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Public Sector Management Information Systems

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PUBLIC SECTOR MANAGEMENT INFORMATION SYSTEMS

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Abstract

Management information systems (MIS) are fundamental for public sector organisations seeking to support the work of managers. Yet they are often ignored in the rush to focus on 'sexier' applications. This paper aims to redress the balance by providing a detailed analysis of public sector MIS. It firstly locates MIS within the broader management monitoring and control systems that they support. Understanding the broader systems and the relationship to public sector inputs, processes, outputs and outcomes is essential to understanding MIS. The paper details the different types of reports that MIS produce, and uses this as the basis for an MIS model and a description of the decision-making benefits that computerised MIS can bring. Finally, the paper describes generic public sector MIS that address internal government transactions, public administration/regulation, and public service delivery. Real-world examples of all types are provided from the US, UK, Africa, and Asia.

A. Introduction

Management information systems can be defined as information systems that provide reports which assist the managerial monitoring and control of organisational functions, resources or other responsibilities.

MIS were first developed during the 1950s and 1960s but came into the organisational mainstream somewhat later. There was a rich literature on MIS during the 1970s, continuing into the 1980s (e.g. Davis, 1974; Davis & Olson, 1984). However, the explosion of other organisational applications of IT has led MIS – at least as defined above – to retain only a small foothold in many more recent publications. Despite their book titles, for example, Hicks (1993) devotes just one chapter to MIS, whilst Laudon & Laudon (1998) devote just a few pages. Nonetheless the fundamental importance of MIS has meant some writers continue to provide a broad and deep discussion of the topic (e.g. Zwass, 1992; Lucey, 1997).

Our discussion in this paper begins with a deeper understanding of the managerial processes that management information systems support.

A1. Management Monitoring and Control Systems

A generic model of a monitoring and control system is shown in Figure 1.

Figure 1: Monitoring and Control System Model

This monitoring and control system consists of four main elements:

- *A process*. At the core of the system is some kind of process that turns inputs into outputs. Let us take the example of a public sector training project that seeks to provide new skills for the unemployed. This project turns inputs of money, equipment and staff labour into outputs of skilled people who are trained via processes of training delivery.

- *A monitoring mechanism*. This mechanism gathers information about the outputs from the process. For example, it would gather information about the number of people trained and the extent of their new skills in the training project.

- *A comparison mechanism*. This compares the information gathered about current performance with information on previously-set plans, benchmarks, targets, etc. These two types of information represent the information needs of the monitoring and control system. For example, this mechanism would compare information on actual skills gained with skill gain targets. This part of the system is often known as the 'evaluation mechanism' (as in the phrase, 'monitoring and evaluation').

- *A control mechanism*. This decides upon and then ensures implementation of corrective action based on the output of the comparison. For example, where skill levels produced by training were lower than expected, changes to the method or location of training might be decided upon and implemented.

Monitoring and control therefore represents a *feedback loop*, in which information about a later stage is fed back into control of an earlier stage. Where all is well, the system's only function is to monitor and report. Where a problem - a shortfall between the actual and the desired situation - arises, the system's function is to assess the impact of that problem, and to decide on and then implement remedial action. Most organisational systems are intended to work on a *negative feedback* principle where corrective action is in the opposite direction to monitored deviations from norms. Take the case of a budget system. Where the monitoring mechanism indicated that more than budget was being spent, feedback should lead the control mechanism to correct this by starting to spend less.

Rationally, the system provides the mechanisms by which the organisation a) knows if it is achieving its objectives, and b) achieves its objectives in the face of problems. In order for this to happen, all the following must be present:

- outputs that can be measured,
- a monitoring mechanism that does measure the outputs,
- a monitoring mechanism that produces information on the outputs that is accurate, timely, relevant, and complete,
- a comparison mechanism,
- targets against which to compare,
- a control and implementation mechanism, and
- an overall feedback loop that does not take too long to be effective.

The place of management information systems in the model is indicated in Figure 1. As shown, MIS can be of two different types:

- *Monitoring MIS*: these MIS merely gather information about output performance and present it to the manager, who will then do the comparison him/herself.

- *Monitoring and comparison MIS*: for these MIS, the pre-set standards for output performance have been entered onto the computer system. The MIS is therefore able to perform the comparisons itself. This forms the basis of exception reporting, discussed below.

Computers are not a necessary part of this or any other management system. There are many manual methods of monitoring and comparing, such as:

- tables of accounts and budgets,
- a chart of staff names and absence days, or
- a line on the wall which, when reached by a diminishing pile of stock items, indicates that they should be re-ordered.

However, computerisation will be our focus in this paper.

A2. Complicating the Simple Picture

So far, a relatively simple picture has been presented of both management system and information system. However, there are four main ways in which these systems differ, as described next.

