

Corporate information systems in health organisations

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Abstract

This paper presents an overview of the nature of corporate information systems and their applications in health organisations. It emphasises the importance of financial and human resource information in the creation of a corporate data model. The paper summarises the main features of finance and human resource systems as they are used in health organisations. It looks at a series of case studies carried out in health organisations, which were selected on the basis of their representation of different aspects of service delivery. It also discusses the theoretical and practical perspectives of the systems themselves, their roles in information management, executive and decision support, and in planning and forecasting.

Introduction

The term ‘corporate information system’ primarily refers to finance and human resources. A broader definition might well include physical facilities management and networked administrative systems such as word processing. In order to confine the present study within reasonable limits, consideration is limited to the two major aspects, finance and human resource management. The transactional nature of corporate information systems, as defined, is sometimes a barrier to health service managers wishing to use them in more complex ways. Financial and human resource databases are crucial to the development of middle and higher level applications of corporate systems to strategic planning, problem-solving, decision support, and executive information systems with which health service managers are deeply involved.

Financial and human resource issues assume a very high profile in the management of health organisations. Financial matters have become increasingly

dominant during the last 15 years or more as shrinking budgets have compelled health organisations to adopt stringent accountability measures, particularly in the area of financial accountability and management decisions (Horowitz, Straley & Kelly 1992). By far the largest segment of health service expenditure is taken up in the human resource area, directly contributing to the costs of health services. Given the magnitude of the issue and problems which surround corporate – sometimes referred to as business – systems and their place in health service management, it is surprising that so little is documented in academic literature: Di Mauro (1987) and Segall (1991) are rare examples, but from different contexts. This paper takes a first step towards filling a large gap in knowledge about corporate information systems in health organisations.

The purposes of the present study are to:

- provide an overview of the functions of corporate information systems in health organisations from a conceptual and theoretical perspective
- draw some simple comparisons by presenting a series of short case studies of their utilisation in different types of health organisations
- identify some of the major issues and problems which might warrant further investigation.

Although this is a preliminary investigation, there is considerable scope for further study in such a significant area of activity in health management. This study attempts to draw a primitive map of territory which is still largely unexplored, and focuses on the basics rather than high-level applications.

Financial management information systems

The financial management of health organisations has long been regarded as a topic of interest. The nature and scope of financial management in hospitals has received extensive treatment (Henderson & Tate 1991; Levy 1992). Financial management is also of major concern to the Commonwealth Government (Commonwealth Department of Finance 1993), which has carried out an extensive evaluation of commercially available management information products. As a first step towards coming to terms with devolved structures, middle and senior managers in health are often found to need explanations at a more basic level (Gill 1990; Dickey 1992). Corporate systems in health organisations, it has to be borne in mind, are basically no different from those in other kinds of organisation in that they carry out similar functions, irrespective of the type of business or service conducted.

Finance departments were one of the first users of system hardware and software in the health service. Historically, the first computer systems were only capable of transactional functions which could be ideally applied in the financial environment of health organisations. There were significant savings in clerical time, which was a determining factor in these being the first computer systems in health organisations. Acquisition of financial systems tended to take place independently of developments in clinical and activity based systems where 'people' savings could not be made. The requirement was for financial systems which were primarily designed for statutory reporting purposes, and to provide statements for budget holders. The emphasis was on finance, with little regard for activity and workload levels other than full-time staff equivalents. The problems inherited from financial management information systems (FMIS) centre around limited linkages between systems, outputs which are limited to operational requirements (for example, pay slips) and inflexible management reporting tools (Institute of Health Services Management 1994, p B7).

The basis of financial management is the accounting system. Computerised systems retain elements of the traditional manual accounting structure. The accounting process as a manual activity deals with several steps:

- recording transactions in journals
- posting journal entries to ledgers
- balancing ledger accounts and closing them off at the end of the period
- creating statements from the balanced amounts (income and expenditure, balance sheet and cash flows).

Computerised financial information systems record, classify, summarise and generate reports on financial transactions and events (Livingstone 1991). Their principal characteristics are as follows.

