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HUMAN RESOURCE INFORMATION SYSTEMS (HRIS):  
A COMPARATIVE STUDY BETWEEN THE  
PUBLIC AND PRIVATE SECTORS

Siriwal Tevavichulada

A Dissertation  
Submitted to  
the Graduate Faculty of  
Auburn University  
in Partial Fulfillment of the  
Requirements for the  
Degree of  
Doctor of Philosophy

Auburn, Alabama

December 15, 1997

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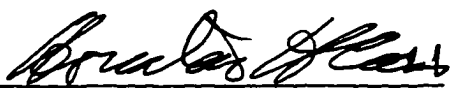
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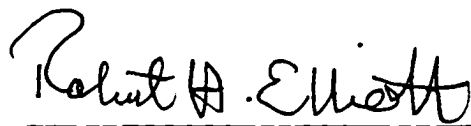
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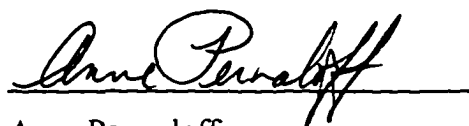
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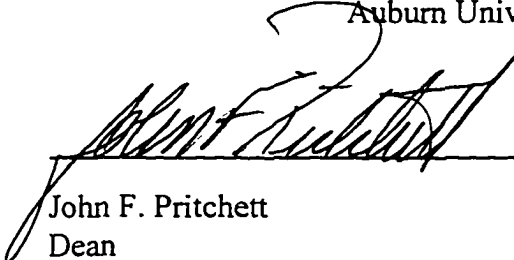
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## VITA

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DISSERTATION ABSTRACT

HUMAN RESOURCE INFORMATION SYSTEMS (HRIS):

A COMPARATIVE STUDY BETWEEN THE PUBLIC AND PRIVATE SECTORS

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Doctor of Philosophy, December 15, 1997  
(M.A., National Institute of Development Administration, 1988)  
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In recent years, scholars have devoted increasing attention to similarities and differences between public and private organizations. Several studies have compared information systems between public and private organizations in various ways. Some studies indicated that private human resource information systems are likely to be superior in several ways; efficient computer systems, active and literate personnel, and good management support. Yet some studies disagree with this statement.

This study is an attempt to examine these claims and investigate the factors that have directly affected both public and private information systems particularly in the areas of human resource information systems (HRIS). The comparisons are relevant to



three main internal organizational aspects: computer systems, personnel (users), and management systems, which influence the similarities and differences between those two sectors.

According to this study, the computer technology and management in public HR departments are as competent as, and to some extent, even more capable than those in private HR departments. However, public HR departments still need to improve their employees' skills and abilities, especially in advanced-computer systems and technology.

Among the practical reasons for this study is the potential relevance to understanding the proper roles of the public and private sectors and the transferability of human resource information techniques between business and government. Also, in this study, several avenues for improving research are suggested.

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## CHAPTER I : NATURE OF STUD Y

### Introduction

Since the world's first computer emerged in 1946, a multitude of computers have been manufactured with corresponding increases in the efficiency of computing technology. Additionally, the purchase price has decreased, and usability and capabilities of computers have increased by leaps and bounds. These computers process a great deal of information and data, the life's blood of business organizations. Efficient computer systems make possible the use of corporate planning methods that otherwise would be too costly. This in turn facilitates the introduction of organizational processes which would be uneconomical or infeasible without computer systems (Scheer, 1991).

Not only are private organizations attracted to these efficient systems, but government agencies are also persuaded to increasingly use these popular data sources and operations. According to Donald F. Norris (1989), governments have widely used computers in almost every type of public department and for a wide variety of activities. Several government agencies have used computers for research purposes. Norris also noted that government agencies heavily used computers for spreadsheet, word processing, and particularly for database management applications. He found that most government agencies tend to employ particular packages and applications, or custom-written software.

Over the past decades, the use of computers as tools of information processing has been widely applied to many fields, but in particular, the field of human resource management (HRM). Effective HRM programs should be perceived by employees to be aimed toward a steadily pursued, mutually beneficial goal. HRM has made use of the technology, developing what have become known as human resource information systems (HRISs) (Walker, 1993). HRIS, according to Cascio and Awad (1981), is an understanding of the inputs, processes, and outputs



carried out in organizations and how a computer manipulates data for human resource decision making. With the increasing complexity of jobs, data, and records used in human resource management, HRISs are becoming an essential part of HRM in the organization. As Edward Blair (1988) stated, HRIS is an essential component of HRM programs.

According to Alfred J. Walker (1993), most human resource (HR) departments devote between 40 and 60 percent of their efforts to administer their HR plans and activities. These activities can be transferred to technology, thereby freeing the staff to perform higher-value work. In addition, using sophisticated computer tools not only helps line managers gain access to the records pertaining to their own employees, but also helps them to analyze jobs and find the right person for a particular job. The HRISs today seem to go beyond merely HR record-keeping functions because they provide the necessary information and administrative assistance to help the organization meet its goals and to realize adequate profits in the private sector (Kavanagh, Gueutal, and Tannenbaum, 1990).

In the 1950s, HR functions were only a support mechanism to keep records, and administer data and reports for the main stream of business from the line departments that were directly concerned with the profits and goals of the company. In other words, HR acted as the caretaker of employees in the company and acted to support the line functions. HRISs, during this period, had their beginnings in skills inventory and payroll systems (Lee and Thorp, 1978; Walker, 1993).

During the period 1960-1980, considered a 'social issues era', human resource management was more concerned with employee morale and motivation. Although HR functions were not yet considered one of the main stream parts of a business which deal directly with the profits of the organization, they seemed to encompass more than record-keeping and data administering. During this period, other important functions e.g., planning, training, career development, and quality of life issues, such as healthcare and insurance systems, were added to the HR department (Kavanagh, Gueutal and Tannenbaum, 1990). In addition, the nature of HR was altered tremendously due to the effects of social, economic, political and technological

changes. Several important social issues dealing with legal protection for employees that later resulted in legislation, required HR departments to comply with these changes, including increased paperwork and more reporting requirements (Walker, 1993).

While many public organizations began to use computers prior to the 1960s, the use of computers for HR functions has generally lagged behind computer applications in other functional areas. The first true use of computerized personnel systems is hard to pinpoint even today (Lee and Thorp, 1978).

The Fair Labor Standards Act of 1934 provided the impetus for time clocks, payroll systems, minimum wage, overtime pay requirements, and other related technology, as well as prohibited many existing uses of child labor (Ceriello, 1991; Walker, 1993). This law was considered one of the most important pieces of legislation in the beginning of HR. In addition, in the 1960s, the forces that resulted in legislation and litigation seriously affected HR systems due to the emergence of other significant concerns. Title VII of the Civil Rights Act of 1964 resulted from civil rights activities and radically altered hiring practices (Kavanagh, Gueutal, and Tannenbaum, 1990; also see details of the Act in the bibliography: United States, 1988 *Education and Title VII: Title VII of the Civil Rights Act of 1964 Prohibits Discrimination Based on Race, Color, or National Origin in Programs or Activities Which Receive Federal Financial Assistance*). This act forbids discrimination against citizens based on race, color, national origin, religion, and gender in employment, and impacts other areas of employees' rights. Title VII established the Equal Employment Opportunity Commission (EEOC) and brought a new need for discipline to personnel processes. With the companion of Executive Orders # 11246 (1964) and Revised Order # 4 (1972), the concept of "affirmative action" was introduced (Walker, 1993). These orders created requirements for setting goals and targets, producing utilization reports, and deriving workforce analyses. Furthermore, these executive orders were implemented and have become a significant influence on several pieces of legislation affecting HRM which followed. (See references):

- The Occupational Health and Safety Act of 1970 (OHSA) was enacted primarily to force employers to maintain a safe and healthy workplace. It set standards for the classification of accidents and injuries, established on-site inspections, and also called for records to be kept on an annual basis.
- The Equal Employment Opportunity Act of 1972 (EEOA) was enacted regarding fair employment opportunities for all employees. It insures fair treatment in the hiring process for all citizens.
- The Employee Relations Income Security Act of 1974 (ERISA), known as '*The Pension Reform Act*', defined certain rules and obligations surrounding pension plan structures, plan rules, funding, and administration.
- The Consolidated Omnibus Budget Reconciliation Act of 1985 (COBRA) required all group health plans to offer health benefits to a variety of former employees who were terminated or retired.
- The Tax Reform Act of 1986 (TRA) impacted employee pension benefits. It attempted to make pension benefits equitable across employees regardless of pay level.
- The Age Discrimination in Employment Act of 1967, amended in 1986 (ADEA) prohibits employers from discriminating on the basis of age against people over 40 years of age. It also eliminates mandatory retirement for most employees.
- The Americans with Disabilities Act of 1991 (ADA) (effective in 1992) was enacted to protect disabled employees from being discriminated in recruitment and employment.
- The Civil Rights Act of 1991 (CRA) amended the CRA of 1964, the CRA of 1866, the Attorney's Fees Awards Act of 1866 (AFAA), and the ADA of 1990, and the ADEA of 1969. This act reversed parts of U.S. Supreme Court decisions that were adverse to the interests of alleged victims of employment discrimination. It provides for increased damages and jury trials in cases of intentional sex, religious, and disability bias.

- The Family and Medical Leave Act of 1993 (FMLA) was enacted to protect employees' right to take leave in case of a (serious) health conditions and to assure their benefits due to sickness.

Consequently, all organizations in both the public and private sectors were forced to upgrade their HRM systems to comply with these laws. In order to facilitate creation of additional jobs, to manage an overwhelming complexity of benefits, and to maintain a safe and healthy workplace for their employees, HRISs came to be recognized as essential for HR departments.

### **Statement of the Problem**

Basic distinctions do exist between the public and private sectors, and they are critical to understanding differences in strategic management processes. Perhaps the most fundamental of these differences stems from organic law: constitutions. In an effort to maintain a separation of power, constitutional draftsmen sharply divided policy formulators from policy implementators (Ring and Perry, 1985; p. 276).

The differences between public and private organizations have been widely studied for decades in their characteristics and operations. Most scholars asserted that there are clear-cut and consistent differences between organizations in the public and private sectors (Robertson and Seneviratne, 1995; Perry and Rainey, 1988; Duke, 1989; Kenny and others, 1987) . Evidently, they are different in several ways: organizational structure, power-dependency relationships, values and goals, incentives, technology, decision making, and environmental constraints (Schiflett and Zey, 1990). Also, Bernard H. Ross (1988) found several differences between public and private sector managers' work attitudes and responsibilities. In comparisons of self-assessments and job satisfaction levels in public and private organizations, Falcone (1991) found some differences in the work-related attitudes of public and private employees. Kenny et al. (1987) indicated that there are notable differences in the influences exerted in decision making.

Several scholars asserted that private organizations are likely to be more efficient, in some ways, than those in the public sector. Santa Falcone (1991) indicated that public

employees have shown lower levels of work satisfaction, organizational commitment, and reward expectancy. Specifically relevant to computer technology in the two sectors, Larry C. Giunipero (1984) studied the differences in departments' purchasing role in computer buying between public and private organizations and found that private sector purchasers have more influence in the source selection decision than public organizations. Moreover, the process of making a decision to purchase computer systems in private organizations is more flexible and less time consuming than those in the public sector (Giunipero, 1984).

On the other hand, some scholars viewed public employment to have some advantages over private. For instance, Charles N. Weaver and Robert S. Franz (1992) investigated work-related attitudes between public and private employees and found that, in contrast to private employees, public employees are more likely to be job-satisfied, more likely to prefer work which gives a feeling of importance, and more likely to prefer opportunities for promotion. Also, public employees enjoy more paid leaves, less expensive health benefits, and better pensions (Moore, 1991). Philip E. Crewson (1995) found that the government was able to attract higher quality entrants during the 1980s than the private sector.

There are several reasons that could explain why public organizations are different from those in private organizations. One of the most important reasons is related to their missions, either profit or non-profit (Cascio, 1989). This leads organizations to differ in other ways such as procedures, strategies, time perspectives, political concerns, and customers (Allison, 1983; Lachman, 1985; Ross, 1988, Coursey and Bozeman, 1990; Posner, 1996; and Dobbs, 1996). Several scholars indicated that public organizations have more political pressures, more concerns about public matters, and more attention from the press and the media. As a result, public organizations differ in other attributes, such as in management styles, authority styles of executives, strategic management, personnel management constraints, and organizational policy and implementation (Perry and Rainey, 1988; Thomas, Schiflett and Zey, 1990; Ross 1988; Crewson, 1995; Rainey, Pandey, and Bozeman, 1995; Silverstein, 1995; and Weaver and Franz, 1992).

This difference in environment also influences human resource management and human resource information systems. Considering that both government and business sectors use computer systems to facilitate work, the question then becomes “What difference exists between the private sector and the public sector in their utilization of computer systems within their HR organizations?”

Like general management information system (MIS), HRIS instruments and applications used in private organizations and/or businesses are likely to be different than those in the public sector for many reasons. William Cats-Barial and Ronald Thompson stated that the trend in public computing is to migrate from mainframe-based systems to smaller computer platforms. Such migrations are proving more difficult for public sector managers than for private sector managers because the bulk of the information technology (IT) management experience in the public sector is with mainframe-based systems (Cats-Barial and Thompson, 1995)

Dawes (1994) indicated that public technology has developed toward private technology. Government HR employees need professional abilities combining both technical and managerial skills, especially HR information management and HR executives. In other words, HRIS in state government needs HRIS people who have not only the technical experience but also managerial expertise in order to use these powerful tools efficiently and to achieve organizational goals.

According to the above argument, some scholars believe that in private organizations, budgets are probably more available for owning and maintaining their own computer systems, personnel are more computer literate, and management is more flexible (Kavanagh, Gueutal, and Tannenbaum, 1990). However, some scholars disagree with this assessment. They argued that public organizations have enough money to implement their own programs. Not only do they receive money in the form of federal government funds, but also they earn money in their own enterprises (Thomas, 1993).

### Significance of study

HRISs, which are an essential part of human resource management, currently influence organizational goals and objectives. A sophisticated, powerful HRIS can process a tremendous number of complicated tasks, which saves time and money, and makes organizations achieve their goals and objectives more effectively (Walker, 1993).

This research is an attempt :

1. To investigate the differences in HRISs between public and private sectors by considering the following factors: computer systems, personnel (end-users), and management systems.
2. To compare the similarities and the differences between public and private HR organizations and to identify the problems and solutions of those organizations in using HRISs. A comparison of the two sectors must include discussion of the weaknesses and strengths of each sector. The strength of one could be the solution to the other's weakness.
3. To examine the possible problems in developing HRISs in each sector whether budget, personnel, management, or political issues. Also, to determine the possible solutions for each problem and to detect potential causes of future organizational problems in both sectors.
4. To analyze how HRISs are used in each sector to improve productivity, to make suggestions about how to increase efficiency and effectiveness in using HRISs, and to determine what other factors could affect the differences of HRISs between public and private organizations.

### Research Hypotheses

- Hypothesis 1:**                    **Computer systems for private sector HR departments are more capable than those in public sector HR departments.**

Scholars, such as Stuart Bretschneider (1990), studied the factors within both public and private organizations that have a major effect on the capacity of an organization to manage computers and data processing effectively. He stated that the capacity of an organization to manage information technology differs between the two sectors. Public organizations sometimes exhibit lower operational efficiency than other types of organizations (Savas, 1982; Perry and Rainey, 1988). This hypothesis, which is a correlative hypothesis, will lead us to investigate what many scholars and practitioners understand to be correct, and to describe the differences among the types of computer systems and software applications, the capacities and capabilities of the computer systems, and how the systems relate to internal and external systems via networks and the Internet.

**Independent variable :** In this study, the independent variable is the difference between the “*organizational type*”, operationalized into two categories, “public organizations” and “private organizations”. The comparison will be made between these two.

**Dependent variable :** “*computer systems*” defined as a cumulative measure of the types and ages of the computer systems, the number of workstations the types of software applications used for HR functions, the overall satisfaction with the software applications, networks and Internet access, and the use of Internet as a resource of HR information.

**Hypothesis 2:                   HR end-users in the private sector are more competent than those in the public sector.**

Are private sector staff members more competent than their public sector counterparts? This could be true because HR personnel in the private sector are more likely to possess advanced degrees, and have greater motivation. In addition, the private sector includes more HRIS specialists, along with more wide spread end-user computing, and better trained and better prepared end-user support personnel. Unlike private employees, public employees typically have long tenures and may not have adequate basic computer skills. Instead of terminating or laying off employees, public organizations usually relocate them to other departments or organizations. It is not unusual for public employees to transfer to different departments within a governmental



system during their careers without getting terminated or retired (Cats-Barial and Thompson, 1995).

**Dependent variable : "end-users"** The variable is measured along several dimensions: the number of employees who have education, training, and/or experience; trained and available support personnel (HRIS Specialists), as well as how well prepared they are as end users in the HR department.

**Hypothesis 3:                    In the public sector, management support systems are less flexible than in the private sector.**

Public sector organizations frequently create rigid bureaucratic structures that can inhibit effective organizational change, because they are primarily designed to hold organizations accountable for a broad range of objectives. Peter J. Robertson and Sonal J. Seneviratne (1995) found differences between the two sectors, indicating that it is more difficult to implement changes in public organizations, but that organizational performance can be improved more readily in these environments . In addition, Robertson and Seneviratne asserted that it is more difficult to generate consistent and high levels of change in organizational technology and work settings in public organizations.

Distinguishing features of public sector HR organizations include the absence of market incentives, a political context with a broader range of constituent groups, higher levels of accountability, and politically imposed goals and quotas due to more rules, regulations, and constraints (Perry and Rainey, 1988; and Robertson and Seneviratne, 1995). Private sector HR organizations do not use these as goals and quotas but as obedience to law. Perry and Rainey (1988) stated that public organizations have more elaborate formal rules and reporting requirements and more rigid hierarchical arrangements. Some of these formal rules and constraints cause inflexibility in management decision making and become an obstacle in strategic planning in personnel information systems (Perry and Rainey, 1988; Gore, 1995). This hypothesis is intended to analyze whether some of those statements should be confirmed.

**Dependent variable :** "*management systems*" The measurement of this variable is the dollar amount that is allocated to the HR department, top management support for the budget and departmental management plan, the HR managers' decision making authority, the delegation of authority by HR managers, and ways to solve computer problems.

### **Limitations of the Study**

1. This study is primarily done to observe the use of HRISs in the HR department, which are units in both public and private sector organizations. These organizations include various types and numbers of organizations, even though stratified random sampling is used to obtain data from various types of businesses (See chapter III : Research Methodology). However, data could still be biased due to the various types of businesses in those two sectors.

2. Public and private organizations are different in several respects such as organizational objectives, strategies, procedures, structures, and political concerns. Therefore, these differences may affect the comparison between the two sectors.

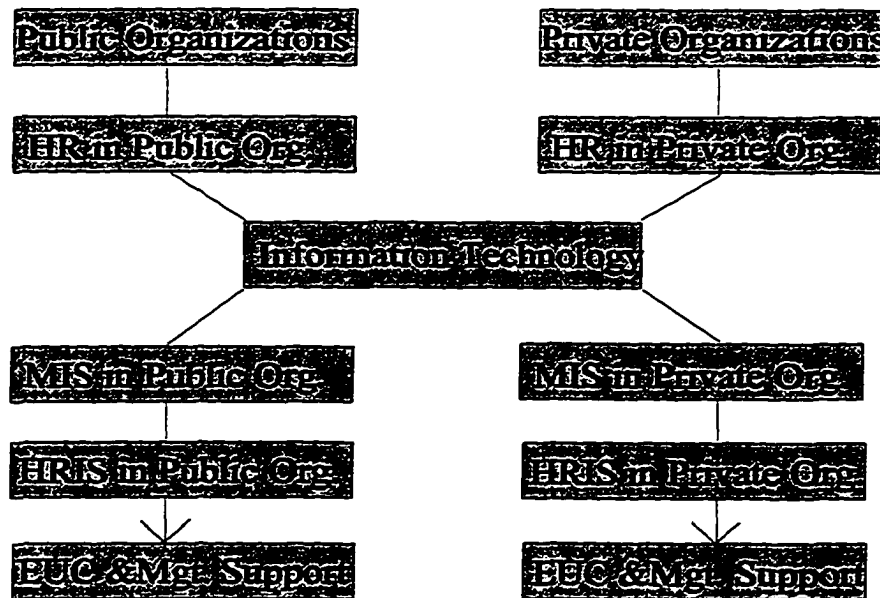
3. There is the possibility of misleading information from the respondents in the questionnaire due to the fact that respondents in human resource department are inadequately knowledgeable in computer systems, particularly in the organizations that do not have human resource information system specialists or computer personnel who can verify the knowledge of human resources and information systems in their own department.

4. The questionnaires were mailed to the head of the departments, such as managers, directors, and vice presidents of HR. According to the follow-up telephone calls after the questionnaire had been mailed out a second time, several of these managers admitted that they did not have time to fill out the questionnaire.

## CHAPTER II : THE LITERATURE REVIEW

The literature review begins with a generalization of the differences and similarities between public and private organizations. Further, it discusses the differences and similarities of the specific information technology (IT) used in organizations, the management information systems (MIS), the human resource information systems (HRIS), and the end users and management support between the two sectors, respectively. (See Figure 2.1 below).

Figure 2.1 The scope of the literature review



### **Public and Private Sector Similarities and Differences**

Several scholars have investigated the similarities and differences between public and private sectors in various ways and found that there are deep and fundamental differences between organizations in the public and private sectors (Robertson and Seneviratne, 1995; Schiflett and Zey, 1990; Kenny et al., 1987; Perry and Rainey, 1988; Ross, 1988; Duke, 1989). They compared not only structure, processes, functions, objectives, goals, purposes, rules, regulations, and legal concerns, but also managers' perspectives and the environments that can influence their decision making (Robertson and Seneviratne, 1995; Schiflett and Zey, 1990).

#### **Similarities**

By nature, public and private organizations are similar in various ways such as their objectives, goals, functions, processes, structures, etc. From this perspective, not only are public and private organizations similar in their ultimate goals of efficiency in providing goods and services to customers, but they are also similar in organizational structures with top management, middle management, lower management and operations. They perform the same management functions: financial, personnel, and customer services. Moreover, both types of organizations involve the same principles of management processes such as planning, organizing, staffing, controlling, and budgeting.

In their research, A. W. Lau, C. M. Pavett, and A. R. Newman (1980) found general similarities in the work of public and private managers, although the public managers devoted more time to crisis management. D. J. Hickson, R. J. Butler, et al. (1986) found that public and private organizations have the purposes of clarifying the important steps in the decision making processes: (1) clarifying problems (2) creating alternatives and (3) making decisions.

Like private organizations, public organizations need efficient processes in the areas of personnel management, financial and account management, and functions such as planning, organizing, staffing, controlling, and budgeting. Therefore, some technical practices from the private sector have been applied to the public sector. As some scholars believe, business

organizational practices have influenced government in many ways such as performance budgets, cost-benefit analysis, cost-accounting procedures, performance appraisals, and zero-based budgeting, to mention but a few (Hickson, Butler, and others, 1986).

### **Differences**

Because of the difference in their purposes (profit versus non-profit), public and private organizations are distinct in some ways. A great deal of research indicates that there are important differences in organizational values and goals, incentives, organizational structure, raw materials, power-dependency relationships, technology, revenues and accountability, environmental constraints, decision making, delegation of authority, management process, and the role played by executives, etc. (Ross, 1988; Lachman, 1985). Rainey et al. (1976) appeared to support this when they noted that public sector organizations “tend to have their purposes, methods, and spheres of operation defined and constrained by law and legally authorized instructions to a much greater degree” (p. 238) than do private sector organizations. Private sector organizations generally operate within the framework of a limited number of relatively stable goals such as growth, profitability, and market share. Therefore, top management appears to focus their attention on a limited set of clearly defined objectives (Ring and Perry, 1985).

James L. Perry and Hal G. Rainey (1988) view several differences between the public and private sectors. They presented the primary difference between the two sectors in the definition of the word, "*public*". In Latin *public* refers to "matters pertaining to and for people", and the word "*private*" refers to "a personal matter". The definition implies differences, at least, in the purposes and strategies of the organization. Public organizations often have been equated with governmental bureaus serving the general citizenry while private organizations generally have been identified as all other organizations or as business firms. Ben and Gaus (1983) suggest that public and private vary along at least three dimensions:

1. Interest—distinguishes whether benefits or losses are communal or restricted to individuals.
2. Access—refers to the openness of facilities, resources, or information.
3. Agency—refers to whether a person or an organization is acting as an individual or as an agent for the community as a whole.

Bernard H. Ross (1988) studied several business executives who came to Washington as new political appointees with the belief that their reputations, competing with other highly successful executives in the business sector, could also make them beneficial to the public sector. Unfortunately, according to Ross, these executives were wrong, shocked, confused and sometimes angered. This was not due to an inability on the part of the public sector to perform its tasks, but the inability of business executives to fully understand that business and government require two different schools, in other words, two different thoughts. This is further reinforced by fields of study in both public and private administration. George A. Steiner (1991) stated that managing in government is far different from managing in business. The entire milieu is different; requirements for managerial success are different, as well as the rules of the game.

In their article *The Values of Business and Federal Government Executives: More Different Than Alike*, Berry Z. Posner and Warren H. Schmidt (1996) found that business and government executives differed in the importance they attached to a variety of organizational goals, stakeholders and personal traits. In addition, they differed in their outlook on future trends and how they handle the tradeoffs between work and personal demands. Lois Duke (1989) stated, "Traditionally, the public sector has lagged behind the private sector in implementing systems of paying employees for their performance on the basis of merit" (p. 440). Zaleznuk (1979) noted that public organizations exposed to political influences had stronger relations with political and/or government authorities, than those in the private sector. F. Nigro and L. Nigro (1977) claimed that high level managers in public organizations played a greater political role than those in the private sector because they needed to seek appropriations through political processes or to cope with political influences and external political coalitions.

Several studies suggested that public sector managers are different from their private sector counterparts in terms of work-related values, reward preferences, and even personality types. Also, they differ in their perceptions of the strategic decision process (Posner and Schmidt, 1996). In his study of public and private differences in the executives' perceptions of their role environments, Lachman (1985) found that public sector managers reported lower organizational commitment, lower satisfaction with work needs, and lower job satisfaction than do private sector managers (also see Buchanan, 1974; Rainey, 1983; Lachman, 1985). Boyatzis (1982) studied the distinction between public and private executives and managers and concluded that private managers scored higher on "goal and action" competencies. This is attributed to the absence in the public sector of clear performance measures such as profits and sales. Private managers also scored higher on the leadership competency of "conceptualization" and the use of oral presentations. This is attributed to more strategic decision making in the private sector and greater openness and standard procedures in the public sector (Boyatzis, 1982; Perry and Rainey, 1988).

In other studies, scholars investigated the differences in the motivation of private and public sector managers. Mak Khojasteh's research (1993) indicated that pay has a significantly greater motivating potential for private than public sector managers. According to his study, managers in the private sector are also substantially more security oriented than their counterparts employed by the public sector (Also see Paine, Carroll, and Leete, 1966).

Although in the overall picture many scholars recognize the fact that distinctions between the public and private sectors are becoming blurred, Perry and Rainey (1988) stated that public organizations lack the incentives of and information about the economic market. They are subject to much greater influence by external political and governmental institutions. While the public sector is struggling with escalating personnel costs, sluggish productivity, federal budget cuts and declining state revenues, the private sector is facing severe domestic and foreign competition (Khojasteh, 1993). Public organizations are exposed to more external scrutiny and accountability and their goals are more numerous, intangible, and conflicting. However, Rainey,

Pandey, and Bozeman (1995) stated that public organizations do not necessarily have higher levels of rule intensity than business firms. Instead, they concluded that external rules and laws concerning such functions as personnel and procurement are the most important sources of red tape in government.

Graham T. Allison (1996) agreed that many times public organizations have tried business techniques; nevertheless, he drew some interesting conclusions that:

1. While the need for increased governmental efficiency is real, "the notion that there is any significant body of private management practices and skills that can be transferred directly to public management....is wrong."
2. While "performance in many public management positions can be improved substantially, improvement will not come from massive borrowing of specific private management skills and understanding."
3. It is possible to learn from experience in the public or private sectors; however, "the effort to develop public management as a field of knowledge should start from the problems faced by practicing public managers." (p. 282)

In addition, Allison (1996) also compared the similarities and differences in the jobs and responsibilities of Doug Costle, Director of the Environmental Protection Agency (EPA), and Roy Chapin, the Chief Executive Officer (CEO) of American Motors. Allison found differences in the authority and management dimensions of these two executives. While Chapin had substantial authority and control over the organization in decision-making about staffing (even though he has to consult his Board), Costle had to follow the legislative process, and thus had to make decisions based on limited choices. In addition, Chapin dealt directly with customers and competitors, and indirectly with government and the press. On the other hand, Costle dealt directly with the government, the press, and the legislative processes. According to Allison's example, public and private executives obviously have differences in their bottom lines, which affect the organizational management style and the executives' management style. Allison



concluded that public and private management are at least as different as they are similar, and that the differences are more important than the similarities.

Unlike the above perspectives, some scholars noted that in public and private organizations some parts of both organizations are different, yet some parts overlap (See Table 2.1) in that both public and private organizations similarly exercise such functions as decision making, delegation of authority, and distribution of incentives (Haas, Hall, and Johnson, 1966; Crewson, 1995; and Allison, 1983). However, they sometimes perform those exercises in different ways depending on organizational policy, structure, purposes, and environmental constraints (Rainey et al. 1976; Ross, 1988; and Lachman. 1985; and Ring and Perry, 1985). J. E. Haas, F. H. Hall, and N. J. Johnson (1966) found that public and private organizations were mixed among categories. To the extent that the two sectors overlap with no consistent differences between public and private organizations, planned organizational change efforts potentially could be equally successful in both arenas (Robertson and Seneviratne, 1995). However, although the overlap makes the two sectors identical in some functions and processes, they achieved organizational goals by different means. According to several scholars, which are discussed in this section, the differences and similarities between public and private organizations could be summarized in the following figure (Please see Table 2.1 below). The top of the figure illustrates the similarities: decision making, delegation of authority, incentives, technology, structure, functions, and management processes. The bottom of Table 2.1 illustrates the differences: purpose, policy, time perspective, decision making, delegation of authority, incentives, customers, procedure, political concerns, and media and press between the public and private sectors. There is some overlap, as mentioned earlier in this paragraph, between the two sectors such as decision making, delegation of authority, and incentives.

