59

Computerized human resource information systems

As defined by Kettley and Reilly (2003), a computerized human resource information system consists of 'a fully integrated, organization-wide network of HR-related data, information, services, databases, tools and transactions'. Such a system can be described as 'e-HR', meaning 'the application of conventional, web and voice technologies to improve HR administration, transactions and process performance'. They suggest that the reasons for adopting e-HR are:

● HR service improvement;
● cost-cutting and operational efficiency;
● the desire of the HR function to change the nature of its relationship with employees and line managers;
● the transformation of HR into a customer-focused and responsive function;
● the offer of services that fit the new world of work and are attractive to current and future staff.

BENEFITS OF A COMPUTERIZED HUMAN RESOURCE INFORMATION SYSTEM

According to IDS (2002), the benefits of a computerized human resource management system are:

- increased access to HR data;
- streamlined and standardized processes;
- more consistent and accurate data;
- a higher internal profile for HR.

HR INFORMATION STRATEGY

The HR strategy of an organization in relation to HR information is concerned first with the use of computerized information for strategic decision making, second with the range of applications which should be included in the system and finally with the provision to line managers of the facility to have direct access to any personnel data they need to manage their own teams in a devolved organization.

Strategic decision taking

The strategic areas involving computerized information and the knowledge gained from analysing that information include macro concerns about organization, human resource requirements, the utilization of human resources, employee development and organizational health.

Specifically the information may focus on areas such as:

- organization development – how the structure may need to adapt to future needs and how IT can enable structural change, for example, high performance team structures;
- human resource plans, especially those concerned with 'mapping' future competence requirements and enlarging the skills base;
- determination of future development and training needs;
- determination of the performance and personality characteristics of the people who will be successful in the organization;
- assessment of the 'health' of the organization measured by attitude surveys and turnover and absence statistics, leading to the development of motivation, retention and absence control strategies;

- analysis of productivity levels as the basis for productivity improvement programmes;
- analysis of the scope for cutting down the number of employees – taking unnecessary costs out of the business.

Range of applications

There is an immense range of applications to choose from, starting from basic employee records and extending to highly sophisticated 'expert' systems which focus on fundamental HR decision areas.

THE FUNCTIONS OF A COMPUTERIZED HR SYSTEM

The basic functions of a computerized HR system are to:

- hold personal details about individual employees including career history, skills and qualifications, leave and absence records;
- hold details about employees' jobs, including grade, pay and benefits, hours, locations, job description or role definition;
- produce reports summarizing different aspects of this information.

The additional 'functionality' that a system can incorporate comprises:

- the recording and analysis of absence, attendance and labour turnover, which includes making comparisons between different occupations and locations and producing data on trends;
- recruitment and training administration;
- job evaluation;
- sophisticated modelling tools for such activities as human resource planning and reward management, which enable the system to be used to support strategic decision-making;
- linkages to the internet (for example as part of an internet recruitment system) or to the internal intranet.

It is useful to distinguish between transactional (HR processes such as records, recruitment and e-learning) application and relational systems (communication, knowledge management and enhancing the employer brand).

Systems may be completely integrated with payroll, or more commonly they

maintain a direct link. Some systems are entirely stand-alone. There may be one comprehensive software package to cover all applications, or specialized software for such functions as attendance management or job evaluation may be used.

THE TECHNICAL INFRASTRUCTURE

Human resource information system

This provides the information required to manage HR processes. These may be core employee database and payroll systems but can be extended to include such systems as recruitment, e-learning, performance management and reward. The system may be web-based, enabling access to be remote or online and at any time.

HR/corporate intranet

An intranet is an electronic network that enables information to be communicated across organizations. It posts static data such as information on HR policies and communications about employee facilities such as learning opportunities and flexible benefits. It can include links that enable managers and other employees to interface directly with HR applications and make changes or enquiries.

B2E portal

A B2E portal provides a single intranet screen that enables the organization to gather and present information and gives people ready access to it.