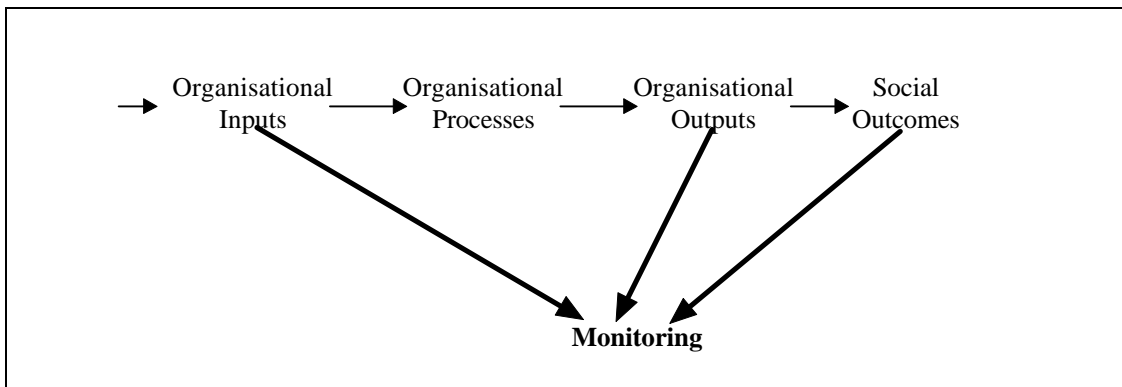### *i. What is monitored: inputs, outputs and outcomes*

The model above places a process at the centre of the model. But, for many management information systems, the focus is on the measure being monitored and reported upon. In overall organisational terms, these measures are not always outputs, but can be divided into three categories:

- *Inputs*: the resources that are used by the organisation.
- *Outputs*: the direct services (or products) produced by the organisation.
- *Outcomes*: the wider impacts of organisational outputs.

To differentiate these, let us take the example of an enterprise development agency. Its inputs would include general financial expenditure and hours of staff time worked. Its outputs could include number of clients served, and number and size of loans provided or guaranteed. The outcomes could include number of new enterprises created, enterprise growth rates, number or proportion of people employed in enterprises, and average income per capita.

We can therefore redraw part of the system model, as shown in Figure 2, to show the different possible monitoring measures.

Figure 2: Different Measures Monitored by Monitoring and Control Systems

An MIS can monitor one or more of these measures. In the latter case, it will need some mechanism for integrating or at least co-ordinating the different measures.
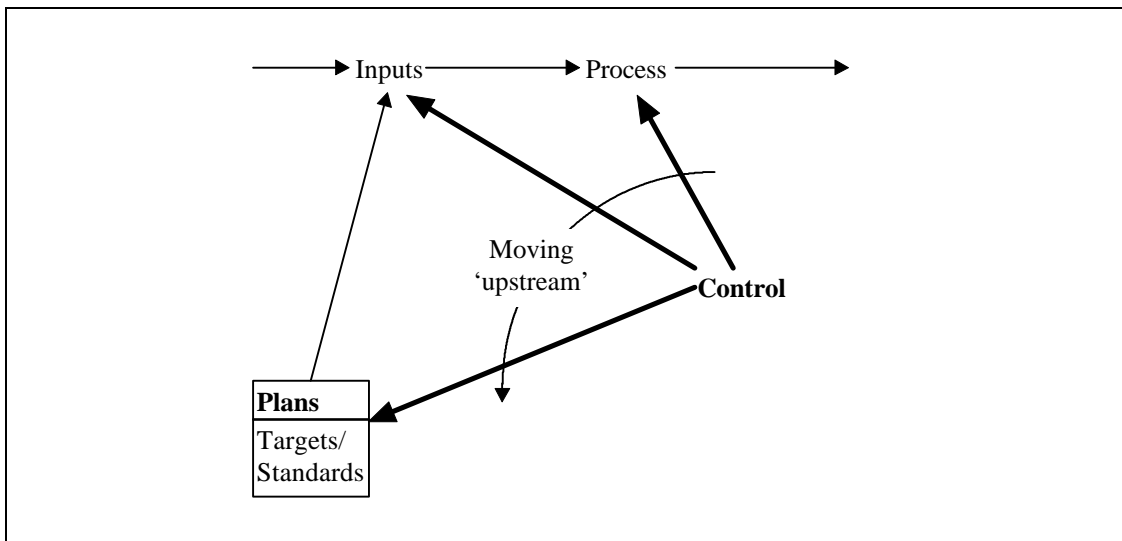
ii. What is controlled: plans, inputs and processes

The control mechanism can focus on one or more different parts of the model:

- *Processes*. The training project example given above described control of processes.