**Table 2.1** The Differences and Similarities between Public and Private Organizations

Major Similarities		
Public Organizations————>>	<b>Decision Making</b>  <b>Delegation</b>  <b>Incentives</b>  <b>Technology</b>  <b>Structure</b>  <b>Functions</b>  <b>Management Process</b>	<<————Private Organizations
Major Differences		
Non-Profit<<————	———— <b>Purpose</b> ————	————>>Profit
Org. Committee<<————	———— <b>Policy</b> ————	————>>Legislative
Short<<————	———— <b>Time Perspective</b> ————	————>>Long
Inflexible<<————	———— <b>Decision</b> ————	————>>Flexible
Everyone<<————	———— <b>Customers</b> ————	————>>Consumers
Formal<<————	———— <b>Procedure</b> ————	————>>Less Formal
Direct<<————	———— <b>Political Concerns</b> ————	————>>Indirect
More Concern<<————	———— <b>Media &amp; Press</b> ————	————>>Less Concern
Less<<————	———— <b>Delegation</b> ————	————>>More
Less Advanced<<————	———— <b>Technology</b> ————	————>>More Advanced
Less<<————	———— <b>Incentives</b> ————	————>>More

### **Public and Private Sector Human Resource Functions**

Traditionally, human resources in public and private organizations are similar in both structure and functions. The HR functions are concerned with the employee management of hiring, flow-through, and exit from organizations, including employee planning and evaluation (Ferris and Curtin, 1990). However, some scholars such as Diane Filipowski (1991) have mentioned that HR functions in the private sector are more flexible in order to cope with business diversity. She indicated that HR functions in private organizations generally are structured in two ways: centralized and decentralized. The decentralized organization allows the company to concentrate on market segments and separate goals to achieve the flexibility of small organizations and the ease of communication within business units. Filipowski (1991) also indicated that, at the same time, the centralized structure has allowed the organization to gain the benefits of technology transfer and a broad use of available information and know-how in research and development, marketing, manufacturing, and management.

In addition, HR functions in the private sector have gone even further than those in the public sector. In the past, HR had its own sphere which separated it from other departments such as payroll, benefits, compensation, and marketing departments. In the 1990s, since organizations began implementing a computerized data base system, several organizations, particularly in the private sector, integrated related functions in some departments together to save time and cost, and to eliminate unnecessary and redundant jobs (Santora, 1992). John E. Spirig (1990) found that by the end of the 1980s fifteen percent of private organizations were integrating an HR operated system with a payroll system. The driving force behind this trend includes an increasingly complex working environment, new regulatory requirements, and management pressures to improve efficiency. Moreover, Myron Glassman and Bruce McAfee (1992) stated that in the 1990s many business organizations are integrating HR with marketing departments because they are supposed to achieve the same organizational goals, even though the departmental goals are different. According to Glassman and McAfee (1992), employers now view employees as 'internal customers' because employees are understood to be the key to

marketing success. “The major issue facing businesses today is not how to integrate marketing and manufacturing more effectively, but how to integrate marketing and personnel more effectively” (p. 52).

The trends in the public sector are the same as trends in the private sector. According to the survey conducted by Northeastern University, Scott, Oswald and Sanders (1988) stated, “Compared with five years ago, the human resources function now wields greater power and influence” (p. 52). They concluded that a dramatic change had occurred over the previous five years in the role and power of the HR functions in both public and private sectors. The new trend of HR changes is emphasized in four areas:

1. Policy initiation and formulation – This area concerned primarily with the drafting of new policies that involve human resources and other HR activities.
2. Collective Monitoring – If an organization is unionized, the HR department also provides information about and advises other managers on the terms and conditions of the collective bargaining agreement.
3. Performance monitoring – Monitoring the performance of line and department managers means ensuring that non-HR managers follow established HR policies, procedures, and practices.
4. Service – This area concerns such activities as developing and administering tests and training programs and developing compensation plans (Scott, Oswald, and Sanders, 1988)

However, in the public sector, changing organizational structure is more difficult, particularly at the federal and state level. Changing the structure or function also changes the organizational policy (Mercer and Koester, 1978). This could be due to the fact that public organizations have higher accountability than those in the private sector (Rainey et. Al., 1976; Nigro and Nigro, 1977; Lau, Pavett, and Newman, 1990; Allison, 1983; and Crewson, 1995) . Rainey and colleagues (1976) indicated that managers in public organizations have less flexibility than managers in private organizations. Nigro and Nigro (1977) pointed out that

public managers have less flexibility because public managers have higher accountability due to their statutory, procedural, and other external controls. For instance, in the case of exit or termination, there are several obstacles such as rules, regulations, and tenure that protect employees' rights and make it difficult for the public managers to terminate employees (Ferris and Curtin, 1990). Also, managers of public organizations have higher formalization, and less autonomy in hiring, firing, or rewarding, than do private sector managers (Lachman, 1985; Buchanan, 1974) In the private sector there are several ways that private managers can terminate their employees such as layoffs, retirement plans, or even some new ways that are not usually used in public organizations such as outplacement and worksharing. Outplacement plans are used in cases where the organization needs to layoff entire layers of management, and these plans often assist these people in locating comparable employment elsewhere. Sometimes worksharing plans or four-day work weeks are used as an alternative to layoffs. Instead of laying off employees, two individuals could share a single job and certainly share the pay as well (Ferris and Curtin, 1990).

We have examined the literature reviewing to general public-private organizational differences, and have looked at those differences as they relate to the HR function. Now let us turn our attentions to the area of information technology.

### **Information Technology (IT) in Organizations**

Information technology (IT), including computer systems, is an organizational tool that affects the quantity and quality of jobs. IT is the outgrowth of the micro-electronics revolution and comprises automation technology, personnel, and communications. IT has a very important role in supporting aspects of the organizational environment such as management, strategic planning, and decision-making. Significant advances in the technologies of computer hardware and software, database, storage devices, graphics equipment, and telecommunications have created a wide spectrum of new opportunities for organizations (Cronin, 1994). Today most organizations, whether large, medium, or small, have computer systems of their own, but the size

of the systems used depends on the size of the organizations and functions performed. Computer systems, which are designed to minimize processing costs and to improve productivity and performance, range in size from small systems such as personal computers (PCs) to large systems such as mainframe computers.

Using computer systems can affect organizational change. For instance, computer systems influence the structure of the organization, improve the position of the organization, and create new opportunities (Porter, 1980). Computers also provide user interfaces that allow users to concentrate on the job at hand, i.e., processes are automated to the point that users don't need to deal with the technical aspects of using the system. Practically speaking, computers can reduce costs, and add value; however, their introduction entails substantial switching costs for customers and users. And, innovating firms must provide sufficient time to reap the benefits. As a result, many executives believe such technologies are critical to their organizations' future success.

Computer systems provide the capability to coordinate a function on a timely basis. The challenge to the organization is how to successfully establish and manage computer systems that facilitate data processing throughout the organization. Wiseman (1985) advocates pursuing opportunities that have a wide range (short, medium, or long term), are sustainable or contestable, and provide price features, or other advantages. For business, these advantages can be measured not only by return on investment but also by other measures such as market share and number of new customers.

Workstations, which include personal computers (PCs) and all kinds of network terminals—ranging from dumb terminals to smart terminals—in the network systems, are the computer systems that have their own inputs, processing mechanisms, and outputs. Generally, these workstations could have their own databases and processor, and perform specific functions for departments or organizations, which are usually small and do not have a variety of tasks. However, workstations are now much more powerful and could possibly perform a variety of tasks that once were performed by mini-computers or mainframe computers twenty years ago

(Ceriello and Freeman, 1991). Workstation systems, according to Stair (1992), can be classified as simple, closed, stable, nonadaptive, and temporary. Workstations can be connected to other workstations or to a mainframe by a network.

Unlike workstations, computer network systems are classified as complex, open, dynamic, adaptive, and permanent (Stair, 1992). Individual computer networks vary in size and type depending on the hardware and software used. In general, networks could be categorized into two types: local area network (LAN) and wide area network (WAN). A LAN is generally used within a single building or among a cluster of buildings (Kosiur and Angel, 1995), and are owned by the organization that uses them. LANs give organizations connectivity and allow the sharing of information and resources, while WANs provide further connectivity and allow for the centralization of control. Also many LANs connect to WANs and the Internet, the ultimate WAN.

Such systems reflect the fundamental objectives of the firm and may have a significant impact on its success. The systems range from large WANs—which may have several thousand workstations connected with mainframes—to workstations networks, which have only a few workstations connected to one another. Presently, most private organizations use mini and microcomputers connected by Novell Networks or Windows NT networks, which link anywhere from a few to several thousand workstations and servers. According to Colborn (1992), major objectives of a network system are to help reduce redundancy and promote peripheral sharing, and file transfer between connected computers. The network system is now becoming a ubiquitous tool utilized both in the public and private sectors of HR management (Kosiur, 1995).

Interorganizational information systems allow major improvements in organizational effectiveness and efficiency concerning the opportunities created by the strategic use of networks. Because the network concerns all parts of an organization, this suggests that a large number of managers and employees throughout an organization should be involved with the system. "Information systems professionals with a good grasp of networking and data

communications technology are in demand in nearly all industries, from services to manufacturing to finance, according to search and consulting firms" (Colborn, 1992; p. 108).

Networking provides both internal and external benefits such as significant cost savings, improved operating efficiency, and better management control (Barrett, 1986). Networks allow users to communicate by electronic mail and to share information and such computer resources as mass storage, backup facilities, software, printers, etc. Several types of computer systems can serve as a server such as a mainframe, minicomputer, or microcomputer, which can be used as a centrally administered system generally performing financial, purchasing, personnel, payroll and scheduling services.

Client-server architecture is one form of information system that uses LANs and WANs. Client-server environments, by definition, are highly networked (Gerston, 1997). This technology is a combination of hardware and software that enables shared application processing across numerous computing devices. Client-server is a great omnipresent networking pattern, giving desktops access to data and applications loaded onto servers (Lippis, 1997). Gerston (1997) stated, "Adopting client-server technologies helps businesses reengineer processes, get closer to their customers, and radically improve time to market" (p. 74).

International connections are expanding at such a rapid rate that for some countries the Internet has become the most popular and sometimes the only available source of data exchange and internal communication (Quarterman, 1990; Cronin, 1994). The Internet is a Wide Area Network (WAN) that allows users to connect to remote computers (computers outside the user's Local Area Network, or LAN), and exchange messages, files, and information. The Internet is sometimes described collectively as an interconnecting matrix, that transmit electronic traffic to the most remote corners of the globe (Quarterman, 1990; Cronin, 1994).

The Internet began in 1969 as an effort by the U.S. Department of Defense to design a computer network, (i.e. a means of communication) that could survive a nuclear attack (Pound and Dillard, 1993). The original net was called ARPANET and achieved its goal. Today the Internet is not based on a centralized computer, but rather, a decentralized network of over



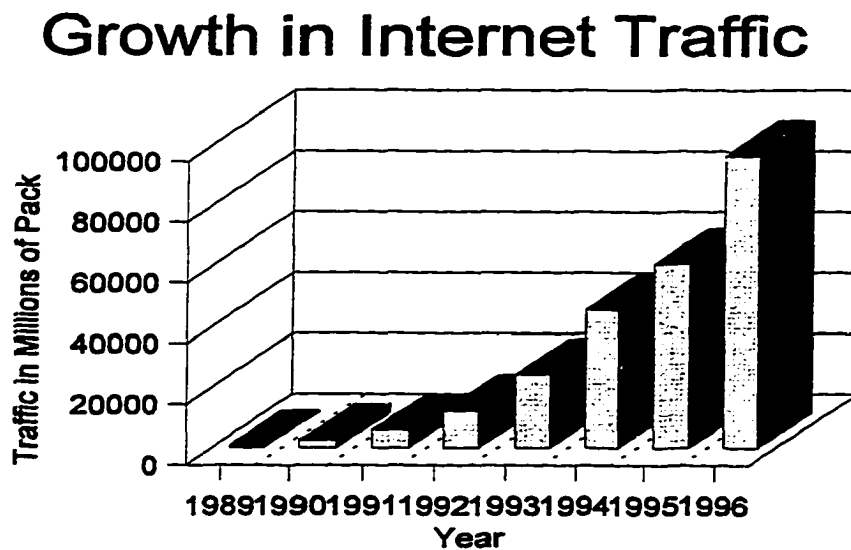
50,000 corporate, educational, and research networks around the world (Cox, 1997). "In many ways, an Internet business strategy has little to do with the actual hardware and software that comprise the system of interlinked computers.....Rather, an Internet strategy is about concepts such as agility, customer intimacy, proactivity, creation of niche markets, and exploitation of core competencies in a virtual environment" (Gascoyne, 1997; from the preface). The Internet business appears to be gathering momentum, showing considerable growth in both online subscription and ad revenues. Online subscriptions jumped from 14.5 million to 21.1 million during 1996 (Tedesco, 1997). Clearly, the Internet has become a burgeoning flow of global communication about research technology, politics, education, and a variety of other topics (Machlis, 1997).

The Internet can be a valuable resource to those who are willing to invest the time to learn how to navigate through it. Because of the Internet's decentralized nature, it is difficult to determine what other computers or organizations are connected to it. "The Internet revolution is not only reshaping corporate networks but also revising the skills that net managers must bring to their jobs—along with the demands made on them" (Keough, 1997; p. 4). A wealth of information that has not yet reached its full potential exists on the Internet, and any organization would benefit immensely from learning to tap into its resources. With the various types of information, employees and managers can stay abreast of the rapid changes in organizational structures, functions and processes. The quality of HR can be improved greatly by virtue of the information now available. Educational and HR software, the sharing of imaging technology, international consulting, and easy access to personnel and company databases, are all available from the Internet (Cronin, 1994).

According to Tedesco (1996), Internet use rose dramatically in the six months between August 1995 and March 1996. It is estimated that during this period the number of registered users worldwide increased from about 24 million to about 36 million. In addition, Ziff-Davis Publishing Company (1997) projects that by the year 2000, the number of users accessing the Internet will be over 66 million. This is because the Internet is an extremely useful source of

information for business organizations that need to evaluate the competitor's products and markets. Also, other information from the Internet is useful for maintaining organizational strategy in political, economic and environmental situations. Moreover, according to the Nielsen Media Research Survey, the Internet's major application, the World Wide Web (WWW) with over eleven million home pages, is an excellent resource source of information about job opportunities (Tedesco 1996). Along with the overall growth in the Internet, the WWW has specifically boomed (See Figure 2.2 which shows the growth in the Internet traffic from 1991 to 1996). Today, the WWW has proven itself to be a valuable business and government tool. "Technology firms are now trying to make the Internet a ubiquitous tool in the business environment" (Greene, 1997; p. 38).

**Figure 2.2 : Growth in Internet Traffic**



**Source :** Nancy Cox, "Building and Managing a Web Services Team" p.5 (Also see NSFNet Statistics—<http://nic.merit.edu/nsfnet/statistecs/>)

### **Public and Private Sector Management Information Systems & Technology**

Let us now turn to the way in which public and private organization are using this information technology. The management information systems literature (MIS) holds that the organizational purpose served by computer applications is either (1) to automate a basic process or task or (2) to provide information for decision making (Curtis, 1989). According to Carr (1994), MIS is comprised of all systems and capabilities necessary to manage, process, and use information as a resource for the organization. Such information can provide managers with insights into the regular operations of the organization so that they can more effectively and efficiently exercise their skills in planning, organizing, leading and evaluating. MIS includes the following computer capabilities:

- **Transaction Process System (TPS):** TPS, developed since the 1950s, is a computer-based tool that is designed to process, store, program, and distribute data on the activities of the organization.
- **Database Management System (DBMS):** DBMS is a collection of software packages that store and organize the data into records, and allow access to the data in a variety of ways. The development and use of database systems has increased in importance in recent years. Today, all large computer manufacturers and many large software houses offer database systems, which are widely used in both public and private organizations.
- **Decision Support System (DSS):** DSS is a computerized tool that incorporates both data and quantitative models to support managers in solving unstructured problems.
- **Executive Information System (EIS):** EIS is designed to integrate MIS and DSS with executives in mind. EIS has specific applications, which are used only for executives, managers, and other higher management positions. It provides easy access to data and information needed by these Special cases.

- Expert System (ES): ES is a computerized tool that embeds relatively complex decision rules gleaned from experts in a limited domain, and is used to solve problems in that domain. ES adds the personal knowledge and skills of experts to a computer system (Carr, 1994).

Two fundamental types of information management, regardless of organization, are *housekeeping activities* and *decision-making activities* (Norris, 1989). Housekeeping activities include a variety of routine everyday functions that nearly all organizations perform, including those supported by TPS and DBMS. On the other hand, decision-making activities are significantly different from housekeeping activities. Although they may use much of the same information, their purposes are different. For example, the purpose of HR processing (a routine housekeeping task) is to produce information about actual personnel. HR planning, on the other hand, is a decision-making activity, in which the consequences affect the entire company. Therefore, not only DSS, EIS, and ES are used, but also TPS and DBMS are significant in providing needed information for these decision makers.

The importance of management information systems is widely recognized (Bradford, 1987; Bretschneider, 1990; Gillette, 1991; Byrd and Ikerd, 1992; and Arkin, 1994). These systems are used as a source of data and information for both public and private organizations, accessed via computer systems and networks. According to Robert Taylor (1986), an information system can be defined as a series of value-adding processes, the results of which help the users to make choices and help them identify problems. The system and its processes require investments of time, staff, knowledge and equipment. Information is the heart of all organizations. It should be considered primarily as the bottom-line of all organizations, as it helps them survive and ensure their achievement of goals and objectives. It is essential to obtain high quality information, particularly in businesses, in which the bottom-line is "profit". No matter how information is obtained either manually or via a computer system, it involves time and cost.

In the period 1978 to 1989 many central state information resource management offices were created or reorganized. The responsibilities and functions of these offices were generally concerned with two primary tasks. One, to define a strategic planning process directly linked to the budgetary process. Two, to establish policy statement activities in areas such as organizational information exchange, technological compatibility, user support, data security, systems development, etc. (Caudle, 1990). Today, more and more executives and managers recognize the importance of these technological tools and their usefulness in creating and processing information (Khojasteh, 1993).

Advances in computer and microprocessing technology have led to the availability of office systems, telecommunications, data and information processing, and information management activities such as information sharing, data administration, records management, information security, etc. These advances in computer systems make it possible for organizations to save a great deal of time and cost as well as achieve their goals and objectives. These information resources utilize all of the well-known management functions such as planning, organizing, staffing, directing, coordinating, and budgeting (Caudle, 1990).

Most private organizations today, particularly those of large and medium size, have their own computer systems, ranging from stand-alone operations serving a limited number of users, to mainframe computers serving a large number of users, and also serving as a telecommunications network. The same is true for the public sector, which has invested in computers since the 1960s, especially in the 1980s when state governments made rapid strides in building and implementing information resources and management approaches (Walker, 1993; Kavanagh, Gueutal, and Tannenbaum 1990). By the year 1990, thirteen states had legislation mandating a telecommunications office or designating a new unit to plan and operate communications services and networks or to purchase communications services. As Caudle (1990) stated, "If the 1980s appeared to be the decade of information technology management maturity in state government, the 1990s might be characterized as the decade for information management maturity" (p. 523). Today, the federal government, and virtually all state, city, and county

governments utilize computers. At the city and county levels alone, computers are used for some 450 different computer applications ranging from payroll, accounts payable to demographic data analysis, routing vehicles, and allocating manpower (Northrop, Kraemer, and others, 1990).

At this point, debate centers around *which* issues must be addressed in designing public-sector information systems and *how* the information in the public sector should be different from the private sector. Northrop, Kraemer, Dunkle, and King's research (1990) is focused on five general payoffs in using computers in the public sector: (1) increased availability of information, (2) better information for management control, (3) better information for city planning decisions, (4) greater efficiency of operational performance, and (5) better interaction with the public. The above researchers found that most payoffs from computerization are not felt immediately; instead, it takes years for goals to be realized using computer systems. The major payoffs occur in the areas of fiscal control, cost avoidance, and better public relations. However, some anticipated benefits, such as better information for planning and managerial control, have not yet been realized (Northrop, Kraemer, Dunkle, and King, 1990).

Staurt Bretschneider (1990), in *Management Information Systems in Public and Private Organizations: An Empirical Test*, studied the factors that have a major effect on public and private sector organizations' capacity to manage computers and data processing effectively. Bretschneider established five propositions based on organizational environments and management activity that can influence changes in public management information systems (PMIS) and private management information systems (MIS):

1. PMIS managers contend with greater levels of interdependence across organizational boundaries than do private MIS managers as a result of constitutional structure.
2. PMIS managers contend with higher levels of red tape than do private MIS managers.
3. Criteria for the evaluation of hardware and software, which affect purchasing decisions, are different for PMIS and private MIS.
4. PMIS planning is more concerned with extra-organizational linkages and is more formal than in the private sector, which is focused on internal coordination.

5. PMIS tend to place the director lower in the organizational structure than do private MIS (Bretschneider 1990).

According to Bretschneider, greater interdependency, in part motivated by checks and balances or accountability, leads to more procedural steps (red tape) for a specific management action, the delay in making a decision to purchase either hardware or software, and obstacles and uncertainty in planning and controlling in public organizations. This condition forces planning to function more as a vehicle to determine interorganizational linkages than to coordinate effort within the organization. Also, Larry C. Giunipero (1984) studied purchasing's role in computer buying in public and private organizations and found that public organizations spent most of their time in preparing invitations to bid before making a decision to purchase the systems, while private organizations spent most of their time negotiating terms and conditions and writing contracts. Moreover, most private sector organizations studied appeared to centralize the procurement of their system equipment. On the contrary, the public sector organizations were decentralized in their responsibility for buying computer equipment. Thus, the private sector purchasers were better able to maintain familiarity with the computer technology and monitor its changes. On the other hand, public sector influence was more confined to less technical areas of the system acquisition. Their decentralized approach hindered clear communication between sellers and buyers (Giunipero, 1984). Newcomer and Caudle (1991) stated, "In the public, the scope of users, the types of decisions the information system supports, and other factors such as time pressures and accountability make information-system evaluation even more complex than in the private sector" (p. 378). Finally, Bretschneider (1990) found that public organizations place the MIS managers or directors in lower positions than those in the private organizations, which result in PMIS managers having less authority than those in the private sector.

Software design in the government sector is still hindered in implementation due to problems which may arise concerning design performance, design economy, the manufacturability of the software, the size of the potential market, and the performance

expectations of end-users (House, Jones, and Bevilacqua, 1977). According to Perry and Kraemer (1979), federal design of computer applications software can be characterized with the following approaches :

1. **The system approach** is the software design equivalent of rational comprehensive policy making.
2. **The functional approach** to applications software design involves the development of a range of applications for a local government operating agency by its federal counterpart.
3. **The ad hoc approach**, with its temporary involvement of federal agencies, most frequently has produced stand-alone, narrow-purpose software designs.

The public sector is considered an area of major payoffs from technological innovations aimed at improving productivity because of its increasing demand for services in the face of a declining base of resources (Perry and Kraemer, 1979). Since the government sector is highly labor intensive, it is hoped that significant productivity improvements can be achieved by replacing labor with capital investments in technology (Roessner, 1976; Perry and Kraemer, 1979).

The basic differences between their two sectors make their capability to manage information technology different. For instance, the public organizational authority is derived in part from legal services and constitutional arrangements, which involve checks and balances between legislative and executive branches (Bretschneider, 1990). Private organizational authority is derived from one person or a group of people within the firm such as the owner or the board. Private managers, therefore, have more authority to make decisions than do those in the public sector (Hickson, Butler, and others, 1994; Coursey and Bozeman, 1990).



### **Public and Private Sector Human Resource Information Systems**

HRIS is one of the indirect-support but essential parts of the organization, and it has come a long way in recent years in establishing itself as a front-line activity. Despite this, some decision-makers still cannot understand the benefits of using a human resource information system (Richards-Carpenter, 1994). Unfortunately, HRIS has been used in only some functions of HR, although the system actually could have been utilized much more in this field. This may be because of system costs, or the fact that HR personnel are not properly prepared for such systems. Trends in the use of HRIS in HR have changed, according to R. J. Niehaus (1979) "Interest in recent years is shifting away from the use of techniques for human resources planning mainly for trend analysis. Focus is now centering on their use to support decision and policy making" (p. 1).

Since the 1980s, there has been tremendous growth in computer systems in private industry, including hardware and software in various fields such as HR management. HRISs have become more sophisticated and powerful. Some of the HRIS software requires at least four stages in its long-term development: database building and transaction processing, reporting and elementary analysis, modeling and sophisticated analysis, and enlightened programs (Hilton, 1985). Several organizations have created applications based on those four stages used in HR functions, including job analysis, recruitment, training & development, performance appraisal, compensation, etc. (Arkin, 1993 ; Finch, 1988; and Kinnie and Arthur, 1993).

With the development of computer systems, a variety of applications of HRIS have also been developed in both public and private sectors, some of which have been used for general personnel functions and others for specific functions or subfunctions. According to Baker (1997), "A recent trend in human resources is the development of systems specifically designed for use in a client-server environment" (p. 37). Generally, in organizations with 1,000 or more employees, a client-server system would be an excellent choice to run HR functions. Client-

server systems can solve the problems of outmoded mainframe or minicomputer systems. Also client-server systems are more compatible with other hardware and software than these other systems (Baker, 1997).

There are several ways to categorize these applications. Sang M. Lee and Cary D. Thorp (1978) indicated that HR managerial activities deal with five functions; the procurement, development, maintenance, utilization, and separation of the work force. As such, it includes the personnel responsibilities of line managers as well. Specifically, some of the activities included within each of the subfunctions are as follows:

- Procurement – Manpower planning, affirmative action, recruitment, and selection
- Development – Orientation, training, management development, career planning, performance appraisal, and promotional systems
- Maintenance – Wage and salary administration, benefits and services administration, safety health, disciplinary systems, grievance systems, employee communications, employee relations, and collective bargaining
- Utilization – Placement (job assignment), leadership, motivation, job design, and work scheduling
- Separation – Pension administration, retirement counseling, layoff procedures, turnover analysis, and exit interviewing.

Michael J. Kavanagh, Hal G. Gueutal, and Scott I. Tannenbaum (1990) categorized HR applications in a similar way. They divided HR functions into subcategories, which include several activities in each category, as indicated in the following table:

**Table 2.2: HR Subfunctions and Typical Activities**

<b>Subfunction</b>	<b>Typical Activities</b>
Planning	Personnel and succession planning Labor relations planning Targeted analysis
Staffing/Employment	Recruitment Selection EEO/AA
Training and Career Development	Training administration Career development Training needs analysis
Performance Management	Performance appraisal Time and attendance Grievance
Compensation and Benefits	Compensation Benefits Compliance
Quality of Work Life	Health and safety Employee assistance programs Child-care programs

**Source:** "Human Resource Information Systems: Development and Application" by Kavanagh, Gueatal, and Tannenbaum 1990, p. 202.

For both government and business, HRIS is, itself, an automated process that produces specific reports for managers for two purposes, accountability and planning. Its design was premised upon the basic assumption that effective planning is linked to accountability (Hyde and Shafritz, 1985). HRIS performs a large variety of management and analysis tasks, many of which can impact each other, although each element in a subsystem of an overall system is an independent function. The system is inherently interactive in that one function may contain information produced from other functions (As illustrated in Figure 2.3 below).

**Table 2.3: Human Resource Information Systems**

<b>Data Inputs</b> Module Objectives	<b>System Throughputs</b>	<b>Data Outputs</b> Module Data Arrays / Reports
<ul style="list-style-type: none"> <li>- Career planning</li> <li>- Equity monitoring</li> <li>- Expansion files</li> <li>- Foreign service locals</li> <li>- Handicap programs</li> <li>- Intake planning</li> <li>- Position classification</li> <li>- Promotion calculations</li> <li>- Recruitment</li> <li>- Resource allocation</li> <li>- Separations</li> <li>- Training assignments</li> <li>- Training projections</li> <li>- Vacancy reporting</li> </ul>	<p style="text-align: center;">         ——Position——&gt;          Data            Planning          ——&gt;     <b>HRIS</b>            Accountability          Person          ——Data——&gt;       </p>	<ul style="list-style-type: none"> <li>- Career planning</li> <li>- Equity monitoring</li> <li>- Expansion files</li> <li>- Foreign service locals</li> <li>- Handicap programs</li> <li>- Intake planning</li> <li>- Position classification</li> <li>- Promotion calculations</li> <li>- Recruitment</li> <li>- Resource allocation</li> <li>- Separations</li> <li>- Training assignments</li> <li>- Training projections</li> <li>- Vacancy reporting</li> </ul>

Source : Hyde and Shafritz in *The Human Resource Information Systems Sourcebook*, Ed. by Beatty, Montagno, and Montgomery, 1985, pp 9.

In addition, HRIS also has an important role in HR strategy, such as creating a highly motivated working environment through a host of HR policies: job rotation, universal employee ownership, non-hierarchical organizational structure, democratic principles, trust, and shared economic risks and rewards (Terry, 1992).

A number of HR software packages are now available on the market. These software packages have been created and modified to meet the organization's needs and to comply with governmental requirements, i.e., federal reporting requirements on EEO hiring, salary planning, benefit administration, and custom reports, as well as auditing any changes to the data base to back up files and update data.