Application service provider

An application service provider (ASP) carries out on behalf of the organization all or much of the administration of the human resource information system. Organizations, often smaller or medium-sized, can use an ASP to outsource the burden of running the system.

RATING OF SYSTEM FEATURES

Research conducted by the IPD and the Institute for Employment Studies (IPD, 1999b) established that the systems features rated highly by organizations were:

- employee records;
- payroll;
- sick pay and maternity pay calculations;
- equal opportunity monitoring;
- production of standard letters and contracts;
- absence recording and monitoring;
- annual leave records;
- enquiries;
- attendance recording;
- disciplinary recording.

The features that were not so highly rated were:

- psychometric testing;
- IiP evaluation;
- shift or roster planning;
- organization charting;
- succession planning;
- 'what-if' modelling;
- jobs/skills matching;
- workforce planning;
- training needs analysis;
- appraisal records;
- salary modelling.

AN EFFECTIVE SYSTEM

The IPD guide on using computerized personnel systems (1999b) states that an effective system will have the following features:

- meets business needs;
- user-friendliness;
- good reporting facilities;
- flexibility;
- value for money;
- good supplier support;
- reliability.

PROBLEMS AND HOW TO DEAL WITH THEM

The 1999 IPD guide lists a number of typical problems and suggests how they can be dealt with. The problems and their solutions are set out in Table 59.1.

Table 59.1   Computer system problems and solutions

Problem	Solution
Poor data quality	Pay particular attention to getting accurate data into the system by training and monitoring
Lack of understanding of the system by users	Provide 'contextual training' covering: ● data sources (who provides the data and in what form) ● why different pieces of data are collected ● links to other systems
Inadequate coding of data producing unhelpful reports	Take care in setting up coding structures and train users in how to use codes
Lack of clarity about responsibilities for generating information on how the system can be used to generate useful information	Ensure that care is taken in specifying responsibilities and spelling out how information can be used supported by training and continuing guidance (a 'help line' to a systems or networks manager is a good idea)
Inadequate reporting capability – this is an aspect of systems that causes most dissatisfaction	● Define report specifications carefully in advance ● Take care in designing report layouts and contents on the basis of surveys of user needs ● Check views about the quality of reports and amend them as necessary
Line managers resent having to contribute or maintain information	● Minimize form filling ● Ensure that managers can access the system easily, possibly via the intranet ● Advise managers on how they can use the system to their benefit

Involving line managers

With the universal availability of personal computers (PCs) and the development of distributed data processing in local area networks (LANS) and the wide area

networks (WANS), it is possible for data for use by line managers to be downloaded from the centre (a mainframe, minicomputer or UNIX system). Managers can also maintain their own data and manipulate the figures by the use of spreadsheets, for example, considering alternative ways of distributing their budget for a payroll increase among their staff. All this will, of course, be subjected to intensive security so that information goes only to authorized people and some data may be on a 'read only' basis.

The strategy for extending the system to line managers will clearly be entirely dependent on the organization's policies for devolving personnel decisions to them. But if this is the policy, its implementation will be much more likely to take place if the information required by line managers is made available.

DEVELOPING A COMPUTERIZED HR INFORMATION SYSTEM

The design decisions that have to be made when developing an e-HR system are concerned with the type and proportion of services to be delivered, the best means of delivery and the use of the system shared by HR service centres. The challenges, as described by Kettley and Reilly (2003) are:

- aligning e-HR investment with the strategy of the business;
- taking into account the needs of a varied workforce, including their access to and familiarity with technology;
- customizing e-HR;
- avoiding information overload;
- making an impact on HR and organizational performance.

They emphasize that it is important to avoid simply computerizing an existing process. It is necessary to take a 'process thinking' approach, ie to redesign the process and then computerize. This might involve significant streamlining of existing processes.

Overall approach

The following are the typical stages in the development of an HR information system.

- Establish the current and future needs of the business and how these impinge on HR, and the implications for information systems.

