

The Benefits of Management Information Systems to the Professional Practice

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SYNOPSIS

The advent of commercially available practice management software for the South African Consulting Engineering Industry some years ago, introduced the possibility of introducing far reaching, tailored, management information systems into the professional practice. This paper sets out to highlight some of the experiences and particularly the benefits derived from one such installation two years after implementation. The system comprises an integrated job costing, billing, debtors and creditors system linked to a comprehensive financial management system and an executive information system offering a wide range of management reports and graphical analysis.

Benefits experienced include the reliability and timeousness of the information, financial results are typically available within ten days of month end and year end financials within the same time frame at reduced audit cost and greater precision. A wide variety of reports are available and the organization can be viewed as a "Rubics Cube" of information in which the information can be grouped and examined in a wide variety of ways allowing project, client, profit center and other views of performance according to management's needs. Full activity based financial analysis and overhead distribution is supported eliminating the approximations typically made in assessing profit distribution and recognizing marketing and management contributions.

Senior management have had their workloads on mundane analysis greatly reduced while obtaining more accurate information faster. Information is also available at different levels of the organization at different levels of detail. Enquiries from a very summarized executive view to a very detailed transaction level analysis allow effective management by exception with drill down to specific problems. The variety of analyses possible offers great scope for effective management and directed marketing in a manner which should allow the company to create and sustain competitive advantage.

INTRODUCTION

The evolution of computer technology in the late eighties gave rise to a situation at V3 Consulting Engineers in 1989 where the existing projects system was becoming obsolete and no longer able to cope with the demands of the firm. Over the period 1989/90, the management of the firm

undertook a number of preliminary reviews of commercially available software and subsequently commissioned a detailed study of the firm's requirements in which the relative strengths and weaknesses of the commercially available software packages was evaluated (Robertson 1990).

It was established that neither of the major packages available were ideally suited to the needs of the firm and further analysis was undertaken to establish in greater detail the scope of modifications required. Following negotiations with the vendors, a scope and budget for the required changes was agreed and a final decision taken as to which system to purchase. The selected system was a South African developed package already in use at a number of consulting engineering firms.

A period of software enhancement by the developers was followed by testing and pilot operation, the system was commissioned and ran live in the Cape Region of V3 in October 1991. Thereafter the system was installed in the Free State and Transvaal regions, running live from March 1992.

This paper outlines some of the experiences with the implementation with particular emphasis on the benefits derived from the use of the system.

SYSTEM OVERVIEW

The system selected comprised a number of major components:

Projects System

The projects system comprises a suite of programs including projects and personnel databases, salary and rates information. A company parameters module allows configuration of the system to model the organizational structure of the practice to take account of offices, departments and associated companies as well as to define the nature of the general ledger interface. A variety of set-up options allow further customization of the operation of the software.

The projects system provides full features for the entry and processing of time and expense information with comprehensive analysis of Work in Progress (WIP). WIP is maintained on an open item basis such that once captured, all items remain in the system until they are either recovered through billing to the client or written off. Full audit trails and analysis reports are available on the WIP. The project system includes a largely automated billing system.

The projects system also provides a wide range of facilities for structuring up to 5 levels of project detail and associated analysis together with activity codes and a variety of project budgeting and reporting options.

The projects system is integrated with debtors and creditors modules to allow full management of these accounting functions with project related reporting in debtors and both project and non-project expenses posted in the creditors program.

All financial components of the projects system are integrated on a batch basis with a commercial general ledger package.

Financial System

The financial system comprises a commercial general ledger package together with integrated cash book software. This is linked on a batch basis to a commercial salary package. The financial system has recently been extended by the acquisition of an integrated assets register package and barcode reader. The financial system replaced 24 column manual cash books.

The general ledger chart of accounts accommodates a comprehensive, fundamental analysis of all income statement and balance sheet items in a manner that is linked to the business model of the organization in terms of cost and profit centres including physical branch offices and administrative, technical and support departments. A hierarchical, structured coding scheme is employed in order to facilitate allocation of expenses on an activity basis, and to allow progressively more detail in enquiries. Associated with the chart of accounts, a variety of financial reports allow summary or detail reporting for the region, office or department as required, including summary and detail income statements, balance sheet, cash flow projections and ratio analysis.

