Paper submitted to

Engineering, Construction and Architectural Management

Towards a Human Resource Information System for Australian Construction Companies

(Ref. No.: 492)

S. Thomas Ng [1]
R. Martin Skitmore [2]
Tulsiram Sharma [2]

[1] *Department of Civil Engineering, University of Hong Kong, Pokfulam Road, Hong Kong.*

[2] *School of Construction Management and Property, Queensland University of Technology, GPO Box 2434, Brisbane, Q4001, Australia.*

Please contact:

Dr. Thomas Ng
Flat C, 18/F., 161 Tin Hau Temple Road,
North Point, Hong Kong.

Tel: Int+ (852) 2564 4274
Fax: Int+ (852) 2564 4274
Email: tstng@hkucc.hku.hk

Version 2a (3rd February 2001)

Towards a Human Resource Information System for Australian Construction Companies

Abstract
The casual nature of employment in the construction industry makes planning human asset requirements a vague exercise. Human resource information systems (HRISs) offer a means of coping with these problems through improvements in the reliability, accuracy and accessibility of the human resources (HR) information. Aimed at improving the understanding of construction HRISs, interviews were carried out with three leading construction companies in Australia. The HR needs of the companies were examined by identifying the HR related functions and activities conducted, the internal and external users of HR information, the type of data needed, and the specific purpose of those data. Twenty-three HR activities were identified and grouped into seven major functions: project management and control, strategic planning, review and analysis, employee profile, employee performance, human resource development, payroll and accounting support, and information systems outside the company. The HR information for each function was established. The findings of this study may facilitate the development of a HRIS for construction companies.

Keywords: Human resource management, human resource information systems, construction companies.

INTRODUCTION

The construction industry is characterised by its fragmented nature of operation and susceptibility to economic fluctuations. While many construction firms have become increasingly decentralised and disintegrated, the workforce has become more and more diverse (Barton, 1985). Although subcontracting has proven for some to be a successful alternative, the management of human resources (HR) is still a very important aspect of the overall planning and management activities of construction businesses (Patchett, 1983).

For many construction companies, HRs are highly mobile and recruited on a casual or project by project basis (Langford *et al*, 1983). As a result, HR information is widely spread between interdependent departments and business units in construction firms making its extraction and use increasingly difficult. In addition, the casual nature of employment in the construction industry makes planning of human asset requirements a vague exercise that can result in low productivity, high labour turnover rates, and reduced motivation to train and plan for the future.

Human Resource Information Systems (HRISs) offer a means of coping with these problems through improvements to the reliability, accuracy and accessibility of the HR information. A HRIS is a computerised system used for acquiring, storing, manipulating, analysing, retrieving, and distributing pertinent information regarding an organisation's HR (Arthur, 1987). The fundamental aim of a HRIS is to facilitate, or support, strategic, tactical and operational decision-making, to evaluate programs, policies, practices, to support daily operations, to provide information and a host of other supports in the management, development, and utilisation of the HR of an organisation (Kavanagh *et al*, 1990). Also, recasting the role and breadth of HRISs not only enhances the performance of the HR function, it also has the potential to transform the HR department into a repository of new organisational wealth (Townsend and Hendrickson, 1996). In addition, HRISs have a potential role in decision-support and strategic manoeuvring, with large or small, companies looking for HRIS to, among other things, help make informed decisions, get the most out of people assets, streamline HR processes and better allocated HR (Miller, 1998).

Many research studies in HRISs have been carried out. For instance, Satao (1996) developed a HRIS for educational institutions, which combined the functions of payroll and personnel departments. Martinsons (1994) benchmarked the HRIS in Canada and Hong Kong and developed a knowledge-based system for manpower planning, recruiting, management development and performance appraisal (Martinsons, 1997; Byun and Suh, 1994). A HRIS has also been developed and used by the US Navy shipyard with more than 80,000 employees (Niehaus, 1995).

Despite that, little research has been undertaken concerning their development in the construction industry context. A survey revealed that only one-third of the construction companies in the US had a personnel department and a written human resources philosophy statement (Albanese and Ferris, 1991). Maloney (1997) has asserted that construction firms failed to develop intentional HRIS strategies to suit the changing external environments. Hillebrandt and Cannon (1990) argued that personnel issues are a secondary-order function in construction. The construction industry has retained a short-term approach to the management of labour, even including professional and managerial employees (Drucker *et al*, 1996). Perhaps the most relevant study on construction HRIS is a decision support system developed by Serpell and Maturana (1995) which mainly focuses on information concerning

performance and labour satisfaction. This paper seeks to improve the understanding of HRIS in construction. The HR functions and activities performed in three typical construction companies are identified and the information required by a HRIS for construction companies is established.

HUMAN RESOURCE INFORMATION

According to Patchett (1983), the major activities involving HR information in construction are manpower planning and development; payroll functions; labour control; safety management; industrial relations; and compensation and benefits.

Manpower Development and Planning

The aims of manpower planning are to maintain satisfactory HR levels both in quality and quantity; to maximise the performance and wellbeing of existing HR; and to anticipate potential HR surpluses/deficits and identify associated problems. The process of manpower development and planning has been widely discussed (e.g. Pettman and Tavernier, 1984; Storey and Sisson, 1993). The key stages are summarised in Figure 1. These comprise: (1) assessment of existing manpower; (2) assessment of external factors; (3) establishment of training and staff development policy; (4) forecasting labour demand; and (5) forecasting labour supply.