- The central module of a financial information system is the general ledger, organised around the chart of accounts. Six categories comprise the chart of accounts: assets, liabilities, equity, revenues, costs and operating expenses. A double entry format (debit and credit) is normally used to enter transactions into the general ledger.
- Accounts receivable and payable are also integral components of a financial information system. The accounts receivable module is organised around the customer and deals with sales orders, billing statements and customer statement reports. Accounts receivable is organised around the vendor and deals with purchase orders, payments to vendors, discrepancy reports, ageing reports and cash requirements forecasts.

- The payroll module processes employee time sheets. It generates payroll cheques and statements to employees and tax authorities. Information in the payroll module is based on pay rate, overtime, income tax and other deductions information.
- Inventory and fixed assets modules are also characteristic features of financial information systems. An inventory module calculates the costs of goods sold for the income statement, and the inventory level for the balance sheet. It generates inventory status reports and usage reports. It can calculate economic order quantities and produces inventory reconciliation reports. A fixed asset module accounts for depreciation of capital assets and purchase of new ones, job costing and profitability.

A government survey (Commonwealth Department of Finance 1994) identified 43 commercial suppliers of financial information systems, 39 of which satisfactorily met a series of evaluation criteria for public sector organisations. It was observed that a large portion of FMIS software is available across a variety of hardware platforms. The report noted a declining reliance on systems developed in-house, with a corresponding increase in the use of off-the-shelf software. As management reporting needs have become more demanding, there are increasing requests for financial information systems that can be integrated with executive information systems, decision support systems, and human resource management information systems. In this regard, it is anticipated that the complexity of user needs is likely to grow over the coming years as more insight is gained into their potential.

Financial management information systems differ from one organisation to another, as the organisations themselves vary. Differences are attributable to the nature of the organisation, the type of transactions, the sophistication of hardware and software, linkages between finance and other databases, and the history of development of the system. Large organisations generally need substantial computing power in order to integrate finance with operations management. In some large organisations home-grown software can still be found, together with a staff of programmers for maintaining and modifying the product. Large organisations employ systems analysts to deal with system and other organisational change. In this way they can respond to their changing information requirements and carry out evaluations of the cost, availability and characteristics of new technology. System security is a major consideration in large organisations, especially for access to confidential data. In large organisations there tended to be significant modification of packages, but today it is a costly exercise and subject to questioning by management.

Smaller organisations, on the other hand, tend to use microcomputers (networked where possible) and packaged software. It is common for a user to adopt a standard chart of accounts and report formats. Niche market items can be found for particular brands of accounting software. Small organisations often lack in-house accounting specialists and need simple, easy-to-master designs. The need for detailed budget information may be limited so that there is a demand for no-frills hardware and software. Integrated hardware and software financial systems, known as turnkey systems, are sometimes used, so that the purchaser needs to deal with only one vendor.

Human resource management information systems

Human resource management information systems (HRMS) exist in order to support decision-making, evaluate policies and programs, and to support the operational side of the organisation. In doing so, HRMS store, retrieve, analyse and distribute information on an organisation's human resources (Kavenagh, Guetal & Tannenbaum 1990). A growing number of organisations (17 per cent in 1985) reported that fully integrated systems were in operation (Stone 1991). Typical HRMS contain information on employees, jobs and work conditions, and activities such as recruitment, training, cessations and performance appraisals (Nankervis, Compton & McCarthy, 1992). Well-designed HRMS provide the organisation with an active role in strategic planning, bring together in one location diverse sets of records, speed cost-benefit analyses, and facilitate storage of and access to personnel records (Schuler et al. 1996). A major difference between FMIS and HRMS is that the origins of the former lie in transactional processing whilst the latter has its roots in database technology. There are major implications in this basic fact of life for future generations of software. HRMS databases are important to organisations in processes such as tracking, recruitment, recording results of performance appraisals and evaluating enterprise bargaining packages. Until relatively recently, such activities were possible only in larger organisations which had mainframe computers, and even then it was common for processing time to be shared with financial functions.