HRIS can be implemented in a number of ways. The organization may tie its HRIS to its mainframe computer and give access to human resource managers on an as-needed basis (Beatty, Montagno and Montgomery, 1985). A separate system may be purchased that is completely under the control of the HR department. In this case, HR people may develop their own data base and software in addition to having their own computer, which is usually done by HRIS professionals or specialists. As an information management architect, the HR professional could use current computer systems to create business models and simulations to:

- Plan and administer compensation programs
- Provide simulations of organizational design options
- Track development
- Manages succession

The information management architect must be able to assess and manipulate information necessary for management decision-making, allow for on-line benefits changes and provide more information for employee decision making (Bailey, 1991). Another option is time-sharing with a major computer systems supplier, wherein softwares are accessed via terminals at the user location. Whatever type of HRIS is appropriate depends on several factors such as organizational objectives, budget, time, policy, and management style.

HRIS can take a major supporting role to ensure that the activities make a positive and measurable contribution to organizational effectiveness. As an organization becomes more complex, HRIS must be flexible enough to handle a number of different types of demands for information. The real value of HRIS may be in its ability to answer questions of a nonstandard nature. This would require that the users be able to scan the data base and extract information on an ad-hoc basis (Beatty, Montagno, and Montgomery, 1985).

### **Public and Private Differences in HRIS**

Technology and the public workplace are not strangers, but their relationship has changed considerably over the past thirty years. Automation in government resulted in large, highly controlled mainframe-based information systems supporting the production of standardized transactions (Newcomer and Caudle, 1991). These information systems tended to rely on a blend of computing and communication technologies, and on a complicated mixture of technical, programmatic, and administrative expertise which created some new challenges for public managers (Dawes, 1994). Technologies have made possible a stunning array of information-based public services. For instance, technology facilitates the administration of more programs and the ability to reach more individuals and communities than ever before. Moreover, service programs can now support high levels of complexity and meet demanding time limits. Finally, citizens can conduct business with government agencies directly from home without entering a government office or dealing through the intervention of a government employee (Gurwitt, 1988).

Automation in human resources, in the area of public finance, administration, and public safety, has still proceeded at a relatively lower level despite substantial federal assistance in the areas of community development and public works (Perry and Kraemer, 1979). In fact, HRIS can sometimes cause as many problems as solutions. In her research focusing on state government, Sharon S. Dawes (1994) found that HRIS can cause problems in five areas:

1. The automation of government operations results in a number of support activities which lack appropriate job titles.
2. Once jobs are classified and career paths made possible, the processes of recruitment, testing, and selection become critical.
3. Technological and organizational change demand continuous attention and planned investment in workforce training.
4. Technical excellence needs to be rewarded in a way that does not force experts to leave their disciplines and sometimes become administrators in order to be promoted to higher status.
5. Most civil service processes have been developed, tested, and refined over a period of many years. As a result, the stability of this system can be a strength, and also it can severely limit its outlook on emerging workforce issues and personnel management techniques.

Due to the above problems, Dawes (1994) suggested broader issues, which the states in the U.S. should acknowledge and address as they move further into the electronic information age. They are as follows:

1. The special requirements of the "hard" technical specialities. This means HR specialists today should have not only the knowledge in HRM, but also the knowledge in HRIS, which is related to the use of HR software and hardware.
2. The emergence of "hybrid" jobs which mix technical and "business" skills.
3. The desirable qualifications for information resource management (IRM) leadership positions.
4. The need to focus on the existing workforce as the basis for solving immediate problems and building future improvements.

According to Dawes's suggestion (1994), state government's technology has been developed toward business' technology. Government agencies need mixed skill professionals, who have both technical and managerial backgrounds, especially valuable for the position of

HRIS specialists and HRIS managers. In other words, HRIS in state government needs HRIS people who have not only the technical experience but also managerial expertise in order to use powerful tools efficiently and to achieve organizational goals.

An in-depth study by William Cats-Barial and Ronald Thompson describes the State of Vermont's Human Resource Management System (HRMS) to illustrate many of the pitfalls in the public sector management of information technology (IT) projects. They stated that the trend in public computing is to migrate from mainframe-based systems to smaller computer platforms. Such migrations are proving more difficult for public sector managers than for private sector managers because the bulk of the IT management experience in the public sector is with mainframe-based systems (Cats-Barial and Thompson, 1995). Cats-Barial and Thompson found that the HRMS in Vermont was not as successful as expected, for several reasons, which illustrate possible problems in general public organizations. (1) The implementation of human resource information systems (HRIS) on the client-server was relatively new at the time the project was instituted. (2) Most of the state members of the project team had full-time responsibilities in their respective departments and could only give limited attention to the HRIS project. (3) There was no direct interaction between state employees and personnel in the department of HRIS. (4) It took more than five years for the project from the beginning to the complete implementation, and much more of the software needed to be modified than had been anticipated. (5) In long-time projects, changes in a new administration with new people and new responsibilities for the project could also be a problem in task continuity, particularly, if the new administration does not agree with some or all of the plan (Cats-Barial and Thompson, 1995).

#### **Public and Private Sector End User Personnel**

People are being recognized as the root component and most valuable resource of any organization, and actions are being taken towards ensuring their tenure. If individuals are successful, it follows that the organization as a whole will be successful (Robinson, 1985; p. 14).



Carr (1994) defines end users as individuals who are willing to use computer resources to get their job done. This includes people in all levels ranging from top management level such as company presidents to the lowest level such as clerks and workers. In addition, Carr defined end user computing (EUC) as the direct hands-on use of computers by people with problems for which computer-based solutions are appropriate. Stair (1992) stated EUC is a phenomenon in which end users such as employees, managers, and executives are directly involved with the development and use of information systems. J. C. Wetherbe and R. L. Leitheiser define EUC as the use and development of information systems by the principal users of the systems' outputs (Nord and Nord, 1994). Other scholars may define it differently; however, the concept is based on the same criteria – how people know how to use computers in executing and developing their jobs.

End-users generally can be classified in several ways ranging from non-skilled (nonprogramming users) to skilled (programmers). Minimally, they should know how to use computers. According to Carr (1994), users are categorized into four distinctive groups:

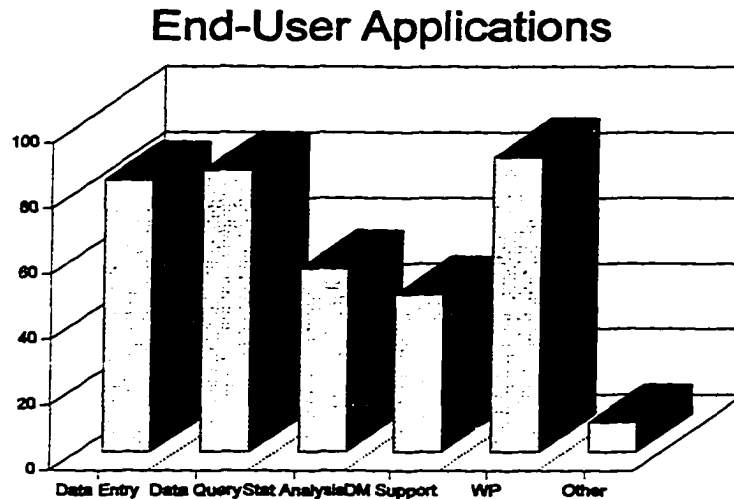
1. Nonprogramming end users whose only access to computer-stored data is through software provided by others (approximately 70 to 85 percent of the population in the United States).
2. Command-level users have a need to access data on their own terms. They can perform simple inquires often with a few sample calculations (approximately 10 to 20 percent of the population in the United States).
3. End user programmers who use both command and procedural languages directly for their own personal information needs.
4. Functional support personnel who are sophisticated end user programmers and who support other end users within their particular functional areas. The 3rd and the 4th groups compose at about 5 to 10 percent of the population in the United States.

Not only do end users differ in computing skills but they also differ in educational background, support, motivation, training, preparation, and other work-related attitudes such as work satisfaction, organizational commitment, and perceived performance-reward relationships. For example, Hal G. Rainey, Carol Traut, and Barrie Blunt (1986) studied the work-related attitudes between public and private employees and found that government employees tend to be less satisfied in their jobs compared to those in the private sector.

Nord and Nord (1994) stated that the proliferation of personal computers increases the demand for information processing systems, causes enormous development backlogs, and user dissatisfaction. These functions have contributed to the phenomenal growth of end-user developed systems. As reported by research studies over the last decade, EUC accounts for up to 50% of the computer resource budget in many organizations with some estimates as high as 75%.

Today, several basic applications, some of which have previously been mentioned, are widely used in both public and private organizations for processing their tasks such as data-base management, spreadsheets, word processing, statistics, data query, graphics, and telecommunications (Carr, 1994). According to Nord and Nord (1994), word processing remains the number one application performed by end-users. However, data query and data entry, which are parts of data-base management, are applications that are performed at the second and the third place respectively as illustrated in Figure 2.4 below:

Figure 2.3: End-User Applications



**Source :** "Perceptions & Attitudes of End-Users on Technology Issues", by G. D. Nord and J. H. Nord, 1994

Education and training are important tools in EUC. They enable end-users to be better positioned to IT for greater productivity. Additionally, education and training will help users better understand how to support themselves when they have basic computer problems, without depending on MIS personnel. Increasing access to new training technology has also encouraged more organizations to develop in-house programs (Arkin, 1994). Users in high management positions, such as executives and managers, also need to be educated and trained, because they make crucial decisions that affect the whole organization. Anthony Byrd and Michael D. Ikerd (1992) indicate that general managers in public organizations are now being called upon to make purchasing decisions about computer and communications hardware and software for their organizations. "These HR managers are increasingly responsible for setting up telecommunication systems, such as LANs and WANs, in addition to using such end-user tools as Decision Support Systems (DSSs) and Expert Systems (ESs)" (p. 194).

Human resource information system personnel are also end-users whose jobs are a hybrid between technical support and personnel management. This requires both personnel experience and an aptitude for information technology. Tomeski (1976) stated that personnel computerization is made more difficult by the fact that the computer staffs, which are the connecting link between the personnel department and the MIS department, generally consist of people who are not behaviorally oriented, and therefore not sensitive to the unique problems of the personnel department (Tomeski, 1976; Short, 1985). Gilbert B. Siegel and James R. Marshall (1991) added, "The role of the personnel expert is more likely to be that of designer of new systems and system changes required by adaptive and other initiatives" (p. 63). Unfortunately, the knowledge and skills of HRIS personnel for effective use of these crucial information systems are not nearly as pervasive as the systems themselves (Newcomer and Caudle, 1991).

#### **Public and Private Sector Management Support**

Management can be either a significant support or obstacle in organizations. Flexibility in management issues can be advantageous. Jay R. Galbraith (1994) stated, "Being flexible and multi-dimensional allows you to do anything or organize around any issue. If you are divisionalized, you are limited" (p. 277). Measures of organizational flexibility include issues such as how power and authority are exercised in decision making, how authority is delegated to subordinates, how much support is received from top management, and how the organization handles budgets and strategic planning (Evans, 1985; Niehaus, 1979; and Mercer and Koester, 1978).

Comparative studies of private and public management often focus on organizational exercise of power and authority in decision making and delegation. The more top management personnel delegate authority to middle and lower managers, the more flexibility middle managers or department managers have in implementing and making decisions (Kenny, Butler, Hickson, Cray, Mallory, and Wilson, 1987). As a result of this flexibility, HR managers would be able to

independently exercise their power in strategic planning, organizing, and controlling. However, some scholars such as Silfvast and Quaglieri (1994) argue that managers in the public and private sectors require different skills, although they perform similar functions.

As mentioned previously, public and private organizations have different missions (profit and non-profit); therefore, the decision making patterns used in the two sectors are distinct. Public management functions pervade many levels ranging from local to federal. As Ring and Perry (1985) state, "The general management functions of government are, as previously noted, constitutionally spread out and separated among and across federal, state, and local executive branches, more than one legislative body, and a variety of judiciaries" (p. 277). Allison (1983) argued that this is not to promote efficiency, but to prevent the arbitrary exercise of power. This separation of functional responsibility frequently contributes to vagueness and/or ambiguity in policy and objectives which must be strategically managed.

Unlike private organizations, which more typically have entrepreneurial roots, public organizations are always created by some higher controlling body (Ring and Perry, 1985). One consequence of higher control in public organizations, as Nutt (1979) pointed out, is that it leads individuals to take opportunities to benefit their own constituents, but not necessarily those of other controlling groups.

HR departments in public organizations, which commit to the same objectives as the organization, have been influenced by those broad legislative agendas. Also, the developments in information technology are facilitating the changes in the role of HR management. HR management is not only dealing with HR functions but also in some organizations with payrolls, benefits, compensation, and marketing functions, particularly in the private sector (Glassman and McAfee, 1992; Spirig, 1990; Santora, 1992). According to Richards-Carpenter (1994), there is a change in the decision making role of line managers and staff managers due to developments in information technology.

The complexity of environments has made it difficult to centralize decision making in organizations, thus the HRIS trend in public organizations is likely to be decentralized. HR

managers are able to delegate authority to their subordinates because of the capability of personal computers to provide vital support in decision-making and decentralize HR management authority.

Today networking is one of the biggest technological changes affecting HR systems. Workstations linked through a network makes database sharing, and constraints and controls on workstations in the network can be managed by a controller unit (Siegel, and Marshall, 1991). Networking can provide tremendous capabilities to HR systems, such as real time information sent directly and immediately to those who need it. However, sometimes the implementation and maintenance of such systems introduces another level of complexity into the system administrator's job (Richards-Carpenter, 1994).

The budget is one of the most important factors to be considered in making a decision about HRIS. Decisions need to be made among several choices according to an available budget, such choices include: how to make the best decisions about cost and productivity, which system is best fitted to organizational goals and objectives, and what should be planned for the future? One approach, proposed by Sandra E. O'Connell (1992) is to anticipate projects within five categories: (1) hardware, (2) software, (3) the HR network, (4) training, and (5) consulting. According to O'Connell, not only do we need to consider what the system should be, but we also need to acknowledge and support users in effectively implementing the systems. However, according to Richards-Carpenter (1994), "Many organizations that tried to implement a substantial revision of their human resource strategies with inadequate information technology support have found that their personnel costs escalated considerably". In fact, few HR departments have the internal expertise or time to devote to their automation strategy. Often no one is responsible for automation planning or projects (Richards-Carpenter, 1994). Therefore, consultants are brought in for three reasons:

- To serve as adjunct and temporary staff to do work that employees do not have time to do
- To provide experience and expertise that is lacking in-house
- To provide needed objectives (O'Connell, 1992).

In budgetary decisions, the priorities that need to be determined are what the system does, its pros and cons, which applications need to be added or removed, and what should be improved and changed in order to have an efficient system which adequately serves the organization's goals. The next decision concerns which system should be used and how it fits the organization within an available budget. After that, an essential consideration is the cost of correcting errors, making changes, and enhancements, i.e., the maintenance cost, because the cost of correcting errors could be higher than the cost of analysis and/or design. As Carr (1994) stated, "Though many feel that change is inevitable, it is nevertheless cheaper to do (in analysis and design) than redo (in maintenance and change). The cost of creation is significantly less than the cost of change and re-creation" (p. 29).

In general, management plans and programs in the public sector are long term activities due to the constraint of the budget. In other words, it takes a long time to implement programs due to budgetary shortfalls. The long term effect is nearly always beneficial because the organization is forced to operate more efficiently and openly (Mercer and Koester, 1978). This usually results in reorganization along program lines, increased lateral communications among programs, decentralized decision making, more participative management, and more open or public operations in general. However, long term plans are inflexible. For instance, important decisions need to be made quickly to solve immediate problems. Therefore, it is necessary for the public managers to have enough authority to make the crucial decisions corresponding to those situations (Thierauf, 1994). Since long term plans are difficult to change, the plans may be outdated before they are implemented, particularly the plans that are involved in information technology (Ceriello and Freeman, 1991).

In conclusion, it appears that decision making, delegation of authority, top management support, budget planning, and strategic planning are significant factors reflecting organizational management flexibility in both the public and private sectors. Although public and private managers differ in practice, they have a uniform set of skills common to management personnel in both sectors (Silfvast and Quaglieri, 1994).



## CHAPTER III : RESEARCH METHODOLOGY

This chapter describes the general organization and research methodology of this dissertation including concepts and operational definitions of variables, population and sample, variables and their measurement, methods of data collection, and the research design. The discussion also includes the identification of the units of analysis and their attributes, methodological procedures, and techniques used to analyze the data.

### Concepts and Operational Definitions of Variables

#### Concepts

**Efficiency:** Efficiency refers to performing or functioning in the best possible manner with the least waste of resources. It usually implies satisfactory and economical use, i.e., less cost and high productivity. Stuart S. Nagel (1988) defines efficiency as the extent to which costs are kept down, especially monetary costs, as indicated by either total costs or a ratio that involves both benefits and costs.

**Difference:** Difference, by definition, refers to a complete or partial lack of identity or a degree of unlikeness. It implies the amount by which one quantity is greater or less than another e.g. a difference of shape, a difference of size, a difference of opinion, etc. (Stein, 1981).

**Delegation of authority:** Delegation of authority pertains to the appointment of a person(s) and commitment of powers, functions, etc. to the person(s) as deputy or representative (Stein, 1981). In other words, it refers to the assignment of responsibilities and/or authority to a person to organize and manage something as a deputy or representative.

**Decision making:** Decision making pertains to the act or process of determination, as of a question(s), problem(s), or alternative(s) by making a judgment in finding the best answers for those questions, solutions for those problems, or choices for those alternatives (Stein, 1981).

**HRIS:** According to Kavanagh, Gueutal, and Tannenbaum (1990), a computerized HR information system (HRIS) is used to acquire, store, manipulate, analyze, retrieve, and distribute pertinent information regarding an organization's human resources. Unlike a personnel information system, HRIS operates more on the demand side and involves all managers, not just the specialists (Kuper and Kuper, 1996).

### **Operational Definitions**

**Computer Systems:** This refers to the use of computer hardware and software together. Hardware includes mainframes, minicomputers, microcomputers, workstations, network hardware, and both local area networks (LANs) and wide area networks (WANs). Software includes operating systems such as MS-DOS, Windows, UNIX, network operating systems like NetWare, OS/2 WARP, and AppleTalk. In this study, the variables that indicate productive use of computer systems are: types and ages of computer systems, number of workstations, types of software and applications for computers and networks, networks access to the Internet, and the percentage of those using the Internet as a resource for HR information.

**Users:** This includes all employees in HR departments who are knowledgeable about and skilled in using computer systems to complete their tasks. These usually refer to individuals who have been educated and trained in school or individuals who have work experiences in using computers. In this study, the variables that indicate the competence of end users are: the number of employees in the HR department, their education level and training, the level of preparation to use computer systems, the HRM professional recruiting process, and the number of HRIS specialists in the department.

**Management systems:** This refers to the administration of organizational processes, policy, and procedures in order to perform appropriate tasks, to solve the problems, and to

achieve the organizational goals. In this study, the variables that indicate management systems are: budget size, support from top management, authority to make decisions, and authority delegation.

### **Population and Sample**

In order to compare HRIS in the public and private sectors, the sample for the study is selected from both sectors. However, because of the differences in the nature of these two sectors, the selection of the population is different. In the private sector, the population is randomly selected from the "COMPACT D/SEC" CD-ROM in the Auburn University Library, Auburn University, AL. Because of the large number of businesses in the United States, it was necessary to narrow down the size of the population and limit it to only the large and medium-size business organizations throughout the United States, (i.e. those with over 3000 employees). These organizations are usually large enough to be compatible in size and function to federal and state level organizations. This resulted in a sample size of 267.

Unlike the private sector sample, the public sector sample was comprised by a stratified random sampling from fifty state departments whose functions are related to personnel or human resources. According to Putt and Springer (1989), stratified random sampling is sampling which divides a population into categories of strata based on characteristics or types of departments and organizations. The purpose of public organizations is to provide non-profit service organizations to the entire state. As such, they are more homogeneous in character. Each state usually has its own HR or personnel department. In this study, HR departments were classified (by name) into four types along with the functions of the organization that related to human resources: (1) employment, (2) labor, (3) personnel, and (4) human resources. Random samples were then selected from each of the four categories or strata. This resulted in a sample size of 143 (133 state government agencies and 10 federal agencies in the OPM department).

Additionally, ten people from all divisions within the U.S. Office of Personnel Management (OPM) were randomly sampled to represent federal agencies. OPM was chosen as a unit of analysis because the OPM is directly concerned with human resource management at the federal level.

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### Variables and their Measurement

**Table 3.1:** Variables and their Measurement

Variables	Measurement
Computer systems	<ul style="list-style-type: none"> <li>- Types of computer systems</li> <li>- Computer system upgrade</li> <li>- Number of workstations</li> <li>- Software applications for HR functions</li> <li>- Satisfaction with the software applications</li> <li>- Other networks and/or Internet access</li> <li>- HRM Activities</li> </ul>
End users	<ul style="list-style-type: none"> <li>- Number of employees in the HR department (Compared to the size of organization)</li> <li>- Educational level</li> <li>- Number of HRIS support specialists</li> <li>- User training</li> <li>- Preparation</li> <li>- Professional recruiting</li> <li>- Ways to solve problems</li> </ul>
Management systems	<ul style="list-style-type: none"> <li>- Budgets</li> <li>- Top management support</li> <li>- Decision making by HR managers</li> <li>- Delegation of authority by HR managers</li> </ul>

### Methods of Data Collection

One objective of the study was to survey the use of computer systems and sources of information in HR organizations and to compare and analyze the differences of these systems between the public and private sectors. Four hundred and ten questionnaires were mailed to human resource professionals, managers, and executives --267 in the private sector, and 143 in the public sector (133 state government agencies and 10 federal agencies in the OPM department). After waiting three weeks, 210 questionnaires were resent to nonrespondents. A week later, follow up telephone calls were made in order to encourage additional responses. An adequate number of surveys were received to allow for empirical analysis. It includes a 54 percent response rate (77/143) from the public sector and a 29 percent response rate (77/267) from the private sector, making a 38 percent overall response rate (154/410).

The questionnaire (see Appendix C), was designed to focus on the five following areas:

1. General company department information (No. 1-5): general characteristics of the company's department and employees, particularly employees in the HR department.
2. General computer use questions (No. 6-15): information about the characteristics of their computer systems and applications used in the HR department and the company in general.
3. Human resource information management (HRIM) (No. 16-18): described the HR activities that involve use of computer hardware and applications.
4. Internet related questions (No. 19-22): the extent to which computer systems used in the HR department link and relate to other systems both inside and outside the department and/or organization.
5. Management related questions (No. 23-28): other factors in management that could affect the use of HRIS.

The questions were primarily closed-ended, with a few open-ended questions interspersed. The close-ended questions consisted primarily of the above five areas. Close-ended questions are especially useful in statistical analysis, using ACCESS, and EXCEL programs calculated average and percentage, and interpreted in tables. Although close-ended

questions have some disadvantages, such as inflexibility and the difficulty to explore issues in-depth, their advantages are that they are easy to code(see appendix D) and analyze (Kidder and Judd, 1986). Further, they encourage answers relevant to the investigator's purpose (Bordents and Abbott, 1991). The open-ended questions consisted of asking about general responsibilities and duties, and final comments on the use of computers and the Internet. The open-ended questions give respondents the opportunity to express their own opinions and freely make comments.

The analysis tools used in this research are ACCESS and EXCEL, which are menu driven windows programs. All data were entered into the ACCESS program, a database program similar to any other database programs such as dBASE IV and V. After all data are deposited in ACCESS, they can be imported into EXCEL, which is a type of spreadsheet program, to calculate percentages and interpret them in the form of tables. EXCEL has a filter function that allows users to interpret data in database forms. Finally, SAS, which produces a basic collection of attractive plots with are clearly designed and easy to use (Permaloff and Grafton, 1993), will be used to analyze the differences among means and standard deviations of the factors used in this analysis.

### **Research Design**

According to the nature of this study, *a cross-sectional research design* is used. Cross-sectional research is a type of descriptive research utilized in the social sciences. Descriptive research provides quantitative statements about the condition of large populations. According to Putt and Springer (1989), descriptive research is focused and involves a more precise determination of empirical characteristics of aggregate phenomena in order to develop a more detailed understanding of problems and solutions. In most social science research, descriptive research has been more widely used than any other method. As Black and Champion (1976) stated,

Although an exact tally of the number of predominantly descriptive studies undertaken during the past 30 years cannot be readily ascertained, it would appear from a cursory

review of available literature that the bulk of sociological material in print to date is, for the most part, descriptive in nature (p. 79).

Compared to exploratory research—a method of gathering data and information usually when the investigator has little or no knowledge about the problem or situation under investigation—descriptive research is more specific in that it directs attention to particular aspects or dimensions of the research target. Descriptive research is generally focused and detailed. The analysis in descriptive research is oriented to accuracy and precision (Black and Champion, 1976; Putt and Springer, 1989).

Statistical methods are crucial in descriptive research. Descriptive research usually employs statistical methods to specify the accuracy of variable measurement. Descriptive statistical methods are used to analyze the characteristics of the sample in several ways: the method may describe the distribution of characteristics of a sample in numbers, percentages, and averages (Putt and Springer, 1989). Descriptive statistics also provide a basis for comparing subgroups within a sample.

Cross-sectional research designs—which are a part of descriptive research—refer to observational studies where the experimenter does not manipulate any of the variables (Ross and Grant, 1996). The main feature of cross-sectional research designs is that data are collected on all relevant variables at this one particular time and relationships among those variables are represented at one point in time (O'Sullivan and Rassel, 1995).

Cross-sectional designs are usually used when the experimental design is not possible and variables cannot absolutely be controlled (Black and Champion, 1976). A well-designed, well-documented, and carefully implemented cross-sectional design has an advantage in that researchers with different interests and models often can work with data from a single cross-sectional study because a small study can be analyzed in many different ways (O'Sullivan and Rassel, 1995). However, cross-sectional designs also have some disadvantages. O'Sullivan and Rassel pointed out that the greatest weakness of the designs rest not in the design but in the implementation.



Given these considerations, the cross-sectional research design is appropriate to this study. Data were collected at one time with two groups under comparison: public and private organizations. Since the population is so large and varied, at times it can be difficult to compare and contrast. Therefore, it is necessary to also employ qualitative methods as a supplement to the data analysis. Qualitative methods are used to explain the phenomena of variables involved in the study. It requires flexibility regarding the methods used in order to gain insights and a more in-depth analysis. Yet, such flexibility can result in low external validity, causing the results of the study to be limited in its generalizability to subjects (Kidder and Judd, 1986).

### **Validity and Reliability of the Analysis**

One of the first questions a researcher should consider when doing research is: "What would make my research valid and reliable?" There are a number of ways to measure research validity and reliability. Campbell and Stanley introduced the concept of the *internal validity* and *external validity* of research designs. Internal validity has to do with the effectiveness of a design to minimize alternative explanations for obtained results, while external validity refers to the generalizability of the results (Cambell and Stanley, 1963). There is no absolute defined term for validity (Black and Champion, 1976). Patt and Springer (1989) noted the two types of validity: *face validity* and *predictive validity*. Face validity refers to defining the concept before indicating the data sources used in gathering information, while predictive validity refers to the accuracy in forecasting.

Generally, in cross-section research designs, variables cannot be controlled. The implementation process can cause internal invalidity. O'Sullivan and Rassel (1995) pointed out the weakness of cross-sectional research design. This weakness lies not in the design itself but in the implementation. Moreover, another weakness of the cross-sectional research design is that data are collected on all relevant variables at one point in time with no comparison group. These weakness can affect the internal validity of the research process.

However, there are several ways to make the research process more valid. The research design should be carefully constructed and documented several months before being implemented. In this research, construction included random population sampling for the private sector, but for the public sector it included clustering of the sample into HR related groups prior to the random sampling. Unrelated factors were eliminated in the design process to produce a more precise determination of empirical characteristics of aggregate phenomena and to reduce invalidity.

“Reliability refers to the precision and accuracy of measurement procedures used in generating data” (Patt and Springer, 1989; p. 130). Reliability evaluates the degree of random error associated with a measurement. Like validity, no measurement is error free (O’Sullivan and Rassel, 1995). According to Patt and Springer (1989), there are general research strategies that can be used to improve the reliability of research information:

1. Standardize research procedures: Clear and specific instructions for coders interviewers, respondents and so forth.
2. Use proven measures: Conduct a thorough search for existing measures that have been used to assess the concept under investigation.
3. Use multiple-item indicators and scales: Use multi-item indicators and scales to obtain the same results.
4. Pretest measuring instruments: When proven measures are unavailable, pretest is essential (p. 131).

Unlike Patt and Springer, O’Sullivan and Rassel (1995) indicated an acute concept of the dimensions of reliability: stability, equivalence, and internal consistency.

- Stability refers to the ability of a measure to yield the same results time after time.
- Equivalence considers two things (1) whether two or more investigators using a measure assign the same number to the same phenomenon, and (2) whether different versions of a measure assign the same number to a phenomenon.

- Internal consistency, which applies to measures with multiple items, considers whether all the items are related to the same phenomenon (p.91).

Unfortunately, since this research is a new frontier in this field, proven measures are not available. There does not yet exist a formal system of questions to obtain the information needed. However, pre-interviews of HR specialists and managers in each sector were conducted before developing the questionnaire to obtain information about HR functions, computer systems used in HR departments, and management systems. After that, pre-tests were conducted by asking 10 people (five from the HR field and five from other fields) a series of question to evaluate their comprehension of the testing process. Next, after the appropriate adjustment to the questionnaire, they were sent out to the population sample. Although descriptive research generally cannot estimate a measure's degree of random error (O'Sullivan and Rassel, 1995), the pre-interview and pre-testing processes should minimize random error of this research.

## **CHAPTER IV : RESEARCH ANALYSIS**

The purpose of this chapter is to analyze data and test our hypotheses. The chapter examines associated variables in computer system features, personnel literacy, and management processes in public and private organizations to determine the following: how they relate to one another, how they rely on one another, and how they differ from each other. This chapter examines differences between the two sectors illustrating many factors that differentiate HRIS between public and private organizations.