Figure 1: *Stages in manpower development and planning*

Payroll Functions

The payroll system basically includes information relating to the employee remuneration position, and involves details of payments, deduction of claims per employee, leave type and leave accruals (Walker, 1993). Payroll system capabilities include the provision of a variety of printed documents (e.g. pay office reports, cheque printing, third party reports, etc.) and support for many necessary administrative analyses. Companies in general are moving towards the integration of payroll systems with the HR departments, driven by government regulations and the increasing complexity of benefits (Nankervis *et al*, 1996).

Labour Control

Labour control enables management to optimise labour output per hour (Moore, 1988). Factors likely to affect this include the impact of work changes on labour, poor weather, labour turnover, accidents and unsafe conditions. Relevant information is essentially concerned with labour records. Labour records provide crucial accounting information for payroll, such as time and attendance allowances, overtime and overtime allowances, labour costing and rosters (Mincks and Johnston, 1998). The labour records also enable workers' productivity, in terms of output per unit of labour, to be calculated.

Safety Management

Construction firms with a poor safety record eventually become less competitive, due to increased insurance premiums, lower employee moral, increased costs of fines, and overall loss of profits (Mincks and Johnston, 1998). Adequate records and dissemination of

information to employees regarding the company's safety policy, accident prevention, substance abuse, personal protection equipment, hazardous materials, safety, accident reporting and investigation, etc. are the key information requirements.

Industrial Relations

A poorly managed workforce can have adverse effects on organisation operations. These include inefficiency, low productivity, low morale and absenteeism through covert conflict in the workplace, or overt conflict resulting in loss of working time through strikes, bans, go slows, etc. (Nankervis *et al*, 1996). The management of industrial relations generally requires information concerning wages, working hours, working conditions, overtime premiums, holidays, allowances, safety representatives, dispute procedures, and equal employment opportunities (Barrie and Paulson, 1992).

Compensation and Benefits

It is necessary for HR managers to decide what benefits to offer and how best to pay the workforce (Boudreau and Milkovich, 1988). D'Netto (1997) suggests that performance appraisal could measure and evaluate how well employees are doing their job, correct their mistakes and acquire new skills. HR information for estimating and budgeting includes performance appraisal, external and internal staffing, training and development, compensation and benefits, and employee relations.

DEVELOPMENT OF HRISs

It is acknowledged that the effective provision and use of HR information can create a competitive advantage for the organisation, resulting in lower turnover, increased job satisfaction, high motivation and less internal conflict (Cox and Blake, 1991). To this end, the development of the first HRISs, focused on skill and payroll functions (Walker, 1993), were begun in the USA in the 1950's, aimed at providing more effective access to information relating to works and workers. The early HRISs maintained descriptive personnel data about employee, organisational data, wage and salary data, and work history data mainly for administrative and operational use (Nankervis *et al*, 1996). As computers became more powerful in late 1950's, payroll and personnel systems advanced accordingly. By the 1970's and 80's, the increasing complexity of payroll systems also demanded more flexibility in, and access to, information systems, and this consequently led to further sophistication in HRISs.

Nowadays, many 'off-the-shelf' HRIS software packages are available on the market. These systems are used to keep records relating to employee demographics, employment status, pay and job information, performance review timing, employee benefits, education and skills, salary status, dependent information, training and development, time and attendance, government reporting, etc. More extensive HRISs include functions such as applicant tracking, job profiles, personality profile analysis, detailed training management and safety management. Table 1 depicts the major functions available in modern HRISs.

Table 1: *Major functions of 'off-the-shelf' HRISs*

The functions listed in Table 1 are, however, not exhaustive and may not necessarily be applicable (nor does the list necessarily include all the functions that are applicable) to construction companies' HR management. This, then, raises the question "Do any 'off-the-shelf' HRISs adequately fulfil the requirements of construction companies?", or indeed, "Do all construction companies have the same HR information requirements?"

Answers to these questions are not at all obvious. What is clear is that, the special nature of the construction industry determines to a large extent the HR needs of construction companies, suggesting the likely homogeneity of company HRIS requirements. Also, as Langford *et al* (1983) observe, the industry is labour intensive with the degree of labour varying from sector to sector, project to project, and with a predominance of external factors that make management of HR especially difficult. The general literature on external factors indicates the most important external factors to be: government regulations impacting on HR management and utilisation; technological advancements in computers and office automation; labour market conditions; societal concerns about privacy issues concerning the use of personal HR information; and competition among companies and in the industry (Kavanagh *et al*, 1990). However, the tenability of this has yet to be tested in the context of construction companies.

DATA COLLECTION

In-depth interviews were conducted to understand the detailed requirements of HRISs for construction companies. These aimed to identify the essential activities and different HR information needs in the companies. Ten leading construction companies in Brisbane, Australia were considered for this study. From these, four companies were selected, based on their experience in the use of HRISs.

A set of protocols was developed to facilitate the interview. These included questions covering a range of HR related issues concerning the companies, and a mix of open-ended and partially structured response questions were used. Four open-ended questions were included to elicit all unknown details and to get a better depth of information. The partially structured questions included a table containing various HR functions and activities against which the interviewees could enter details of data needed by the function or activity. The interviewees could rename the functions as they applied to their organisation or add new ones as necessary.