The financial system is linked directly to the projects system in a manner that is designed to support activity based costing and allocation of income and expenses in a manner that permits clear definition of ownership of information with a view to achieving a high level of internal auditing and a resultant improvement in accuracy and reduction in audit delays.

National Consolidation

In the past year, procedures have been implemented to permit all financial results to be consolidated nationally at the detail level, thus permitting the extraction of a wide variety of detailed and summary analyses. Various controls on inter-region charges have also been implemented together with procedures for accumulation and distribution of corporate overheads.

Executive Information System

Recently a graphical Executive Information System (EIS) has been developed to operate on the underlying operational projects and financial systems. This EIS has been developed using a commercial, windows based tool and provides a high level of graphical summarization of certain key values in the projects and financial systems. Development is continuing.

The EIS system has been developed with the objective of enabling senior management to see key values summarized graphically in a meaningful way that allows them to rapidly identify potential problems and drill down to the detail in any way that they may consider necessary. Particular emphasis was placed on achieving a user interface that was intuitive for senior management and did not restrict enquiries on the basis of simplifying assumptions made during construction. The EIS also provides an interactive mechanism for overhead distribution on an activity basis, whereby all income and expenditure relating to non-production business units is distributed over the production units on an agreed basis. The model has been designed with a view to providing management with the means to examine the effect of alternative allocation formulae on the profitability of individual business units without altering the underlying data which has been allocated on a fundamental basis.

The ultimate objective set for the EIS is to support a "paperless board meeting" in which all relevant information is projected onto a screen in the board room so that managers can analyze and query

information interactively and proactively thus facilitating management by exception rather than tabling large volumes of information.

OBJECTIVES FOR THE SYSTEM

A number of short term and long term strategic objectives were set for the system at the time that the initial investigation (Robertson 1990) was undertaken. Particular emphasis was placed on specifying the objectives and requirements for the system with the objective of meeting the long term strategic requirements of the firm with a view to avoiding the need to replace the system after a few years. Objectives set included:

- Provide tools to monitor and improve productivity and profitability.
- Enable profitability to be measured on a project, department and office basis using the cubic model proposed by Robertson.
- Assist the firm to offer the highest possible levels of service to its clients.
- Ensure that charges for work were realistic and that work was performed effectively for the client.
- Provide comprehensive budgeting facilities for projects and financials.
- Assist in the evaluation of current and future directors with respect to appointment and promotion.
- Provide concise management summaries.
- Permit a global view of the practice.
- Permit detailed enquiry on all aspects of operations and job costing.
- Require minimum management time and manpower to operate system.
- System must be affordable.

All of these objectives have been met at the current time although costs have been greater than expected and would be handled differently if the project was undertaken today. Certain specific benefits are discussed in more detail in subsequent sections.

IMPLEMENTATION EXPERIENCE

The implementation was undertaken in a phased manner, as outlined previously. Problems were experienced in terms of availability of senior personnel in-house at certain times and in terms of commissioning the system in other regions using in-house personnel. This was undertaken with a view to cost containment but ultimately gave rise to increased costs associated with correction of problems experienced.

With hindsight, more use should have made of outside assistance in the implementation in the second and third regions. In-house staff were not experienced enough and the time they spent in other regions placed pressure on their own region's operation.

Time taken to achieve understanding and commitment to the new system by managers and staff at all levels proved to be greater than anticipated and required focused and firm action by top executives before all required information was provided by project leaders and other staff and proper use was made of management reports. Experience tends to support the widely reported view that a paradigm change of this magnitude requires between three and five years to become permanent in an organization.

BENEFITS OF THE SYSTEM

The projects system has now been in operation in the Cape Region of V3 for close to two years and in the rest of the country for eighteen months while the financial system has been in use country wide for eighteen months. As stated above, the objectives set three years ago have all been met. Specific benefits are discussed in the sections that follow:

Reliability and Timeousness of Information

Information is readily available, in many cases almost instantly. For example, analysis of time sheet data and other data captured to projects is available within two working days of the end of the month.

Full analysis of project performance for the month is available immediately data capture is completed including a wide variety of budget, costing and profitability reports. Up to date sales journals are available at any stage as are debtors and creditors age analyses. The EIS projects analysis can be made available within twenty four hours of month end or updated more frequently as appropriate.