- Define what outputs are required from the system in the form of information and reports.
- Prepare a high-level statement of requirement.
- Identify the options available to meet the HR business requirements.
- Prepare a recommendation on how to proceed for executive approval and buy-in. This must be supported both by a financial evaluation and by an analysis of the benefits to the business and any associated changes in business practices. A transition plan will be required which sets out the sequence of activities that would allow the organization to move swiftly and efficiently to any new system with the minimum of disruption.

Preferred characteristics of an information system

The preferred characteristics of an information system are:

- direct input of data at source;
- systems that can be used by the 'occasional user', not just a dedicated expert;
- systems able to deal with administrative processes, not simply a management information system;
- systems that provide the information needed by line managers in an easily understood format.

The range of applications will be defined by the information strategy. It will be vital to ensure that the hardware is appropriate to the organizational requirements in that PCs and terminals are provided where needed and are linked together in a network as required.

It is equally essential to ensure that the system is designed in such a way as to hold all the base data needed to provide management information. The system should be user-friendly, bearing in mind that the task which demands most time in using a system is data entry and that the enquiry system for obtaining information must be as easy to learn and use as possible.

The detailed points to be considered when developing a system are:

- the choice of hardware;
- database management;
- the degree to which the system is integrated with the payroll;
- the choice of software;
- the development programme.

Choice of hardware

There may be no choice of hardware – some systems are still linked to a mainframe computer. But networked PC systems using either mini or microcomputers are common, especially in larger organizations.

Database management

The system should be founded on a database – a self-describing collection of integrated personnel records. Particular attention has to be paid to the database management system (DBMS), the program or set of programs that develops and uses the database and database applications. Careful attention has also to be given to the design of database forms: data entry forms which are custom developed, video displays used to enter and change data, queries using standard query language (SQL) and report forms which are the hard copy output of database data. The base data is likely to be of much better quality if it is used in such day-to-day processes as recruitment, training administration and job evaluation.

Integration

Although many organizations have separated the payroll and purely personnel applications (the former usually being controlled by the accounts department), there is a lot to be said for having an integrated system. This makes economic use of one comprehensive database and facilitates such processes as flexible payment (cafeteria) systems.

Software

There is a massive and almost bewildering choice of software packages for application programs to provide information and generate reports. The software houses are constantly innovating and developing their products and between them provide something for everyone. However, if the organization has its own systems analysis and programming resources there are advantages in developing tailor-made software. But great care will need to be taken to debug the system, especially if a distributed system involving line managers is being created.

However, most organizations use an external supplier although the HR application market is highly fragmented, as an IRSI (2004i) survey into the use of human resource management information systems found. The two basic approaches are the 'integrated best-of-breed model', which links applications from separate specialist providers to produce what is in effect a bespoke system, or the 'application suite'

model, with one vendor supplying a linked group of modules. If an external supplier is used the choice should be made as follows:

- research the HR software market through trade exhibitions and publications;
- review HR processes and existing systems;
- produce a specification of system requirements;
- send an invitation to tender to several suppliers;
- invite suppliers to demonstrate their products;
- obtain references from existing customers, including site visits;
- analyse and score the product against the specification.

The development programme

The 10 steps required to develop and implement an information system are:

1. Determine objectives – are they to save administrative costs, speed up processing, provide advanced decision support, or a combination of any of these?
2. Prepare a business case for the system, setting out the benefits and the costs.
3. Carry out a feasibility study to consider applications and their likely costs and benefits. This study could be carried out in-house or with the help of outside consultants or software houses who provide a consultancy service. The feasibility study will broadly analyse and define user requirements and ensure that all concerned are aware of what is being planned, how they will benefit from it and the contribution they will be expected to make to the development and application of the system. The information the system will be required to store and process and the uses to which the information will be put should be specified. Account should be taken of the provisions of the Data Protection Act (1998) as described in Chapter 55.
4. Prepare a requirements specification which will set out in detail what the system is expected to do and how the company would like to use it. This specification can be used to brief hardware and software suppliers before selecting the system.
5. Select the system in the form of the hardware and the software required. This may involve decisions on the extent to which existing hardware or systems (eg payroll systems) will be used. The need and scope for networking, that is, linking users by means of terminals, will also need to be considered.
6. Plan the implementation programme to ensure that the objectives will be achieved within a given time scale and in line with the cost budget.
7. Involve users to ensure that everyone who will benefit from the system (line

managers as well as members of the personnel department) can contribute their ideas and thus feel that it is their system rather than one imposed upon them.