The interview protocols were piloted with Human Resource Management (HRM) personnel of a construction company not to be involved in the main study. The intention of each question was personally explained and answers were solicited as part of the piloting exercise. This helped identify some ineffective aspects of the protocols due to the existence of duplicated, redundant and obscured questions, failure to stimulate the interviewee, or requesting details the interviewees could not provide.

Recognising the shortcomings of the initial protocols, a substantial restructuring was carried out. The final version of the protocol set was used during the main study. All four companies selected for participation in the interviews responded with some enthusiasm and the interviews gave rise to a considerable amount of data. However, one of the companies had to be dropped because of lack of an adequate supply data for the purposes of the study. Thus the analysis focused on the data generated by the three remaining companies.

ACTIVITIES PERTINENT TO CONSTRUCTION HRM

Twenty-three HR activities pertinent to construction were identified from the three construction companies interviewed (Table 2). A close examination of the HR activities in the three companies presented in Table 2 failed to reveal any significant variations in the activities between companies. However, two interviewees did not regard financial planning and labour records as the key activities for construction HRM (which are supposed to be significant to the management of construction resources). This highlights the values of a HRIS in construction as many companies might have slightly different perceptions as to the HR functions.

Table 2: *Major activities of HRIS in construction*

These HRM activities can be broadly grouped into seven functions: (1) project management and control, (2) strategic planning, review and analysis, (3) employee profile, (4) employee performance, (5) human resource development, (6) payroll and accounting, and (7) information system outside the company (Figure 2). Project management and control deals with the human resources being employed in a project and their attendance. Information system outside the company contains information about subcontractors' resources, industrial relations, etc. Strategic planning, review and analysis includes financial planning, human resource planning, organisational analysis, succession planning/development, etc. Employee profile, employee performance, human resources development and payroll/accounting constitute the personnel system. Information about the performance of employees may be used for setting salaries and strategies for staff development. The personnel system can be regarded as the core of a construction HRIS, and it should interact with project management and control, strategic planning, reviewing and analysis, and information system outside the company to obtain and provide necessary information for HRM.

Figure 2: *Structure of a construction HRIS*

HRIS INFORMATION REQUIREMENTS

Table 3 summarises the HR information needs of various users and the purposes for which the information was required. Slight variations between companies that were noted (see Appendix I). For instance, while information about contractors, consultants, part-time workers, temporary workers were important to Companies A and B, Company C was less concerned. Also, while Companies A and B showed that the employees company-wide used the information system for purposes such as to access policies and procedures, sharing of intra-company information and knowledge, this group of users were ignored by Company C. Data gathered from the interviews suggested that this difference might be due to the lack of a standard HRIS in the company as well as a lack of awareness among HR management personnel. Despite that, similarities were noted in terms of the types of HR information users, types of data required, and the purpose of those data among all the three companies covered in this study, again confirming the homogeneous nature of the HR requirements of the construction companies involved. With the assistance of the three companies participated in the interviews, the information shown in Table 3 was reclassified in accordance with the seven major functions as identified.

Table 3: *Data required in a HRIS and its purposes*

Project Management and Control

Project and site managers need to have complete job histories, educational records and other information relating to employees in order to make realistic decisions concerning the utilisation of the workers under their control. Job-site managers and construction managers also need to have access to information and underlying work processes and functions controlled by HR department. Such information includes:

- Data pertaining to each person in the project or at the work location, including demographic data, employment history, qualifications, career plans, and training/development completed/required.
- Data relating to contractor, consultants, part-timers, and temporary workers.
- Information concerning peoples' time-off patterns/preferences and desired work/location preferences.
- Information concerning the availability of others in the organisation for job reassignment or redeployment.
- Operational data concerning the workforce itself – such as workforce size, productivity ratios, resource allocation, both for site managers' organisational units and similar work organisation-wide.
- Information such as time and attendance data, payroll, applicant data from an applicant tracking system, training records from the career development system, cost data from accounting.
- Information relating to wages, working hours, holidays, allowances, safety, disputes, and for the proper management of industrial relations.
- Environmental data that impacts on the HRs managed by the site manager, supervisor, or team leaders – such as salary surveys, skill shortages, new employment legislation, demographic trends, retirement trends, and changing attitudes and values of workers.
- The impact of on-site availability of operational HR data helps managers to know their people better and can help them find answers to such questions as:
    - Can two tasks be handled by the same individual? Will that result in lower costs and provide similar or better results?
    - What skills are required for the tasks, and who has the skills to take both tasks in this organisation or in other locations?

Strategic Planning, Review and Analysis

Senior and upper management of construction companies are concerned with the analytical results of HRIS information. Such information is useful for the formulation of company strategies. Strategic planning in construction firms involves the development of plans and business manoeuvres for the expansion and long-term survival of the firm. This requires data from external sources, information concerning environmental issues not normally available from local sources, demographic data, trends in the labour market, educational statistics, changes in the global economy, etc. This, combined with internal data such as projected graduate requirements in the next five years, estimated payroll costs, etc. available from the company's other departments, provides the decision support data for the company's planning for the future.