Full financial statements including summary and detailed income statements, balance sheets and cash flow projections are generally available ten days after month end and include all closing and balancing adjustments for the period in question so that there is considerable confidence in the reliability of the information. The EIS financial analysis can be made available at the same time.

Because of the wide variety of combinations and groupings in which the information can be presented and the wide variety of controls built into the system, it is possible for all information to be reported in a manner which allows recipients to accept full ownership of specific sets of data. This facilitates verification and control and allows senior management to operate on the basis that, "if all subordinate managers have accepted the accuracy of their figures, the consolidated figures must be correct". This ensures a high degree of reliability and confidence in the information.

As a result of the detailed analysis contained in the general ledger, it is possible to operate the financial system in such a way that very little additional processing is required at year end over that required at month end. While some difficulties were encountered at the end of the first year of operations since not all procedures were fully in place, it was still possible to table the year end

figures 17 days after the end of the year and they were signed off without qualifications by the auditors approximately five weeks later.

The Cubic Business Model

The business model referred to earlier allows the databases to be viewed as a multi-dimensional "Rubik's" cube which can be rotated and viewed in a wide variety of different ways. This permits the financial and production information to be grouped and summarized by office, department and region. Production (project) information can also be viewed by project leader, technical director, marketing director, client market segment, project discipline and client thus providing a fully market focused information capability. This information can then be used to focus marketing efforts and identify different marketing and management styles required for different market sectors as well as enabling management to evaluate the performance of individuals in terms of marketing and management contribution as well as production contribution.

In conjunction with these facilities, the activity based allocation of administrative overhead contribution by technical staff permits an accurate measurement of true profitability of individual business units or sub-units at a level which permits "level playing field" comparisons of business units. This eliminates the traditional problem of professional service organizations where the business units of those involved in management and marketing are penalized since only the production contribution is measured. Through this approach, inappropriate management decisions resulting from incorrect cost allocation can be avoided.

The system also supports attribution (allocation) of income from professional fees to the business unit employing the person doing the work. This permits the profitability of business units to be measured in terms of true, salary linked, revenue contribution as well as by the traditional method of project profitability and reduces the dependence on relatively arbitrary, rates based, costing approaches.

Senior Management Work Load and Effectiveness

Senior management have had their work load on mundane analysis greatly reduced as many of the analyses previously performed using spreadsheets have been incorporated into the system and are therefore available automatically with greatly reduced effort. Time spent resolving problems of mis-allocation and addressing queries with regard to year end has also been considerably reduced.

The multiple levels of summarization in conjunction with the high level of detail of the underlying data enable management to receive very summarized reports for routine management while affording them the capability to rapidly "drill down" to progressively more detail in order to answer queries.

Strategic Advantage

The wide variety of analyses available and the ready availability of information have freed management to be more effective while devoting less time to management and administration. At the same time, management have greatly improved scope to identify opportunities to improve operational effectiveness, increase delegation and improve profitability. They are also able to identify market related factors that can have a bearing on marketing strategy, product mix and other

matters. These factors all enable the firm to offer innovative and competitive services in a competitive market. This is expected to assist the firm in creating and sustaining competitive advantage over the medium- to long- term as part of it's commitment to providing relevant, appropriate and cost effective services.

CONCLUSION

The components of a management information system (MIS) and associated financial and executive information systems have been summarized based on the experience of V3 Consulting Engineers. Certain experiences during implementation have been summarized and the objectives set for the system at the outset are reviewed. It is noted that these objectives have been met.

The benefits experienced by the firm are discussed with particular reference to issues such as timeousness and reliability of information, flexibility of analysis and control. It is noted that the work loads of senior management have been reduced while more accurate and detailed information is made available more rapidly. The ability to summarize the information in a great variety of ways while providing the ability to undertake enquiries at a very high level of detail when required, is noted as a further benefit.

It is concluded that the system has met most of the objectives set for it at the outset and that it is assisting the firm in it's objective of creating and maintaining competitive advantage through the provision of focused, appropriate and cost effective consulting engineering services.

REFERENCES

Robertson J A (1990) *Report on Investigation Into Professional Practice Management Information Systems for Vorster, van der Westhuizen and Partners Unpublished report, October 1990.*