Early versions of HRMS experienced severe limitations on software flexibility. They were used as report generators rather than as management tools. Other limitations of early mainframe HRMS included high operational costs, lack of flexibility, and lack of suitability to the health environment, particularly in accommodating the wide range of special awards and conditions that exist in the health service. The introduction of relational databases as the source of many HRMS has enabled easier use. It is now possible to answer in seconds what were

hitherto regarded as difficult and time-consuming questions. Since the mid-1980s the widespread adoption of electronic spreadsheets in both FMIS and HRMS has facilitated the downloading of data from mainframes to microcomputers. Analysis of human resource data can be carried out effectively by both mainframes and personal computers. It is now possible to test prospective organisational decisions and policies on bottom-line measures of performance and conditions.

Possibilities for human resource information management by means of mainframe databases have existed for a considerable time (Bartholomew 1982; Smith 1982) and the topic continues to be treated extensively in more recent texts (Strike 1995). Based on the notion of human resource management as a function of supply of, and demand for, various categories of skilled and unskilled labour, HRMS have to deliver a series of essential analytical reports. Central to this notion is the concept of stocks, the current number of staff employed expressed as headcounts or full-time equivalents, and flows expressed as recruitment and wastage rates. Many examples of policy matters which depend on HRMS are to be found in the planned reduction of the workforce by means of redundancy, redeployment, and early retirement. Similarly, indicators of the state of the current workforce are reflected in staff absence rates, turnover, stability ratios, overtime levels and vacancy levels, all of which depend on HRMS.

The basic requirement for this form of HRMS is an integrated database which holds subsets of information on both people and positions. Health organisations with a publicly funded establishment need to keep track not only of the positions themselves, but also of their nominal and actual occupants. An individual employees' database will typically contain information on recruitment and termination, leave, skills and qualifications, staff development and training. Estimation of workforce needs utilises both data sets to identify trends in staff numbers and their relationship to other relevant variables such as recruitment, wastage and promotion.

In their more advanced form, mainframe HRMS have the potential to develop planning models. A human resource planning model systematically provides speedy, accurate and repeatable results. There are two main forms taken by planning models. A deterministic model projects into the future based on the expected value for flows without provision for random variation. A stochastic model, by comparison, takes account of the influence of probability over time and tends to be used with relatively small groups. Other statistically and computing-based planning models in common use are based on fractional flows, and on Monte Carlo simulation techniques. The sophistication offered by these models is available to larger health organisations such as health departments and

bigger acute care institutions which have the capacity to make provision for modelling activities.

The PC revolution has also made HRMS more accessible to medium- and smaller-sized health organisations (Beutell 1996). Downloading of data into microcomputers for use in analysis and planning is a prominent feature of many postgraduate training programs. The design of spreadsheets, built around a grid of rows and columns, makes them well suited to 'what if' analyses. The possibilities for even the smallest health organisational unit to engage in HRMS activities have increased dramatically as a consequence of the accessibility of data that can be managed by PCs.

As tools for human resource management policy issues, spreadsheet applications to 'what if' models can be supplemented by database applications and automated questionnaires. Prominent among the activities generated by PC applications is the issue of workforce planning, underpinned by the necessity to understand the nature and process of staff turnover. Human resource activities such as recruitment, equal employment opportunities considerations, interpretation of performance data, staff development and training, collective bargaining, attitude surveys and more general issues such as work stress can be analysed and reported on by means of PC applications. The range of PC activities adds depth to the ways in which human resource issues can be utilised in management, and promises to make a significant contribution to small- and medium-sized health organisations. A new generation of business intelligence tools will further extend the capacity of human resource managers to conduct sophisticated analyses.

Summary

The foregoing overview of FMIS and HRMS demonstrates the framework they bring to health service management. A theoretical perspective is necessary to a full understanding of the relationship between two of the principal operational information systems at work in health organisations. Bringing together two diverse fields of management and focusing them on health organisations is only part of the problem to be addressed. The view from the ground is equally important to make possible comparisons and contrasts between theory and reality. Since so little research has been carried out in this area, the appropriate means for this project was to carry out a series of case studies in a sample of health organisations. Selection of the organisations was based on representation of different aspects of health care delivery. Studies were conducted in a State department of health and community services, an acute care facility, a large community health centre, and a small privately owned and operated nursing

home. There were two purposes to the case studies: to develop a profile of information management in a cross-section of organisations; and to generate issues for discussion which might be of interest and significance to researchers, managers and professional groups in health.