Decentralisation of business units at various locations in the construction industry has tended to isolate the branch offices from their head office thus causing the creation of islands of HR and payroll systems to meet each's needs. Branch offices therefore require access to the HRIS for overall business strategies, company's HR information, policies and procedures, and external data.

Employee Profile

People who work full-time, or temporary and part-time workers, who are not regularly on the company payroll, are often critical of the HRM of construction firms. Such people include:

- Temporary and part-time employees, including some whom may be employees of an outside agency responsible for the administration of pay and benefits, who may need access to certain company information for training courses.
- Retired personnel who may be receiving pension checks from the company.
- Business partners, such as insurance agencies and their employees, and shareholders.
- Consultants, architects and contractors.
- Key suppliers, service providers, and their employees.
- Major customers.

The HRIS can provide access to information relating to employee positions, training and development activities, and give company-wide information concerning trends in workforce movement, HR surpluses and shortages, and other career relevant information. Should extra information be required, the HRIS for staffing can provide on-line position descriptions, job advertisements when openings arise, resumes of all covered employees, knowledge-based assessment modules, and systematic procedures that link qualified candidates and open positions, providing managers with backgrounds and resumes of employees and applicants to show their relevance to the position requirements.

Employee Performance

Employee surveys in the construction industry should be useful to identify and handle day-to-day problems in industrial relations; to gather statistics relating to employee turnover, absenteeism, performance, and productivity to help the company plan its HR strategies.

The accessibility of the HRISs to all employees can permit automated, instantaneous employee attitude surveys and provide a means of letting employees company-wide make their views and ideas known to management in a timely, cost efficient manner. Reward systems in the construction industry play a very crucial role in productivity. To assess the effectiveness of the rewards system, employee attitudes are important to the organisation. Identification of attitudes and perceptions among employees are important characteristics of surveys. According to Walters (1996), communication surveys can be used to assess the level and effectiveness of communications in the organisation. For instance, on-line or phone systems linked to HRIS data can provide data for several aspects of surveys, and especially timely input on current issues. Linked to HRIS data, an automated attitude survey can produce summaries of responses, by such groupings as management level, job function, location, or demographic characteristics, without the need for manual analysis (Walker, 1993).

Human Resource Development

The effectiveness of training an increasingly heterogeneous workforce in the construction industry is a critical HR issue today. HRISs can help HR managers to develop, and deliver training in the following ways:

- Analysis of HRIS demographic data for the training population to develop training formats for different groups.
- Analysis of the relationships between training and performance ratings, compensation, etc. to establish the cost-benefits of specific training types.
- Delivery through HRIS, of computer-based training and performance support tools such as on-line reference guides.
- Development of new recruitment practices, pre-employment tests, etc. based on analysis of training data and the requirements of positions.

In the construction environment, effective training is governed by a number of HR management issues. Motivation, employee involvement in career development, job design, and other issues are involved in effective training, and HRISs can be the best source of data for addressing these issues.

Payroll and Accounting Support

This study found that accounting and payroll systems, which traditionally function separately from the HR department, also need HRIS information. The HRIS allows the payroll department to access large volumes of data quickly, calculating pay, creating paycheques, producing pay-related registers and preparing federal, state and local tax reports, etc.

Each location may have individually discrete pay policies for hourly employees. Regional pay levels may influence hourly rates; different labour contracts may be in effect in different locations. Yet, government legislation may require overtime pay and record keeping. In addition, the accounting department needs financial data in consistent formats and timing cycles, possibly from locations around the country or even abroad, depending on where the company operates. This demands that all the users access such information quickly and easily. Entering a HRIS, managers and other users can examine the company policy with respect to treatment for time off, vacations, holiday pay, or infractions to discipline. Further, merit pay guidelines, performance appraisal instructions, access to training programs, or instructions on how to transfer or hire individuals may be obtained from the HRIS.

Information Systems Outside the Company

The construction company HRIS needs to link with the external environment for information, including:

- Data on population shifts, demographic changes in the population (race, sex, age, etc.) e.g. from the Australian Bureau of Statistics.
- Link with tax departments, insurance companies, superannuation schemes, etc.
- Data on workforce changes, demographic changes, and data relating to industry employment patterns from labour department or relevant sources.
- Data on trends in educational patterns, levels, types of degrees, basic skill levels, etc. from education department, universities, etc.
- Economic projection data at national, regional, and local levels.

- Trends in political changes affecting the regulatory environment, technology, and many other issues that influence the HR of the firm.

HR information relating to customers is valuable for construction companies, and so certain key information concerning people and their jobs in these customer organisations may be worth tracking and analysing. For example, depending on the nature of service provided, the HRIS needs to include information such as the client's organisational configuration, marketing programs, use of technology, competitive posture, and workforce characteristics that will affect the future of the client relationship.

Construction companies are experiencing a new trend in partnership arrangements, and even outsourcing of some of their traditional in-housed activities. Information concerning the quality, continuity, performance, and future reliability of business partners' HR activities is needed, particularly for partners are critical to the survival of the company.

CONCLUSIONS

The number of functions and the management objectives supported by the HRIS of the future is growing, requiring vast range of data. With the environment of users becoming increasingly heterogeneous, the effective development and management of HRISs requires the managers of the system to be able to set priorities, address privacy and ethical issues, comply with increasing legislative requirements, etc. The increasing diversity of the workforce in the industry is an area HRIS managers will need to handle with greater sensitivity. HRIS and its management require new and improved competencies to succeed in the years ahead.