- *Inputs*. Alternatively, information may be fed back further 'upstream' than processes, and affect the inputs to the process. For example, the information gathered on skill levels produced by the training project might indicate that, to generate the required outputs, altering the training method or location was not enough. Instead, more labour (e.g. a higher trainer:trainee ratio) or more investment (e.g. in better-paid, better-qualified trainers) was required.

- *Plans*. Moving even further 'upstream' in the model, information may be fed back to affect the original planning of the process. For example, the information gathered might indicate that no amount of 'tinkering' with inputs or methods can produce the originally-planned outputs. The plans themselves would therefore have to be amended. These changes could be directed at increasingly higher-order parts of planning:
  - *Amended targets*. For example, revised output targets on the number of skilled trainees or the depth of required skills to be produced.
  - *Amended immediate objectives*. For example, changing the project to produce a different set of skills.
  - *Amended intermediate objectives*. For example, changing the project type from increasing the employability of the jobless through training to provision of a direct employment subsidy.
  - *Amended overall objectives*. For example, changing from trying to raise employment levels in a poor rural district to encouraging relocation to areas of high employment demand.

We can therefore redraw part of the system model, as shown in Figure 3, to show the different focus of control mechanisms.

Figure 3: Different Control Focus in Monitoring and Control Systems

iii. Management role supported

Management information systems can support the different management roles of public administration:
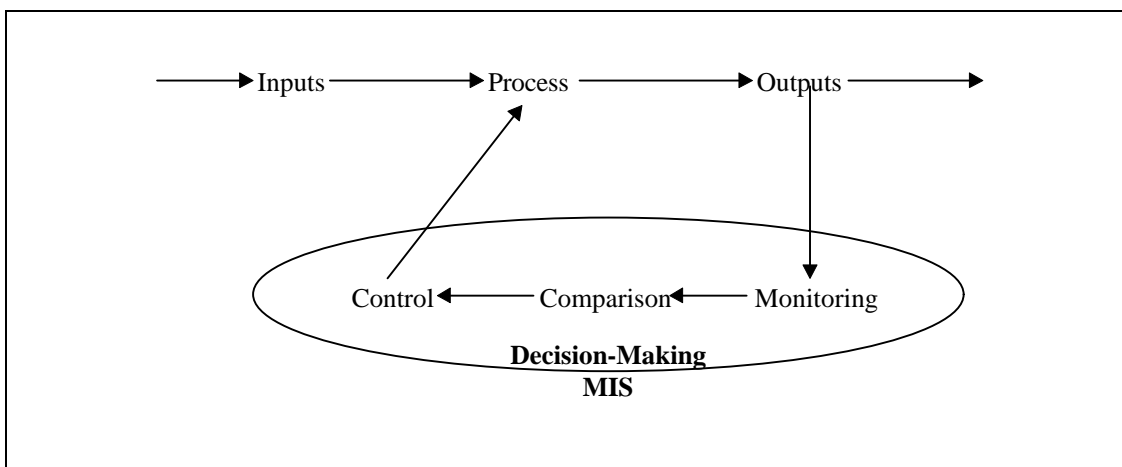
- *Operational management*. This role is often largely supervisory in nature and so MIS for operational management may well be used to support day-to-day monitoring and control. Such MIS will not contain 'higher-order' feedback to plans. These MIS might involve any of the areas in which basic operational information systems function such as accounting and human resources. As described below, systems supporting this type of role may be particularly appropriate for automation of control and decision making because of the relatively narrow, structured nature of the role. Sea Lake County Welfare Department in the US, for example, used an operational MIS to support the day-to-day monitoring and authorisation of food stamps and other welfare payments (Schultheis & Sumner, 1995).

- *Tactical management*. MIS for this role operate in the same areas as for operational management, but take an organisationally-broader and longer-term perspective. There might be a greater emphasis on human decision making (because situations are less certain and structured) and on more 'upstream' control feedback. In the Sea Lake case, tactical MIS were used to monitor accumulated reasons for welfare denial, and for welfare case opening and closing.

- *Strategic management*. MIS can and do support strategic management. However, rational description of the strategic role places a particular emphasis on planning and, for more senior managers, on an integrated view of the organisation. This is seen as being supported mainly by executive information systems. In the Sea Lake case, the executive information system incorporated both internal welfare data and external data on government regulations to assist strategic planning.

iv. Automation of control

In many management information systems, the output from the comparison stage forms an input to human decision making. However, in some information systems the process of decision making may be automated. For example, inventory information systems can gather data on the level of stocks and suggest the decision that particular items should be re-ordered if stocks fall below a certain level. Some such systems even create the order form and send it electronically to a supplier. Such automated decision-making systems are represented in Figure 4.