Student's t-test and chisquare tests are applied to examine the differences among those variables between the public and private sectors (See test results in Appendix E). The t-test is used to compare overall mean scores between the public and private sectors. For some data types, the chisquare test will be used to analyze the differences among proportions and compare mean scores for each proportion. Finally, probability values (p-values) at the alpha level 0.05 was used to determine whether or not the test is significantly different between the two sectors.

The preliminary questions of the survey concern the similarities and differences in human resource information systems used in public and private organizations. This chapter presents the questionnaire results, divided into five sections (See Table 4.1 - 4.17) :

1. Nature of Respondents and Organizations
2. General Information on Computer Systems
3. Human Resource Management Applications and Activities
4. Use of Internet
5. Management Information

The questionnaire was sent out directly to the HR department head and most of them responded to the survey themselves. (See Appendix A and Table 4.1) This gives us relevant data for our analysis.

**Table 4.1: Response Rate**

	No. of Resp.	Respondents Position	
		MGR	Asst.
Gov (N=77)	54% (77)	70% (54)	30% (23)
Bus (N=77)	29% (77)	84% (65)	12% (16)
Total (N=154)	38% (154)	77% (119)	23% (39)

Gov	=	Government Sector or Public Sector
Bus	=	Business Sector or Private Sector
No. Of Resp.	=	Number of Respondents
MGR	=	Manager, Director, President, Vice President, Commissioner, State Secretary
Asst.	=	HR assistant, Administrative assistant, Secretary, Specialist, Analyst, Consultant, Officer

To effectively address the goals of this study, the descriptive data are interpreted to explain the main ideas of each factor under study. Before the analysis of HRIS in HR departments can begin, generalized data on the overall organization of human resource departments will be reviewed. Although the study is largely exploratory, several relevant data sources collected in descriptive form and in the form of documents are also used in the analysis.

## **Data Presentation (Comparison and Analysis)**

### **Nature of Respondents and Organizations**

As noted earlier, the percentage of respondents in the public sector (54%) is much higher than those in the private sector (29%). Together these factors produce a total response rate of 38%. (See Table 4.1) The response rate from private organizations, as expected, is lower than that of public, possibly due to the time pressures in an environment where, as Clark (1994) stated, "In the private sector, time is money". According to open-ended questions (See appendix A), although both public and private HR managers have similar duties and responsibilities in control of the overall HR functions, there are some differences between public HR managers and private HR managers. Several public HR managers indicated that they acted as legislative liaisons, while private managers are more concerned with company policy and strategic planning.

What is most interesting in Table 4.1 is the large percentage of high level management respondents (77%) (Private sector = Sr. Vice Presidents, Vice Presidents, directors, and managers; Public sector = Commissioner, Deputy Commissioner, State Secretary, and various Directors). Of the above, 84% of the private sector respondents and 70% of public sector respondents classified themselves into manager positions.

### **Organizational Size**

The *organizational size* is determined by the number of employees in the entire organization. Public organization respondents, as shown in Table 4.2, are fairly equally distributed in each category with middle-sized organizations accounting for 40% of the total. On the other hand, the majority of private organizations (70%) are overwhelmingly represented in the medium size category with large and small organizations comprising the remaining percentages.

Due to the structure and functions, public organizational size is different from its counterpart. (See Table 4.2). The t-test confirms the significant difference at the 0.01 level (t-

value = 2.200; p-value = 0.029). However, at the 0.05 level, there is no significant difference between the two sectors.

**Table 4.2: Organizational Profile**

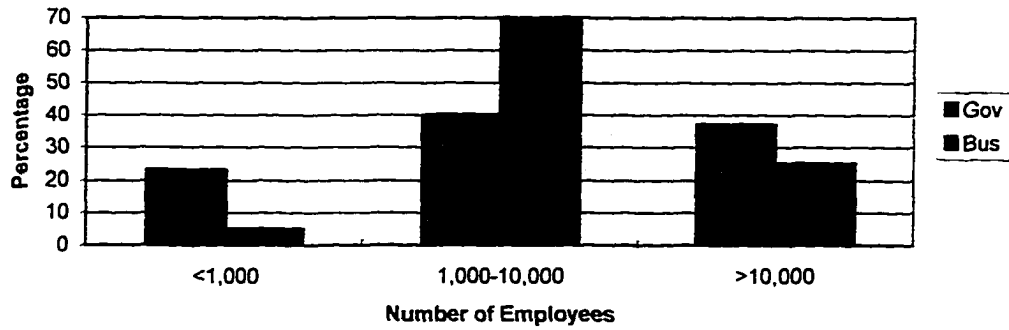
	Organizational Size			Department Size		Education level of Employees in the Department		
	< 1,000	1,000 - 10,000	> 10,000	< 100	> 100	< College	College Level	Grad. Level
Gov (N=77)	23% (18)	40% (31)	37% (28)	62% (48)	38% (29)	31% (24)	62% (48)	7% (5)
Bus (N=77)	5% (4)	70% (54)	25% (19)	97% (75)	3% (2)	15% (12)	77% (59)	8% (6)
Total (N=154)	14% (22)	55% (85)	31% (47)	80% (123)	20% (31)	23% (36)	70% (107)	7% (11)

< College = High school graduate or lower  
 College Level = College graduate or Equivalent  
 Graduate Level = Master Degree or Higher

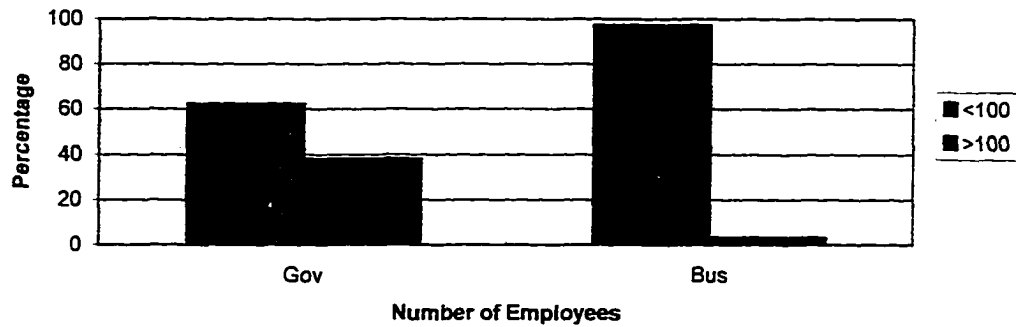


Figure 4.1: Organizational Profile

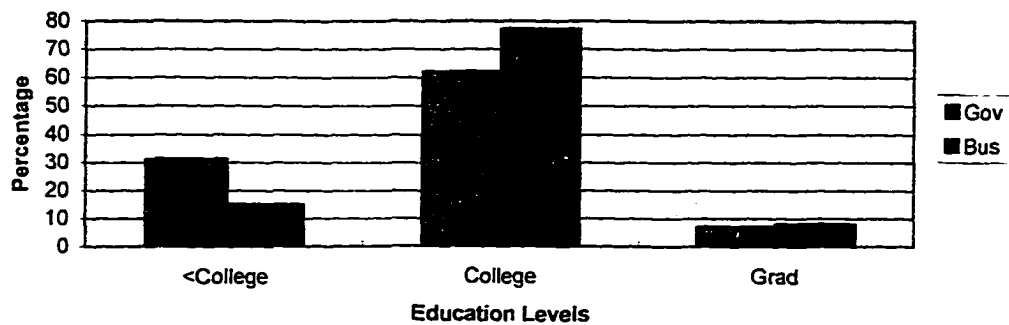
**Public and Private Organizational Size**



**HR Departmental Size**



**Education Level of Employees in the Dept.**



### **Departmental Size**

Similar to the *organizational size*, the *HR departmental size* is determined by the number of employees in the human resource department. According to Table 4.2, most HR departments in both the private and public sector are small (less than 100 employees), and the number of small HR departments in the private sector (97%) is higher than those in public organizations (62%). It is noteworthy that 38% of the public sector HR departments exceeded hundred employees. (See also Figure 4.1).

At the alpha level 0.05, the t-value = -2.855 (p-value = 0.005) indicates that public HR *departmental size* is significantly different from private HR organizational size. Furthermore, mean scores are obviously different between the two sectors (28.79 for the private and 348.62 for the public sector). This provides evidence that public HR *departmental size* is larger than that in the private sector.

### **Educational Level**

Generally, given the increasing complexity of modern organizations, educational attainment of their workforce is an important measurement standard. According to Byrd and Ikerd (1992), the lack of knowledge or deficiency in knowledge could affect organizational success factors. Since employees contribute an essential component to the success of organizational goals, they must have appropriate levels of knowledge and skills.

The survey of college deans and placement officers conducted by the Merit Systems Protection Board (MSPB, 1988) reported perceptions of poor pay, negative image, and insufficient career information as factors hindering recruiting quality graduates into public positions. As a result, public employees tend to have the disadvantage of poor monetary incentives and a bad image of the public sector. Nevertheless, data from the MSPB 1992 survey contradicted this trend with the finding that public managers were more likely (than in previous years) to indicate that entrance quality has improved in the public sector (MSPB, 1994).

Table 4.2 summarizes the level of education for employees in our sample. Most employees in both sectors are college graduates. The overwhelming majority have a bachelor degree in both the public sector (62%) and the private sector (77%). Another 8% of private employees have a master's degree or higher, while 7% of public employees have a master's degree or higher. The study echoed Sanders' research which analyzed honor college graduates' career expectations and found few to be interested in a public service career (Sanders, 1990). The chisquare test revealed that there is no significant difference in employee education between the two sectors at the 0.05 level (chisq-value = 5.722; p-value = 0.126), thus indicating that both public and private sectors contain an equal percentage of college graduates. This finding, however, contrasts the OPM data in the *Study of Federal Employee Locality Pay* (1989) which indicates that the percentage of public sector employees who are college graduates or who hold graduate degrees is higher than in the private sector. However, this survey was developed for middle level managers or higher such as HR managers. Therefore, we can deduce that in the middle management level, both public and private sector have an equal percentage of employees college graduates.

### **Motivational Level**

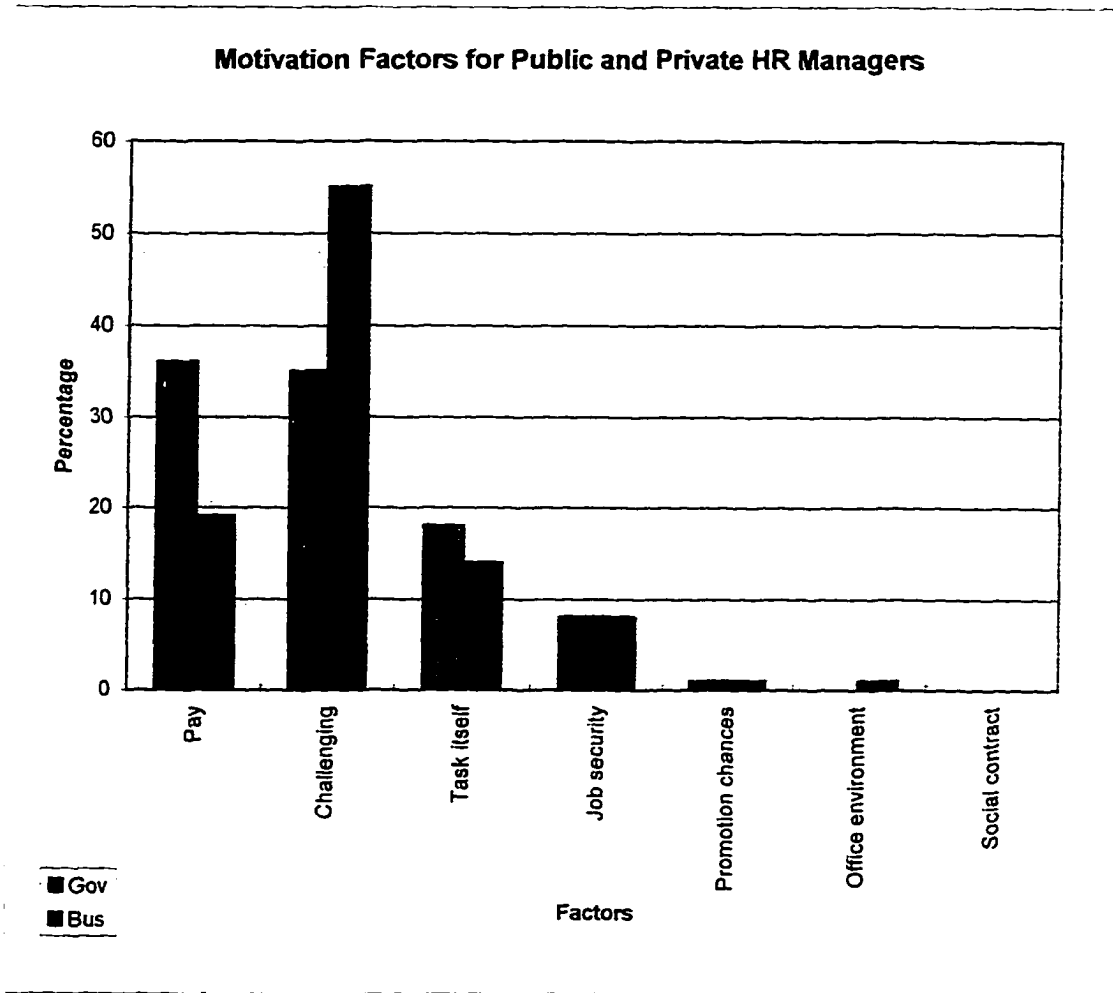
In order to investigate the nature of this sample of employees compared to samples drawn by other researchers, the employees were asked to rate, on a seven point scale, the importance of a number of job-based motivational factors. The results are displayed in Table 4.3 and Figure 4.2. Although there are strong similarities in the way both groups rate these factors, some differences do appear. For both groups, four factors (*pay, challenging work, the nature of the task itself, and job security*) are the highest ranked. The remaining three factors (*chances for promotion, the office environment, and social contracts*) are clearly of less significance to our sample of public and private sector workers. However, when we look more closely at the four highest ranked factors we find that private sector employees place *challenging work* (55%) at the top of their list, whereas public sector workers are more evenly split between *pay* (36%) and

*challenging work* (35%). In third place for both groups we find the factor the *task itself*, and in fourth place for both groups we find *job security*.

**Table 4.3: Motivational Factors**

	Government (N=77)	Business (N=77)	Total (N=154)
Pay	36% (28)	19% (15)	28% (43)
Challenging position	35% (27)	55% (42)	45% (69)
Interest in task itself	18% (14)	14% (11)	16% (25)
Job security	8% (6)	8% (6)	8% (12)
Chances for promotion	1%(1)	1%(1)	1%(2)
Office environment	–	1% (1)	1% (1)
Social contract	–	–	–

Figure 4.2: Motivational Factors



According to Herzberg's Motivation-Hygiene Theory, "*intrinsic rewards*" are motivators such as achievement, advancement, responsibility, recognition, and work itself; "*extrinsic rewards*" are made up of factors such as supervision, company policy, administration, interpersonal relationships, pay, working conditions, status, and job security (Herzberg, 1959; Khojasteh, 1993). In this study, we consider *pay, chances for promotion, office environment, social contract, and job security* as extrinsic factors and *challenging position and interest in task itself* as intrinsic factors.

Maidani (1991) found that employees's motivation in both sectors tended to emphasize intrinsic or motivator factors, while those who worked in the public sector tended to value the extrinsic or hygiene factors, especially *pay*, significantly higher than those in the private sector. This study has supported Maidani's research. In addition, the study has also supported Rainey, Traut, and Blunt's research (1986) in the extent to which *pay* is a significantly greater motivating factor for public managers than for private managers. Moreover, Rainey, Traut, and Blunt asserted that the relation of extrinsic rewards to performance has been treated as a major issue in public organizations in the last decade, since public managers have perceived the value of monetary incentives.

Vinokur-Kaplan, Jayaratne, and Chess (1994) found that for both sectors, the most influential factor that motivates managers and higher level management is not *pay*, rather it is a *challenging position*. According to Byrd and Ikerd (1992), employees in high level management positions (managers or higher positions) seem to have a higher need for a *challenging position* and *achievement* rather than *pay* (Also see Guyot, 1962)

Furthermore, the rank of *challenging position* was the second highest of all factors in the public sector. This ranking could be attributed to the rapidly changing form of industry from a manufacturing economy to a more service oriented economy. Moreover, the extensive application of modern technology has forced many employees (including managers) to become concerned with the new challenges of these advancements in technology (Khojasteh, 1993). However, there is a clear conformity in the response from the two sectors. In both sectors,

*challenging position, pay, and work itself* were ranked as the top motivators. This fact strongly supports the outcomes of the studies conducted by William A. Nowlin (1982).

However, this study, according to Table 4.3, gives little support to the conclusion of studies conducted by some scholars such as Cacioppe and Mock (1984), which indicated that private managers place greater value on economic reward than public managers. On the contrary, Khojasteh (1993) asserted that the intrinsic reward factor of *interest in task itself* had higher motivation potential for public rather than private managers. The fact that public managers view *pay* as being less important than private managers can be explained by Porter and Lawler's survey (1968) which reports that public managers feel that *pay* in their organizations does not represent a reward for a job well done.

### **General Information on Computer Systems**

#### **Types of Computers**

As noted earlier, private organizations would need to have a large number of employees to be compatible with organizations in the public sector. Therefore, most of these corporations are likely to have their own massive computer systems such as mainframes, minicomputers, microcomputers, or a combination of all three types.

According to Table 4.4, most departments in the two sectors have a system combining a mainframe and workstations. As the nature of public organizations is to serve large geographically wide areas and numerous constituents, they usually have a large computer system or a combination of large systems. As shown in Table 4.4, 32% of all computer systems in the public sector are a combination of large systems such as mainframe, minicomputer, and/or microcomputer, including workstations. This percentage of combined systems is almost twice as high as those in the private sector.

In order to test for the existence of significant computer-size differences between the two sectors, two tests were used, t-test and chisquare test. Both tests indicate the same results showing that the difference in computer size between the two sectors is significant (t-value =

16.454; p-value = 0.002) (chisq-value = -4.087; p-value = 0.000). We can conclude that computer systems in public organizations are significantly larger than their private sector counterparts.

On the other hand, 17% of all private organizations in this sample use workstations only. This percentage is about four times higher than these organizations in the public sector that use workstations only. (See also Figure 4.3) Because public organizations have large computer systems, public organizations usually require their own networks to link to other departments in local and federal levels (Mayer and De Luca, 1986). From the data found in Table 4.4, we see that public organizations have larger computer systems requiring expensive maintenance and upgrading. Several of these systems, according to Henderson, may be outdated and sometimes not compatible with the new advanced technology currently available (Handerson, 1988).

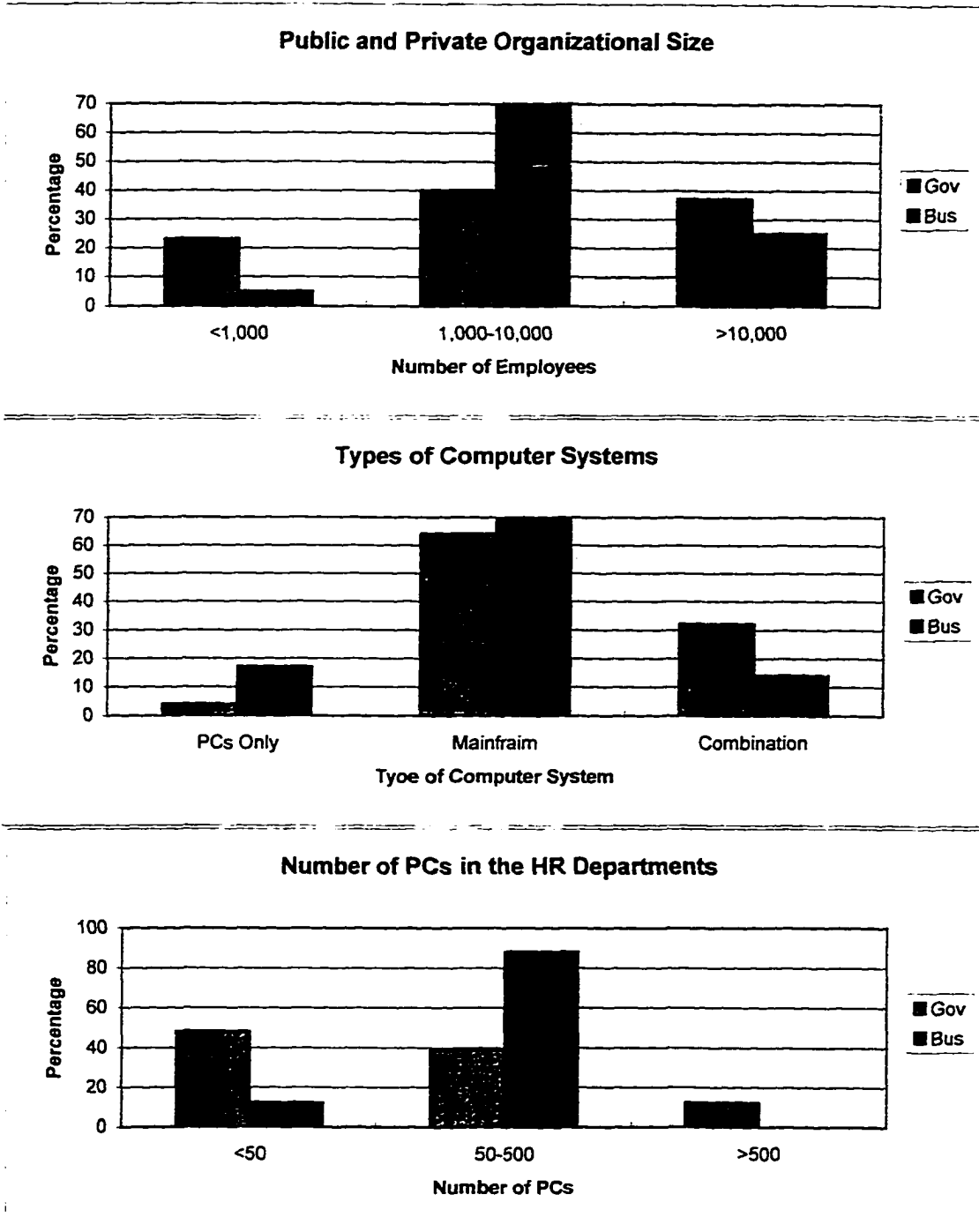


**Table 4.4: Computer System Evaluation**

	Organizational Size			Type of Computers			Number of Workstations in the HR Department		
	< 1,000	1,000 - 10,000	> 10,000	Workstations Only	Main and Workstations	Combination	< 50	50 -500	> 500
<b>Gov</b> N=77	23% (18)	40% (31)	37% (28)	4% (3)	64% (49)	32% (25)	48% (38)	39% (30)	12% (9)
<b>Bus</b> N=77	5% (4)	70% (54)	25% (19)	17% (13)	69% (53)	14% (11)	12% (9)	88% (68)	---
<b>Total</b> N=154	14% (22)	55% (85)	31% (47)	10% (16)	66% (102)	23% (36)	31% (47)	64% (98)	6% (9)

**Workstations Only**        =        Use Personnel Computers only  
**Main. and Workstations**    =        Use Mainframe and Personnel Computers together  
**Combination**                =        Use a combination of two or more large systems with Workstations such as Mainframes, Minicomputers, or Microcomputers

Figure 4.3: Computer System Evaluation



According to Norris and Kenneth (1994), the *size of computer systems* at the local level of the public sector depends on the population of its cities and municipalities. For instance, less-populated cities such as Lampasas, Texas and Hilton Head Island, South Carolina report wide use of minicomputers while more densely populated cities such as Cincinnati, Ohio and San Antonio, Texas report the use of mainframe computers. The computer systems in these municipalities also link to state level computer systems. Also, the computer systems on the state level usually link down to the local level, as well as the federal level. Therefore, these systems have at least a mainframe or a combination of large systems.

### **Number of Workstations**

However, there are some unexpected results from our data which indicate that some individual public organizations have a smaller *number of workstations* to support their large systems than most private organizations. For example, 48% of public organizations report having less than 50 workstations, while only 12% of private organizations have less than 50. With a higher percentage of large computer systems, public organizations generally have a greater number of workstations to support their large systems. Moreover, 88% of private organizations have 50-500 workstations which is remarkably higher than those in the public sector (39%).

On the other hand, only 39% of workstations in public organizations number between 50 to 500 per department, and only 12% exceed 500 per department. Whereas within private organizations, no departments have been recorded as using more than 500 workstations. Surprisingly, although 96% of the computer systems in the public sector are large systems or a combination of large systems as shown in Table 4.4, the percentage of departments with less than 50 workstations is four times higher (48%) than those in the private sector (12%). To support this claim, a t-test was used to compare the difference in number of workstations between the two

sectors. The result of this comparison demonstrates that the *number of workstations* in public organizations is significantly less than those in the private organizations (t-value = -3.150; p-value = 0.002).

Despite the fact that most private HR departments have fewer workstations than public HR departments, the ratio of the *number of workstations* and the *number of employees* in private HR departments (1:1) is distinguished from those in the public sector (1:1.5). However, the t-test result reveals that the ratio of the *number of workstations* and the *number of employees* in HR departments between the two sectors is not significantly different (t-value = -1.578; p-value = 0.118).

According to Newcomer and Caudle (1991), the scope of users in the public sector, the types of decisions the information system supports, and other factors such as time pressures and accountability make information-system evaluation even more complex than in the private sector. However, more complex and large information systems do not indicate more efficiency because this depends upon several factors previously mentioned. Further, the trend in computing is to migrate from mainframe-based systems to smaller computer platforms (Cats-Baril and Thompson, 1995).

According to our respondents in the private sector, almost each individual within the private sector has a workstation in his/her own office. This ownership facilitates and makes it convenient to complete tasks without having to wait on other employees. Although today's managers in public and private organizations are looking for real "paybacks" in their high technology investments, public organizations still spend more money for their HRIS than private organizations.

However, that does not mean that public computer systems are more efficient. Rather the major part of the money is spent on the whole system installation not on maintaining and upgrading the systems. Most of the investment can be focused in the central processing units which are usually much more expensive than the peripheral equipment such as workstations (Gallagher, 1986). Further, the level of managerial fiscal control resulting in computerization

within the public sector is limited especially since the 1970s for fear of inflation (Northrop, Kraemer, Dunkle, and King, 1990). Larger amounts of money, in the public sector, are invested in computer systems and software applications rather than the workstations. (See Table 4.5)

**Table 4.5: HRIS Description**

	The Last Upgrade/ Change the Systems			Budget for HRIS				HRIS Specia- lists	Ways to solve problems		
	< 3 yrs.	3-5 yrs.	> 5 yrs.	< \$100, 000	\$100, 000 - \$1,000, 000	> \$1,000, 000	Don't know		HRIS	MIS	Outside
Gov (N=77)	76% (59)	20% (15)	4% (3)	43% (33)	32% (25)	20% (15)	5% (4)	56% (43)	51% (39)	48% (37)	1% (1)
Bus (N=77)	88% (68)	8% (6)	4% (3)	48% (37)	31% (24)	9% (7)	12% (9)	62% (48)	44% (34)	55% (42)	1% (1)
Total (N=154)	82% (127)	14% (21)	4% (6)	45% (70)	32% (49)	14% (22)	8% (13)	59% (91)	47% (63)	51% (70)	1% (2)

HRIS = Human Resource Information System  
MIS = Management Information System Department  
Outside = Outside Consultants

### Computer Upgrade and Change

To get some idea about the nature of the current level of computer technology in the two sectors, respondents were asked how long it had been since their computers had been upgraded. It is apparent from our results that computer technology rapidly becomes dated. Private sector organizations seem to more rapidly update their equipment in a three year time frame, but over a five year period these differences between the two sectors disappear. Moreover, in Table 4.5, although private organizations tend to upgrade and change their computer systems more frequently than those in the public sector, t-test results exhibit that number of years between *computer system upgrades* are not significantly different in the two sectors (t-value = -1.438; p-value = 0.152)

### Way to Solve Computer Problems

When system hardware needs repair and software needs upgrading, how do the two sectors handle such problems? Based on descriptive percentages presented in Table 4.5 and chisquare test results (chisq-value = 14.596; p-value = 0.042), the *ways to solve computer problems* in private organizations are not significantly different at the 0.05 level from those in public organizations, nor is the number of HRIS specialists (chisq-value = 0.672; p-value = 0.413). However, it is somewhat surprising that even though private organizations have a slightly higher percentage of HRIS specialists, only 44% of HR departments in the private sector use the services from departmental HRIS specialists in computer problem solving. Instead, they use the services from the MIS department about 55% of the time. Furthermore, public organizations have a lower percentage of HRIS specialists, yet they use the services from HRIS specialists in their own department 51% of the time. This is higher than the percentage of the services used in the MIS department (48%). Finally, both rarely use services from outside consultants.

## Human Resource Management Applications and Activities

### Software Applications for HR Functions

The mere physical presence of computers, be they workstations, mainframes, or combination systems, is not in itself sufficient to realize organizational objectives. The physical hardware must be combined with the appropriate software, updating, and repairs to provide the requisite information needed by the organization. We were interested in the most common *types of software* now being used by public and private sector organizations.

According to Mayer and De Luca (1986), the use of appropriate software and applications is also a crucial determinate for all organizations.

Finding the appropriate software and applications is the most important part of the system. A computer that runs faster with a great deal of storage space and high-resolution graphics capability is useless without software that fits the organization's needs (Mayer and De Luca, 1986; p. 7).