This paper identified the HR information requirements of a group of construction companies and established a conceptual framework to facilitate the integration of HRISs into construction company activities. As a result of a series of in-depth interviews, twenty-three basic HR activities associated have been identified. These activities were grouped into seven major functions: (1) project management and control, (2) strategic planning, review and analysis, (3) employee profile, (4) employee performance, (5) human resource development, (6) payroll and accounting, and (7) information systems outside the company. Since the organisational HRM priorities may differ in various countries, there is a need to examine the cultural differences and their effects to the importance of HR information before the final HRIS is to gain international applicability.

The results of the interviews also revealed the potential users of the HRIS, the purpose of the information, and the types of data they seek from the system. The HR information identified was reclassified according to the seven major functions. By establishing the HR activities and informational requirements of construction companies, this work opens new horizon for better understanding of the construction HRIS. It is clear that further works are necessary to improve the utility of HR information identified, e.g. why it is needed, how useful it is, which one is more important for different purpose, how it is collected, etc., for the full potential of HRIS is to be realised by construction companies.

ACKNOWLEDGEMENT

The authors would like to acknowledge the contribution of the various construction company personnel in providing valuable time and information for this study, but whose names cannot be revealed for the sake of anonymity.

REFERENCES

Albanese, R. and Ferris, G.R. (1991) Survey of Human- Resources Practice in U.S. Construction Firms, *Journal of Management in Engineering*, ASCE, Vol. 7, No. 1, pp. 50-69.

Arthur, D. (1987) *Managing Human Resources in Small and Medium-sized Companies*, American Management Association, AMACOM, New York.

Barrie, D.S. and Paulson, B.C. Jr. (1992) *Professional Construction Management Including CM, Design-Construct and General Contracting*, 3rd Edition, McGraw Hill, Inc.

Barton, P. (1985) *Information Systems in Construction Management: Principles and Applications*, London, Batsford Academic & Educational.

Boudreau, J.W. and Milkovich, G.T. (1988) *Personal Computer (PC) Exercises in Personal / Human Resource Management*, Illinois.

Byun, D.H. and Suh, E.H. (1994) Human Resource Management Expert Systems Technology, *Expert Systems*, Vol. 11, No. 2, pp. 109-119.

Cox, T.H. and Blake, S. (1991) Managing Cultural Diversity: Implications for Organisational Competitiveness, *Academy of Management Executive*, **5**(3) 45-46.

D'Netto, B. (1997) Managing Workforce Diversity in Australia, *Department of Management Working Paper Series*, ISSN 1327-5216, February.

Druker, J., White, G., Hegewisch, A. and Mayne, L. (1996) Between Hard and Soft HRM: Human Resource Management in the Construction Industry, *Construction Management and Economics*, Vol. 14, No. 5, pp. 405-416.

Hillebrandt, P. and Cannon, J. (1990) *The Modern Construction Firm*, Macmillan, London.

Kavanagh, M.J., Guetal H.G. and Tannenbaum S.I. (1990) *Human Resource Information Systems: Development and Application*, PWS-Kent, Boston.

Langford, D., Fellows, R., Newcombe, R. and Urry, S. (1983) *Construction Management in Practice*, Longman Inc. New York, Construction Press.

Maloney, W.F. (1997) Strategic Planning for Human Resource Management in Construction, *Journal of Management in Engineering*, ASCE, Vol. 13, No. 3, pp. 49-56.

Martinsons, M.G. (1994) Benchmarking Human Resource Information Systems in Canada and Hong Kong, *Information and Management*, Vol. 26, No. 6, pp. 305-316.

Martinsons, M.G. (1997) Human Resource Management Applications of Knowledge-Based Ssyetms, *International Journal of Information Management*, Vol. 17, No. 1, pp. 35-53.

Miller, M.S., (1998) Great Expectations: Is Your HRIS meeting them? *HR-Focus*, **75**(4) S1-2.

Mincks, W.R. and Johnston, H. (1998) *Construction Job-site Management*, Delmer Publishers.

Moore, N. (1988) *Information Intensive Management: Impact on the Employment Market for Information Professionals*, Birmingham Polytechnic and Aslib.

Nankervis, A.R., Compton R.L. and McCarthy T.E. (1996) *Strategic Human Resource Management*, Thompson Publishers, Melbourne.

Niehaus, R.J. (1995) Evolution of the Strategy and Structure of a Human Resource Planning DSS Application, *Decision Support Systems*, Vol. 14, July, pp. 197-204.

Patchett, S. (1983) *Construction Site Personnel Checkbook*, Butterworth and Co Publishers Ltd., Scotland.

Pettman, B.O. and Tavernier G. (1984) *Manpower Planning Workbook*, 2nd Edition, London.

Satao, K.J. (1996) Information System for Human Resource Management for an Educational Institute – A System's Analysis and Design, *Modelling, Measurement and Control*, Vol. 14, No. 1-2, pp. 989-1074.