Figure 4: A Model of Automated Decision Making

B. Features of Management Information Systems

You should by now understand the main rationale for a management information system. In order to draw up a model of an MIS, two further elements must be described: the link to data-gathering systems and the production of reports.

B1. Link to Data-Gathering Systems

MIS often rely on monitoring data produced by a corporate database. In many cases, the division between the two systems is not obvious. For example, many users merely perceive that they have a payroll system that collects payroll data, produces both operational payroll information and management reports, and is used for both operation and monitoring/control of the payroll system.

B2. Reports, Reports, Reports

Central to its monitoring and control roles, an MIS produces reports. This is mainly what managers perceive about an MIS since these are its tangible outputs. Reports come in many forms, as described below. They can be differentiated in two main ways: by content and by schedule.

i. Differentiation by content

MIS reports fall into three main categories of content:

- *Detail report*. This contains all relevant information on the report topic. For example, a detailed payroll report might give the following information for all staff: employee number, name, wage/salary rate, standard monthly earnings, standard tax payable, and each individual monthly payment for the year to-date.

- *Summary report*. This contains a summarisation of information on the report topic. For example, the total number of staff in each unit, each unit's total payroll bill for this year and last year, and the percentage change between the two. Some summaries may be recognised performance indicators. For example, one measure of a unit's performance might be its total actual payroll bill as a proportion of the total budgeted payroll bill.

- *Exception report*. This filters out information to provide just that which is deemed to be most important, according to some pre-set criteria. It may be summarised or

detailed. For example, a report could include employee name, total individual payroll payments this and last year, and percentage change between the two, only for those staff whose pay rose by more than 10 per cent.

These reports may find themselves combined. For example, a report might:
- provide information on unit salary and income tax payment totals (summary),
- for only those units where the total was more than 5 per cent above last year's total (exception), and
- allow the manager to break this down into individual staff salaries and tax payments if required (detail).

ii. Differentiation by schedule

MIS reports fall into three main categories of schedule:

- *Periodic report*. This is produced at regular intervals: daily, weekly, monthly, quarterly, etc. For example, a report of organisational unit salary totals produced every month after staff have been paid.

- *Event-triggered report*. This is produced in response to a particular event or set of conditions. An example of the former might be a detailed payroll report produced once the first tranche of federal government funding for a project was agreed. An example of the latter might be a detailed payroll report produced if the total payroll bill in a unit exceeded budget in any month by more than 3 per cent. In some cases, more than a report might be triggered. For instance, the last example could also trigger production of a pro forma memo to the head of unit warning them about their payroll expenditure situation.

- *Request report*. This is produced as and when required in response to an ad hoc request. For example, a payroll report on all staff in the top two salary grades could be produced in response to a politician's concern about increasing public vs. private sector pay differentials for top managers.

B3. The Role of Reports

Periodic summary and detailed reports are the 'bread and butter' of management information systems. For certain older MIS, this might be all that they produced. However, it is the other forms of report that provide MIS with much of their organisational value. If they work correctly, for example, exception-triggered reports

can take a substantial monitoring workload from managers. Managers know that the computer system is 'watching out' for certain problems and will alert them if these problems arise. Examples could include alerting reports when:

- an unusually large amount of cash is involved in a transaction,
- there is a sudden increase in recorded imports, or
- more than three states report the incidence of Colorado beetle infestation.

Reports with just exception contents provide no redundant information, but just focus the manager on problem areas that require corrective action. This therefore helps managers cope with the problem of information overload. Exception reports have a wide variety of applications and can provide, for example:

- just the names of those staff who have been absent more than five times during the past month,
- details of only those loans which have received no repayment for more than eight weeks, or
- codes of only those budget heads which are more than 10 per cent over-spent.

One exception report issue lies in the choice of exception condition on which to report. In the loan example, the eight week condition might be a bad choice. It could be that an eight week delay is perfectly normal. The report is therefore unnecessarily targeting many borrowers who are not in trouble. Alternatively, it could be that a default of only two weeks indicates that help is needed. By eight weeks, matters may have deteriorated too far for any outside assistance to be of value. There will have to be an input of both experience and analytical skills in the choice of exception condition.

A second exception report issue relates to data inputs: such reporting can only be relied upon if data inputs are being continuously and reliably gathered.

