Historical Evolution of Human Resource Information System (HRIS): An Interface between HR and Computer Technology

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Abstract   Human resources (HR) are the key success factor of any organization operating in the 21st century. From the beginning till today, they have been playing vital role to boost up organizations' competitive capabilities for enjoying competitive advantage and superior profitability over rivals. As today's business environment is more vulnerable due to intense market competition and higher employee empowerment. Organizations have been using information technology for achieving efficiency in human resource management. Thus, it is need for HR professionals to get a clear picture about the historical development of HRM and the increasing role of information technology there in. Consequently, the study tried to analyze critically about evolving human resource information system (HRIS) as a comparatively new technology in HRM. To gratify the stated need, this study analyzed the historical data collected from different published and unpublished sources. The study found that HRIS emerged in the low-cost era (1980-90) and the roles of HR professionals transformed from traditional administrative to more strategic roles during the high-tech era (from 1990).

Keywords   Human Resource Management (HRM), Computer technology, Interface, Historical evolution

1. Introduction

With the increasing development in technology in the recent years, it is possible to create a real-time information-based, self-service, and interactive work environment. Employee Information Systems have developed from the automated employee record keeping in the 1960s into more complex reporting and decision systems [1]. The last decade observed a remarkable increase in the number of organizations acquiring, storing and analyzing and using human resources data with the help of Human Resource Information Systems (HRIS) [2-5]. Given the authority and relevant accessible information for decision making, human resources (HR) respond more quickly to changes than any time before [6]. The recent emergence of HRIS automates and works out regular administrative and compliance functions that would traditionally perform by corporate HR departments and can facilitate the outsourcing of HR [3]. HR performs traditional HR activities with IT. Since, employees are not just one of the means of production rather a key source of competitive advantage in the 21st century. The authors need to draw a clear picture about the emergence and contributory role of human resources intertwined with developments of Information Technology (IT). Here, a modest attempt made to explore and provide a clear & comprehensive analysis of historical evolution of today's HRIS. The reminding of this paper mentioned here. This paper stated the study method in selection-2 while extensive literature review with authors' own analysis discussed in section-3. Authors evaluated systematic development of HRIS critically in section-4 based on the discussion of section-3. Concluding remarks have drawn in final section.

2. Method

Secondary data used that collected from the different journals, research articles, published & unpublished theses, textbooks, company periodicals and websites.

3. Literature Review and Authors' Analysis

A superficial look into the aims of personnel management showed that this is by far the most important job in industrial management. The materials do not go into the production automatically. Machines are useless without human being to run it. Olivcer Sheldon aptly pointed out that no industry can

be efficient so long as the basic fact remains unrecognized that it was the principally human. It is not a mass of machines and technological processes, but a body of man. It is not a complex matter, but a complex of humanity. It fulfills its function not by some impersonal force, but by human energy. Its body is not an intricate maze of mechanical devices but a magnified nervous system. All the activities of an enterprise are initiated and determined by persons who make up that institution. From all the tasks of management, managing human component is the central and most important task because all else depends on how well it works [7]. Prominent Management Gurus concluded that it is not technology, but the excellence of human-and human resource management that forced the continuing challenge for executives in the 21st century [8]. Similarly, it assumes that potential economic and strategic advantage will remain with the organizations those may most effectively attract, develop, and retain a various group of the best and brightest human resources in the marketplace. Historical analysis will demonstrate the growing importance of employees from being just one of the means of production in the 20th-century industrial economy to being a key source of sustainable competitive advantage in the 21st-century knowledge economy. In this study, the historical evolution of HRM had traced out five broad phases of the historical development of industry in the United States [9].

3.1. Stage-I: Pre-world war-ii era and Emerging Personnel Management

3.1.1. Emergence of the Term "Personnel"

Personnel Management (the precursor of the term HRM) can trace back to prehistoric times, when tribal members assigned for specific jobs of hunting or gathering. The households of ancient Chinese emperors had employment tests to identify servants with special talents for special jobs. Then there were the apprentice system and artisan guilds, formed to train new workers. Then human resources treated as "Personnel.