Serpell, A. and Maturana, S. (1995) Decision Support System for Construction Human Resources Management, *Proceedings: 6th International Conference on Computer in Civil and Building Engineering*, 12-15 July, Berlin, Germany, Pahl & Werner (eds), Vol. 2, pp. 1529-1535.

Storey, J. and Sisson, K. (1993) *Managing Human Resources and Industrial Relations*, Open University Press, USA.

Townsend, A.M. and Hendrickson, A.R. (1996) Recasting HRIS as an Information Resource, *HR Magazine*, Feb, **41**(2) 91-4.

Walker, A.J. (1993) *Handbook of Human Resource Information System: Reshaping the Human Resource Function with Technology*, McGraw-Hill, Inc.

Walters, M. (1996) *Employee Attitude and Opinion Survey*, Institute of Personnel and Development, London.

LIST OF CAPTIONS

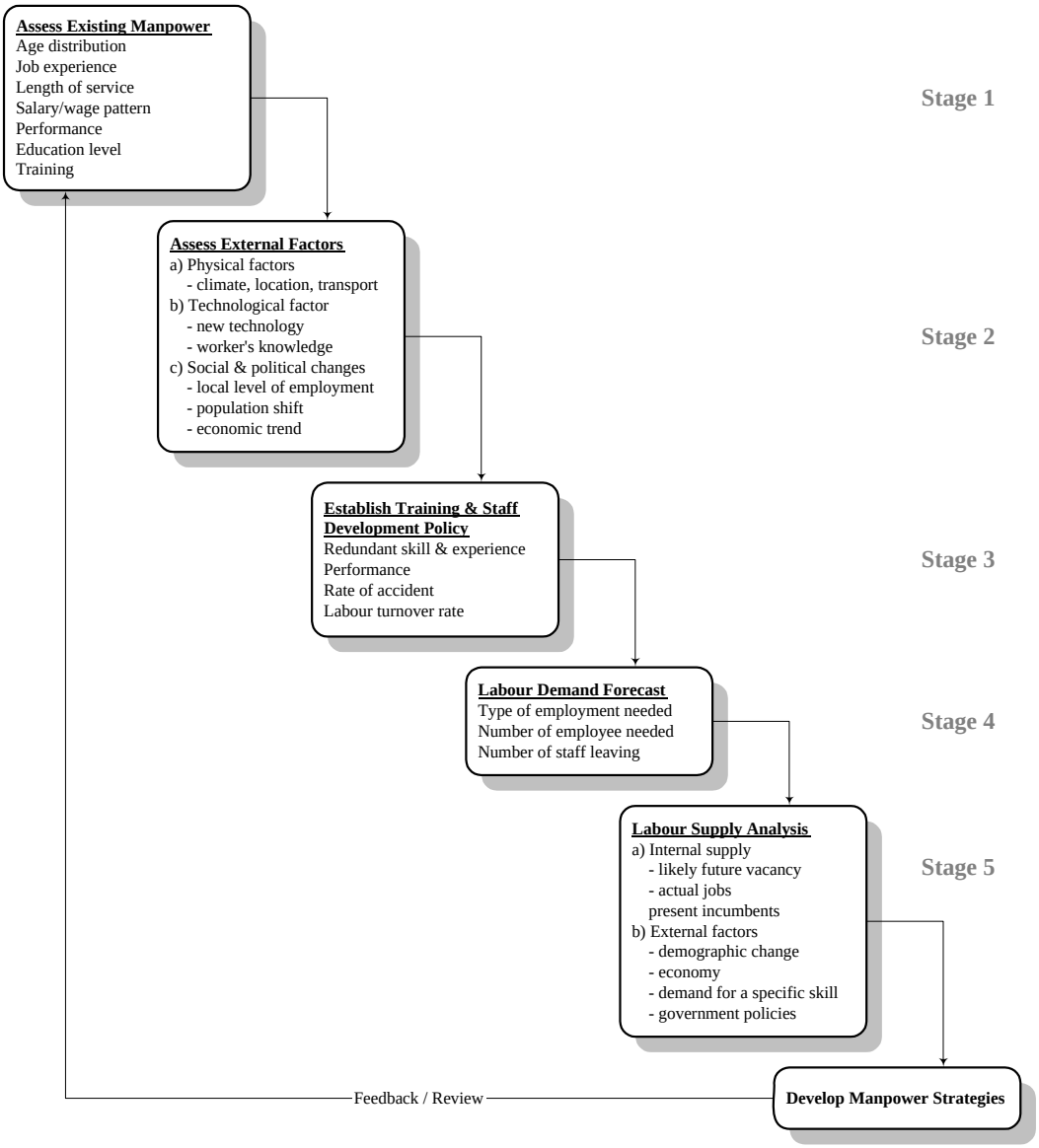

Figure 1: Stages in manpower development and planning

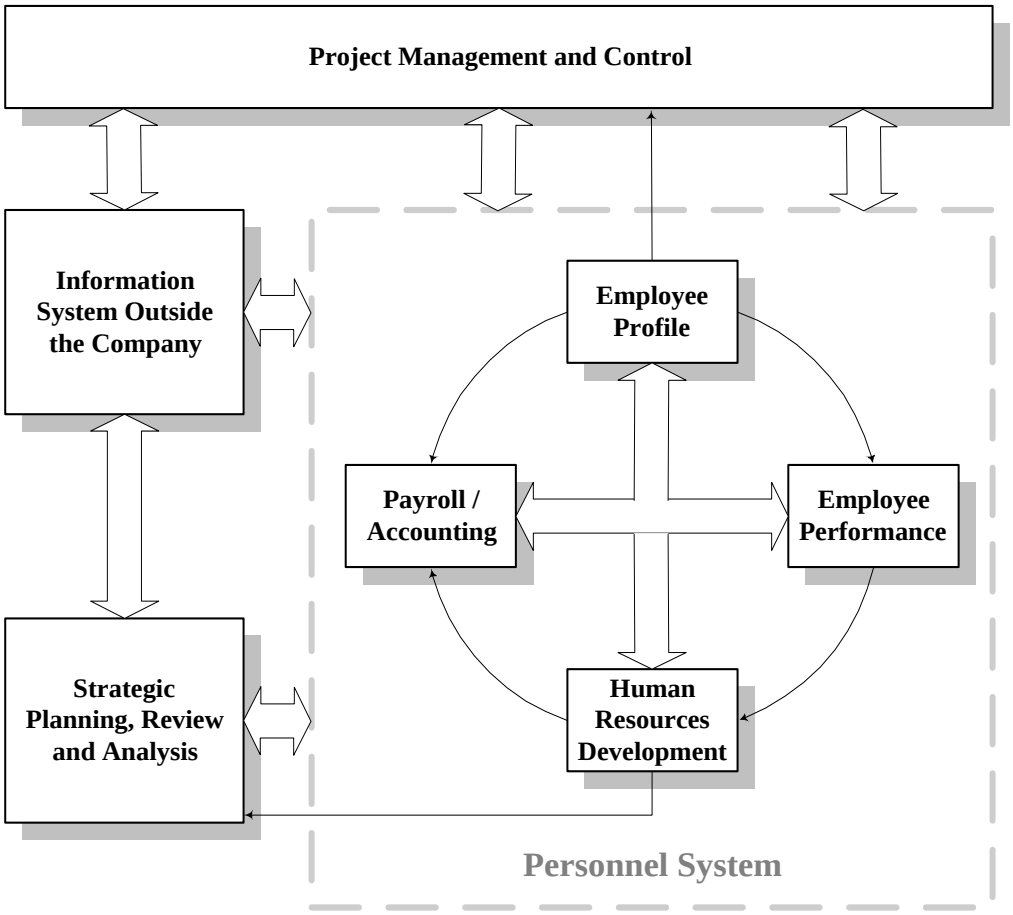

Figure 2: Structure of a construction HRIS

HRIS function modules
Applicant tracking
Basic Employee Information
Benefits Administration
Career Development Planning
Compensation Planning
EEO/AA Compliance
Employment History
Health and Insurance
Health and Safety
Human Resource Planning and Forecasting
Job Evaluation
Job Posting
Job/Description Analysis
Labour relations Planning
Pension and Retirement
Performance Management
Position Control
Short term and Long term Disability
Skills Inventories
Time and Attendance
Training
Turnover Analysis

Table 1: Major functions of an off-the-shelf HRIS

Functions and activities	*Company A*	*Company B*	*Company C*
Applicant tracking	Yes	Yes	N/A
Basic employee information	Yes	Yes	Yes
Benefits administration	Yes	Yes	Yes
Career development	N/A	Yes	Yes
Compensation	Yes	Yes	N/A
EEO/AAP	Yes	Yes	N/A
Employment history	Yes	Yes	Yes
Employee surveys	N/A	Yes	Yes
Financial Planning	N/A	N/A	Yes
Government regulatory compliance	Yes	Yes	Yes
Occupational Health and Safety (OHS)	Yes	Yes	Yes
Human resource planning (manpower forecasting, training & development)	Yes	Yes	Yes
Industrial relations	Yes	Yes	Yes
Labour records	N/A	Yes	N/A
Organisational analysis	Yes	Yes	N/A
Payroll	Yes	Yes	Yes
Performance appraisal	Yes	Yes	Yes
Recruitment	Yes	Yes	Yes
Relocation	Yes	N/A	Yes
Salary administration	Yes	Yes	Yes
Skill inventories	Yes	Yes	Yes
Succession planning / management development	Yes	N/A	Yes
Time and attendance	Yes	Yes	Yes

Table 2: Major activities of HRIS in construction

Human resource information users	*Need or Purpose*	*Data required*