The case studies

A department of health and community services

A State government department is perhaps the largest and most complex organisational entity engaged in health service management. It could be expected that the corporate information systems in use would be the most powerful and substantial in terms not only of the hardware, software and data communications in use but also in the level of sophistication of the analysis of the information they contain. During the last few years a series of amalgamations between government departments has added a new dimension to the development and rationalisation of corporate information systems. At the time of the study, the department employed between 11 000 and 12 000 staff in total, excluding service providers belonging to non-government organisations. The department's total annual budget is in the region of \$4 billion (Department of Health and Community Services 1995, p 213). Finance and human resource management systems exist in an environment of devolved financial management, with the consequence that well-defined reporting mechanisms are essential to effective functioning.

The financial departmental system in use is an application developed in-house, known as Renaissance (RFMS), which collects data and generates reports, running on a VAX platform. Base data is captured by RFMS, fed into the general ledger, and from there the full range of financial reports derive. In-house systems do not seem to be found so commonly, as previously stated. It was not surprising to learn that the department thought that their financial system was nearing the end of its useful life, and that tenders were being evaluated for a replacement.

Payroll is a batch-oriented operation outsourced to a private company (Health Computing Services). Payroll processing is performed by an application called NEWPAY, on UNISYS hardware. A related application, PERSPAY, gives on-line access to about 300 users on a statewide basis, and from which human resource management standard reports are generated. Data are transferred from PERSPAY via an interface to NEWPAY, which performs payroll processing. Under this arrangement, both finance and human resource transactional requirements are met by the same system.

Information can be downloaded from PERSPAY and NEWPAY into personal computer software for further analysis. In particular, SAS is extensively used for workforce planning and reporting. More recently, an executive information system has been implemented. Key performance indicators are identified for each departmental division, financial performance being prominent. Managers are able to view a series of tables in summary form at the highest level and then 'drill down' in highlighted areas to examine information in greater detail. Extensive use is being made of the decision support tool in identifying finance for the capital works program. It is an example of the use of one of the new generation of business intelligence tools.

A public acute care organisation

The organisation is a public facility which provides a comprehensive range of health services. The services include acute care, aged care, rehabilitation, psychiatric care and residential care and are targeted at a regional population of some 200 000 people. The facility operates from three main sites and eight smaller sites. It employs about 2000 staff in total, which represent 1500 full-time equivalents. The total budget is around \$90 million. The creation of the comprehensive health organisation in 1995 had the effect of increasing the demand for services, so that patients are less likely to travel to the State capital for health care needs than previously.

At the time of the study there were two accounting systems in operation, MacDonnell Douglas and IBA, both running on Unix platforms. By mid-1996 it was anticipated that there would be a single stores system, creditor, payroll, general ledger and reporting systems. The organisation has autonomy of choice in acquiring the system which is best tailored to defined organisational needs, although it was noted that there seems to be a movement away from health-specific products and towards standard commercial packages. In moving towards a single unified financial system, it is believed that minimisation of financial risks will be achieved. Reporting to State and Commonwealth departments is in standard format. Reports of this nature are seen to be a by-product of the financial information system, rather than its main focus. Reporting to the Commonwealth Government is a routine matter. Care Aggregated Module/ Standard Aggregated Module (CAM/SAM) data, for example, is sent to the State government for coordination. Internally, the organisation perceives some difficulties in comparability between organisations which have been subsumed into the comprehensive facility.

Within the last three years the whole human resource function has been reorganised and is now a recognised specialist function. Previously, it had been

a control rather than a service function, which reflects on the changing management role played by human resource management in general. It led to much duplication of effort, and with hidden costs that are probably of high magnitude. Centralisation of the human resource function had empowered unit managers. Everyone in the organisation had been affected by the big effort which had been made in performance development.

The information system in use (HCS 1992) is a database system running off the payroll. The potential of the system is not fully realised. In part, this is attributable to the fact that the system itself is not easily understood and needs to be more fully resourced. Recognition of the changing needs in management, brought about by the introduction of devolved budgets, suggests that, whilst the necessary information was in existence, it needs a clearer focus. Perhaps this might be brought about by disaggregation of data from a central bureau and posted to unit managers. Whilst the need to maintain an establishment database has diminished in recent years, organisation caps on staffing levels have been retained. It was suggested that there was no real ownership of human resource information, and that reports are often not related to perceived needs. The cause of the problem seems to be that defining and retrieving information is difficult, particularly for clinicians, because the system has been designed from a human resource management perspective, with little regard for health professionals.

