet for presentation. This process was not only time consuming but also ran a high risk of error due to manual data handling. To overcome these difficulties a new program was written to access the ManuSoft databases directly and produce a 'one-touch' report that could be run by any staff member in a matter of minutes.

BENEFITS OF THE MIS STRATEGY

The project is considered to have a mixed success:

Firstly, with the implementation of the project the General Manager can now call up the management for necessary reports or generate the reports himself. User friendly interfaces development have made that possible: it was not possible before. The utility of the IT system has improved significantly.

Secondly, the IT system had a significant positive impact on the operations in the company. At the time of completion of the project the delivery on time was around 50% (refer to Figure 1). Since then the delivery on time has gone up to about 70%, which could be considered a significant contribution by the project. The company now has a tool to tell them not only what the company has delivered on time, but what each section of the business has delivered on time. The company came from a situation, where they could not tell, to a situation where they could tell whether the delivery situation is good or really bad. As the management of delivery times is not only being able to see what are the dates, but also to see what is going on in production, the IT system provided the tool to the managers to act on time. As quoted by the IT project manager of the company (interviewed on May 5th, 2000): "... at the time when the project started, they just knew what orders came in a month and what orders were delivered in that month. That is the level of information they cared about to tell which jobs performed well. Now they can see details of delivery and costs so that they know which sections of the business performed well. Now they also have a set of budgets to meet in each month and delivery performance".

Thirdly, even with the direct benefits to operations and management decision making, there has not been much investment in IT area. The company spent around \$100,000 in 5 years since 1995, which seems to be not significant for a company with an annual turnover of \$18 million a year. The project itself cost \$70,000 to the company in terms of manpower costs from 1995-97. The company spent around \$10,000 from 1997-99 on maintaining the hardware. The company is now looking at spending another \$20,000 to \$30,000 on upgrade and maintenance.

Is there any IT strategy shift in the company?

The company went to public ownership in 1997 soon after the completion of the IT project. It is now part of an infrastructure of a large public company and the company management is interested in developing IT infrastructure to the level of the parent company. At the moment an IT consultant is working on analysing the systems requirements and there is a possibility that the company will invest heavily on hardware and not on services. What it means effectively is that the company will replace the existing system to make room for a standardized system compatible with the parent company. This decision to a large extent is influenced by the inflexibility inherent with the ManuSoft software. Much more user friendly and cost-effective enterprise wide IT systems are now available to meet this company's requirements. Another important development in the organisation is the employment of a production manager who understands and is keen in using an IT system for management control.

With the basic elements in place, the prospect of IT implementation in ABC Engineering is seen to be bright. The new coding structure, proper employee training in IT, and placement of IT knowledgeable person in key management position are the right steps.

DISCUSSION

The IT strategic choice which ABC Engineering made in 1995 is clearly in jeopardy in the current situation. The company is now reviewing its IT options and will be investing heavily in installing a completely new system. Short term opportunism may become a heavy burden in future years. This is the lesson which company management forgets easily.

The paper described in detail the application of ManuSoft software in a job shop environment. The study showed that software limitations caused the IT system to fall short of requirements in many areas. Most importantly, it was not capable of delivering information in the format that was required by management at ABC Engineering. The development of customised interfaces to management proved that despite the proprietary data file structures of the ManuSoft MIS, it was possible to generate the outputs required for the job shop environment.

The project contributed to MIS technology in providing a framework for the development of a flexible interface layer from traditional generic MIS applications to management of real manufacturing organisations. Future system / user interfaces developed by MIS vendors should make use of available technology to provide the information solutions actually required by the users. The project has contributed to manufacturing by providing a system that delivers critical information, actually required by users, in the appropriate time frame. Specifically, the object-oriented interface development tools provide the capability of producing interfaces to senior and middle management that require practically no training to produce required results.

However, the solution provided to the company through this project proved to be only a temporary solution. Long term view of information needs and information technological developments should be considered in formulation of IT strategy.

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