Senior/upper management	• Strategic planning, • 3-year plan • Review and analysis	• Demographic data, labour market data, economic, education, population shifts, workforce changes, industry employment patterns, & political change affecting regulatory environment.
Project, site or construction managers	• Making decisions about workers in their control. • Information links with all sites and locations in the company • Occupational Health and Safety (OHS) • Job assignment and deployment • Better utilisation of workers • Industrial relations	• Employee detailed information at site, including demographic data, employment history, & training. • Data about contractors, consultants, part-time workers, & temporary workers. • Company-wide workforce data, workforce size, productivity ratios, & resource allocation. • Time and attendance data, applicant data, training records, & cost data. • Data on health and safety, disputes, accidents, & absenteeism. • Environmental data, salary surveys, skill shortages, new employment legislation, retirements trends, & workers views. • Information about wage, working hours, holidays, allowances, safety, disputes, & benefits.
Branch and business units	• For human resource management & development of the branches and units	• All company human resource information, overall business strategies, policies and procedures, & other external data.
Company's information system	• For applicant tracking • Relationship building, • For partnership building, & outsourcing	• Temporary, part-time employees, retired pensioners, contract employees, business partners, clients and major customers, & suppliers. • Client's organisational configuration, marketing programs, workforce characteristics, competitive posture, & use of technology. • Client's quality reliability, continuity, & performance,
All employees	• To change their personal data. • To communicate policies & procedures • Intra-company sharing of information & knowledge	• Employee data, company policies and procedures, OHS rules, workers rights, industrial relations, etc.
Traditional HR functions and company-wide support	• Accounting systems, payroll • Support for training & performance • Planning & management staffing	• Operational data like personal data, position data, job data, training data, performance data, absenteeism, & turnover.
Information systems outside the company		• Insurance companies, tax departments, superannuation, national, & statistics bureau.