8. Control the project against the implementation programme to ensure that it delivers what is required, on time and within the budget. As *The IPD Guide on Implementing Computerized Personnel Systems* (1997b) emphasizes, it is essential to ensure that the selection and implementation of a system is a managed process. This means selecting an individual to act as project manager with the responsibility for dealing with all the steps listed above.

9. Provide training to all users to ensure that they can operate and get the most out of the system.

10. Monitor performance to ensure that the system lives up to expectations.

APPLICATIONS

As established by the IRSI (2004i) survey, in many respects the core functionality in use is concerned with administrative processes, particularly absence management (very popular), training and development, reward, payroll and recruitment and selection. Most HR functions use their HRM information system to change pay rates, alter employee records, monitor absence figures and download forms for manual completion. Not many organizations use their IT systems strategically for workforce planning, tracking the skills of individuals and making the data available for analysis and action. Some but by no means all organizations were developing self-service applications such as employees changing their personal details, and booking on training courses directly. The main potential applications are summarized below.

Personal records

These can include personal details, job details, employment contracts, pay details, performance appraisal, contacts and addresses and employee transactional data. The latter includes all the special items of information a company may need for its employees including qualifications, special skills and competences, training, absence, medical history and discipline.

Business to employees (B2E)

As defined by Watson Wyatt Worldwide (2002), business to employee (B2E) processes involve the application of any computer technology enabling managers and

employees to have direct access to HR and other workplace services for communication, performance reporting, team management and learning, in addition to administrative applications. A self-service approach can be adopted, which allows managers or staff to access personal records and update them or add new information, subject to rigorous security arrangements.

Human resource planning

An information system can be used to model the effects on groups of people within the organization of change over time in the numbers and structure of each group and movements into, through and out of each group. Such a model looks at the organization, using a staffing system consisting of grades and flows. The user has considerable freedom in defining the number and type of flows required whether into, through, or out of each level of the system, ie:

● flows in – recruitment, transfers in;
● flows out – transfers out, retirement, resignation (uncontrolled losses), early retirement (controlled losses).

Employee turnover monitoring and control

Computer models can monitor and help in the control of employee turnover. They can therefore provide a critical input to other areas of human resource decision making such as policies on recruitment, promotion, redeployment, training and career planning.

Employee scheduling

An information system can be used to provide an integral system for matching the numbers of employees to business needs. The process of scheduling human resources to meet output in processing targets is becoming increasingly complex with the availability of more flexible ways of deploying people. They include multi-skilling (employees who are capable of carrying out different tasks and are not subject to trade-union-imposed constraints in doing so), the use of contract workers, the use of outworkers (people working at home or in another centre, a process which is facilitated by computer networking and electronic mailing), twilight shifts, more part-timers, job sharing etc.

Human resource planning is an interactive process which is always using output from one part of the process to influence another part of the process. Thus, assessments of the demand and supply of people, scheduling policies and possibilities, and

the scope for flexing workloads and the use of people all influence the human resource supply policies adopted by the organization.

Employee profiling

Profiling is a particular aspect of employee scheduling concerned with the matching of staff to workloads and ensuring that the right number of people are available to meet fluctuations in activity levels over time. Profiling techniques are used where there are measurable volumes of work that can be costed and forecast with reasonable accuracy. Profiling can be linked with employee budgeting control in the sense that the use of people is both constrained and influenced by the cash budget and performance and employee establishment targets.