3.1.2. Isolated Function

The then, personnel management isolated from core organizational functions, like; operations, marketing, accounting and finance, and research & development.

3.1.3. The Term "Employee Welfare"

In the late 19th century, where organizations such as; Cadburys at its Bournville factory organized the importance of looking after the welfare of the workforce, and their families. Employing women in their factories in UK during the first world-war leads to introduce "Welfare Officers".

3.1.4. Record Keeping

In the early 20th century and before World War II, the personnel function (the precursor of the term human resource management) primarily involved in record keeping of

employee information, like; name, address,, phone, employment history etc. In other words, it fulfilled a "caretaker" function. There was simply no computer technology to automate the records now in history of the course paper records would keep and we can still see paper record Human Resource Systems in many smaller firms today.

3.1.5. Few Govt. Influences

At this point in history, there were few government influences in employment relations, and thus, employment terms, practices, and conditions left to the owners of the firm. As a result, employee abuses such as child labor and unsafe working conditions were common.

Table 1.   Summary of pre-world war-ii era

Period	Issues
Pre-world war-ii era	- HR treated as personnel - Personnel management as separate and independent function of organization - Organizations focused on employee welfare programs - Focused on more record keeping about HR - Less emphasized on employee relations

3.2. Stage-II: Post world-war-ii era (1945-60)

The period of 1945-1960 is characterized by the importance of employee morale while personnel are part of operating costs but not yet in mainstream of operations. Research and development in employee selection, payroll automation, applications of mainframe computers for personnel use in defense industry [9] also practiced during this period.

3.2.1. Employee Morale

Labor utilization and mobilization during the war-ii had a great impact on developing the personnel function. Managers realized that employee productivity and motivation had a significant impact on the profitability of the firm. The human relations movement after the war emphasized as employees was motivated not just by money but also by social and psychological factors, such as recognition of work achievements and work norms.

3.2.2. Formal Selection and Development

During the middle of the last century, larger corporations, typically those in the United States that emerge after the second world-war. They recruited personnel from US military and could apply new selection, training, leadership and management development techniques, originally developed by the Armed services, working with, for example, university based occupational psychologists. Similarly, some leading European multinationals, such as; Shell and Phillips developed new approaches to personnel development and drew on similar approaches already used in Civil Service

training. Gradually, this spread more sophisticated policies and processes that required more central management via personnel department composed of specialists and generalist team.

3.2.3. Concept of Job Description

Due to the need for classification of large numbers of individuals in military service during the war, systematic efforts began to classify workers around occupational categories to improve recruitment and selection procedures. The central aspect of these classification systems was the job description, which listed the tasks, duties, and responsibilities of any individual who held the job in question. These job description classification systems could also use to design appropriate compensation programs, evaluate individual employee performance, and provide a basis for termination.

3.2.4. Extensive Reporting to Govt. Agencies

Because of the abusive worker practices prior to the War, employees started forming trade unions, which played an important role in bargaining for better employment terms and conditions. There were a significant number of employment laws enacted that allowed the establishment of labor unions and defined their scope in relationship with management. Thus, personnel departments had to assume more record keeping and reporting to governmental agencies.

3.2.5. Use of Computer Technology

Because of these trends, the personnel department had to establish specialist divisions, such as recruitment, labor relations, training and benefits, and government relations. With its changing and expanding role, personnel departments started keeping increasing numbers and types of employee records, and computer technology emerged for facilitating in maintaining employee information.

Table 2. Summary of post-world war-ii era

Period	Issues
Post World War-II era (1945-60)	• More emphasized on employee relations • Systematic selection • Emerged the term job description for effective selection • Focused on extensive record keeping and reporting • Emerged computer technology as facilitator in managing employee information.

3.3. Stage-III: Legislative era (1960-1980) and Emerging Human Resource Management (HRM)

During the period of 1960-1980, social issues change HR; the increased paperwork and reporting requirements; protector of employees; advent of MIS in computer world; introduction of IBM/360; HR now more in mainstream of operations [9].