Request reports provide the manager with a great deal of power. They can produce information that more exactly matches the manager's particular needs at the moment of need. Request reports are often a response to the unexpected. Examples could include reports on:

- the finances of a project, for input to a meeting requested by the project manager,
- those clients who have been occupying a refuge bed for more than six months, in response to a shortage of beds for incoming homeless persons, or
- the past training of a staff member, in response to their request to go on a training course.
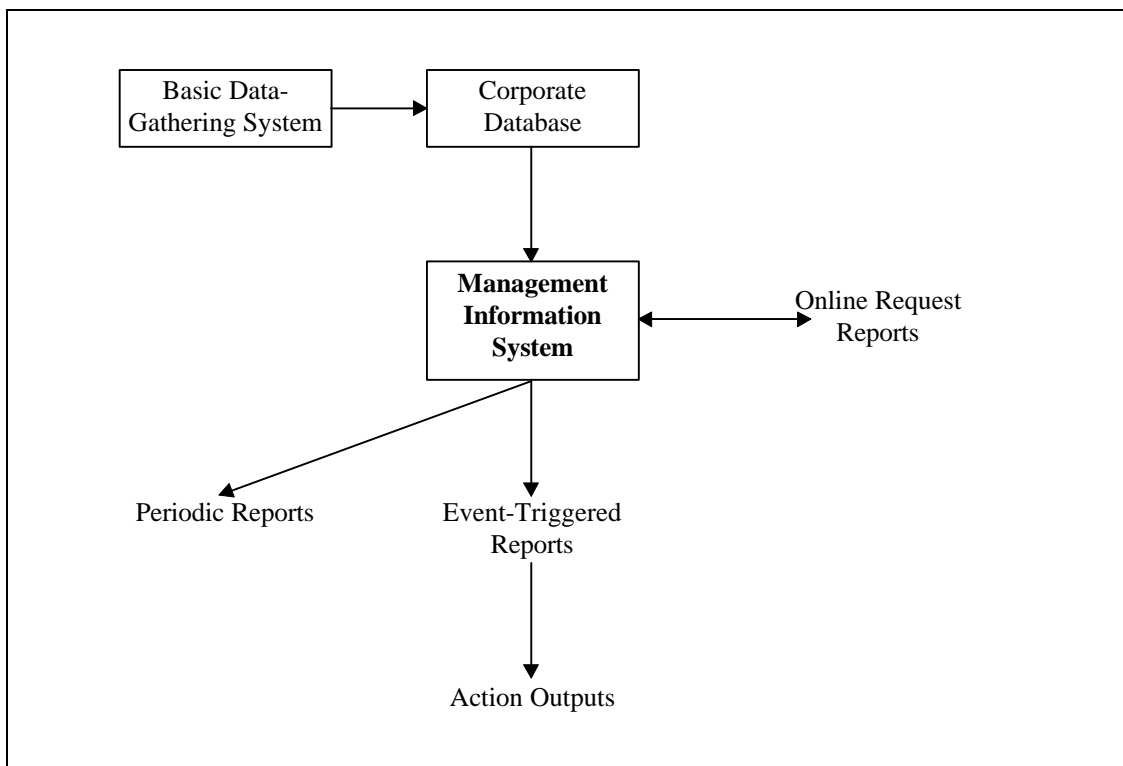
Typically these request reports are produced using search forms or search expressions. Many computerised management information systems allow this to be done online: the request is typed in and the report appears almost immediately on-screen. There will often be a choice of showing the report as a table of figures or, if appropriate, as a graph, or as both.

As with all information systems, the response to the request can only be as good as the data that has been put into the system. MIS data is often entered with the expected rather than the unexpected in mind, leading to the risk that unexpected requests cannot be answered. If, on the other hand, large swathes of data are entered into the MIS 'just in case they are needed', this runs the risk of substantial expenditure on gathering data that is never used. A balance should therefore be struck between the likelihood of needing data in a request plus the value of being able to respond to that request, and the cost of providing that data.

B4. Management Information System Model

Using the further details described above, we can now draw an MIS model that builds on the organisation's corporate database, as shown in Figure 5.

Figure 5: Management Information System Model

In some systems, the separation of basic data-gathering system and MIS would not be so clear cut as depicted here. Instead, they would merely be separate modules of the same overall information system. The data-gathering module would deal largely with data input and storage. The MIS module would deal largely with information retrieval and output.

B5. Benefits of MIS Computerisation

If it functions as anticipated, the creation of a monitoring and control system produces, by definition, greater understanding of the organisation and a greater ability to manage organisational resources and their performance. Within these systems, and by comparison with manual systems, creation of a computerised, rationally-functioning MIS can produce a number of organisational benefits. These include:

- *Faster decision making and control* through provision of timely information. For example, the MIS described by Anthes (1993 cited in Laudon & Laudon, 1995) provided an early warning of performance problems in bulk buying of inputs by US public agencies. Faster decision making released time that would otherwise be tied up on monitoring. Tottle (1986) describes the introduction of an MIS to assist government agricultural extension workers in Malaysia. Time was released in this case thanks to upward reporting by the computer system and to exception reporting, which focused the extensionists on those farmers with immediate problems.