The organisation has a clinical costing decision support system in operation (Shapleigh 1994) which was thought to be effective in a static environment. Experience in using the decision support system had highlighted several issues which would in due course influence the development of corporate systems. The speed of delivery of information from the systems in use is inadequate. Even in the decision support system, the information utilised is five weeks old. There is also a problem in the design of the systems in use. Technical specifications are perceived to be arrived at without sufficient regard to end-user needs. An example of this can be seen in the fact that the systems in use are still input-oriented rather than output-oriented. The problems raised seem to indicate that there is a requirement for corporate systems to have predictive power. Financial and human resource information should be capable of being modelled to show forecasts for the future against actual performance. Clinical data, in the form of diagnosis related groups, as well as that from corporate systems should be more outcome-oriented. A link back into performance could be achieved by showing the data as relative values, which would for the first time make it possible to benchmark performance.

A community health centre

A multi-sited, community-based and managed community health centre is a complex organisation to manage. A management review in 1991 recognised the fact by recommending the introduction of a flat management structure. In the centre studied, there are 108 salaried employees and another 132 caregivers (wage-earning and voluntary). The centre delivers a comprehensive range of programs, both medical and in-depth community services such as consumer advice, tenancy, problem-focused counselling (for example, gambling), gender-specific focus groups, health promotion, stress management, diabetes, home and community care, youth homelessness and STD/AIDS services. The different sites are based on the client types to whom the programs are delivered. The total gross budget is in the region of \$5.5 million.

The financial system was centralised as part of the 1991 review in order to keep accountability at a high level. The computerised accounting system in existence at the largest site (Pacific Databases 1989) was extended to all other sites. The basis of the reorganisation was to create a chart of accounts which would serve the whole organisation. Reflecting on the experience, it was observed that a needs analysis should have been carried out and the new system introduced at the beginning of a new year, rather than retrospectively. However, the initiative had been successful in that the whole organisation had brought in a profit for the last three years for the first time. A full-time accountant and accounts payable and receivable clerk are employed reporting to the finance and personnel coordinator. The management committee is now better informed on financial matters than previously, there is a higher level of financial awareness, and financial reports are closely questioned.

Functions of the basic accounting information system are as described in the section on FMIS above. Cost centres and codes are used to distinguish between employees whose salaries and wages are derived from State, Commonwealth or other sources. The board of management carries the legal responsibility for ensuring that appropriate distribution of funds is made for service provision (through service agreements), regardless of the source of the funds.

The introduction of the Employee Relations Act in 1992 brought contractual arrangements into community health. An outcome has not only been more enterprise and collective bargaining, but also more productivity and profit-sharing. Employees are now on one-year contracts, which are evaluated by a panel before re-appointment. Job descriptions and contracts are stored on a word processing package, and other human resource data on electronic spreadsheets. Salary packaging is the issue which brings together FMIS and HRMS. The issue

is still some way from resolution because access to salary packaging for all employees is still being developed. The review system is carried out manually. It is anticipated that it will continue to do so as a means of maintaining personal communication

The FMIS issue identified in community health is consequent on the introduction of unit-based funding. Reporting requirements have changed as a consequence of linking unit-based funding with the health service agreement, which details and specifies the services to be delivered. A unit-based funding approach was introduced before the development of adequate software. Data has to be collected manually and extra staff will have to be appointed to input data. The discrepancy between State- and Commonwealth-funded programs also causes problems in community health. An example is provided by home and community care, which is not integrated with other forms of service delivery. The top level of financial and human resource software is not yet in sight for the organisation. The range of products presently available is thought to be beyond the expectations of the organisation which, in any case, does not have the purchasing power to acquire it. An unresolved problem is that the linkage between budgeting and output-based funding has to be defined and established. Presently, the two processes are carried out independently.