3.3.1. Emergence of HR

It was about this time that personnel departments were beginning to be called Human Resources Departments and the field of human resource management was born.

3.3.2. HR Became Key in Organization

The increasing need to be in compliance with numerous employee protection legislations or suffer significant monetary penalties made senior managers aware of the importance of the HRM function. In other words, effective HRM practices were starting to affect the "bottom line" of the firms. So, there was a significant growth of HR departments, and computer technology had advanced to the point where it was beginning to use.

3.3.3. Govt. and Regulatory Agencies Increased Reporting Requirement

This period witnessed an unprecedented increase in labor legislation that governed various parts of the employment relationship, such as prohibition of discriminatory practices (EEO), occupational health and safety (OSHA), retirement benefits, and tax regulation. As a result, the HR department burdened with the additional responsibility of legislative compliance that required collection, analysis, and reporting of voluminous data to statutory authorities.

3.3.4. Development of MIS for HRM

There was an increasing demand for HR departments to adopt computer technology to process employee information more effectively and efficiently. This trend resulted in an explosion in the number of vendors who could assist HR departments in automating their programs in terms of both hardware and software. Simultaneously, computer technology was evolving, and delivering better productivity at lower costs. These technology developments and increased vendor activity led to the development of a comprehensive management information system (MIS) for HRM.

Table 3. Summary of legislative era

Period	Issues
Legislative Era (1960-1980)	• Personnel became HR • HR treated as key for organization success • Increased govt. pressure on proper report keeping • Emergence of MIS for HRM • HRIS used mostly to keep administrative records.

3.3.5. Limited use of HRIS

The decreasing costs of computer technology versus the increasing costs of employee compensation and benefits acquire of computer-based HR systems (HRIS) a necessary

business decision. However, the personnel departments were still slow in adopting computer technology, even though it was inexpensive relative to the power it could deliver for the storage and retrieval of employee information in MIS reports. Still, HRIS would use mostly for keeping administrative records.

3.4. Stage-IV: Low Cost Era and Emerging HRIS (1980-1990)

With increasing competition from emerging European and Asian economies, U.S. and other multinational firms increased their focus on cost reduction through automation and other productivity improvement measures. The increased administrative burden intensified the need to fulfill a growing number of legislative requirements, while the overall functional focus shifted from employee administration to employee development and involvement. To improve effectiveness and efficiency in-service delivery, through cost reduction and value-added services, the HR departments came under pressure to harness technology that was becoming cheaper and more powerful and desired cost-effective HR software like HRIS. The history of HRIS began from payroll systems in the late 1950s and continued into the 1960s when the first automated employee data used [9].

3.4.1. Affordability of HRIS Regardless of the Size of the Organization

In the 1960's and 1970's, large companies felt a need to centralize their personnel data in large part to facilitate record keeping and meet regulatory needs. Programs would write on large mainframe computers that acted as a central data repository with little transactional processing, usually only for payroll. The Human Resource Information System (HRIS), also known as a Human Resource Management System (HRMS), became prevalent in the 1980's with the popularity of Enterprise Resource Management (ERP) applications and the move from mainframe systems to client server technology.

3.4.2. HRIS as Simple Record Keeping to Complex Analytical Tools

HRIS has evolved from simple record keeping to complex analytical tools to assist management decision making. The 1980's saw a shortage in skilled workers, especially in the technology sector. Human Resource Management had long evolved from the basis of a skills management discipline to more of an employee satisfaction and productivity tool. However, by the 1980's, HRIS systems now included a host of feature sets and functional capabilities aimed at attracting, retaining and properly compensating the workforce. By 2000, the human resource software industry saw HRIS grow to include recruitment, benefits management, time management, payroll, compensation management, learning management, expense reporting and reimbursements, and performance management. Self-service applications built on

top of the underlining data empowered employees to manage their own data and make timely changes. Online employee portals further consolidated disparate systems, documents and information into one place.