Profiling models can be used to:

- monitor and analyse employee utilization;
- test the effects of moving some activities to different times of the year and analyse their predicted impact on the employment profile;
- monitor movements in expenditure on pay and other employee benefits and carry out sensitivity tests on the impact of different pay assumptions;
- forecast future employee requirements;
- synchronize the recruitment of permanent and temporary employees with forecast workloads;
- flex employee budgets on the basis of revised activity level forecasts;
- control employee budgets.

Skills inventories and audits

Many organizations need to store detailed information about the skills, competences and experience of the individuals they employ. A separate skills inventory can be linked to a personnel database in order that any individual changes in experience or additional training can be fed through automatically to it.

Periodical audits can be carried out by the information system of the skills and competences available in the organization. These can be compared with estimates of current and future requirements to identify areas where recruitment or training action is required.

Competency modelling

Competency modelling brings together organization planning and performance management data to establish the skills or competencies required to do particular

jobs. This assists in appointment, promotion and training decisions. Competency analysis looks both at what tasks have to be carried out and the competencies required. Profiles can then be developed by the computer and matched to assessments of current job holders or job applicants.

Recruitment

A recruitment system can carry out the following tasks:

- storage of applicants' details;
- retrieval and amendment of those details;
- matching CVs to person specifications for short-listing purposes;
- link with Internet recruiting processes;
- letter writing (linking the system to word-processing facilities) – acknowledgements, invitations to interview, offers and rejections;
- management reports, analysis of response by media and monitoring recruitment costs.

Computerized recruitment control packages not only automate recruitment correspondence (coupling the system with word processors) but also enable users to determine instantly who has applied for which post, track progress in recruiting for a specific post and match and process internal candidates (applicant tracking systems).

The database can be used in more advanced applications to assist in establishing selection profiles with the standards against which potential job holders can be assessed in order that the right people can be appointed to or promoted into jobs.

As reported by Kettley and Reilly (2003), the United Biscuits graduate recruitment portal is a competency-based pre-screening tool. It allows people to review online details of the company, its jobs and career development opportunities. Interested applicants are invited to go through pre-screening by entering their personal details, filing academic information, and completing a questionnaire focused on United Biscuits' high performance behaviours derived from the company's top 100 managers.

If successful at this level, applicants are given a unique password enabling access to the website's next level, where applications to specific functions can be made.

Reward management

The system can be used for pay modelling and to carry out a number of reward administration activities. It can also be used in job evaluation.

Pay models provide the answers to 'what if?' questions such as, 'How much would

it cost if we gave x per cent to this part of the company, y per cent to another part of the company, and implemented the following special package across these job functions?'

A system can also:

- analyse and report on average pay or pay distributions by job, grade, age or length of service;
- calculate compa-ratios to show how average pay in a range differs from the target pay;
- calculate the effects of attrition;
- assist in job evaluation;
- forecast future payroll costs on the basis of assumptions about numbers, promotions and pay levels;
- administer pay reviews, producing review forms, analysing proposals against the budgets and calculating the cost of performance-related pay awards in accordance with different assumptions about amounts and the distribution of awards within a budget;
- provide information to line managers which will guide them to their pay decisions;
- generate instructions to adjust pay as well as letters to individuals informing them of their increases.

Performance management

An information system can help to operate performance management, generating forms, analysing and reporting on the result of performance reviews showing the distribution of people with different degrees of potential or performing at different levels, and highlighting individuals with particular skills or special promise. This system can be linked to others to provide an integrated basis for creating and implementing human resource management policies.

Computer-managed learning

A system can be used for computer-managed learning by:

- storing e-learning modules on the database, which enables trainers to select an appropriate module or mix of modules to meet a specified learning need;
- analysing the training recommendations contained in performance review reports to identify collective and individual training needs;
- identifying suitable training courses to meet training needs;

- making arrangements for off-the-job courses;
- informing employees about the arrangements for courses;
- handling correspondence about training courses;
- storing data on standard or individually tailored induction, continuation or development training programmes, including syllabi, routings, responsibilities for giving training, test procedures and progress reporting;
- generating instructions and notes for guidance for all concerned with providing or undergoing on-the-job training programmes;
- storing progress reports and monitoring achievements against training objectives;
- producing reports summarizing current and projected training activities and calculating the output of training programmes – this can be linked to human resource planning models including those designed to determine the input of trainees required for training schemes;
- recording and monitoring training expenditure against budget.