A private nursing home

Although the 20-bed organisation has 38 staff in total, only one, the proprietor and the director of nursing, is full-time, with the remainder being part time. The part-time staff comprise 25 nurses and 12 ancillary staff (therapy, cooks, cleaners gardeners, and so on). The total budget is in the region of \$750 000, comprising CAM/SAM and OCRE (Cost Reimbursed Expenditure) combined. Income is generated by a resident contribution of 87.5 per cent of the combined single pension and rent allowance. The balance is made up by a Commonwealth Government subsidy paid directly to the nursing home each month.

A manual accounting package, the Kalamazoo System, was used until mid- 1995. It was found to be inadequate because it depended on one person, and could not generate enough information for reporting needs. The requirement for improved accessibility of financial information to a wider range of employees led to the introduction of a standard financial package marketed at small nursing homes (Australian Nursing Home Management Pty Ltd 1995). Features of the package include general ledger, accounts payable and receivable, resident records and payroll. The distinctive feature is the inclusion of a Resident Classification Instrument, the basis of CAM/SAM funding. Trust accounting and full reporting of resident transactions are possible through this facility. Payroll and rostering

are interrelated in order to produce cheques and pay slips automatically. Three staff are involved in using the system and all have required essential training. Despite the effort, external technical support is necessary, especially in the area of communications.

Human resource management, in the form of storage of employee records, is included in the package recently implemented. The main characteristics are work classifications, CAM/SAM allowances, deductions and entitlements, long service leave accrual, award tables and electronic transfer of salaries to bank accounts. Since all information is stored in the same system, Commonwealth reporting requirements can be met with relatively little effort. Possibilities for analysis of human resource issues such as wastage and job analysis exist within the package, but the size of the organisation is seen to impose more severe limitations in this regard.

The needs for capacity such as decision support and executive information summaries for the organisation are thought to be adequately met by the system. It may be that full realisation of the potential of the selected system may not be realised because alternative software for the Resident Classification Instrument (for example, Microsoft 1992) may better meet the needs, allowing for alteration and modification of information to model Resident Classification Instrument changes and their impact on the organisation. The package in use does not give the opportunity to model the information to any great extent.

Discussion

Information management provides the key to gains in efficient resource use in the health services (Abel Smith 1994, p 203). The World Health Organization Regional Committee for the Americas estimated that 30 per cent of total resources available to the health sector were lost through inadequate technology and deficiencies in management (World Health Organization 1985, p 13, quoted in Abel Smith 1994, p 204). There is little doubt of the importance of the place occupied by corporate systems in health organisations, and of the likelihood that they will continue to maintain their pre-eminence in a climate of continuing change. Since there has been very little systematic study of their form and use in health organisations, there is considerable scope for further investigation. From a brief review of the literature, and preliminary study of a small sample of health organisations, it would be inappropriate to attempt to reach definitive conclusions. Enough can be learned, however, to highlight some issues which might warrant comprehensive study in a wider range of health organisations. Discussion of the present investigation arises from the nature of FMIS and

HRMS themselves, and from their place in the totality of information available to health service managers, and will consequently centre on these main themes.

Financial management information systems

Developments in FMIS are having the effect of coordinating clinical, financial and management aspects of health. Health organisations are looking to financial information systems to supply them with the tools to bring into reality an integrated approach to management. Some features of the movement observable in the case studies, particularly in acute care, can be seen in:

- sharing and common ownership of financial information
- interfacing between financial and other systems, as in casemix
- local control and management of systems
- improvements in the reporting functionality of systems so that information is available to all managers, as well as the financial director
- better presentation of information to improve understanding by non-financial systems users
- improved capacity for forecasting and planning.

It is noteworthy that the tendency for health organisations to develop their own systems is changing, as seen in the State department studied. Solutions developed by private sector software suppliers appear to keep better pace with changes in technology and with increasing user expectations, evidenced in their uptake by relatively small, as well as large, health organisations. Many health organisations are beginning to adopt clinical costing packages such as TRENDSTAR, which are closely linked to financial systems and the widespread introduction of casemix.