- *Better decision making and control* through provision of relevant information. The Malaysian government workers described by Tottle (1986) had a much better understanding of what was going on in their area thanks to the introduction of an MIS. They also had more detailed information which allowed them to provide farmers with a better service, and make better use of available resources. Similarly, in the Anthes (1993) example, the statistical analyses gave US state agencies a much better understanding of what was going on in contract bidding. Without the MIS, such an understanding would not have been possible.

In addition, MIS can improve job satisfaction for public servants and can reduce the number of paper records that have to be held.

C. Examples of Management Information Systems

Management information systems can be introduced to support a variety of public sector applications, as described below.

C1. Internal Transaction-Based MIS

Three main types of management information system fall into this category: accounting, human resources, and 'other'.

i. Accounting MIS

Far more than anything else, the emphasis of public sector MIS has been on money: on monitoring how much has been spent; on comparing this with budget; and on controlling expenditure to bring it in as close as possible to budget at year-end. Examples of this type of computerisation range from the Kenyan Ministry of Agriculture (Pinckney et al., 1987) to major US regulatory agencies (Brown, 1999).

Typical reports include:
- Statements of account: month-end, year-end, year-to-date, etc.; these will generally have to be designed to fit with existing regulatory or legislative standards for public sector accounting.
- Warnings of budget head over- or under-spend against target; variance from planned budget can be shown either in absolute or in percentage terms.
- Statements of cash requirements in the month ahead based on payments still owed within accounts payable data.

Payroll often represents the main cost for public sector organisations. It has therefore been a starting point for MIS in many organisations, looking to monitor and control salary and income tax payments, and also to issue payments. One focus for payroll MIS in some countries has been to identify and then eliminate 'ghost workers', who do not exist but whose pay is fraudulently collected by other employees. Cain (1999) describes the importance of this approach in the creation of MIS for the governments of Ghana, Uganda and Zimbabwe. Examples of payroll reports were described above.

An example of a typical accounting MIS report is shown in Table 1.

Table 1: Accounting MIS Report Example

Accounting Report
Department of Land Management
Year-to-date, end September 1999

Expenditure Head	*Budget (US$)*	*Actual (US$)*	*Variance (US$)*	*Variance (%)*
Salaries	275,900	291,400	**15,500**	**5.6%**
Wages	241,200	248,000	6,800	2.8%
Office Equipment	113,600	141,600	**28,000**	**24.6%**
Utilities	88,500	84,500	-4,000	-4.5%
Transport	69,300	69,300	0	0%
Consumables	54,900	63,800	8,900	**16.2%**
Other	127,100	131,100	4,000	3.1%
TOTAL	*970,500*	*1,029,700*	*59,200*	*6.1%*

The MIS reporting Table 1 has been instructed to highlight all variances greater than US$10,000 and all variances greater than 5 per cent. Rationally, in attempting to control the overspend indicated, management priority would be given to those items highlighted in both columns.

This form of accounting report, based on responsibility for particular budget heads, is widely used in the public sector. Some public sector organisations, especially those providing public services, have developed cost accounting MIS. These aggregate costs horizontally as they are incurred in the delivery of a service. They therefore require allocation of labour and other costs to particular services during the entire process of providing that service.

This is often difficult but can provide very valuable information in helping to assign a value or cost to a public service, and in comparing costs between public service providers. The British public sector National Health Service, for example, has been

creating management information systems that can report health care provision costs down to the level of individual patients. This allows better-informed decisions about prioritising the use of scarce resources. It also allows health units to compare their costs with other units (HSMU, 1996).

Income-related MIS are the exception rather than the rule in the public sector. MIS are found, though, reporting on:

- Loans and loan repayment. For example, to report those applicants who have been waiting for more than one month to know if their loan application has been granted.

- Customer payments where cost recovery operates in health, education and other social welfare provision. For example, to report those public hospitals which have recovered most and least per patient treated.

- Customer payments to public sector utilities, transportation, rented housing, and enterprises. In these cases, the MIS are likely to be building upon some form of accounts receivable transaction processing system. For example, to report those customers whose accounts remain outstanding 60 days after bills for provision of utility services were issued.

ii. Human resources MIS

Management information systems are used in the entire human resource lifecycle from recruitment to termination or retirement. Reports include:
- *Vacancies*: for example, a detail report on all vacant posts in the organisation.
- *Recruitment and selection*: for example, a summary report on the ethnic origin and sex of all job applicants and recruits for use in equal opportunities monitoring.
- *Staff performance*: for example, an exception report on only those secretarial staff who are able to take shorthand dictation and type at over 50 words per minute.
- *Payroll*: examples have already been given.
- *Training*: for example, an ad hoc report on all those staff who have received training in gender awareness.
- *Staff promotion*: for example, a detail report on all performance assessments for a potentially-promotable member of staff.
- *Staff departure*: for example, a comparative report on turnover rates and reason for departure in the information systems and accounting departments.
- *Pensions*: for example, a summary report on recent annual pension fund growth rates.