In Table 4.6 and Figure 4.4, there are not obvious distinctions between the use of computer applications in the two sectors. It appears that both sectors are using *Windows programs* for *word processing*, and creating *databases* and *spreadsheets*. In contrast, both sectors rarely use *statistic applications*, (more so in public organizations). A chisquare test was employed in order to test for significant differences in mean scores of each particular category of software between the two sectors. The results of the comparisons reveal that most software applications used in both sectors are not significantly different except *statistics* and *utility programs* (chisq-value = 14.535; p-value 0.001 for statistics programs and chisq-value = 8.472; p-value = 0.004 for utility programs). The rationale for this similar use of software and applications probably can be explained because such applications are ubiquitous and are widely used for the exact same HR purposes (Norris 1989). Nearly all organizations use *word processing* and *spreadsheet* programs. While word processing is more popular for public organizations, *spreadsheet* programs are more popular for private ones. Mayer and De Luca (1986) stated that a *word processing* application is one of the most cost-effective packages a computer system can have to produce letters and reports. Other programs such as *graphics*,

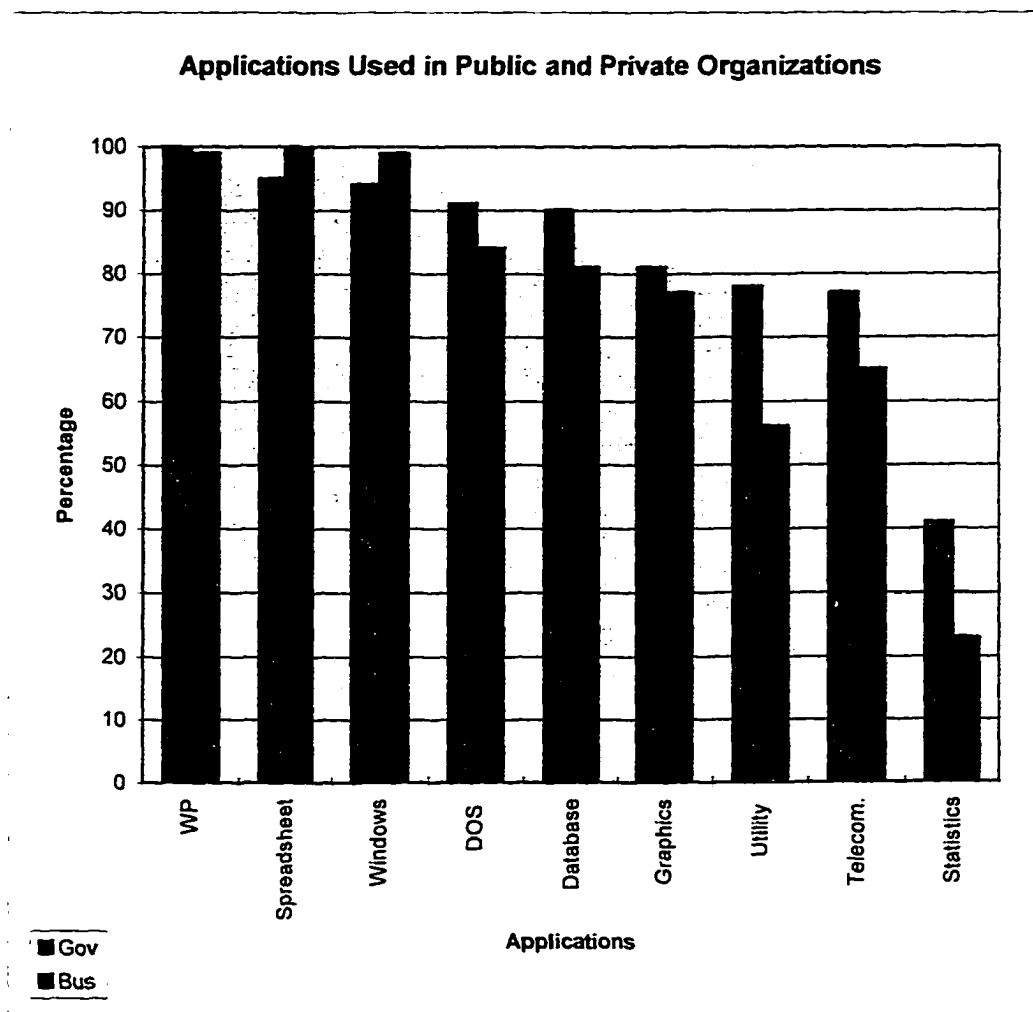


*DOS, telecommunications, database, and utility* programs are also utilized in both sectors. Nevertheless, use of these programs is higher in public organizations than in the private sectors, particularly the utility programs that are used for training, project management reporting and presentation, as well as *telecommunications* programs like Microsoft Explorer and other Internet access programs.

**Table 4.6: Software and Applications**

	<b>Government (N=77)</b>	<b>Business (N=77)</b>	<b>Total (N=154)</b>
Word Processing	100% (77)	99% (76)	99% (153)
Spreadsheet	95% (73)	100% (77)	97% (150)
Windows	94% (72)	99% (76)	96% (148)
DOS	91% (70)	84% (65)	88% (135)
Database	90% (69)	81% (62)	85% (131)
Graphics	81% (63)	77% (59)	79% (122)
Utility Programs	78% (60)	56% (43)	67% (103)
Telecommunications	77% (59)	65% (50)	71% (109)
Statistics	41% (41)	23% (18)	38% (59)

Figure 4.4: Software and Applications



### Human Resource Management Activities

It has been established that a wide variety of software applications are being employed to perform numerous activities by the organizations in our sample. Now let us turn our attention to the Human Resource Management function. We were interested in the extent to which organizations in our sample have integrated computer software into their human resource management (HRM) activities. Information technology is considered a powerful agent of change in HRM activities in several areas such as recruitment, selection, legal services and training. “Over the past decade, simple automation has given way to ubiquitous desktop technology supported by complex software and networking tools” (Dawes, 1994; pp. 31). For the answer to our question on the integration of HRM software within the organizations in our sample let us examine Table 4.7.

**Table 4.7: Integration of HRM Activities and Computer software**

	HRM Activities	No HRM Activities	Don't know
Gov (N=77)	71% (55)	25% (19)	4% (3)
Bus (N=77)	81% (62)	15% (12)	4% (3)
Total (N=154)	76% (112)	20% (31)	4% (6)

HRM Activities = Have Integrated some Human Resource Management Activities  
 No HRM Activities = Have not integrated Human Resource Management Activities  
 Don't know = No information about this

First, there have been substantial efforts here. Three out of four organizations in our sample have done some integration of *HRM activities* with computer software. In Table 4.7, although private organizations perform *HRM activities* slightly more than their public counterparts, the chisquare test shows that there are no significant differences between the two sectors (chisq-value = 1.999; p-value = 0.368).

In Table 4.7, around three quarters of the organizations in our sample have made use of software for some HRM functions. However, many questions remain about specific *HRM activities*. We would suspect that computer software would be heavily employed to help bring order to the important *HRM activity* encompassing compensation management. Yet, we know little about the vast array of additional traditional HRM functions. Respondents were asked to examine a list of functions usually associated with HRM within organization and tell us whether:

1. The function is mainly computerized
2. Only a few aspects of the function have been computerized
3. None of the aspects of the function have been computerized
4. Don't know

The results are displayed in Table 4.8 and Figure 4.5. Of these respondents who use computer software in the area of HRM, the findings illustrate that while some work has been done to computerize basic HRM functions, much more work needs to be accomplished. In most functions, small percentages of respondents in both government and business indicated that a particular function was already "mainly" computerized. Indeed, our respondents were more likely to indicate that none, or a few of these HRM functions have been computerized. For instance, 13% overall indicated that job analysis was mainly computerized, 28% indicated that *recruitment* was mainly computerized, 26% indicated that *selection* was computerized, 24% indicated that *performance appraisal* was computerized and 7% indicated that *labor\management relations* was mainly computerized. Looking at the other end of the spectrum, overall, 41% indicated that none of the aspects of *job analysis* had been computerized, comparable percentages for other functions are: 24% *recruitment*, 38% *selection*, 31% *performance appraisal*, and 48% *labor\management relations*.

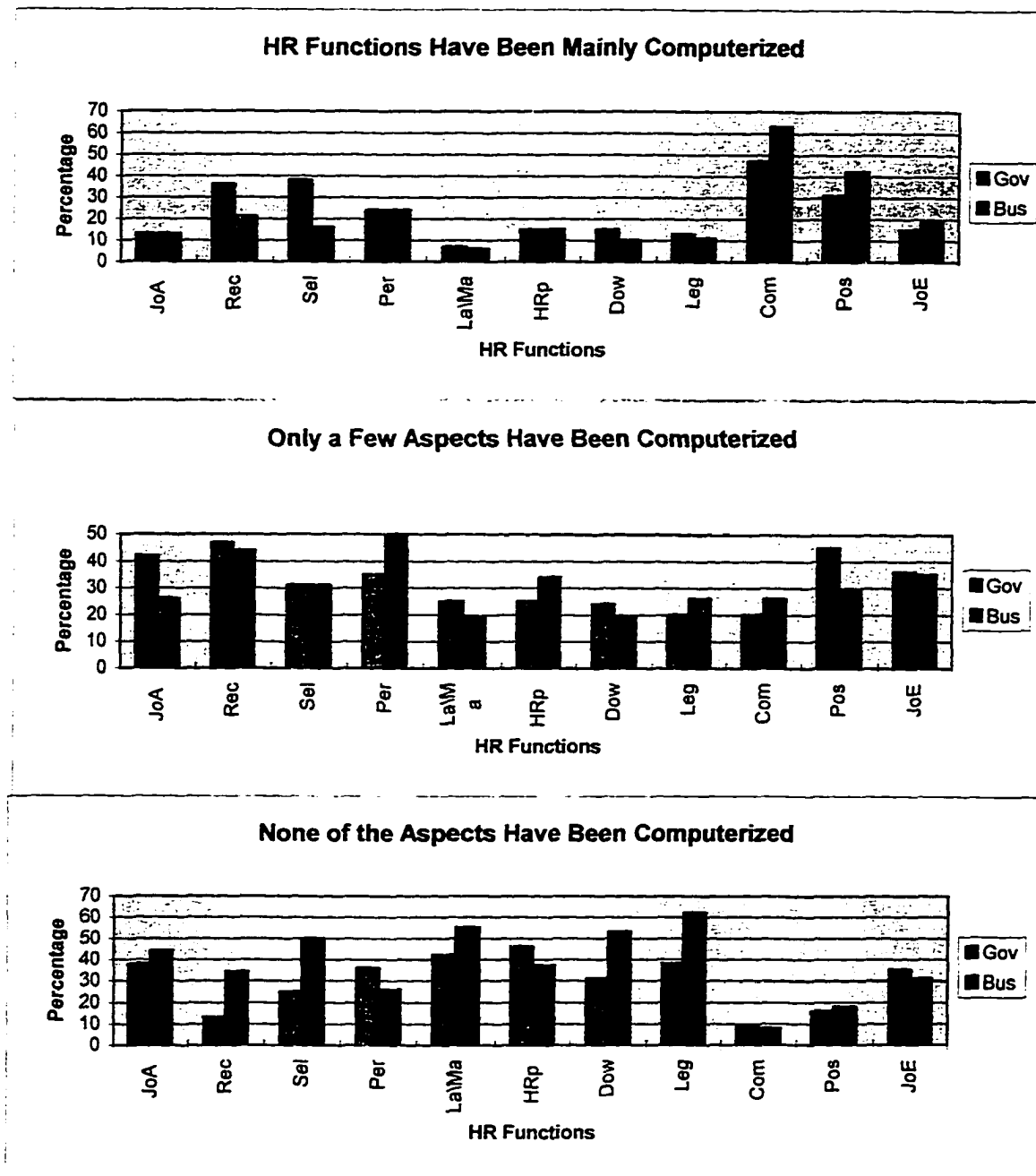
Table 4.8: HRM Functions and the Implementation of Computer Applications

	Government (N=55)		Business (N=62)		Total (N=117)
Position Classification	M	31% (17)	M	42% (26)	36% (43)
	O	45% (25)	O	29% (18)	36% (43)
	N	16% (9)	N	18% (11)	17% (20)
	D	5% (3)	D	11% (7)	8% (10)
Compensation Management	M	47% (26)	M	63% (39)	55% (65)
	O	27% (15)	O	27% (17)	27% (32)
	N	9% (5)	N	8% (5)	8% (10)
	D	15% (8)	D	2% (1)	8% (9)
Selection	M	38% (21)	M	16% (10)	26% (31)
	O	31% (17)	O	31% (19)	31% (36)
	N	25% (14)	N	50% (31)	38% (45)
	D	5% (3)	D	3% (2)	4% (5)
Performance Appraisal	M	24% (13)	M	24% (15)	24% (28)
	O	35% (19)	O	50% (31)	42% (50)
	N	36% (20)	N	26% (16)	31% (36)
	D	2% (1)	D	—	1% (1)
Recruitment	M	36% (20)	M	21% (13)	28% (33)
	O	47% (26)	O	44% (27)	45% (53)
	N	13% (7)	N	34% (21)	24% (28)
	D	4% (2)	D	2% (1)	3% (3)
Job Evaluation	M	15% (8)	M	19% (12)	17% (20)
	O	36% (20)	O	35% (22)	36% (42)
	N	35% (19)	N	31% (19)	32% (38)
	D	14% (8)	D	14% (9)	14% (17)
Human Resource Planning	M	15% (8)	M	15% (9)	14% (17)
	O	25% (14)	O	34% (21)	30% (35)
	N	46% (25)	N	37% (23)	41% (48)
	D	13% (7)	D	15% (9)	14% (16)
Job Analysis	M	13% (7)	M	13% (8)	13% (15)
	O	42% (23)	O	26% (16)	33% (39)
	N	38% (21)	N	44% (27)	41% (48)
	D	7% (4)	D	18% (11)	14% (16)
Downsizing	M	15% (8)	M	10% (6)	12% (14)
	O	24% (13)	O	19% (12)	21% (25)
	N	31% (17)	N	53% (33)	42% (50)
	D	31% (17)	D	18% (11)	24% (28)
Legal	M	13% (7)	M	11% (7)	12% (14)
	O	20% (11)	O	26% (16)	23% (27)
	N	38% (21)	N	62% (39)	40% (47)
	D	29% (16)	D	21% (13)	25% (29)
Labor/Management Relations	M	7% (4)	M	6% (4)	7% (8)
	O	25% (14)	O	19% (12)	22% (26)
	N	42% (23)	N	55% (34)	48% (57)
	D	27% (15)	D	19% (12)	23% (27)

M = Mainly computerized this function  
O = Only a few aspects of this function have been computerized  
N = None of the aspects of this function have been computerized  
D = No information with which to evaluate this area

According to Table 4.8, the functions where most work in this area has been computerized are *compensation management* (47% public and 63% private) and *position classification* (31% public and 42% private) respectively. However, differences were noted between the two groups in their use of computer software and applications to perform HRM activities. In four distinct areas, ranking from the highest to the lowest, software use in public organizations was distributed as follows: *compensation management* (47%), *selection* (38%), *recruitment* (36%), and *position classification* (31%). Conversely, private organizations mainly use computer software and applications to perform HRM activities only in *compensation management* (63%) and *position classification* (42%). Obviously, as is illustrated in Figure 4.5, the percentage of these two functions within private organizations that are mainly computerized is higher than those in the public sector. Additionally, the percentage of these two functions, *compensation management* and *position classification*, is also remarkably higher than any other HR functions. Compensation management (47% public and 63% private) is the most computerized of all HRM functions in both sectors.

Figure 4.5: HRM Functions and Implementation of Computer Applications



Viewed differently, in Figure 4.5, several functions which are essential in the HR field such as job analysis, *labor\management relations*, *human resource planning*, *downsizing*, *legal services*, and *job evaluation* still need more computerized augmentation in both sectors. A part of the explanation for these low levels could be the fact that specific software in each of these areas is only recently becoming popular in the market. This despite the wide availability of several hundreds of HR software and applications which can perform both individual function and integrated functions with user friendly menu driven interface and with capabilities to network workstations through distributed processing (Siegel and Marshall, 1991).

#### **Satisfaction Level**

We have now seen that computer software is being used in HRM functions, although in modest numbers of HRM total functions and by a minority of the organizations in our sample. But, our sampling techniques admittedly only captures one point in time, and it is expected that the number of organizations integrating software and HRM functions is constantly growing with the passage of time. An important consideration to all those other HRM professionals currently considering the application of software technology to HRM would be how satisfied past users have been when they have blended the two. To provide information in this area our respondents were asked about their *degree of satisfaction* with the results of computer usage in HRM functions. These results are displayed in Table 4.9.



**Table 4.9: Satisfaction Rate with HRM Functions**

	<b>Government</b> N = 56		<b>Business</b> N = 62		<b>Total</b> 118
<b>Downsizing</b>	S	100%	S	83%	93%
	N	0%	N	17%	7%
<b>Human Resource Planning</b>	S	88%	S	89%	88%
	N	12%	N	11%	12%
<b>Compensation Management</b>	S	88%	S	64%	74%
	N	12%	N	36%	26%
<b>Selection</b>	S	81%	S	80%	81%
	N	19%	N	20%	19%
<b>Labor\Management Relations</b>	S	75%	S	75%	75%
	N	25%	N	25%	25%
<b>Legal Services</b>	S	71%	S	71%	71%
	N	29%	N	29%	29%
<b>Job Analysis</b>	S	71%	S	63%	67%
	N	29%	N	37%	33%
<b>Recruitment</b>	S	70%	S	69%	70%
	N	30%	N	31%	30%
<b>Performance Appraisal</b>	S	69%	S	66%	68%
	N	31%	N	34%	32%
<b>Position Classification</b>	S	65%	S	77%	72%
	N	35%	N	23%	28%
<b>Job Evaluation</b>	S	63%	S	67%	65%
	N	37%	N	33%	35%

S = Satisfied with the results of computer usage in HR functions  
N = Not satisfied with the results of computer usage in HR functions

For those HRM professionals who have merged the use of computer software and HRM functions, *satisfaction levels* are exceptionally high. Percentages indicating they are satisfied are exceedingly high across all HRM functions and across both public and private sector respondents. In nearly all cases greater than two-thirds of the respondents who had tried it, liked it. One might say that levels of satisfaction were slightly higher in the public than in the private sector. In six of the eleven functional categories the public sector expressed higher levels of satisfaction with the results. In two of the eleven categories the levels of satisfaction were identical and in the remaining three categories the private sector indicated higher levels of satisfaction with the results. However, according to the t-test, there was no difference in satisfaction in HR functions (t-value = 1.129; p-value = 0.285).

The results confirmed Lau, Pavett, and Newman's study that there are similarities in the work satisfaction between the two types of managers, although the public managers devoted more time to their jobs (Lau, Pavett, and Newman, 1980). However, Solomon (1986) believed that private managers are personally satisfied more with various dimensions of their works (See also Falcone, 1991; and Kilpatric, Cummings, and Jennings, 1964).

### **Training**

*Training* may be required when gaps exist between job requirements and abilities of the employees involved. *Training* is a tool for improving performance, diagnosing organizations, and documenting workplace expertise (Swanson, 1994). "The right training in a supportive environment reaps big rewards" (Kuri, 1996; p. 73). The amount of training should be tied to the capabilities of the trainees. Furthermore, learning tends to be more effective when adequate reinforcement and feedback are presented (Cascio and Awad, 1981). Lack of job training is normally most pronounced among new employees, employees who have been assigned to new positions, and those who expect to be re-trained because of changes in technology. With rapid advancements in computer technology, *training* is necessary for most employees in every

department because current work place demands require everyone to be familiar with the systems. HR departments, in cooperation with operating management, is usually responsible for *training*.

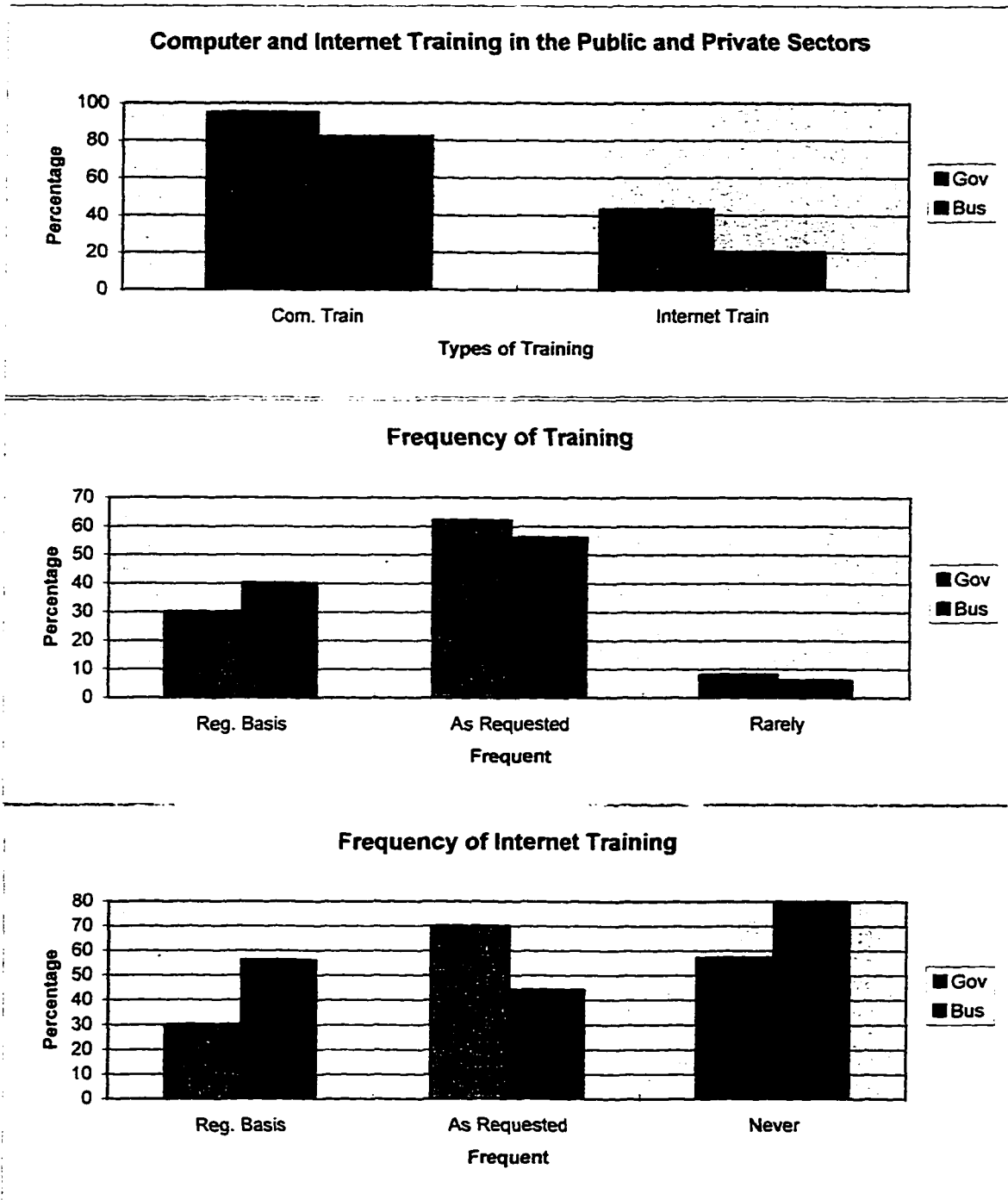
*Computer training* is now a crucial topic in all levels of organizational management. “You can spend thousands of dollars on a new computer system to increase productivity. But if employees can’t use it, or don’t want to, all you’ve increased is the red ink in your ledger books” (Rakes, 1989; p. 25). Many scholars such as Nelson (1990) assert that HR personnel should be considered as an important part of the organization and as such have *computer training* at all levels within the department. Nelson noted that HR departments need to devote more attention to the education and training of all employees in the area of general information technology (IT) knowledge. Accordingly, both end-users and HRIS staffers could benefit greatly from education and training programs on issues such as HR processes and plans relating to data bases (Nelson, 1990). Byrd and Ikerd (1992) added that HR managers are sometimes being called upon to make purchase decisions about computer and communications hardware and software in HRISs for their departments. A part of the reason for the low numbers on the integration of software and HRM functions could be related to fear based on ignorance and low levels of knowledge and training. Increasingly, HRM managers are responsible for setting up and communicating over Local Area Networks (LANs), in addition to using such end-user tools as Decision Support Systems (DSSs).

In order to get some feel for the amount of technology training now being offered employees by the organizations in our sample, we included several training-related questions in our questionnaire. The results are displayed in Table 4.10. In response to a general questions about *computer training*, employees indicated in overwhelming percentages that at least some training was being provided. (See also Figure 4.6)

**Table 4.10: Levels and Frequency of Computer and Internet Training**

	Computer Training		Frequency of Training			Internet Training			Frequency of Internet Training		
	Yes	No	Regular Basis	As Requested	Rarely	Yes	No	Don't Know	Never	Regular Basis	As Requested
Gov (N=77)	95% (73)	5% (4)	30% (22)	62% (45)	8% (6)	43% (33)	21% (16)	36% (28)	57% (44)	30% (10)	70% (23)
Bus (N=77)	82% (68)	12% (9)	40% (27)	56% (38)	6% (4)	20% (16)	35% (27)	44% (34)	79% (61)	56% (9)	44% (7)
Total (N=154)	92% (141)	8% (13)	35% (49)	59% (83)	7% (10)	32% (49)	28% (43)	40% (62)	68% (105)	39% (19)	61% (30)

Figure 4.6: Levels and Frequency of Computer and Internet Training



Both public and private organizations have a very high percentage of employees with *computer training*, with those in the public sector slightly ahead (95% compared to 82% for the private sector). This makes a total of 92% of all organizations with some *computer training*. The t-test indicates that there is no significant difference in *training* between public and private sector (t-value = -1.449; p-value = 0.149).

However, these percentages decrease somewhat when we look at Table 4.10 dealing with the frequency of such training. Thirty-five percent of the employees in our sample indicated that they received *training on a regular basis*. This percentage was slightly higher in the private sector (40%) than in the public (30%). A large percentage indicated that they received *training as requested*, and a few organizations reported that they were *rarely* trained. Given the complicated nature of computer applications and the inherent fear with which many individuals approach computers and software applications, and given the low numbers of HRM professionals actually integrating software and HRM discussed above, it would seem that organizations may need to initiate more *training on a regular basis* within their organizations rather than waiting for specific requested training if they desire to stimulate grassroots activities in this area.

The use of the Internet is a fast growing, advanced technology (Cronin, 1994). Therefore, it is difficult for these organizations to keep up with new software and advances in Internet applications. However, some organizations have realized how useful the Internet can be to provide information. Several of them have started *Internet training* programs for their employees. Although public and private organizations are not significantly different in general *computer training*, *Internet training* between the two is significantly different (t-value = -3.007; p-value = 0.003).

Since most public organizations have been using networks and the Internet more than those in the private, it is not surprising that public organizations have a higher percentage of *Internet training* than those in the private sector (See Table 4.10). With the intensive use of the Internet, public organizations have incorporated *Internet training* (43%) more than twice as much as those in the private sector (20%). However, the percentage of organizations without

such a program is relatively high in both sectors with a marked increase for those in the private sector. The percentage of organizations without an *Internet training* program comprise over half of all the organizations responding.

If some organizations are providing training, how regularly does such training occur? In our sample, results displaying information on the *frequency of training* are found in Table 4.10. The private sector appears to provide more *regular basis* training than public sector, where the public sector provides such *training on an as requested* basis. Of those public organizations receiving training, only 30% have been *training on a regular basis*, while 70% have been *training as requested*. Conversely in the private sector, the percentage of *Internet training on a regular basis* (56%) is higher than *as requested* (44%).

#### **Level of Preparation**

Respondents in our sample were specifically asked about their level of preparation to deal with HRM applications. Results in Table 4.11 indicate more training may be called for. About one in five employees felt *well prepared* in this area, but almost an equal percentage (19%) indicated that they were *inadequately prepared*. Most employee placed themselves into the *adequately prepared* category (59%). (See also Figure 4.7)

The t-test indicated that a significant difference exists between public and private HR employees in their level of preparation (t-value = 2.779; p-value = 0.006). This demonstrates that the level of preparation of private HR employees is somewhat greater than those in public organizations.