Human resource management systems

HRMS have the capacity to quantify resources to compare with patient-based activity and resource use throughout the whole health system, particularly in comparing costs and performance. As budgetary control is devolved, the tools which allow skill-mix analysis are being introduced. Examples of the process are afforded by the fostering systems utilised in nursing homes where CAM/SAM is a powerful vehicle for local responsibility in effective deployment and financial management.

There is scope for further development of the HRMS function in health organisations. Comprehensive sets of records are commonly held manually by

unit managers. A missing link is between staff groupings and the data sets with which to manage the human resources of the organisation. While computerised personnel records create an electronic filing cabinet that allows the possibility for analysis, there remains the need to address the broader issues of cost-effective management to reflect contractual obligations and equitable group representations. HRMS are able to give the opportunity for insights into policy changes, for example, an impending pay award or cuts in staffing levels. Nursing homes represent an excellent small-scale model for the generation of these systems in their use of rostering systems to comply with complex staffing rules and requirements. There is a need for more effort to balance the costs of collecting and maintaining human resource data against the value of accessibility and ad hoc reporting from HRMS.

Information management

The operational roles of FMIS and HRMS have to be fully effective before management needs can be satisfied. Information management requires not only the provision of routine reports, but must also support complex and varied enquiries. To be efficient, management information systems must be functionally separated from operational systems, drawing data down and storing it independently. A layered approach to reporting, with high standards of graphics, should be part of a management information system. A well-designed network, consistent with the organisation itself, and capable of data modelling, are further requirements of management information systems. Once in place, the conditions are created for information management capable of problem-solving and decision support (Smith 1995). Primary health care organisations present some of the best opportunities for advancements in information management. In recent years a great deal of effort has been made in corporate restructuring, and the gradual introduction of unit costing emphasises the needs for a more integrated approach to information management.

Executive information and decision support

The challenge facing corporate information systems is to become the platform on which executive information systems and decision support systems can be built. The problems faced by senior managers in using traditional management information systems are well known and include:

- data saturation, often of a trivial nature
- a strong bias towards financial information, and an absence of information on other aspects of corporate performance

- reports which give no clue to underlying trends and variances
- data which are irrelevant to critical organisational issues
- tabular output with no graphical display.

The alternative of senior managers using query languages to address some of the problems is found to be not feasible, and an ineffective use of time. Executive information systems are a high risk venture which can quickly lead to disillusionment at a senior level, with the loss of many benefits. Despite this, it seems likely that executive information systems will grow significantly in the next few years. To be successful, such systems have to use flexible development methods and rapid prototyping, and directly involve senior management. Executive information systems are difficult to justify on cost because of intangible short-term benefits. The executive information system recently implemented at the State level in itself represents a noteworthy achievement in resolving these problems, although a further evaluation is awaited. Some of the re-assessment of the decision support tools being utilised in acute care is also perhaps a natural reaction to a bold new venture.

Planning and forecasting

A description of the business processes in health organisations forms a conceptual model for criteria which are consistent with corporate strategies and objectives. If the activities they embody are well understood, then the corporate data model to control and monitor business functions can be defined. The creation of a management information database which integrates corporate systems with service delivery outcomes enables planning to take place by projecting forward trends into areas such as health status improvement, demographic changes, changes in social status, and changes in government policies. Essential to such work are projections of cost levels and human resource requirements. Evidence is beginning to emerge, particularly at State departmental level, that models are being developed to plan the need for hospital beds, appraise capital investment options, and assist with locational analyses and performance of health services. Bearing in mind that planning and forecasting tools are used to inform, rather than prescribe, management action, it can be anticipated that there will be significant future developments in this direction, given the increasing sophistication and decreasing costs of hardware, software and data communication.

Conclusion

Corporate information systems in health organisations are here to stay. They play a major part in health management because they store much of the data essential to decision-making and control. Recognition of these factors leads to the conclusion that managers in different types of health organisations have to take care not to become slaves to the minutiae of transactional data that are held in individual FMIS and HRMS. It can be argued that the need is for a broad understanding of the systems, together with insights into how they might be geared towards the creation of a relatively clear and far-sighted vision of the strategic options available, and where these options might lead. If there is validity to such a view, then the implications for present needs have to be considered alongside the education and training of future health managers. The present paper represents a tentative step towards identifying the necessary strategic management objectives.

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