Computers can also be used as training aids.

Career management

A system can help in the implementation of career management policies and procedures which embrace both career planning and management development. The system does this by analysing the progression of individuals and comparing the results of that analysis, first, with assessments of organizational requirements as generated by the human resource planning models and, second, with the outputs of the performance management system.

Absence control

Absence control can be carried out with the help of computerized time recording and attendance systems which:

- record clocking-on or -out time and the hours actually worked;
- enable employees to record the time spent on particular jobs;
- get employees to explain the reason for late arrival, early departure, or any other absence;
- can be linked to the payroll system for pay and bonus calculation purposes and to a flexible working hours system;
- provide team leaders with a statement showing the length and reasons for absence.

Advanced systems link information obtained from clocking-on or -out direct to a screen in team leaders' offices so that they can have instant information on how many people are at work and on the incidence of lateness.

Equal opportunity monitoring

The system can store records of the ethnic composition of the workforce. This information can be analysed to produce data on the distribution of ethnic minorities by occupation, job grade, age, service and location. The analysis could show the overall proportion of ethnic minority employees compared with the proportion in each job grade. Similar statistics can be produced for men and women. The analysis can be extended to cover career progression, splitting the results of the overall analysis into comparisons of the rate at which women and men of different ethnic groups progress.

Expert systems

Knowledge-based software or expert systems are computer programs which contain knowledge about particular fields of human activity and experience, which, through linkages and rules built into the system design, can help solve human resource management problems. Unlike a database system which stores, sorts, manipulates, and presents bits of information – ie data – expert systems store, sort, manipulate and present managers with ready-to-use knowledge of management practice, written in a language that management understands, as opposed to computerese.

Expert systems are developed through a process of knowledge engineering which starts from a knowledge base containing facts and a body of expertise ('heuristics', or rules of thumb) about the use of those facts. These 'rules' enable decisions to be made on the basis of factual information presented to the computer. Thus, a fact may be information on employee turnover during the last three years, and the rule of thumb may be the method by which turnover could be predicted over the next three years. These facts and rules are processed by what is termed the 'inference engine', which solves problems or makes predictions, and the results of this process are presented to the user in the 'user interface'.

An expert system can produce a list of suitable candidates for promotion by using information from the database. If more information were required, it would ask the user to answer questions. It would also respond to users' questions about why particular candidates had been identified, by giving details of qualifications, performance appraisal results and so on.

What can loosely be described as expert systems are also used in job evaluation

applications where they make use of a database of job analyses and evaluations in order to make consistent judgements about evaluation scores. This is done by:

- defining the evaluation rules;
- programming the computer to ask appropriate questions concerning each factor in a job to enable it to apply the evaluation rules – this involves the analysis of structured questionnaires which have been specially designed to facilitate the systematic collection and analysis of data;
- applying the rules consistently and determining the factor score for the job;
- grading and ranking jobs;
- storing the information in the computer's memory so that it can be called to the screen or printed at any time.

AUDITING THE SYSTEM

As suggested by Robinson (1999), regular audit of the system should be carried out to obtain answers to these questions:

- Is the system being used efficiently and effectively?
- Are there any barriers to the effective use of the system?
- Does the technology enable managers or merely dictate to them?
- Are there any aspects of the system which are causing dissatisfaction in the HR department, with senior management or line managers?
- Are there any problems with data inaccuracy?
- Are reports accurate, helpful and used for decision-making?
- What is the functionality of the system? That is, what does the system do, and how well does it do it? What additional functions might be useful?
- How effective are the systems links, the use of data in different applications?