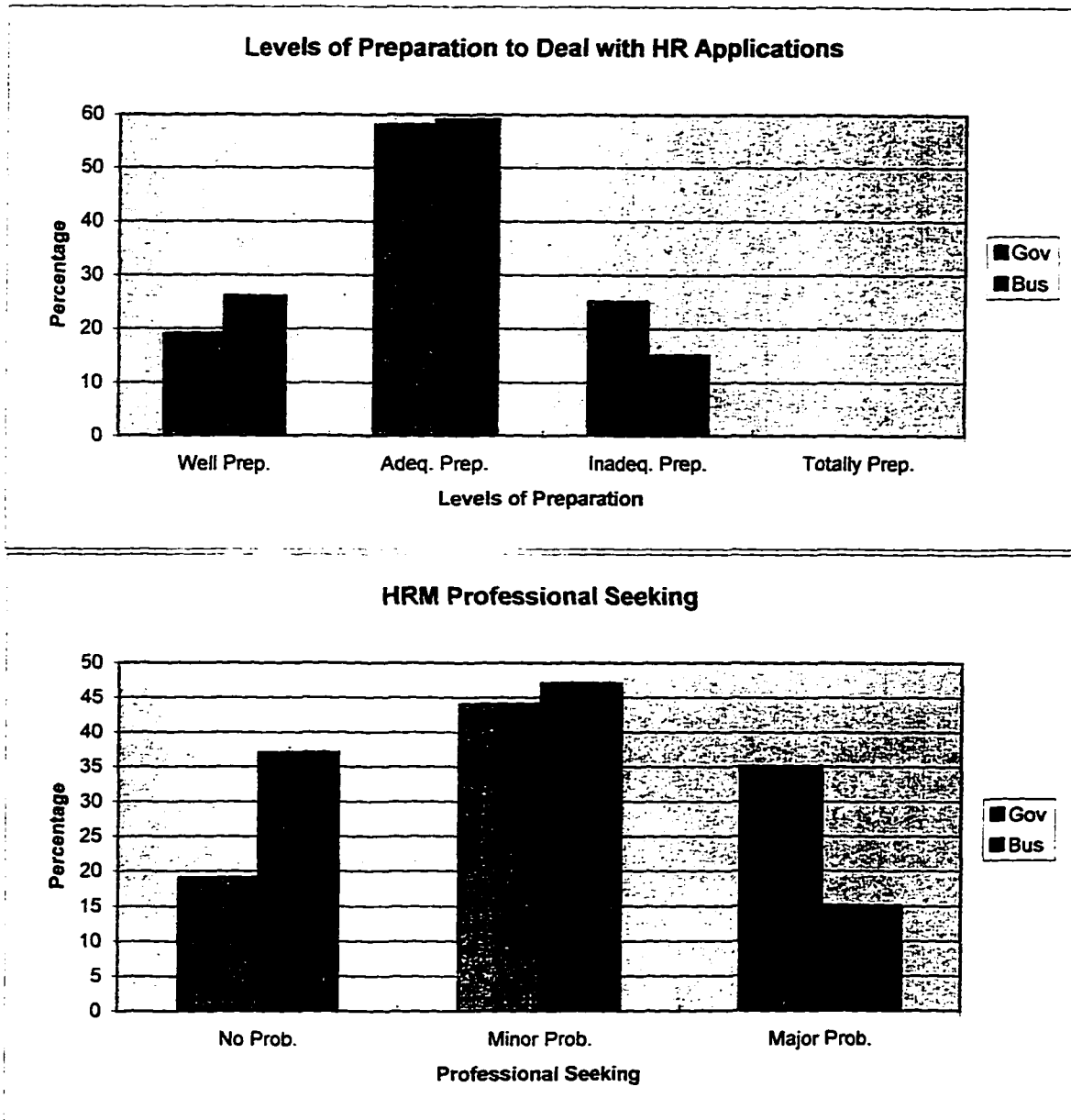
**Table 4.11: Personnel Information**

	Level of Preparation to deal with HR applications				HRM Professional Recruiting		
	Well Prep.	Ade- quately Prep.	Inade- quately Prep.	Totally Unprep	No Prob.	Minor Prob.	Major Prob.
Gov (N=77)	19% (9)	58% (31)	25% (13)	---	19% (9)	44% (21)	35% (17)
Bus (N=77)	26% (17)	59% (39)	15% (10)	---	37% (23)	47% (29)	15% (10)
Total (N=154)	22% (26)	59% (70)	19% (23)	---	29% (32)	45% (50)	25% (27)

- Well Prep. = Well prepared for the computer related tasks
- Adequately Prep. = Adequately prepared, but need constant updates
- Inadequately Prep. = Inadequately prepared and need additional training
- Totally Unprep. = Totally unprepared in this area
- No Prob. = Hiring individuals with the computer skills has no problem
- Minor Prob. = Hiring individuals with the computer skills has is a minor problem
- Major Prob. = Hiring individuals with the computer skills has a major problem



Figure 4.7: Personnel Information



### **HRM Professional Recruiting**

Any organization must provide training to its current workforce, but it must also be able to reach out and attract competent and qualified individuals from its environment. Occasionally, especially in highly technical areas, organizations have difficulties recruiting and selecting individuals with the requisite skills needed. To find out if this is the case in the specific areas being examined, our questionnaire queried respondents about their level of difficulty in hiring individuals with the necessary computer skills. It is interesting that one in four respondents indicated that hiring such individuals was a *major problem* (Table 4.11). It is not surprising that government had greater difficulty in this area than did the private sector. Over one in three (35%) public sector respondents indicated this as a *major problem* compared to 15% in the private sector. This corresponds to the t-test result that there are significant differences between public and private HR departments in professional recruiting (t-value = 3.767; p-value = 0.000). It is obvious that public HR departments have more problems in hiring computer professionals than their private counterparts. Considering the greater flexibility in the hiring systems in the private sector compared to the more rigidly controlled and slow moving merit systems present in government, it is not terribly surprising that the public sector is more likely to experience such problems.

As noted in Chapter III, private managers have some advantages in finding competent personnel compared to public managers. This can be explained in part due to the fact that public employees generally enjoy longer tenure and may not have adequate basic computer skills. Instead of termination or laying off employees, public organizations usually relocate them to other departments or organizations (Cats-Barial and Thompson, 1995). Also, public managers have less flexibility than managers in private organizations because of several obstacles such as rules, regulations, and tenure that protect employees' rights. This gives public managers less autonomy in hiring, firing, or rewarding, than private sector managers (Rainey et al., 1976; Nigro and Nigro, 1977; Lachman, 1985; Buchanan, 1974). On the other hand, within private organizations, the rate of turnover is higher than in the public sector. There are several means

that private managers can use to terminate their employees and hire appropriate personnel to fill the position quicker and with more flexibility than those in the public sector (Ferris and Curtin, 1990). In addition, within private organizations, a small number of influential people dominate at the top of a organizational hierarchy. Private managers, therefore, manipulate society from a fulcrum of greater power, compared to public managers (Steiner and Steiner, 1991).

In briefly reviewing the last few areas, we have seen that governmental respondents are less likely than their private sector counterparts to report regular training, more likely to report that they are inadequately prepared to deal with HRM computer applications, and more likely to have difficulties hiring individuals with the necessary computer skills. Taking these three together government would seem less likely to perform many of the computer applications in HRM.

#### **Use of networks and the Internet**

Meteoric growth in Internet usage has become the communications phenomenon of the mid 1990s, as the network that was once the province of the Department of Defense has become both the darling of cocktail party chatter and an indispensable research tool (Sewell, 1997; p. 168).

According to Sewell (1997), Internet access in both public and private sectors has been enormously increasing along with the fast growing of advanced technology. Workstations were once used to be only stand alone systems, while today they are commonly used as terminals and workstations for the Internet. As users increasingly demand network monitoring tools and services, many vendors and service providers have rushed to build them (Nash, 1996).

#### **Internet Linkage**

Both public and private organizations also need to have various kinds of information in all HR processes which can be retrieved from the Internet. With tremendous advances in computer technology at present, it is much easier to obtain useful information within minutes from anywhere around the world through the Internet (Cronin, 1994). According to our data,

nearly all organizations have established some computer linkages. Further analysis (chisquare test) reveals that there is a significant difference between public and private organizations in Internet linkages (chisq-value = 16.734; p-value = 0.001). All public organizations have their own networks, 17% link only within the organizations, and 83% link both within and without the organizations as well as link to the Internet. This data supports the survey by Norris and Kenneth (1994) that all public sector organizations in cities with populations of 250,000 or more report the use of local area networks (LANs).

**Table 4.12: Internet Linked Features**

	Linked Features		
	No Link	Internal Link	Internet Link
Gov (N=77)	—	17% (13)	83% (64)
Bus (N=77)	4% (3)	43% (33)	53% (41)
Total (N=154)	2% (3)	30% (46)	68% (105)

No Link = Does not link to any other systems either within or without the department  
 Internal Link = Links to the company network only  
 Internet Link = Links to other networks, Internet, or a combination of link within and without the company

Unlike public organizations, according to the study, private organizations (43%) have their own networks linked internally. This is remarkably higher than those in public organizations; however, only 53% of private organization networks link to the Internet. According to Kosiur and Angel (1995), most private organizations tend to stand alone and the information they gather, in most cases, is useful only to themselves. A possible explanation is the view of security in linking to the Internet. Public organization generally have less risk than private from intrusion when connecting externally.

The organization's network linkage within and outside the organization has also been investigated in this study. Similar to private organizations, most public organizations are also information self-sufficient, yet this is not to say that information is not shared (Mayer and De Luca, 1986). To be certain, inter-organizational relationships cannot be denied. The nature of public organizations frequently require that information be distributed throughout different departments. For instance, job descriptions and job analysis of all departments on the federal level are of significant value to the Office of Personnel Management (OPM). Also, hiring and performance appraisal of employees are required for the payroll department. All information can be obtained via networked mainframe, mini, or micro-computers. In addition, these networks are connected to the Internet. This study supports Mayor and DeLuca's (1986) research that most public organizations have inter-organizational relationships with other departments. Moreover, Blustein (1986) reported that public organizations now widely utilize networks and the Internet even more than their private counterparts.

It is one thing to have access to the Internet, but another thing to actually use this linkage to improve the organization. Often times, employees may be overwhelmed by information unless they know how to most efficiently navigate the Internet using the appropriate search tools. As Sanuel Greengard has indicated, "The key to mining data on the Web is to understand what search tools exist and how to use them. The challenge isn't finding information, but sorting through all of it to locate exactly what you want. It's estimated that upward of 75 million Web pages now exist" (Greengard, 1997; p. 80). While over 50% of both public and private sector respondents indicated Internet linkages, we were interested in the specific ways they used these linkages to improve HRM activities. Our questionnaire was designed to obtain information in this area.

#### **Using Internet as a Resource of HR Information**

As we suspected, (Table 4.13) most of the organizations with Internet linkages do little to use the Internet to help them obtain specific HRM information in both sectors. Yet, in

reference to Internet-related functions, all functions are implemented; however, not all are *fully* implemented. Both the percentage of functions that are implemented only in *some areas* and *not at all* is high. The only HRM areas where information on the Internet has been deemed very useful by at least one quarter of responding organizations (combining all SA and FA responses) were *recruitment (53%), legal services (37%), selection (32%), training and development (31%),* and *compensation management (26%)*.

**Table 4.13: HRM Functions and Internet Implementation**

	Government (N=50)		Business (N=43)		Total (N=93)
Recruitment	SA	18% (9)	SA	21% (9)	19% (18)
	FA	34% (17)	FA	35% (15)	34% (32)
	NU	4% (2)	NU	12% (5)	8% (7)
	NT	46% (23)	NT	33% (14)	40% (37)
Legal Services	SA	8% (4)	SA	21% (9)	14% (13)
	FA	28% (14)	FA	16% (7)	23% (21)
	NU	2% (1)	NU	7% (3)	4% (4)
	NT	62% (31)	NT	56% (24)	59% (55)
Selection	SA	4% (2)	SA	23% (10)	13% (12)
	FA	22% (11)	FA	16% (7)	19% (18)
	NU	14% (7)	NU	9% (4)	12% (11)
	NT	60% (30)	NT	51% (22)	56% (52)
Training and Development	SA	12% (6)	SA	14% (6)	13% (12)
	FA	18% (9)	FA	19% (8)	18% (17)
	NU	8% (4)	NU	16% (7)	12% (11)
	NT	64% (32)	NT	51% (22)	58% (54)
Compensation Management	SA	4% (2)	SA	9% (4)	6% (6)
	FA	20% (10)	FA	21% (9)	20% (19)
	NU	6% (3)	NU	12% (5)	9% (8)
	NT	70% (35)	NT	58% (25)	65% (60)
Performance Appraisal	SA	6% (3)	SA	2% (1)	4% (4)
	FA	12% (6)	FA	16% (7)	14% (13)
	NU	6% (3)	NU	5% (2)	5% (5)
	NT	76% (38)	NT	77% (33)	76% (71)
Human Resource Planning	SA	2% (1)	SA	5% (2)	3% (3)
	FA	12% (6)	FA	16% (7)	14% (13)
	NU	2% (1)	NU	7% (3)	4% (4)
	NT	84% (42)	NT	72% (31)	78% (73)
EEOC / Affirmative Action	SA	2% (1)	SA	2% (1)	2% (2)
	FA	16% (8)	FA	16% (7)	16% (15)
	NU	14% (7)	NU	5% (2)	10% (9)
	NT	68% (34)	NT	77% (33)	72% (67)
Labor/Management Relations	SA	6% (3)	SA	14% (6)	10% (9)
	FA	8% (4)	FA	2% (1)	5% (5)
	NU	2% (1)	NU	7% (3)	4% (4)
	NT	81% (41)	NT	77% (33)	80% (74)
Downsizing	SA	2% (1)	SA	5% (2)	3% (3)
	FA	4% (4)	FA	7% (3)	8% (7)
	NU	4% (2)	NU	7% (3)	5% (5)
	NT	86% (43)	NT	81% (35)	84% (78)
Job Analysis	SA	2% (1)	SA	2% (1)	2% (2)
	FA	10% (5)	FA	7% (3)	9% (8)
	NU	12% (6)	NU	14% (6)	13% (12)
	NT	76% (38)	NT	77% (33)	76% (71)

SA = The information off the Internet has been very useful in several areas.  
 FA = The information off the Internet has been very useful in one or two areas.  
 NU = The information off the Internet has not been very useful when I have attempted to obtain and use it.  
 NT = Never really tried to use the Internet to obtain this type information.

The areas where information was found to be most helpful were not surprising; *recruitment, legal services, selection, training and development, and compensation management.*

Due to the abundant information for these functions to be found on the Internet, particularly *recruitment*, which is the most Internet-used function for both sectors, much of the data can be directly retrieved from the Internet, as has been observed. "Cyberspace offers new frontiers in recruiting, networking and information gathering" (Greengard, 1995; pp. 55).

There are thousands of employers, both public and private, who have posted their job vacancies on the Internet. Thousands of candidates have posted their resumes on line so that employers can easily select and match the candidates' qualifications with their vacant positions. For instance, since the Wisconsin State Government has posted the Job On-Line Bulletin Service (JOBS), candidates throughout the state (and the world) have continuous access to vacancy information and over 50,000 candidates per month visit this site (Lavigna, 1996).

*Compensation* is another function for which both public and private organizations use the Internet as a resource, but in a few areas such as wages and salary administration, compensation trends, and planning analysis (Walker, 1993). Before 1985, Internet usage in both public and private sectors was almost equal. At that time, the network had only a few thousand users who had expertise. Since the real purpose of the Internet was to help people learn how to build and use networks, the number of users has increased a thousand-fold in the past twelve years (Krol, 1992).

Although abundant information is available for other HR functions such as performance appraisal, labor-management relations, and EEO/affirmative action, neither public nor private organizations used the Internet for information for the top five functions listed in Table 4.13. This is because the Internet has not been widely promoted as a source of HR information. Many HR departments in both public and private organizations have never used the sophisticated hypertext links and graphics of the Internet's World Wide Web (Greengard, 1997) According to Table 4.13, we see that the majority of respondents have never tried to get information from the Internet.



Here, traditional differences between public and private sector groups almost completely disappear. What is most remarkable is how similar the two groups are using the Internet in the HRM area. If we again combine the very useful category responses (SA and FA), we see that both groups have the same HRM areas in their top five. Although they are given slightly different top five rankings, *recruitment, selection, legal services, compensation management, and training and development* are the areas where Internet information has been deemed to fall into the very useful category. Some small differences do appear between the two sectors with the private sector being more likely to make greater use of information available on human resource planning (21% vs 14%), downsizing (12% vs 6%), and labor management relations (18% vs 14%). However, t-test indicates that there is no significant difference in these functions between the two sectors.

Open-ended questions were asked about the use of computers and/or the Internet to gain information on HRM functions. Eighteen comments were received from public HR managers and fifteen comments from private HR managers (See Table 4.14).

**Table 4.14: Free Form Comments by Participants**

Comments	Public	Private
Usage - Planning to use the Internet in the near future	9	7
Usage - The Internet has been very useful for HR functions	4	4
Needs - More Internet training	3	
Needs - Needs more management support	1	
Needs - Needs more time to implement successfully	1	
Needs - Internet to be more standard and a global HR database		4
Needs - security systems on the Internet		1

According to Table 4.14, several organizations in both the public and private sectors reinforce that they still have not fully made use of the Internet. Most are in the process of “Planning to use the Internet in the near future”. Only four organizations in each sector have reported successfully using the Internet as a useful resource for HR functions. In the public sector, managers have mentioned the needs of training in how to use and get useful information from the Internet. Private managers made comments about their needs in improving the Internet standard and global use of HR database and functions. Also, they referred to the security systems on the Internet. According to Cronin (1994), the global rule in using the Internet has been widely accepted by the Internet users. However, the security on the Internet would be very difficult because the data are accessible to the public.

### **Management Support**

#### **HRIS Budget**

*Budgeting* is one of the most important factors for an organization to run and manage its business (Thierauf, 1994). A budget links tasks to be performed with the amount of money and resources necessary to accomplish those tasks (Rubin, 1997). Each department generally has its own budget that is distributed from the overall organization budget. According to the *Budget of the United States Government (Fiscal Year 1997)*, the public budget procedure provides support for several areas such as education and training, the environment, science and technology, and other priorities. For some units in the public sector these *budgets* are well-defined and self-contained; for other units, they are interdependent. In the private sector, most of these *budgets* are clearly well-defined (Rubin, 1997). For instance, some HRM budgets may be linked to MIS functions. As mentioned earlier in Table 4.4, most computer systems in private organizations are single systems (not a combination of many large systems) and smaller than those of public organizations. Therefore, the cost of the system and maintenance is not as high as those of larger systems. Generally, large systems cost more than small ones, not only for the systems themselves but also for the maintenance and upgrades.

The *budget* is an essential factor in making decisions to purchase or to lease software and hardware. However, in large multi-site organizations, particularly public organizations, an HRIS is seldom installed without the purchase of additional network and hardware operating system components (Richard-Carpenter, 1994). Respondents were asked to estimate the approximate dollar amount of the company budget used for HRIS. Table 4.15 illustrates public organizations are likely to spend more dollars on large HRIS than private organizations. Twenty percent (20%) of public organizations spend more than one million dollars in their HRIS, while only 9% of private organizations spend more than one million dollars on their HRIS.

**Table 4.15: HRIS Budget**

	Budget for HRIS			
	< \$100,000	\$100,000 - \$1,000,000	> \$1,000,000	Don't know
Gov (N=77)	43% (33)	32% (25)	20% (15)	5% (4)
Bus (N=77)	48% (37)	31% (24)	9% (7)	12% (9)
Total (N=154)	45% (70)	32% (49)	14% (22)	8% (13)

Furthermore, 48% of private organizations spend less than \$100,000 on HRIS, while 43% of public organizations spend less than \$100,000 on HRIS. The percentage of the medium costs range on HRIS (between \$100,000 - \$1,000,000) is about the same for both sectors. In order to test for the existence of significant budget differences between the two sectors, two tests were used. A t-test was used to determine the magnitude of difference between mean scores and a chisquare test was used to compare the difference in the size of each category between the two sectors. The t-test results indicate that the average budget for both sectors is not significantly different (t-value = 0.320; p-value = 0.749). However, the chisquare test shows that there is a significant difference among dollar amount categories. We can conclude that public

organizations spend more dollars in the highest level HRIS category (one million dollars or more) than their private counterparts. As mentioned earlier, public organizations in general have large or a combination of large systems. Therefore, this could be the rationale behind public organizations higher spending on HRIS.

**Top Management Support**

The respondents in our survey were asked to rate the level of *top management support* for HRIS within their departments. An unanticipated finding from this study shows that public HR managers perceive that they have slightly stronger support from high level management in running their HRISs than those in the private sector; 48% for public and 32% for private. Conversely, the perceptions of “little support” of the HRIS in the private sector is four times higher than those in the public sector. (See Table 4.16). However, the chisquare test indicates that there is no significant difference between the two sectors in *top management support* (chisq-value = 7.660; p-value = 0.054).

**Table 4.16: Managerial Support Rating**

	Top Management Support of the HRIS			
	Strong	Mod	Little	None
Gov (N=77)	48% (37)	47% (36)	4% (3)	1% (1)
Bus (N=77)	32% (25)	48% (37)	16% (12)	4% (3)
Total (N=154)	40% (62)	47% (73)	10% (15)	3% (4)

- Level of Decision = Freedom of decision making in the area of HRIS
- Level of Delegation = Authority to delegate to the subordinates to let them make decisions in the area of HRIS
- Strong = Strong support of HRIS within the department
- Mod = Moderate support of HRIS within the department
- Little = Little support of HRIS within the department
- None = No support of HRIS within the department

### Decision-Making

In selecting HRIS, *decision making* is a critical role of the HR managers. Certainly, the level of decision making affects the efficiency of the HRIS such as a decision to buy a computer system for use in a particular department, a decision to choose software to run on it, and a decision to utilize outside services with direct on-line input or reporting capability (Bonin, 1986). Several scholars earlier noted that public organizations are heavily influenced by external political factors. They are prone to elaborate hierarchies and rules. Furthermore, due to civil service rules, they have greater diversity of personnel and weak commitment expectations (Coursey and Bozeman, 1990)

Generally, when and how top management centralizes, decentralizes, or delegates authority to the middle management level will affect HR manager decision making and organization (Hickson, Butler, et al., 1986). Our data in Table 4.17 shows that more managers in the private sector felt that they have higher freedom (60%) in *making decisions* for their areas of responsibility than those in the public sector (45%). The percentage of the two sectors are very close moderate level, where more public sector managers say they have low freedom (34%) in *decision making* than their private counterparts (21%).

Since public organizations have formal rules and constraints in their procedures, this could serve to limit the authority of the managers in *decision making*. (See also Figure 4.8) The more constraints on procedures, spheres of operations, the less autonomy of managers in making decisions (Rainey, Backoff, and Levine, 1976). Furthermore, public managers have to work with law makers and these law makers usually have more explicit authority than do managers (See Allison, 1996). However, according to the t-test result, which compares mean score on *decision making authority*, there is no significant difference between the two sector HR managers (t-value = 1.933; p-value = 0.055).

This study gives some support to Silfvast and Quaglieri's (1994) study, and Blumenthal's study (1983). Our respondents were asked to evaluate the extent to which they enjoyed freedom of *decision making* when using computers in their HRM functions. Silfvast and

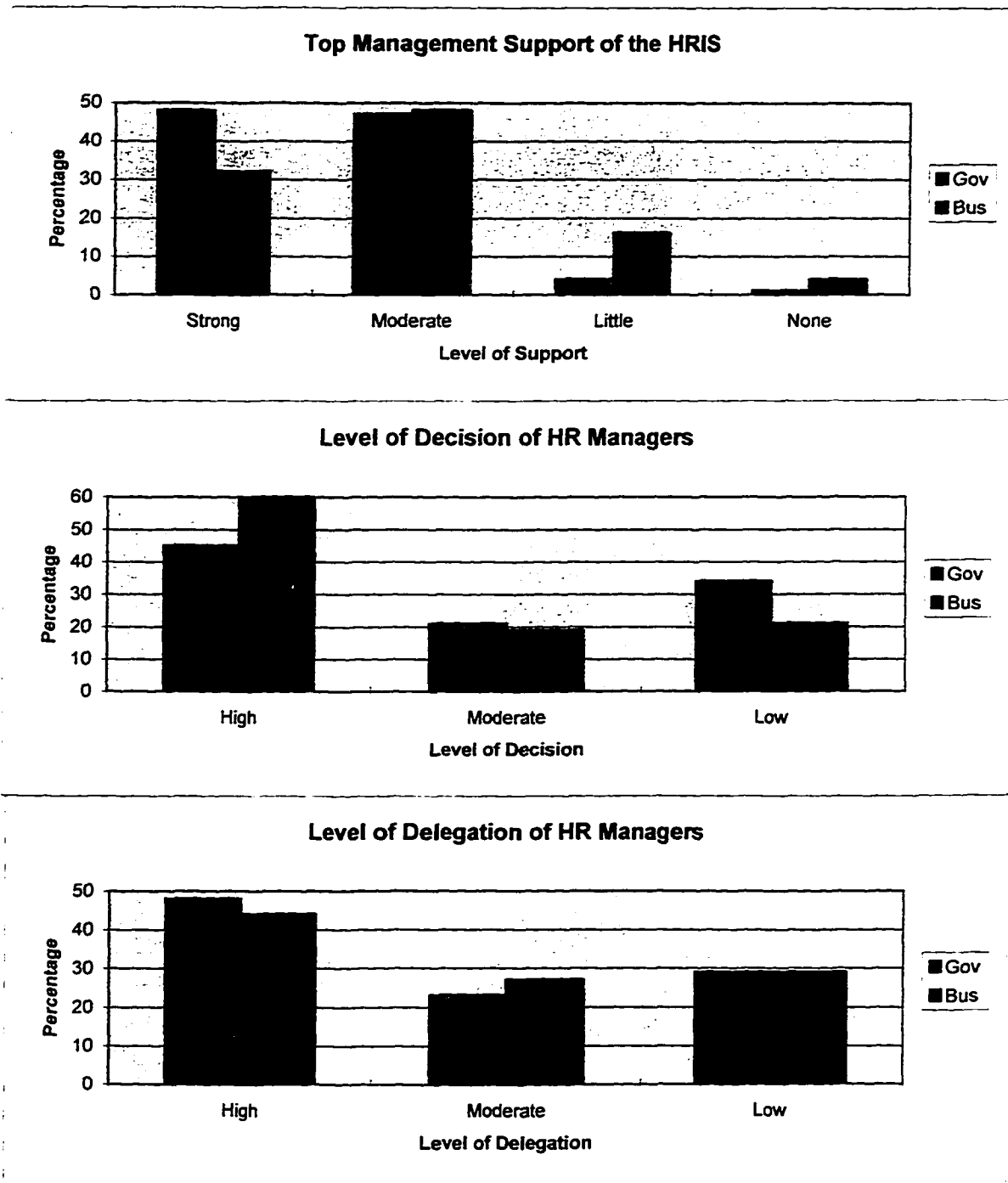
Quaglieri noted that private middle managers have more power to make decisions in strategic planning, negotiations, and selection of personnel than their public counterparts. Blumenthal's research also indicated that middle level public managers have less control over their organizations than business managers. This could be due to the fact that public organizations are more conglomerated and diverse, and therefore, the decision process is more cumbersome (Blumenthal, 1983).

**Table 4.17: Management Factors**

	Top Management Support of the HRIS				Freedom in Decision-Making			Level of Delegation		
	Strong	Mod	Little	None	High	Mode	Low	High	Mode	Low
Gov (N=77)	48% (37)	47% (36)	4% (3)	1% (1)	45% (35)	21% (16)	34% (26)	48% (38)	23% (17)	29% (22)
Bus (N=77)	32% (25)	48% (37)	16% (12)	4% (3)	60% (46)	19% (15)	21% (16)	44% (34)	27% (21)	29% (22)
Total (N=154)	40% (62)	47% (73)	10% (15)	3% (4)	53% (81)	20% (31)	27% (42)	47% (72)	25% (38)	29% (44)

- Level of Decision = Freedom of decision making in the area of HRIS
- Level of Delegation = Authority to delegate to the subordinates to let them make decisions in the area of HRIS
- Strong = Strong support of HRIS within the department
- Mod = Moderate support of HRIS within the department
- Little = Little support of HRIS within the department
- None = None support of HRIS within the department
- High = High level of delegation
- Mode = Moderate level or delegation
- Low = Low level of or delegation

Figure 4.8: Management Factors





### Level of Delegation

We have now examined perceptions of our respondents regarding how much freedom of *decision making* is handed to them from above by senior managers. It is also interesting to examine their perceptions of their own *delegations* of decision making to their subordinates. We asked them to rate the extent to which they delegate such freedom. According to Table 4.17, although public HR managers perceive themselves to have slightly less power in *making decisions*, they are more likely to delegate their authority to their subordinates than private HR managers (48% vs 44% for high category). In fact, if we combine the two categories: “high” and “moderate” *level of delegation* together for both sectors, the percentages of the two sectors are the same (71%). Identical figures can also be seen in the low category of the table above. This claim has been confirmed by a t-test (t-value = -0.722; p-value = 0.471) which indicates there is no significant difference in *delegation of authority* between the two sectors.

In summary, although public managers perceive that they have somewhat more support from their upper level managers, and although the total dollar amount spent on public HRIS systems appears slightly larger, in the area of freedom for *decision making*, the two groups seemed very similar in the extent to which they *delegated freedom* in decision making down the chain-of-command.

The findings in this chapter suggest several general implications in comparing differences and similarities in the three viewpoints of HRIS: computer systems, end-users, and management systems between the two sectors. The summary of statistical results and conclusions will be discussed in the next chapter.

## CHAPTER V : RESULTS AND DISCUSSION

### Results and Discussion

In this study, we have performed a macroscopic investigation of the differences between public and private HR organizations from three standpoints: computer systems used in HR, computer competent personnel (end-user personnel), and management systems. In addition, we have examined other possible related influences that have an effect on those factors. Three hypotheses were tested in this investigation. A summary and discussion of the findings result from the following hypotheses:

**Hypothesis 1: Computer systems for private sector HR departments are more capable than those in public sector HR departments.**

The first hypothesis was concerned with the different level of computer systems between public and private organizations. Two statistical analyses, Student's t-test and Chisquare test, were used to determine the magnitude of the difference between the two sectors. A t-test is used to compare overall mean scores and a chisquare test was used to analyze the categorical differences between public and private sectors. The statistical results for hypothesis 1 are displayed in Table 5.1.

**Table 5.1 : The Statistical Results for Hypothesis 1**

Variables	Chisq-test	T-test	P-value	Results	Gov	Bus
- Types of computer systems	4.087		0.000	Diff	+	
- Number of workstations		-3.150	0.002	Diff		+
- Other networks and/or Internet access	16.734		0.001	Diff	+	
- Computer system upgrade		-1.438	0.152	No		
- Ratio (number of workstations / number of employees)		-1.578	0.118	No		
- Satisfaction with the software applications		1.129	0.285	No		
- HRM Activities	1.999		0.368	No		
- Software applications for HR functions	(See Table 5.11)					

Diff = Significantly different  
 No = Not significantly different  
 Gov = Government  
 Bus = Business  
 + = In favor of

**Table 5.1.1 : The Summary Results of Software and Applications**

Variables	Chisq-test	P-value	Results	Gov	Bus
Word Processing	1.007	0.316	No		
Spreadsheet	4.107	0.043	No		
Windows	2.775	0.096	No		
DOS	1.501	0.221	No		
Database	2.504	0.114	No		
Graphics	0.631	0.427	No		
Telecommunications	2.543	0.111	No		
Utility Programs	8.472	0.004	Diff	+	
Statistics	14.535	0.001	Diff	+	

The application of these tests revealed that, between public and private computer systems, *types of computer systems, number of workstations, and Internet access* (See Table 5.1) are significantly different. Most public computer systems are large systems compared to private computer systems because the systems are likely to have higher capabilities in operating large tasks found in the public domain. It is not surprising that most public systems have Internet linkages due to their large systems. From our data, a hundred percent of public organizations link to other networks, while public organizations have more Internet access than private organizations. However, the data do not indicate that public organizations have been using the Internet as a resource of HR information. Rather, the data show that in most HR functions, the percentage of both public and private organizations using the Internet as a source of HR information is still very low (See Table 4.13).