- *Other*: for example, a comparative report on workplace accident rates on different days of the week; this and other categories may relate to government reporting and compliance.

The State of Vermont in the US developed a human resources management information system (albeit both over-time and over-budget) that covered a number of these reporting functions (Cats-Baril & Thompson, 1995). Similar experiences are reported in the development of a personnel information system with MIS capabilities for Northamptonshire County Council, a local government body in the UK (Palmer, 1993).

iii. Other MIS

Public sector inventory information systems tend to be relatively basic and/or automated. The aim of an inventory MIS is to monitor stock levels and to control stocks to ensure that all items are neither over- nor under-stocked.

MIS may also report on other entities such as fixed assets, financial investments and projects. One US regulatory agency, for instance, set up an MIS covering its major facilities in order to monitor, control and then reduce expenditure on those facilities, as requested by Congress (Brown, 1999).

MIS may also combine the functional areas described above. The British Department of Social Security, for instance, has proceeded with development of an integrated MIS covering financial, personnel and resource management (Bellamy & Henderson, 1992).

C2. Public Administration and Regulation MIS

Management information systems have been created to support the whole range of public administration and regulatory activities. In the US, for example, the National Drivers Register has MIS facilities to report on driver licence details, such as all those within a given state whose licence has been revoked or suspended (Danziger, 1991). Similarly, the US Environmental Protection Agency is pushing forward in use of MIS to help monitor and control environmental risks (Sparrow, 1992). Just a couple of other examples are provided here.

i. Buildings registration MIS

Based on data recorded about particular types of buildings, or buildings in a particular locality, this could monitor building ownership and use, and produce reports on, for instance:

- all details of one individual building (building code, address, description, owner, floor space, utility connections, local tax liabilities, etc.),
- annual growth in the total number of small industrial units in major cities, or
- all buildings within one city block for which no ownership records were lodged.

Japan's registration MIS has these types of uses in mind. It was begun in earnest in 1988 as a 20-year project, and will eventually cover some 40 million buildings and 230 million parcels of land (Snellen, 1991).

ii. Taxation MIS

Based on data recorded about individual tax-paying entities (whether individuals or organisations), this could monitor the payment of taxation, and produce reports on, for instance:

- all details of an individual tax payer (payer code, name, address, employment, employer, tax code, record of assets, record of recent tax payments and liabilities, etc.),
- a summary of sales tax receipts broken down by sector,
- patterns of non-payment in order to target enforcement efforts more effectively, or
- the names and addresses of all those registered on public or private payrolls as tax payers who are also claiming social welfare payments.

The State of New Jersey in the US used the last of these report types to identify welfare cheats and to generate 'estimated savings of $45 million in the first two years of operation' (Danziger, 1991:175).

C3. Public Service Delivery MIS

Many public service providers have developed management information systems to monitor and control the services that they provide. Both the US and UK Social Security agencies have developed MIS to report on the welfare payments and services that they provide (Danziger, 1991; Bellamy & Henderson, 1992). The British public healthcare system has also been a major investor in MIS as it tries to control healthcare costs and simultaneously improve delivery standards (HSMU, 1996; Ballantine & Cunningham, 1999). One further example is provided here.

i. Education sector MIS for schools

Based on data gathered from individual schools and from other educational institutions such as exam boards and school inspectorates, this could monitor the provision of education and produce reports on, for instance:

- details of one individual school (school code, name, address, location, staff numbers, student enrolment by year, annual budgets, school facilities, examination grades, etc.),
- a summary of the average staff:student ratio for each state, or
- the name and location of all schools without on-site sports facilities.

An example of a typical school MIS report is shown in Table 2.

Table 2: Public Service MIS Report Example

Performance Report
Department of Education
Change in High School Examination Performance, 1998-99

School	*1998 Average Exam Grade*	*1999 Average Exam Grade*	*Percentage Change*
Jacobson	45.3	51.5	**13.7%**
Chaparral	63.7	66.9	5.0%
Tomoroon	58.8	61.7	4.9%
Beaunine	49.8	51.3	3.0%
Burndale	51.5	47.9	-7.0%
Cheyenne	56.2	46.2	**-17.8%**
AVERAGE	*54.2*	*54.2*	*0%*

The MIS reporting Table 2 has been instructed to present the schools in decreasing order of percentage change and to highlight all percentage changes of more than 10 per cent. Those raising their average grades by more than 10 per cent might be the focus for special attention to learn how they achieved this (or to probe for exam fraud!). Those with averages falling by more than 10 per cent might be prioritised for external assistance or inspection.