Table 3: Data required in a HRIS and its purposes

APPENDIX I – PURPOSE OF HR INFORMATION FOR VARIOUS USERS AND DETAILED DATA REQUIRED

HR info users	***Purpose of data***			***Data required***		
	Company A	*Company B*	*Company C*	*Company A*	*Company B*	*Company C*
Senior/upper management	• strategic planning • 3-year plan • review & analysis	• strategic planning • review & analysis	• strategic planning • review & analysis	• demographic data, labour market data, industry employment patterns, economic, education, population shifts, workforce changes, political change affecting regulatory environment	• demographic data, labour market data, economic, industry employment patterns, trends in education patterns, levels, basic skills	• demographic data, labour market data, economic, industry employment patterns, trends in education patterns, levels, basic skills

HR info users	***Purpose of data***			***Data required***		
	Company A	*Company B*	*Company C*	*Company A*	*Company B*	*Company C*
Project/site managers; construction managers	• making decisions about workers in their control • information links with all sites & locations in the company • occupational health & safety • job assignment & deployment • better utilisation of workers • industrial relations	• making decisions about workers in their control • information links with other sites & locations company-wide • occupational health & safety • industrial relations	• making decisions about workers in their control • information links with other sites & locations in the company	• employee detailed information at site, e.g. demographic data, employment history, training • data of contractors, consultants, part-time workers, temporary workers • company-wide workforce data & size, productivity ratios, resource allocation • time & attendance data, applicant data, training records, cost data • data on OHS, disputes, accidents • environmental data, salary, skill shortages, new employment legislation, retirements trends • wage, working hours, holidays, allowances, safety, disputes, benefits	• employee detailed information at site, e.g. demographic data, employment history • data of contractors, consultants, part-time workers, temporary workers • peoples' time-off patterns, work preferences • time & attendance data, applicant data, training records, cost data • environmental data, salary surveys, skill shortages, new employment legislation, retirements trends, and workers views • wage, working hours, holidays, allowances, safety, disputes, benefits • data on OHS, disputes, accidents	• employee detailed information at site, demographic data, employment history • time & attendance data, applicant data, training records, cost data • environmental data, salary surveys, skill shortages, new employment legislation, retirements trends, & workers views

HR info users	***Purpose of data***			***Data required***		
	Company A	*Company B*	*Company C*	*Company A*	*Company B*	*Company C*
Branch and business units		• for human resource management & development of the branches & units	• for human resource management & development of the branches & business units		• all company human resource information, overall business strategies, policies & procedures, external data	• all company human resource information, overall business strategies, policies & procedures, external data
Company's information system	• for applicant tracking • relationship building • for partnership building • outsourcing	• for applicant tracking • relationship building • for partnership building • outsourcing		• temporary, part-time employees, retired pensioners, contract employees, business partners, clients & major customers, suppliers • Client's organisational configuration, marketing programs, workforce characteristics, competitive posture, use of technology • client's quality reliability, continuity, performance	• temporary, part-time employees, retired pensioners, contract employees, business partners, clients & major customers, suppliers • client's organisational configuration, marketing programs, workforce characteristics, competitive posture, use of technology • client's quality reliability, continuity, performance	

HR info users	***Purpose of data***			***Data required***		
	Company A	*Company B*	*Company C*	*Company A*	*Company B*	*Company C*
Hall employees	• to change their personal data • to communicate policies & procedures • intra-company sharing of information & knowledge	• communicate policies & procedures • identify employee attitudes through surveys for reward system & productivity • intra-company sharing of information & knowledge		• employee data, company policies & procedures, OHS rules, workers rights, industrial relations	• Employee data, company policies & procedures, OHS rules, workers rights, industrial relations	
Traditional HR functions & company-wide support	• accounting systems, payroll • support for training & performance • planning & management staffing	• accounting systems, payroll • support for training and performance • planning & management staffing	• accounting systems, payroll • support for training and performance • planning & management staffing	• operational data, e.g. personal data, position data, job data, training data, performance data, absenteeism, turnover	• operational data, e.g. personal data, position data, job data, training data, performance data	• personal data, position data, job data, training data, performance data, absenteeism, turnover
Information systems outside the company	• support decision making	• support decision making	• support decision making	• insurance companies, tax departments, superannuation, national statistics bureau	• insurance companies, tax departments	• insurance companies, tax departments