One interesting point that indicates the capability of private HR computer systems over public HR systems is that private HR have more workstations for their employees' use than public organizations, although most of their systems are smaller (See Table 4.4) and the percentage of employees are less than those in the public sector (See table 4.2).

For the remaining factors which relate to computer systems: *computer upgrade and change, ratio of the number of workstations and the number of employees, satisfaction with the software applications, and HRM activities* (See Table 5.1), the statistical tests indicate that there are no significant difference in those factors between the two sectors. Both public and private HR departments use similar software and applications. Finally, both public and private organizations also have a similar degree of satisfaction with the HR software applications they have been using. However, in comparing *software applications* for HR functions, the results indicate that most software applications used in both sectors are not significantly different except in *statistical and utility programs* (See Table 5.1.1). Furthermore, the differences in statistical and utility programs is a result of the distinction in the nature of jobs which does not indicate any of the differences in capability.

According to Table 5.1, we can conclude that the findings fail to support hypothesis 1: *computer systems for private sector HR department are more capable than those in public sector HR departments*, although computer systems in private organizations have higher number of workstations which would be more convenient for their employees. Computer systems used in public organizations, on the other hand, are larger than those in the public sectors. Large and more complex information systems alone; however, do not indicate a higher capability since capability, depends upon several factors previously mentioned.

**Hypothesis 2: HR end-users in the private sector are more competent than those in the public sector.**

The second hypothesis concerned differences between public and private HR end-users, impacted by factors such as the background of the users themselves, their educational level, preparation, etc. and/or the company surroundings, such as user training programs, professional recruiting, etc. The statistical results for hypothesis 2 are presented in Table 5.2.

**Table 5.2 : The Statistical Results for Hypothesis 2**

Variables	Chisq-test	T-test	P-value	Results	Gov	Bus
- Number of employees in the HR department (Compared to the size of organization)		-2.855	0.005	Diff	+	
- Internet training		-3.007	0.003	Diff		+
- Preparation		2.779	0.006	Diff		+
- Professional recruiting		3.767	0.000	Diff		+
- Educational level	5.722		0.126	No		
- Number of HRIS support specialists	0.672		0.413	No		
- Computer training		-1.449	0.149	No		
- Ways to solve problems	14.596		0.042	No		

Statistical analyses indicate that most of the end-user related factors, e.g., *employees' educational level, computer training, number of HRIS specialists, and ways to solve problems* (See Table 5.2), are not significantly different between the two sectors. Although private organizations hire more HRIS specialists to solve basic HRIS problems within the HR department and to offer support when necessary, they apparently depend on their MIS department to solve problems (See Table 4.5).

For the computer training factor (Table 4.10), although data demonstrate that there is no significant difference between public and private organizations, the amount of Internet training is significantly different between the two sectors. Because public computer systems are large and have Internet access, they have a higher percentage of Internet training. However, Byrd and Ikerd (1992) indicated that employees in the public sector still have deficiencies in information technology knowledge and skills. Although public organizations are likely to offer more training in both computer and Internet skills, most of this training is conducted by request rather than on a regular basis.

On the other hand, it appears that three user related factors: *number of employees in the HR department, level of preparation, and professional recruiting* (See Table 5.2) are significantly different between the two sectors. This reveals that, for similar sized public and private organizations, the number of employees in private HR departments is less than the number of employees in public HR departments. For the levels of preparation to deal with HR applications, private employees overall are better prepared than their public counterparts. Also, private organizations have less problems in recruiting HR professionals with computer skills.

According to Table 5.2, we can conclude that the findings support the hypothesis 2: *HR end-users in the private sector are more competent than those in the public sector*. Although they do not have a high degree of education, they excel in those factors: *better preparation* (See Table 4.11), *more Internet training as a regular basis* (See Table 4.10), and *professional recruitment* (See Table 4.11).

**Hypothesis 3: In the public sector, management support systems are less flexible than in the private sector.**

The third hypothesis concerned systems evaluating the differences in management support as to *budgets* (Table 4.15), *top management support* (Table 4.16), *decision making* (Table 4.5), and *delegation of authority* (Table 4.5) between the two sectors. The statistical results for hypothesis 3 are presented in Table 5.3. Although the percentages show that public HR managers perceive that they obtain stronger support for their HRIS from top management, and they feel that they delegate authority to their subordinates more than their private counterparts, statistical tests indicate that these management related factors are not significantly different.

**Table 5.3 : The Statistical Results for Hypothesis 3**

Variables	Chisq-test	T-test	P-value	Results
- Budgets	7.660	0.320	0.749	No
- Top management support			0.054	No
- Decision making by HR managers		1.933	0.055	No
- Delegation of authority by HR managers		-0.722	0.471	No

Diff = Significantly different  
 No = Not significantly different

According to Table 5.3, we can conclude that the findings fail to support the hypothesis 3: *In the public sector, management support systems are less flexible than in the private sector*, since there is no significant difference to indicate that *any factors in management systems* in the public sector are less flexible than those in the private sector.

## Conclusion

Based on these data, differences between the public and private sectors do exist. It becomes evident that public HR end-users are somewhat different from those in private organizations. The private HR end-user factors are more advantageous, particularly in the *level of preparation, professional recruiting, and Internet training* (See Table 5.2). The differences can be explained in part by the nature of their purposes: profit and non-profit, which influences the organizational objectives, management processes, and procedures in public organizations, making them distinct from their private counterparts.

According to our research findings, public computer systems are also partially different from those in the private organizations, in terms of *types of computer systems, number of workstations* in the HR department, and *networks and/or Internet linkages*. However, the differences are affected by the *organizational size*. Since public organizations, by nature, are larger and more diverse in their processes and functions, *types of computer systems* and *Internet linkages* need to correspond with the *organizational size*. However, unlike private HR departments, the number of workstations in public HR departments is not an adequate supply for the number of employees. Nevertheless, the statistical test shows no significant difference between the two sectors.

Finally, the data indicate that there is no significant difference between public and private management systems. Although Table 4.17 illustrated some differences, the statistical test refute the claim and demonstrate that there is no significant difference in management systems between the two sectors.

In summary, due to the differences in public and private purposes, it is difficult to say that one is better than the other. Also, the variations inherent in comparing similarities or differences between public and private sector HR departments are very broad and difficult to clearly distinguish between the two sectors. Factors that are suitable for one are not necessary applicable for the other. For instance, due to the nature of large tasks in the public domain, the



systems are likely to have higher capabilities in operating those tasks. On the other hand, since private organizations deal with profit, their work environment has more pressure.

Although it is difficult to clearly classify and compare public and private organizations using the same criteria because of their basic differences in their purpose, profit and non-profit, some recommendations may be noted that public organizations need to understand:

1. Although public organizations have been using the Internet as a resource of HR information, Internet training still has not been widely implemented on a regular basis. Most of the existing Internet training is executed on demand. It is recommended for the public sector to evaluate if its Internet training is adequate for their employees and if the training needs to be changed. If so, then how.

2. Another engaging point in considering end-user personnel competence is that although the number of employees in private HR departments is much smaller compare to the size of the organization, private HR end-users are better prepared. What needs to be investigated is why private HR end-users are better prepared, what causes this, and measures need to be implemented to improve the quality of their end-user personnel.

3. According to the result of professional recruiting in the public sector, public HR departments need to consider what causes these professionals to target their jobs to the private sector. For instance, public organizations need to determine whether or not, according to this research, *task itself* and *challenging position* attach the high level of management to make decisions to select private jobs. If so, then how should public HR organizations solve this problem and improve their motivativs factors.

4. According to the findings regarding computer systems, most public organizations have large computer systems; however, the number of workstations is still insufficient by the ratio of three employees with two workstations. However, in order to decide how this problem needs to be solved, public organizations ought to analyst other factors such as the characteristics of jobs and time constraints.

On the other hand, private organizations need to reconsider obtaining more Internet access and Internet training since, at the present time, the Internet has become the most popular and sometimes the only available source of external data exchange. The Internet revolution has created a wealth of information and has an extremely high growth rate that provides invaluable information to the organizations.

However, both public and private organizations still need to improve their employees' skills and abilities, especially in advanced-computer systems and technology. There remains a need to improve the computing knowledge and skills of employees in HR areas, particularly public employees. Training in the area of general computing and technological knowledge is of the utmost importance. Since workers are considered an essential factor within an organization, no matter how advanced computer technology and management systems are, if the workers are not competent, the technology might not be worthwhile for the organization.

What was discovered in this research can be useful and valuable for the future research in HRIS regarding the three main factors: computer systems, end-users personnel, and management system. It would be worthwhile to investigate further to define causes and effects of each factor. Several interesting questions need to be examined for the future research concerning mainframe, mini, micro and personal computer systems: what features of the systems causes differences in public and private systems, how do the systems network among other systems, and how do the systems affect the management's decision when choosing to use the systems' software and applications. Considering end-users personnel, the research needs to analyst whether training affects HR end-user capability and why private HR departments have better prepared employees although their departmental size is smaller than those in the public sector. The questions concerning management systems include whether organizational structures affect the decision making and how, what are the supports and obstacles in decision making and delegation of HR managers, and how HR managers receive support from top management level.

According to all of the above questions, future research seems to be challenging for the next-generation researchers to determine whether the characteristics of public and private sector HRISs are distinct and proper and what is most suitable for each of them.

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**APPENDIX A**  
**OPEN-ENDED QUESTION RESPONDENTS**

### **Open-ended-Question Respondents**

According to the questionnaire, there are a few open-ended questions that asked about respondents' duties and responsibilities. The response of the question concerning their duties and responsibilities in HR functions could be grouped into four broad categories:

1. **Management Level:** President, Vice President, Commissioner, Deputy Commissioner, HR director, HR manager, and other manager levels. These positions are involved in management decisions and strategic planning for their HR department. They oversee the entire HRM functions such as recruitment, position classification, compensation complaints, benefits, records, performance appraisal employment, training and development, downsizing, and labor relations. Most of the time, this involves HR policies, budget systems, and internal and external operations for the HR department, as well as administrative services management.

2. **Job Specialists:** HRIS specialist, Analyst, Consultant, and advisor. These positions required specific skills in particular tasks. They are responsible for conducting special projects such as equal employment opportunity (EEO), legislative liaison, and salary surveys. In addition, some positions such as HRIS control HR systems and databases, maintain network support, provide technical support, job analysis, job evaluation, and other HR research activities.

3. **Office Personnel:** Senior Administrator, Administrator, and other Office operator. These positions generally have a variety of responsibilities in the office. The positions include: personnel record keeping, accounting, grievances appeals, office automation, and general departmental administration.

4. **Office Assistant:** HR Assistant, Administrative Assistant, Secretary, and Clerk. These positions are concerned primarily with assisting others in all HR areas in conducting departmental jobs and supply secretarial / clerical workload.

The questionnaire was sent out directly to the HR head department and most of them response to the survey themselves. This is indicated by Table 4.1. Therefore, the data that we received are relevant to the objectives of this study, intended to get information about overall department.

Although both public and private HR managers have similar duties and responsibilities in control of the overall HR functions, there are some differences between public HR managers and private HR managers. Several public HR managers indicated that they acted as legislative liaisons, while private managers have more concern in company policy and strategic planning.

The other open-ended question has been asked about the overall comments on the use of computers and/or the Internet to gain information on HRM functions. In all of the responses to these questions, we have received eighteen comments from public HR managers and fifteen comments from private HR managers that can be summarized in their usage and needs as the following table.

Comments	Public	Private
Usage - Planning to use the Internet in the near future	9	7
Usage - The Internet has been very useful for HR functions	4	4
Needs - More Internet training	3	
Needs - Needs more management support	1	
Needs - Needs more time to implement successfully	1	
Needs - Internet to be more standard and a global HR database		4
Needs - security systems on the Internet		1

According to the above Table, several organizations in both the public and private sectors still have not fully made use of the Internet yet. Most are in the process of "Planning to

use the Internet in the near future". Only four organizations in each sector have reported successfully using the Internet as a useful resource for HR functions. In the public sector, managers have mentioned the needs of training in how to use and get useful information from the Internet. On the other hand, private managers made comments about their needs in improving the Internet standard and global use of HR database and functions. Also, they referred to the security systems on the Internet. According to Cronin (1994), the global rule in using the Internet has been widely accepted by the Internet users. However, the security control systems on the Internet would be impossible since the data would be accessible to the public.



**APPENDIX B**  
**LETTERS TO RESPONDENTS**

29 July 1996

Dear Human Resource Professional,

We are gathering information about how organizations use computers in performing their management responsibilities. You have been chosen because we feel that as a human resource manager your knowledge and experience in the field of **Human Resource Management (HRM)** can provide us the kind of information we need. If you feel that another HRM professional in your department would be better equipped to answer these **computer oriented questions**, please forward it appropriately.

The **purpose** of this survey is to document the current status of computer use by a random sample of organizations in the public and private sectors. Please be assured that all results will be treated confidentially, and nowhere will any individual or company be singled out in the data analysis.

Your response to this survey will be very useful to both scholars and practitioners as it will help us gauge the current level of computer use by HRM professionals in carrying out your management responsibilities. **If possible, please return the enclosed questionnaire in the self-addressed, stamped envelope by August 23, 1996.**

Once again, thank you for your time and consideration.

---

Siriwal Tevavichulada  
Ph.D. candidate

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Dr. Robert Elliott  
Professor - Associate Dean

**P.S. If you would like to see the summary result of this study, please do not forget to check the box on page 1 of the questionnaire. It should not take you more than 15 minutes to complete this questionnaire.**

September 26, 1996

Dear Human Resource Professional,

Recently you received a letter and questionnaire designed to gather information about the extent to which human resource professionals make use of computer software and information systems in their personnel operations. This survey compares the application of these uses in the public and private sectors. It is gratifying that a large number of your fellow HRM professionals have chosen to respond. We know that you would like your organization included in these survey results, and we are giving you another opportunity.

**We realize that you are busy and have designed this questionnaire so that it should not take you longer than fifteen minutes to complete.** If you will check the square at the top of the questionnaire, we will happily provide you with the summary results of this study.

Once again, thank you for your time and consideration.

---

Siriwal Tevavichulada  
Ph.D. candidate

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Dr. Robert Elliott  
Professor - Associate Dean

**Please return the enclosed questionnaire in the self-addressed, stamped envelope by October 18, 1996.**

**APPENDIX C**  
**QUESTIONNAIRE**



Please Check this box, if you would like to receive the summary results of this questionnaire. (Questionnaire can be completed in fifteen minutes)

 **General Questions** 

☉ Organization's Name \_\_\_\_\_

☉ Organization's Primary Business Concern \_\_\_\_\_

☉ Title of Your Current Position \_\_\_\_\_

1. Please briefly describe your major duties:

\_\_\_\_\_

\_\_\_\_\_

2. Please specify size of Organization (check the box below which best describes your size)

- |  |   |
|--|---|
| <input type="checkbox"/> Less than 100 employees | <input type="checkbox"/> 1000 - 3000 employees        |
| <input type="checkbox"/> 100 - 500 employees     | <input type="checkbox"/> 3000 - 10000 employees       |
| <input type="checkbox"/> 500 - 1000 employees    | <input type="checkbox"/> Greater than 10000 employees |

3. Please look at the list of items below that people generally feel motivate them to work. Then, rank this list placing a "1" by the item you feel is your most important motivator, a "2" beside the 2nd most important motivator, and so on until all 7 items are ranked.

- |  |  |
|--|--|
| <input type="checkbox"/> Pay (Salary & Benefits) | <input type="checkbox"/> Job security            |
| <input type="checkbox"/> Chances for promotion   | <input type="checkbox"/> Challenging position    |
| <input type="checkbox"/> Office environment      | <input type="checkbox"/> Interest in task itself |
| <input type="checkbox"/> Social contract         | <input type="checkbox"/> Other                   |

4. Approximately how many employees work in your department? \_\_\_\_\_

5. Which of the following statements best characterizes the type of management employees working in your department:

- most have at least a high school diploma
- most have at least some college
- most have a college degree
- most have a masters degree
- most have Ph.Ds

☺ **General Computer Use Questions** ☺

6. Do you have a Human Resource Information System (HRIS) specialist in your department?
- a. Yes b. No
7. If your employees have **problems** with miscellaneous computer tasks, how are they resolved?
- a. Consult the HRIS specialist in your department  
 b. Request assistance from an MIS department within the company  
 c. Call outside consultant  
 d. Solve the problems themselves  
 e. Other (Please Specify) \_\_\_\_\_
8. Is **computer training** provided by your organization to its employees?
- \_\_\_\_\_ Yes \_\_\_\_\_ No \_\_\_\_\_ Don't know
9. If **computer training** is provided, about **how often** does it take place?
- \_\_\_\_\_ at least monthly \_\_\_\_\_ as requested  
 \_\_\_\_\_ at least quarterly \_\_\_\_\_ rarely (less than once per year)  
 \_\_\_\_\_ at least annually
10. What **type of the computer system** is used in your company? (You may answer more than one)
- a. Mainframe b. Minicomputer  
 c. Microcomputer d. Workstations  
 e. Other (Please Specify) \_\_\_\_\_
11. How many **individual computers** do you have in your department? \_\_\_\_\_
12. When was the last time that your **computer system was upgraded or changed**? \_\_\_\_\_ Years
13. Please specify **all applications** available on your computer.
- |   |   |
|---|---|
| <p>_____ Windows</p> <p>_____ Word Processing</p> <p>_____ Graphics</p> <p>_____ Statistics</p> <p>_____ Utility Programs</p> | <p>_____ Disk Operation System (DOS)</p> <p>_____ Spreadsheet</p> <p>_____ Telecommunications</p> <p>_____ Database</p> <p>_____ Other (Please specify) _____</p> |
|---|---|

14. Is your department's **computer system** linked with other computer systems? (You may answer more than one)

Does not link to any other systems either within or without the department  
 Links to the **company network** only  
 Links to the **Internet** or WWW (World Wide Web)  
 Links to other networks (Please specify) \_\_\_\_\_

15. Today many organizations are making use of computers and computer software to enable them to more efficiently perform Human Resource Management activities. Does your organization use computer software in the area of HRM?

Yes                       No                       Don't know

## Human Resource Management (HRM) Questions

16. If you answered "yes" to question number 15, could you take a moment and consider the list of HRM activities below and use the following scale to select the number that best describes your **organization's involvement with computer software** in each area. (If you answered "no" proceed on to question number 19.)

1. This function is mainly computerized and I am satisfied with the results thus far.
2. This function is mainly computerized but I am not satisfied with the results thus far.
3. Only a few aspects of this function have been computerized.
4. None of the aspects of this function have been computerized.
5. I have no information with which to evaluate this area.

Job Analysis  
 Recruitment  
 Selection  
 Performance Appraisal  
 Labor\Management Relations  
 Human Resource Planning  
 Downsizing  
 Legal  
 Compensation Management  
 Position Classification  
 Job Evaluation

17. Could you please check the box below that best describes your **employees' level of preparation** (computer literacy) to deal with the HRM applications they are expected to perform:

My employees are well prepared for their computer related tasks  
 My employees are adequately prepared, but need constant updates  
 My employees are inadequately prepared and need additional training  
 My employees are totally unprepared in this area  
 I have no information with which to evaluate this area.

18. In the hiring process, which of the following statements best describes your ability to obtain HRM professionals with the computer skills you are recruiting:

- Hiring individuals with the computer skills we need has been no problem.  
 Hiring individuals with the computer skills we need is a minor problem.  
 Hiring individuals with the computer skills we need is a major problem.  
 I have no information with which to evaluate this area.

\* If you have used the Internet to obtain information for your organization, please answer the following group of questions. If your organization does not have Internet access please go on down to question number 23 .

☺ **Internet Related Questions** ☺

19. What applications do you use for Internet access? (You may answer more than one).

- |   |   |
|---|---|
| <input type="checkbox"/> On-line Services | <input type="checkbox"/> Netscape Navigator           |
| <input type="checkbox"/> Mosaic           | <input type="checkbox"/> File Transfer Protocol (FTP) |
| <input type="checkbox"/> E-mail           | <input type="checkbox"/> News Groups (Tin, Usenet)    |
| <input type="checkbox"/> Gopher           | <input type="checkbox"/> Other (Please specify) _____ |

\* Some organizations have found the information on the Internet to be very useful to them as they do research and make decisions in the area of HRM. Other organizations have found the Internet of very little use, and many organizations have never really attempted to use the Internet to gather information for HRM research and decision making.

20. Please look at the list of HRM functions and activities and use the number on the scale below which best describes your own experience with the Internet as it applies to the following areas:

1. The information on the Internet has been very useful in several areas.
2. The information on the Internet has been very useful in one or two areas.
3. The information on the Internet has not been very useful when I have attempted to obtain and use it.
4. I have never really tried to use the Internet to obtain this type information

\_\_\_\_\_ Job Analysis (accessing information on job tasks, Knowledges, skills or abilities (KSAs), job analysis methodologies used elsewhere, etc.)

\_\_\_\_\_ Recruitment activities (advertising in electronic magazines, posting of job announcements, setting up an organization homepage, etc.)

\_\_\_\_\_ Selection activities (receiving electronic resumes, contacting applicants via e-mail messages, obtaining information regarding written tests, setting up interview schedules, etc.)

\_\_\_\_\_ EEO and Affirmative Action (targeted advertising, accessing government EEO information and requirements, etc.)



- \_\_\_\_\_ Compensation Management (obtaining cost of living data, salary figures, merit pay procedures, etc.)
- \_\_\_\_\_ Training and Development (Finding training consultants, finding training materials, finding information on training topics, schedules, etc.)
- \_\_\_\_\_ Performance Appraisal (finding and comparing different appraisal forms, researching literature on topic, etc.)
- \_\_\_\_\_ Labor\Management Relations (accessing information relevant to collective bargaining legislation, bargaining procedures, laws, etc.)
- \_\_\_\_\_ Human Resource Planning (obtaining information regarding establishing a skills inventory, position forecasting, setting up career ladders, etc.)
- \_\_\_\_\_ Downsizing (obtaining information about downsizing options, procedures, costs\benefits, etc.)
- \_\_\_\_\_ Legal (researching current status of laws, guidelines, regulations and court cases as they apply to HRM functions)

21. Does your organization **provide training** on the use of the **Internet**?  
 \_\_\_\_\_ Yes                      \_\_\_\_\_ No                      \_\_\_\_\_ don't know
22. If your organization does **provide training** on the use of the Internet, about **how often** is this training being conducted?  
 \_\_\_\_\_ at least monthly                      \_\_\_\_\_ as requested only  
 \_\_\_\_\_ at least quarterly                      \_\_\_\_\_ rarely (less than once a year)  
 \_\_\_\_\_ at least annually


**Management Related Questions**


23. In your opinion, what is the approximate **dollar amount** of the company budget used for human resource information system (HRIS)?
- |                            |                                |
|----------------------------|--------------------------------|
| _____ Less than \$5,000    | _____ \$100,001 - \$500,000    |
| _____ \$5,000 - \$10,000   | _____ \$500,001 - \$1,000,000  |
| _____ \$10,001 - \$30,000  | _____ Greater than \$1,000,000 |
| _____ \$30,001 - \$100,000 |                                |
24. How would you rate **top management support** of the human resource information systems (HRIS) within your department?
- |                     |                   |
|---------------------|-------------------|
| a. Strong support   | c. Little support |
| b. Moderate support | d. No support     |
25. The information systems (IS) in your department are **managed by**
- a. IS specialists in your department
  - b. Internal MIS department experts
  - c. Outside Consultants

26. We are interested to know about the extent to which you enjoy **freedom of decision making** in the area of **using computers in your HRM functions**. On the scale of 1 -10 below , with one being absolutely no discretion on your part in decision making and 10 being absolute freedom on your part to do whatever you like, please circle the number that best represents higher management control over your decision making in using computers in your HRM functions.

1 2 3 4 5 6 7 8 9 10

27. Using the scale below with one representing absolutely no **delegation on your part to subordinates** and 10 representing their complete freedom to do what they like in the area of **HRM computer applications**, rate the extent to which you delegate decision making in this HRM area.

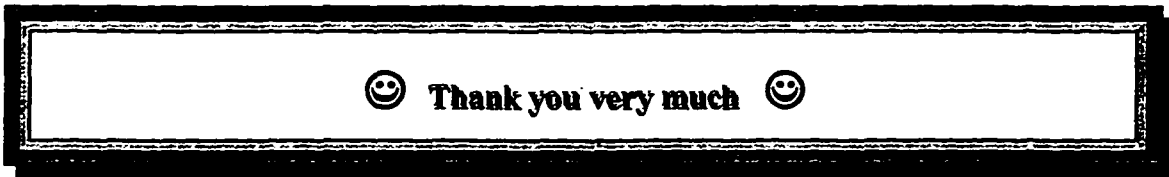
1 2 3 4 5 6 7 8 9 10

28. Finally, would you like to make any **overall comments on the use of computers and/or the Internet** to gain information on HRM functions on make your HRM functions run more smoothly.

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**APPENDIX D**  
**CODES FOR THE QUESTIONNAIRE**

## Codes for the Questionnaire

**Name :** PU# & PR# = Key name or Identification  
**Res :** Yes/No = Want the result

## Organization's Primary Business Concern

**TYPE :** GOV = Government  
 BUS = Business

## Title of Your Current Position

**POSIT :** VP = Sr. Vice President, Vice President, or Commissioner  
 MGR = Manager, Director, or State secretary  
 SPEC = Specialist, Analyst, Consultant, or Advisor  
 OFF = Officer, Sr. Administrator, or Administrator,  
 ASST = HR Assistant, Administrative Assistant, or Secretary

1. Please briefly describe your major duties:

**\*\*Descriptive Analysis\*\***

2. Please specify size of Organization (check the box below which best describes your size)

**SIZE :** 1 = Less than 100 employees  
 2 = 100 - 500 employees  
 3 = 500 - 1000 employees  
 4 = 1000 - 3000 employees  
 5 = 3000 - 10000 employees  
 6 = Greater than 10000 employees

3. Please look at the list of items below that people generally feel motivate them to work. Then, rank this list placing a "1" by the item you feel is your most important motivator, a "2" beside the 2nd most important motivator, and so on until all 7 items are ranked.

**PAY :** 1-8 = Pay (Salary & Benefits)  
**CHA :** 1-8 = Chances for promotion  
**OFF :** 1-8 = Office environment  
**SOC :** 1-8 = Social contract  
**JOB :** 1-8 = Job security  
**CHL :** 1-8 = Challenging position  
**INT :** 1-8 = Interest in task itself

4. Approximately how many employees work in your department?

**DEMP :**        #        =        **Number of Employees in the department**

5. Which of the following statements best characterizes the type of management employees working in your department:

**EDUCAT :**    1        =        **most have at least a high school diploma**  
                   2        =        **most have at least some college**  
                   3        =        **most have a college degree**  
                   4        =        **most have a graduate degree**

6. Do you have a Human Resource Information System (HRIS) specialist in your department?

**HRIS :**        1        =        **Yes**  
                   2        =        **No**

7. If your employees have problems with miscellaneous computer tasks, how are they resolved?

**RES OL:**      1        =        **Consult the HRIS specialist in your department**  
                   2        =        **Request assistance from an MIS department within the company**  
                   3        =        **Call outside consultant**  
                   4        =        **All of the above**  
                   5        =        **1 & 2**  
                   6        =        **2 & 3**

8. Is computer training provided by your organization to its employees?

**COMTRN :**    1        =        **Yes**  
                   0        =        **No, Don't know**

9. If computer training is provided, about how often does it take place?

**FETRN:**       0        =        **No answer**  
                   1        =        **at least monthly**  
                   2        =        **at least quarterly**  
                   3        =        **at least annually**  
                   4        =        **as requested**  
                   5        =        **rarely (less than once per year)**

10. What type of the computer system is used in your company? (You may answer more than one)

**COMTY :**    **1**    **=**    **Workstations**  
               **2**    **=**    **Mainframe and PCs**  
               **3**    **=**    **Minicomputer and PCs**  
               **4**    **=**    **Microcomputer and PCs**  
               **5**    **=**    **Combination of the three large systems and PCs**

11. How many individual computers do you have in your department?

**NUMPC :**    **#**    **=**    **Number of Individual Computers**

12. When was the last time that your computer system was upgraded or changed?

**UPGRAD :**    **#**    **=**    **Number of Years**

13. Please specify all applications available on your computer.

**WIND :**        **=**    **Windows**  
**WORD :**        **=**    **Word Processing**  
**GRAP :**        **=**    **Graphics**  
**STAT :**        **=**    **Statistics**  
**UTIL :**        **=**    **Utility Programs**  
**DOS :**         **=**    **Disk Operation System (DOS)**  
**SPRE :**        **=**    **Spreadsheet**  
**TELE :**        **=**    **Telecommunications**  
**DBASE :**       **=**    **Database**

14. Is your department's computer system linked with other computer systems? (You may answer more than one)

**LINK :**        **0**    **=**    **Does not link to any other systems either within or without the department**  
                   **1**    **=**    **Links to the company network only**  
                   **2**    **=**    **Links to the Internet or other networks**

15. Today many organizations are making use of computers and computer software to enable them to more efficiently perform Human Resource Management activities. Does your organization use computer software in the area of HRM?

**HRMACT :**    **1**    **=**    **Yes**  
                   **2**    **=**    **No**  
                   **3**    **=**    **Don't know**

16. If you answered "yes" to question number 15, could you take a moment and consider the list of HRM activities below and use the following scale to select the number that best describes your **organization's involvement with computer software** in each area. (If you answered "no" proceed on to question number 19.)