Table 4.   Summary of low cost era and emergence of HRIS

Period	Issues
Low Cost Era and Emergence of HRIS (1980-1990)	• HRIS became affordable to organizations • HRIS became complex analytical tool • HRIS for all

Table 5.   Differentiating features of both legislative and low cost era

Basis	Legislative Era	Low Cost Era
Time	1963-1980	1980-1990
Focus	HR assumed key	HRD concentrates on HRIS
Regulators	increased reporting requirements by Govt. and Regulatory Agencies	Increased demand for ensuring a technology-enabled HRM system by giant competitors.
Scope	HRIS used mostly to keep administrative records.	HRIS as simple record keeping to complex analytical tools.

Table 6.   Historical Highlights of Humanic offering

Year	Name of HRIS service providers	Solutions Offered
1982	Humanic Design	Empire HRMS (was DOS based)
1987	Humanic Design	Rational Database Product
1991	Fiserv	Fiserv HRIS
1994	Humanic Design	HRMS solutions in the U.S. (Windows based)
1999	Fiserv & Humanic Design	Humanic Solutions
2000	Humanic	Integrated HRMS/Payroll/self-Service Offering with Drag and Drop reporting
2000	Humanic	Application Service Provider(ASP) Solution

3.4.3. HRIS for Large and Small Businesses

As computer hardware prices fell and computing power simultaneously grew, more and more companies could afford enterprise software systems and vendors saw a market for standalone HRIS software. Data connectors and application programming interfaces empowered customers with HR systems that need not delivered with their financial

accounting software. They now have an a la carte option and can leverage a higher fit system that better fulfills their HRIS needs and can integrate information such as payroll and headcount to their financial system.

Humanic (formed as result of merger between Fiserv HRIS, founded in 1984 and Humanic Design Corporation, founded in 1982) solved many HR, Payroll, benefits and challenges. The following table shows the historical highlights of Humanic greatest strength was in its in-depth knowledge and experience of its professional staff in all facets of the HRMS/Payroll industry.

3.5. Stage-V: Tech Era and Emergence of Strategic HRM (1990 to the present)

The increased use of technology and changed focus of the HRM function as adding value to the organization's product or service led to emerge the HR department as a strategic partner. With the growing importance and recognition of the people and people management in contemporary organizations, SHRM has become critical in management thinking and practice. SHRM derives it theoretical significance from resourced based view of the firm that treats human capital as a strategic asset and a competitive advantage in improving organizational performance [10]. SHRM designed to diagnose firm strategic needs and planned talent development, which requires implementing a competitive strategy and achieving operational goals.

Strategic Human resource Management (SHRM) evolved from Personnel Management in two-phased transformation: from personnel management to traditional human resource management (THRM) and then from THRM to SHRM [11]. Firms today realize that innovative and creative employees who hold the key to organizational knowledge provide a sustainable competitive advantage because unlike other resources, intellectual capital is difficult to imitate by competitors.

4. Critical Evaluation

Many researchers have tried to explore the true picture of emerging the computer aided HRM (e-HRM) from longtime before; still today, it is a continuous attempt to many researchers. Findings of the earlier researchers had published in different journals. Based on the literature survey, the study found that few articles showed the real, more comprehensive and easily understandable outcomes on the chronological emergence of today's HRIS. Consequently, here it has tried to explore the clear, almost complete and coherent summary on the chronological development of HRIS. This has done based on the five development stages of U.S. industry.

During the pre-world war-ii, the term personnel management mostly used and labor would treat as personnel. Personnel management evolved as an isolated function as other core functions of organization and the term employee welfare would use. On the other hand, government had few influences on HR policies, rules, regulations regarding personnel. Since, owners were free from government interference, child labor and unsafe working conditions were common. The personnel function primarily involved in record keeping of employee information as course paper because there was simply no computer technology to automate the records now.