Individual schools can also make use of MIS. Hobmoor Junior and Infant School, a public school in Birmingham, UK, introduced a computerised attendance system to produce MIS reports that monitor pupil attendance. This improved the Principal's ability to understand and control absence patterns, resulting in a 2.5 per cent increase in attendance rates (Capita, 1998).

D. Conclusion

Management information systems form a bedrock of IT use in the public sector. They are therefore found in all sections of the public sector and in all countries, as the examples cited in this paper suggest.

Of course, different people use the term 'management information system' differently. The term should therefore not form the basis for arguments about what an MIS is and is not. So long as one and those with whom one works understand and agree on a definition, that is good enough. Similarly, when dealing with written material, one needs to be able to understand and communicate, not get locked into doctrinal debate.

On the basis of our definition provided here, though, we can end by summarising a few general points about MIS that differentiate them from other types of public sector information systems:

- Monitoring and control is central; the focus is therefore mainly on information about what has happened (or is happening) rather than, as with planning, what will happen.
- Reports are generally based on relatively simple analysis techniques.
- MIS normally feed into some human decision making, based on their reports; such decision making is usually structured or semi-structured.
- MIS are mainly targeted at operational and tactical management levels.
- Unless custom-written, MIS are often based on a database system, because of the superior query and reporting capabilities of database management systems.

References

Anthes, G.H. (1993). Stat tool weeds out bid-rigging companies, <u>Computerworld</u>, July 5.

Ballantine, J.A. & Cunningham, N. (1999). Strategic information systems planning: applying private sector frameworks in UK public healthcare, in R.B. Heeks (ed.), <u>Reinventing Government in the Information Age</u>. London: Routledge.

Bellamy, C. & Henderson, A. (1992). The UK Social Security Benefits Agency: a case study of the information polity?, <u>Informatization and the Public Sector</u>, 2(1), 1-26.

Brown, D.M. (1999). Information systems for improved performance management: development approaches in US public agencies, in R.B. Heeks (ed.), <u>Reinventing Government in the Information Age</u>. London: Routledge.

Cain, P. (1999). Automating personnel records for improved management of human resources: the experience of three African governments, in R.B. Heeks (ed.), <u>Reinventing Government in the Information Age</u>. London: Routledge.

Capita (1998). <u>Case Study: Attendance</u>. http://www.sims.co.uk/interest/CaseStudies/attendance.htm

Cats-Baril, W. & Thompson, R. (1995). Managing information technology projects in the public sector, <u>Public Administration Review</u>, 55(6), 559-66.

Danziger, J.N. (1991). Management information systems and interorganizational relations within the American governmental system, <u>Informatization and the Public Sector</u>, 1(3), 169-87.

Davis, G.B. (1974). <u>Management Information Systems</u>. New York: McGraw-Hill.

Davis, G.B. & Olson, M.H. (1984). <u>Management Information Systems (2nd edn.)</u>. New York: McGraw-Hill.

Hicks, J.O. (1993). <u>Management Information Systems (3rd edn.)</u>. St. Paul, MN: West Publishing.

HSMU (1996). <u>The Evaluation of the NHS Resource Management Programme in England</u>. Manchester, UK: Health Services Management Unit, University of Manchester.

Laudon, K.C. & Laudon, J.P. (1995). <u>Information Systems (3rd edn.)</u>. Fort Worth, TX: Dryden Press.

Laudon, K.C. & Laudon, J.P. (1998). <u>Management Information Systems (5th edn.)</u>. Upper Saddle River, NJ: Prentice Hall.

Lucey, T. (1997). <u>Management Information Systems (8th edn.)</u>. London: Letts Educational.

Palmer, J. (1993). CPIS: three years on, in <u>Computers in Personnel</u>. London: Institute of Personnel Management.

Pinckney, T.C., Cohen, J.M. & Leonard, D.K. (1987). Kenya's introduction of microcomputers to improve budgeting and financial management in the Ministry of Agriculture, in S.R. Ruth & C.K. Mann (eds.), Microcomputers in Public Policy. Boulder, CO: Westview Press.

Schultheis, R. & Sumner, M. (1995). Management Information Systems (3rd edn.). Chicago: Irwin.

Snellen, I.Th.M. (1991). Informatization in Japanese public administration, Informatization and the Public Sector, 1(4), 247-67.

Sparrow, M.K. (1992). Informing enforcement, Informatization and the Public Sector, 2(3), 197-212.

Tottle, G. (1986). The use of computing techniques to support agricultural extension in rural development, Information Technology for Development, 1(3), 187-98.

Zwass, V. (1992). Management Information Systems. Dubuque, IA: WCB Publishers.