- 1 = This function is mainly computerized and I am satisfied with the results thus far.  
 2 = This function is mainly computerized but I am not satisfied with the results thus far.  
 3 = Only a few aspects of this function have been computerized.  
 4 = None of the aspects of this function have been computerized.  
 5 = I have no information with which to evaluate this area.

<b>JOB :</b>	=	<b>Job Analysis</b>
<b>REC :</b>	=	<b>Recruitment</b>
<b>SEL :</b>	=	<b>Selection</b>
<b>PER :</b>	=	<b>Performance Appraisal</b>
<b>LAB :</b>	=	<b>Labor\Management Relations</b>
<b>HUM :</b>	=	<b>Human Resource Planning</b>
<b>DOW :</b>	=	<b>Downsizing</b>
<b>LEG :</b>	=	<b>Legal</b>
<b>COM :</b>	=	<b>Compensation Management</b>
<b>POS :</b>	=	<b>Position Classification</b>
<b>EVA :</b>	=	<b>Job Evaluation</b>

17. Could you please check the box below that best describes your employees' level of preparation (computer literacy) to deal with the HRM applications they are expected to perform:

<b>PREP :</b>	<b>0</b>	=	<b>My employees are inadequately prepared and need additional training</b>
	<b>0</b>	=	<b>My employees are totally unprepared in this area</b>
	<b>0</b>	=	<b>I have no information with which to evaluate this area.</b>
	<b>1</b>	=	<b>My employees are adequately prepared, but need constant updates</b>
	<b>2</b>	=	<b>My employees are well prepared for their computer related tasks</b>

18. In the hiring process, which of the following statements best describes your ability to obtain HRM professionals with the computer skills you are recruiting:

<b>HIRE :</b>	<b>0</b>	=	<b>I have no information with which to evaluate this area.</b>
	<b>0</b>	=	<b>Hiring individuals with the computer skills we need is a major problem.</b>
	<b>1</b>	=	<b>Hiring individuals with the computer skills we need is a minor problem.</b>
	<b>2</b>	=	<b>Hiring individuals with the computer skills we need has been no problem.</b>

\* If you have used the Internet to obtain information for your organization, please answer the following group of questions. If your organization does not have Internet access please go on down to question number 23 .

19. What applications do you use for Internet access? (You may answer more than one).

<b>ONL :</b>	=	<b>On-line Services</b>
<b>MOS :</b>	=	<b>Mosaic</b>
<b>EMI :</b>	=	<b>E-mail</b>
<b>GOP :</b>	=	<b>Gopher</b>
<b>NET :</b>	=	<b>Netscape Navigator</b>
<b>FTP :</b>	=	<b>File Transfer Protocol (FTP)</b>
<b>NEW :</b>	=	<b>News Groups (Tin, Usenet)</b>
<b>OTH :</b>	=	<b>Text</b>

\* Some organizations have found the information on the Internet to be very useful to them as they do research and make decisions in the area of HRM. Other organizations have found the Internet of very little use, and many organizations have never really attempted to use the Internet to gather information for HRM research and decision making.

20. Please look at the list of HRM functions and activities and use the number on the scale below which best describes **your own experience** with the Internet as it applies to the following areas:

1. The information on the Internet has been very useful in several areas.
2. The information on the Internet has been very useful in one or two areas.
3. The information on the Internet has **not** been very useful when I have attempted to obtain and use it.
4. I have never really tried to use the Internet to obtain this type information

<b>JOB :</b>	=	<b><u>Job Analysis</u> (accessing information on job tasks, Knowledges, skills or abilities (KSAs), job analysis methodologies used elsewhere, etc.)</b>
<b>REC :</b>	=	<b><u>Recruitment activities</u> (advertising in electronic magazines, posting of job announcements, setting up an organization homepage, etc.)</b>
<b>SEL :</b>	=	<b><u>Selection activities</u> (receiving electronic resumes, contacting applicants via e-mail messages, obtaining information regarding written tests, setting up interview schedules, etc.)</b>
<b>EEO :</b>	=	<b><u>EEO and Affirmative Action</u> (targeted advertising, accessing government EEO information and requirements, etc.)</b>
<b>2COM</b>	=	<b><u>Compensation Management</u> (obtaining cost of living data, salary figures, merit pay procedures, etc.)</b>
<b>TRA :</b>	=	<b><u>Training and Development</u> (Finding training consultants, finding training materials, finding information on training topics, schedules, etc.)</b>
<b>PER :</b>	=	<b><u>Performance Appraisal</u> (finding and comparing different</b>



<b>LAB :</b>	=	<b>appraisal forms, researching literature on topic, etc.)</b> <b><u>Labor\Management Relations</u></b> (accessing information relevant to collective bargaining legislation, bargaining procedures, laws, etc.)
<b>HUM :</b>	=	<b><u>Human Resource Planning</u></b> (obtaining information regarding establishing a skills inventory, position forecasting, setting up career ladders, etc.)
<b>DOW :</b>	=	<b><u>Downsizing</u></b> (obtaining information about downsizing options, procedures, costs\benefits, etc.)
<b>LEG :</b>	=	<b><u>Legal</u></b> (researching current status of laws, guidelines, regulations and court cases as they apply to HRM functions)

21. Does your organization provide training on the use of the Internet?

<b>TRNI :</b>	<b>1</b>	=	<b>Yes</b>
	<b>0</b>	=	<b>No, Don't know</b>

22. If your organization does provide training on the use of the Internet, about how often is this training being conducted?

<b>FETRNI :</b>	<b>0</b>	=	<b>Never</b>
	<b>1</b>	=	<b>at least monthly</b>
	<b>2</b>	=	<b>at least quarterly</b>
	<b>3</b>	=	<b>at least annually</b>
	<b>4</b>	=	<b>as requested only</b>
	<b>5</b>	=	<b>rarely (less than once a year)</b>

23. In your opinion, what is the approximate dollar amount of the company budget used for human resource information system (HRIS)?

<b>BUDG :</b>	<b>1</b>	=	<b>Less than \$5,000</b>
	<b>2</b>	=	<b>\$5,000 - \$10,000</b>
	<b>3</b>	=	<b>\$10,001 - \$30,000</b>
	<b>4</b>	=	<b>\$30,001 - \$100,000</b>
	<b>5</b>	=	<b>\$100,001 - \$500,000</b>
	<b>6</b>	=	<b>\$500,001 - \$1,000,000</b>
	<b>7</b>	=	<b>Greater than \$1,000,000</b>
	<b>8</b>	=	<b>Don't know</b>

24. How would you rate top management support of the human resource information systems (HRIS) within your department?

<b>SUPPORT :</b>	<b>0</b>	=	<b>No idea</b>
	<b>1</b>	=	<b>Strong support</b>
	<b>2</b>	=	<b>Moderate support</b>
	<b>3</b>	=	<b>Little support</b>
	<b>4</b>	=	<b>No support</b>

25. The information systems (IS) in your department are managed by

<b>ISMGT :</b>	<b>1</b>	<b>=</b>	<b>IS specialists in your department</b>
	<b>2</b>	<b>=</b>	<b>Internal MIS department experts</b>
	<b>3</b>	<b>=</b>	<b>Outside Consultants</b>
	<b>4</b>	<b>=</b>	<b>1 &amp; 2</b>
	<b>5</b>	<b>=</b>	<b>2 &amp; 3</b>
	<b>6</b>	<b>=</b>	<b>All of the above</b>

26. We are interested to know about the extent to which you enjoy freedom of decision making in the area of using computers in your HRM functions. On the scale of 1 -10 below , with one being absolutely no discretion on your part in decision making and 10 being absolute freedom on your part to do whatever you like, please circle the number that best represents higher management control over your decision making in using computers in your HRM functions.

**DECI :**      **1 2 3 4 5 6 7 8 9 10**      **= Range of Decision Making**

27. Using the scale below with one representing absolutely no delegation on your part to subordinates and 10 representing their complete freedom to do what they like in the area of HRM computer applications, rate the extent to which you delegate decision making in this HRM area.

**DELE :**      **1 2 3 4 5 6 7 8 9 10**      **= Range of Delegation**

28. Finally, would you like to make any overall comments on the use of computers and/or the Internet to gain information on HRM functions on make your HRM functions run more smoothly.

**APPENDIX E**  
**STATISTICS TEST OUTPUT**

**Statistics test the differences between public and private sectors**

21:57 Wednesday, October 22, 1997

Variable	N	Mean	Std Dev	Minimum	Maximum
SIZE	154	4.7922078	1.1863897	1.0000000	6.0000000
DEMP	154	188.7077922	711.0829073	2.0000000	5500.00
EDUCAT	154	2.8116883	0.5915470	1.0000000	4.0000000
HRIS	154	0.5909091	0.4932702	0	1.0000000
RESOL	154	2.2857143	1.6398401	1.0000000	8.0000000
COMTRN	154	0.9155844	0.2789171	0	1.0000000
FETRNI	154	3.0194805	1.5015059	0	5.0000000
COMTY	154	3.7727273	1.1800229	1.0000000	5.0000000
NUMPC	154	139.0324675	451.2256427	2.0000000	4000.00
UPGRAD	154	1.9318182	2.7272938	0.5000000	20.0000000
LINK	154	1.6623377	0.5141244	0	2.0000000
HRMACT	154	1.2792208	0.5300975	1.0000000	3.0000000
PREP	154	0.7922078	0.7110273	0	2.0000000
HIRE	154	0.7467532	0.7801599	0	2.0000000
TRNI	154	0.3181818	0.4672901	0	1.0000000
FETRNI	154	1.0194805	1.6268610	0	4.0000000
BUDG	154	4.7142857	2.0055944	1.0000000	8.0000000
SUPPORT	154	2.3116883	0.6717403	0	3.0000000
ISMGT	154	1.9870130	1.0352418	1.0000000	6.0000000
DECI	154	6.2402597	2.3123855	1.0000000	10.0000000
DELE	154	5.8961039	2.4499402	1.0000000	10.0000000

**TTEST PROCEDURE****Variable: SIZE**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	5.00000000	0.85839508	0.09782320	1.00000000	6.00000000
GOV	77	4.58441558	1.41747226	0.16153596	1.00000000	6.00000000

Variances	T	DF	Prob> T
Unequal	2.2006	125.1	0.0296
Equal	2.2006	152.0	0.0293

For H0: Variances are equal,  $F' = 2.73$  DF = (76,76) Prob>F' = 0.0000

\*\*\*\*\*

**Variable: DEMP**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	28.7922078	59.0272768	6.7267825	2.00000000	500.000000
GOV	77	348.6233766	981.1359560	111.8108191	2.00000000	5500.000000

Variances	T	DF	Prob> T
Unequal	-2.8553	76.6	0.0055
Equal	-2.8553	152.0	0.0049

For H0: Variances are equal,  $F' = 276.28$  DF = (76,76) Prob>F' = 0.0000

\*\*\*\*\*

**Variable: EDUCAT**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	2.89610390	0.55213499	0.06292162	1.00000000	4.00000000
GOV	77	2.72727273	0.62061861	0.07072606	1.00000000	4.00000000

Variiances	T	DF	Prob> T
------------	---	----	---------

Unequal	1.7835	150.0	0.0765
Equal	1.7835	152.0	0.0765

For H0: Variances are equal,  $F' = 1.26$  DF = (76,76) Prob>F' = 0.3102

\*\*\*\*\*

**Variable: HRIS**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	0.62337662	0.48771651	0.05558045	0	1.00000000
GOV	77	0.55844156	0.49982909	0.05696081	0	1.00000000

Variiances	T	DF	Prob> T
------------	---	----	---------

Unequal	0.8159	151.9	0.4158
Equal	0.8159	152.0	0.4158

For H0: Variances are equal,  $F' = 1.05$  DF = (76,76) Prob>F' = 0.8312

\*\*\*\*\*

**Variable: RESOL**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	2.24675325	1.42492700	0.16238550	1.00000000	8.00000000
GOV	77	2.32467532	1.83848878	0.20951524	1.00000000	8.00000000

Variiances	T	DF	Prob> T
------------	---	----	---------

Unequal	-0.2940	143.1	0.7692
Equal	-0.2940	152.0	0.7692

For H0: Variances are equal,  $F' = 1.66$  DF = (76,76) Prob>F' = 0.0276

**Variable: COMTRN**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	0.88311688	0.32338774	0.03685345	0	1.00000000
GOV	77	0.94805195	0.22337742	0.02545622	0	1.00000000

Variances	T	DF	Prob> T
Unequal	-1.4497	135.1	0.1494
Equal	-1.4497	152.0	0.1492

For H0: Variances are equal,  $F' = 2.10$  DF = (76,76) Prob>F' = 0.0015

\*\*\*\*\*

**Variable: FETRN**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	2.75324675	1.59897866	0.18222053	0	5.00000000
GOV	77	3.28571429	1.35585614	0.15451415	0	5.00000000

Variances	T	DF	Prob> T
Unequal	-2.2287	148.0	0.0273
Equal	-2.2287	152.0	0.0273

For H0: Variances are equal,  $F' = 1.39$  DF = (76,76) Prob>F' = 0.1527

\*\*\*\*\*

**Variable: COMTY**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	3.40259740	1.32048377	0.15048309	1.00000000	5.00000000
GOV	77	4.14285714	0.88428213	0.10077330	1.00000000	5.00000000

Variances	T	DF	Prob> T
Unequal	-4.0874	132.8	0.0001
Equal	-4.0874	152.0	0.0001

For H0: Variances are equal,  $F' = 2.23$  DF = (76,76) Prob>F' = 0.0006

**Variable: NUMPC**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	27.6753247	59.1582271	6.74170566	2.00000000	500.000000
GOV	77	250.3896104	617.4636183	70.36650988	4.00000000	4000.000000

Variances	T	DF	Prob> T
Unequal	-3.1506	77.4	0.0023
Equal	-3.1506	152.0	0.0020

For H0: Variances are equal,  $F' = 108.94$  DF = (76,76) Prob>F' = 0.0000

\*\*\*\*\*

**Variable: UPGRAD**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	1.61688312	2.31967571	0.26435158	0.50000000	15.00000000
GOV	77	2.24675325	3.06467927	0.34925262	0.50000000	20.00000000

Variances	T	DF	Prob> T
Unequal	-1.4380	141.6	0.1526
Equal	-1.4380	152.0	0.1525

For H0: Variances are equal,  $F' = 1.75$  DF = (76,76) Prob>F' = 0.0162

\*\*\*\*\*

**Variable: LINK**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	1.49350649	0.57636284	0.06568264	0.00000E+00	2.00000000
GOV	77	1.83116883	0.37705917	0.04296988	1.00000E+00	2.00000000

Variances	T	DF	Prob> T
Unequal	-4.3020	131.0	0.0001
Equal	-4.3020	152.0	0.0000

For H0: Variances are equal,  $F' = 2.34$  DF = (76,76) Prob>F' = 0.0003



**Variable: HRMACT**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	1.23376623	0.51031734	0.05815606	1.00000000	3.00000000
GOV	77	1.32467532	0.54872000	0.06253245	1.00000000	3.00000000

Variances	T	DF	Prob> T
Unequal	-1.0646	151.2	0.2888
Equal	-1.0646	152.0	0.2888

For H0: Variances are equal,  $F' = 1.16$  DF = (76,76) Prob>F' = 0.5286

\*\*\*\*\*

**Variable: PREP**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	0.94805195	0.70517082	0.08036167	0	2.00000000
GOV	77	0.63636364	0.68650700	0.07823473	0	2.00000000

Variances	T	DF	Prob> T
Unequal	2.7791	151.9	0.0061
Equal	2.7791	152.0	0.0061

For H0: Variances are equal,  $F' = 1.06$  DF = (76,76) Prob>F' = 0.8157

\*\*\*\*\*

**Variable: HIRE**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	0.97402597	0.79428925	0.09051766	0	2.00000000
GOV	77	0.51948052	0.69981933	0.07975181	0	2.00000000

Variances	T	DF	Prob> T
Unequal	3.7678	149.6	0.0002
Equal	3.7678	152.0	0.0002

For H0: Variances are equal,  $F' = 1.29$  DF = (76,76) Prob>F' = 0.2719

**Variable: TRNI**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	0.20779221	0.40838779	0.04654011	0	1.00000000
GOV	77	0.42857143	0.49811675	0.05676567	0	1.00000000

Variiances	T	DF	Prob> T
Unequal	-3.0077	146.4	0.0031
Equal	-3.0077	152.0	0.0031

For H0: Variances are equal,  $F' = 1.49$  DF = (76,76) Prob>F' = 0.0854

\*\*\*\*\*

**Variable: FETRNI**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	0.53246753	1.22027192	0.13906289	0	4.00000000
GOV	77	1.50649351	1.83262378	0.20884686	0	4.00000000

Variiances	T	DF	Prob> T
Unequal	-3.8820	132.3	0.0002
Equal	-3.8820	152.0	0.0002

For H0: Variances are equal,  $F' = 2.26$  DF = (76,76) Prob>F' = 0.0005

\*\*\*\*\*

**Variable: BUDG**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	4.76623377	2.01243571	0.22933833	1.00000000	8.00000000
GOV	77	4.66233766	2.01056675	0.22912535	1.00000000	8.00000000

Variiances	T	DF	Prob> T
Unequal	0.3205	152.0	0.7490
Equal	0.3205	152.0	0.7490

For H0: Variances are equal,  $F' = 1.00$  DF = (76,76) Prob>F' = 0.9936

**Variable: SUPORT**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	2.20779221	0.69467263	0.07916529	1.00000E+00	3.00000000
GOV	77	2.41558442	0.63558198	0.07243129	0.00000E+00	3.00000000

Variances	T	DF	Prob> T
Unequal	-1.9365	150.8	0.0547
Equal	-1.9365	152.0	0.0547

For H0: Variances are equal,  $F' = 1.19$  DF = (76,76) Prob>F' = 0.4401

\*\*\*\*\*

**Variable: DECI**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	6.59740260	2.37453453	0.27060332	1.00000000	10.00000000
GOV	77	5.88311688	2.20629498	0.25143065	1.00000000	10.00000000

Variances	T	DF	Prob> T
Unequal	1.9337	151.2	0.0550
Equal	1.9337	152.0	0.0550

For H0: Variances are equal,  $F' = 1.16$  DF = (76,76) Prob>F' = 0.5233

\*\*\*\*\*

**Variable: DELE**

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	5.75324675	2.37395874	0.27053771	1.00000000	10.00000000
GOV	77	6.03896104	2.53107819	0.28844313	1.00000000	10.00000000

Variances	T	DF	Prob> T
Unequal	-0.7225	151.4	0.4711
Equal	-0.7225	152.0	0.4711

For H0: Variances are equal,  $F' = 1.14$  DF = (76,76) Prob>F' = 0.5778

**Variable: SATIS**

Variable	N	Mean	Std Dev	Minimum	Maximum
GOV	11	76.4545455	11.4574311	63.0000000	100.0000000
BUS	11	73.0909091	8.4315425	63.0000000	89.0000000

Analysis Variable : DIFF

N	Mean	Std Error	T	Prob> T
11	3.3636364	2.9795446	1.1289096	0.2853

\*\*\*\*\*

**Variable: DIFF** (The ratio of the number of employees and the number of PCs in public and private HR departments).

TYPE	N	Mean	Std Dev	Std Error	Minimum	Maximum
BUS	77	1.14618897	0.53669445	0.06116201	0.19354839	4.00000000
GOV	77	2.17542415	5.69770044	0.64931323	0.01560284	44.00000000

Variances	T	DF	Prob> T
Unequal	-1.5781	77.3	0.1186
Equal	-1.5781	152.0	0.1166

For H0: Variances are equal,  $F' = 112.71$  DF = (76,76) Prob>F' = 0.0000

**Chisquare Test Results: Differences between Public and Private Sectors****Type by Size**

Statistic	DF	Value	Prob
Chi-Square	5	26.456	0.001
Likelihood Ratio Chi-Square	5	30.174	0.001
Mantel-Haenszel Chi-Square	1	4.724	0.030
Phi Coefficient		0.414	
Contingency Coefficient		0.383	
Cramer's V		0.414	

Sample Size = 154

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY EDUCAT**

Statistic	DF	Value	Prob
Chi-Square	3	5.722	0.126
Likelihood Ratio Chi-Square	3	5.836	0.120
Mantel-Haenszel Chi-Square	1	3.136	0.077
Phi Coefficient		0.193	
Contingency Coefficient		0.189	
Cramer's V		0.193	

Sample Size = 154

WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY HRIS**

Statistic	DF	Value	Prob
Chi-Square	1	0.672	0.413
Likelihood Ratio Chi-Square	1	0.672	0.412
Continuity Adj. Chi-Square	1	0.430	0.512
Mantel-Haenszel Chi-Square	1	0.667	0.414
Fisher's Exact Test (Left)		0.256	
(Right)		0.837	
(2-Tail)		0.512	
Phi Coefficient		-0.066	
Contingency Coefficient		0.066	
Cramer's V		-0.066	
Sample Size = 154			

**TYPE BY RESOL**

Statistic	DF	Value	Prob
Chi-Square	7	14.596	0.042
Likelihood Ratio Chi-Square	7	18.126	0.011
Mantel-Haenszel Chi-Square	1	0.087	0.768
Phi Coefficient		0.308	
Contingency Coefficient		0.294	
Cramer's V		0.308	

Sample Size = 154

WARNING: 63% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY COMTRN**

Statistic	DF	Value	Prob
Chi-Square	1	2.100	0.147
Likelihood Ratio Chi-Square	1	2.151	0.142
Continuity Adj. Chi-Square	1	1.344	0.246
Mantel-Haenszel Chi-Square	1	2.087	0.149
Fisher's Exact Test (Left)		0.961	
(Right)		0.123	
(2-Tail)		0.246	
Phi Coefficient		0.117	
Contingency Coefficient		0.116	
Cramer's V		0.117	
Sample Size = 154			

**TYPE BY FETRN**

Statistic	DF	Value	Prob
Chi-Square	5	7.744	0.171
Likelihood Ratio Chi-Square	5	7.923	0.161
Mantel-Haenszel Chi-Square	1	4.842	0.028
Phi Coefficient		0.224	
Contingency Coefficient		0.219	
Cramer's V		0.224	
Sample Size = 154			

**TYPE BY COMTY**

Statistic	DF	Value	Prob
Chi-Square	4	16.454	0.002
Likelihood Ratio Chi-Square	4	17.380	0.002
Mantel-Haenszel Chi-Square	1	15.151	0.001
Phi Coefficient		0.327	
Contingency Coefficient		0.311	
Cramer's V		0.327	

Sample Size = 154

WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY LINK**

Statistic	DF	Value	Prob
Chi-Square	2	16.734	0.001
Likelihood Ratio Chi-Square	2	18.231	0.001
Mantel-Haenszel Chi-Square	1	16.607	0.001
Phi Coefficient		0.330	
Contingency Coefficient		0.313	
Cramer's V		0.330	

Sample Size = 154

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.



**TYPE BY HRMACT**

Statistic	DF	Value	Prob
Chi-Square	2	1.999	0.368
Likelihood Ratio Chi-Square	2	2.013	0.365
Mantel-Haenszel Chi-Square	1	1.132	0.287
Phi Coefficient		0.114	
Contingency Coefficient		0.113	
Cramer's V		0.114	

Sample Size = 154

WARNING: 33% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY PREP**

Statistic	DF	Value	Prob
Chi-Square	2	7.790	0.020
Likelihood Ratio Chi-Square	2	7.890	0.019
Mantel-Haenszel Chi-Square	1	7.398	0.007
Phi Coefficient		0.225	
Contingency Coefficient		0.219	
Cramer's V		0.225	

Sample Size = 154

**TYPE BY HIRE**

Statistic	DF	Value	Prob
Chi-Square	2	13.297	0.001
Likelihood Ratio Chi-Square	2	13.606	0.001
Mantel-Haenszel Chi-Square	1	13.069	0.001
Phi Coefficient		0.294	
Contingency Coefficient		0.282	
Cramer's V		0.294	
Sample Size = 154			

**TYPE BY TRNI**

Statistic	DF	Value	Prob
Chi-Square	1	8.650	0.003
Likelihood Ratio Chi-Square	1	8.787	0.003
Continuity Adj. Chi-Square	1	7.663	0.006
Mantel-Haenszel Chi-Square	1	8.594	0.003
Fisher's Exact Test (Left)		0.999	
(Right)		2.68E-03	
(2-Tail)		5.36E-03	
Phi Coefficient		0.237	
Contingency Coefficient		0.231	
Cramer's V		0.237	
Sample Size = 154			

**TYPE BY FETRNI**

Statistic	DF	Value	Prob
Chi-Square	4	18.190	0.001
Likelihood Ratio Chi-Square	4	19.310	0.001
Mantel-Haenszel Chi-Square	1	13.801	0.001
Phi Coefficient		0.344	
Contingency Coefficient		0.325	
Cramer's V		0.344	

Sample Size = 154

WARNING: 60% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY BUDG**

Statistic	DF	Value	Prob
Chi-Square	7	14.412	0.044
Likelihood Ratio Chi-Square	7	14.760	0.039
Mantel-Haenszel Chi-Square	1	0.103	0.748
Phi Coefficient		0.306	
Contingency Coefficient		0.293	
Cramer's V		0.306	

Sample Size = 154

**TYPE BY SUPORT**

Statistic	DF	Value	Prob
Chi-Square	3	7.660	0.054
Likelihood Ratio Chi-Square	3	8.433	0.038
Mantel-Haenszel Chi-Square	1	3.684	0.055
Phi Coefficient		0.223	
Contingency Coefficient		0.218	
Cramer's V		0.223	

Sample Size = 154

WARNING: 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY DECI**

Statistic	DF	Value	Prob
Chi-Square	9	10.466	0.314
Likelihood Ratio Chi-Square	9	10.711	0.296
Mantel-Haenszel Chi-Square	1	3.674	0.055
Phi Coefficient		0.261	
Contingency Coefficient		0.252	
Cramer's V		0.261	

Sample Size = 154

WARNING: 40% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY DELE**

Statistic	DF	Value	Prob
Chi-Square	9	8.525	0.482
Likelihood Ratio Chi-Square	9	8.679	0.467
Mantel-Haenszel Chi-Square	1	0.524	0.469
Phi Coefficient		0.235	
Contingency Coefficient		0.229	
Cramer's V		0.235	
Sample Size = 154			

**TYPE BY WIND**

Statistic	DF	Value	Prob
Chi-Square	1	2.775	0.096
Likelihood Ratio Chi-Square	1	3.019	0.082
Continuity Adj. Chi-Square	1	1.561	0.212
Mantel-Haenszel Chi-Square	1	2.757	0.097
Fisher's Exact Test (Left)		0.105	
(Right)		0.986	
(2-Tail)		0.209	
Phi Coefficient		-0.134	
Contingency Coefficient		0.133	
Cramer's V		-0.134	

Sample Size = 154

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY WORD**

Statistic	DF	Value	Prob
Chi-Square	1	1.007	0.316
Likelihood Ratio Chi-Square	1	1.393	0.238
Continuity Adj. Chi-Square	1	0.000	1.000
Mantel-Haenszel Chi-Square	1	1.000	0.317
Fisher's Exact Test (Left)		1.000	
(Right)		0.500	
(2-Tail)		1.000	
Phi Coefficient		0.081	
Contingency Coefficient		0.081	
Cramer's V		0.081	

Sample Size = 154

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY GRAP**

Statistic	DF	Value	Prob
Chi-Square	1	0.631	0.427
Likelihood Ratio Chi-Square	1	0.632	0.426
Continuity Adj. Chi-Square	1	0.355	0.551
Mantel-Haenszel Chi-Square	1	0.627	0.428
Fisher's Exact Test (Left)		0.840	
(Right)		0.276	
(2-Tail)		0.552	
Phi Coefficient		0.064	
Contingency Coefficient		0.064	
Cramer's V		0.064	
Sample Size = 154			

**TYPE BY STAT**

Statistic	DF	Value	Prob
Chi-Square	1	14.535	0.001
Likelihood Ratio Chi-Square	1	14.832	0.001
Continuity Adj. Chi-Square	1	13.298	0.001
Mantel-Haenszel Chi-Square	1	14.440	0.001
Fisher's Exact Test (Left)		1.000	
(Right)		1.18E-04	
(2-Tail)		2.35E-04	
Phi Coefficient		0.307	
Contingency Coefficient		0.294	
Cramer's V		0.307	
Sample Size = 154			





**TYPE BY SPRE**

Statistic	DF	Value	Prob
Chi-Square	1	4.107	0.043
Likelihood Ratio Chi-Square	1	5.652	0.017
Continuity Adj. Chi-Square	1	2.310	0.129
Mantel-Haenszel Chi-Square	1	4.080	0.043
Fisher's Exact Test (Left)		0.060	
(Right)		1.000	
(2-Tail)		0.120	
Phi Coefficient		-0.163	
Contingency Coefficient		0.161	
Cramer's V		-0.163	

Sample Size = 154

WARNING: 50% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

**TYPE BY TELE**

Statistic	DF	Value	Prob
Chi-Square	1	2.543	0.111
Likelihood Ratio Chi-Square	1	2.556	0.110
Continuity Adj. Chi-Square	1	2.009	0.156
Mantel-Haenszel Chi-Square	1	2.527	0.112
Fisher's Exact Test (Left)		0.962	
(Right)		0.078	
(2-Tail)		0.156	
Phi Coefficient		0.129	
Contingency Coefficient		0.127	
Cramer's V		0.129	

Sample Size = 154

**TYPE BY DBASE**

Statistic	DF	Value	Prob
Chi-Square	1	2.504	0.114
Likelihood Ratio Chi-Square	1	2.539	0.111
Continuity Adj. Chi-Square	1	1.840	0.175
Mantel-Haenszel Chi-Square	1	2.488	0.115
Fisher's Exact Test (Left)		0.966	
(Right)		0.087	
(2-Tail)		0.174	
Phi Coefficient		0.128	
Contingency Coefficient		0.127	
Cramer's V		0.128	
Sample Size = 154			