After the war, it observed that employees motivated not just by money but also by social and psychological factors, such as recognition of work achievements and work norms. There were new selection, training, leadership and management development techniques, originally developed by the Armed Services working with university based occupational psychologists. The job description classification systems could also use to design appropriate compensation programs, evaluate individual employee performance, and provide a basis for termination. Since personnel would deprive from their rights and privileges, they formed trade union and organizations were under more pressure than pre-world war-ii to keep more record and report to the government agencies. As personnel department characterized by more and wider functions, computer technology began to emerge as a possible way to store and retrieve employee information.

During the period of legislative era (960-1980), the term personnel and personnel management replaced by the term human resource and human resource management. On the other hand, the HR department burdened with the additional responsibility of legislative compliance that required collection, analysis, and reporting of voluminous data to statutory authorities. There was an increasing demand for HR departments to adopt computer technology to process employee information more effectively and efficiently. These technological developments and increased vendor activity led to develop a comprehensive management information system (MIS) for HRM. Though the decreasing costs of computer technology versus the increasing costs of employee compensation and benefits motivate acquiring of computer-based HR systems (HRIS) a necessary business decision yet HRIS used mostly for keeping administrative records.

Since, HR departments approached under pressure to link with technology that was becoming cheaper and more powerful and desired cost-effective HR software during low cost era (1980-1990). HRIS became prevalent in the 1980's to meet the then HR demand with the popularity of Enterprise Resource Management (ERP) applications and the move from mainframe systems to client server technology. In addition, HR department with the upgrading information technology evolved from simple record keeping to complex analytical tools to assist management decision making. It not only evolved for larger organizations with huge capital but also for small enterprises with low capital. In fact, HRIS applications in true sense observed during this period (1980-1990).

The drastic change in the information technology altered the role of HR professionals from traditional to strategic at

the last decade. HR professionals with computer aided HRM are now in the position to be more strategic to contribute in gaining competitive advantage, improving organizational overall performance and better knowledge management. Hence, HRIS is a predictor of strategic human resource management (SHRM).

In fine, the study found the use of personnel management before world war-ii, traditional HRM during the legislative era (1963-1980), computer aided HRM (e-HRM) during the period of low cost era (1980-1990). Further, it observed the roles of HR professionals have transformed from traditional HRM to Strategic HRM (SHRM) during high-tech era (from 1990). In this junction, HRIS plays vital role to the changing roles (strategic) of HR professionals so they can be more responsive to the vulnerable and intense competitive market. HR professionals have now specific HR agenda about how they to be more strategic with the efficient application of HRIS. The following figure shows the sequential evolution of HRIS and SHRM.
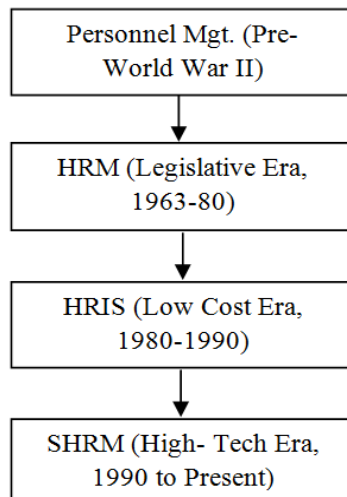

Figure 1.	A Sequential Evolution of HRIS and SHRM

5. Concluding Remarks

Companies in the 21st century are under pressure to reduce the cost of the production and to be more responsive to the customers. Moreover, the success of today's companies mostly depends on the effective and efficient utilization of their human resources. Since, HR professionals not only play administrative but also strategic roles with the advent of IT-enabled HRM, HR managers should have clear idea about the background of HRIS. This study showed the true picture of HRIS evolution based on theoretical analysis. Hence,

Personnel Mgt. HRM, HRIS, and SHRM emerged during the pre-world war, legislative era (1963-80), low cost era (1980), and high-tech era (1990 to Present) respectively. The outcomes of the study will assist HR professionals, HR managers, HR executives, employees, owners, government, and regulatory bodies to formulate HR related policies for ensuring the proper application of HRIS. This study will also support new researchers to study advance regarding this matter. Finally, this study suggests researchers for further study, to gather more realistic knowledge about today's HRIS, by collecting information directly from different HR professionals, management gurus and successful entrepreneurs with the published sources of information.

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