Designing Essentials of Effective Human Resource Management Information System (HRMIS) Engineering for e-Governance & Business Virtualization

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Abstract:

Human resources management information system (HRMIS) is the computer software intended for simplification and acceleration of HR management process, improvement of its quality via automation of the basic (routine) objectives and activities in organization. Due to this advantage more and more organizations apply HRMIS effective for public, government, e-Governance as well as private business sectors also switching for HRMIS to implement digital & virtual business. Development of the HRMIS unified standards is of key significance for improvement of HR management effectiveness and transparency in certain departments, as well as in public sector, in general. In addition, it will be the significant step in introduction of the unified e-governance system and fast execution of business. This research paper discusses fundamental and initial modeling how to analyze, design and develop HRMIS in business organization.

1. Introduction

Human resources management information system (HRMIS) is the computer software intended for simplification and acceleration of HR management process, improvement of its quality via automation of the basic (routine) objectives and activities. Due to this advantage more and more organizations apply HRMIS. Development of the HRMIS unified standards is of key significance for improvement of HR management effectiveness and transparency in certain departments, as well as in public sector, in general. In addition, it will be the significant step in introduction of the unified e-governance system in the country. Social and organizational changes in the economic environment are numerous and extensive. According to that, it is important for human resource management (HRM) to be comprehensive, high in quality, fast, flexible and in line with upcoming trends, because it is one of the parameters of successful business. Use of information and communication technology

becomes an imperative for HRM, as well as the other activities in the company. Enterprise Resource Planning (ERP) is very widely applied in HR departments. For instance, company can track employment's life cycle or engagement of the new labour. These changes can be viewed as transactional data, because employment of workers begin and end within the organizational structure of one company. As a result of that, HRM with its data is ideal for traditional ERP infrastructure, thus it has found the appropriate support in ERP systems. However, modern Knowledge economy and labour statistics impose the need for consistent initiatives in real time, so HRM department must implement these initiatives before the actual employment of workers. For these reasons, HRIS systems separate from standard ERP solutions and become stand-alone platforms with wider range of options, such as adjustable employment statistics for each enterprise. There is lot of terms in use for these systems, but the most common are the following: e- HRM (e-Human Resource Management), HRIS (Human Resource Information Systems) and HRMS (Human Resource Management Systems). We must be aware that there is a fundamental difference between e-HRM and HRIS. HRIS, as human resource information system, has direct implementation in HR department and employees in this department are users of that system. Enhancement of HR department is the main goal of HRIS, which will indirectly improve business. Term e-HRM covers services not only for HR department, butalso for wider range of employees, potential employees and management. Those services are available over Internet or Intranet. The difference between HRIS and e-HRM could be defined as transition from the automation of HR services (Transactional Systems) to IT support of HR information (Management Information Systems). Apart from that, HRIS can be viewed as a database system or a series of interconnected databases, and HRMS as software that can combine multiple HR functions (Venkateswaran, 2007). The differences between two systems are quite blurred so these terms are in use as synonyms in many references. The aim is to comprehensively show the role of HRIS systems, their evolution, structure, advantages and possible shortcomings, as well as the process of implementing the systems in organization and to highlight the importance they play in modern business. Evolution of the systems is shown from the point of new role in organization, because they switch their role from transactional to strategic [1,3,17].

1.1. Definition and Evolution

Effective HRM, in order to provide competitive advantages, requires adequate updated information on current employees, as well as potential employees in the labour market. IT evolution has improved a technique of collecting this information through the development of HRIS systems (Kavanagh, Mohan, 2009, p. 5). HRIS includes systems and processes that connect the function of HRM and information technology. Enterprises often choose to introduce this information system after the successful implementation of ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) solutions, aiming to improve the processes associated with making decisions about employees. Information technology have enabled the broad implementation of HRIS applications and help companies to improve efficiency in general by increasing the efficiency of HRM (Nuasair, Parsa, 2007, p. 70). Vujovic (2005, p. 310) points out that the modern HR function is not merely reduced to administrative procedures in the processes of recruitment, organizing the employees, regulating their rights and obligations, but also has a major role in creating corporate culture. In the new environment employee can propose, control and execute planning decisions, so development of HR must adapt to the new

requirements. De Sanctis (1986, p. 15) indicates that apart from daily and operational information, HRIS has the ability to supply with strategic information management of the company. Data collected within the HRIS provide a mechanism for management decision support. With proper HRM companies are able to provide calculations that will have consequences for the entire business. These calculations include the following: health care costs per employee, turnover rates and costs, the time required to fill in the appropriate position, return on invested capital in HR and increase the value of human capital. Numerous studies have offered evidence supporting the recognition of the role of HRIS systems in support strategic decision making. For this reason, there has been a dramatic increase in the use of HRIS systems in companies, over time. For example, Lower and Mohrman (2001) reported that the use of HRIS is in constant increase over the years. Obviously, the use of HRIS solutions raised sustainable development, even in those companies where HR management does not have a strategic role. Vujovic (2005, p. 311) put the specific dimension on this themes with the view that modern business requires intensive use of knowledge based on multidisciplinary approach, while education should provide the acquisition of new skills, such as finding relevant information, encouraging creative thinking, effective communication, teamwork etc. We already have companies where employees, in addition of official duties, acquire new knowledge and these organizations are called learning organizations. Hendrickson (2003, p. 382) made a first step in accepting the employee in the form of human capital. It was in the period 1945-60. However, that has not led to the substantial changes in the functioning of the HRIS (at that time information systems have existed and operated without the use of modern information technology). In the next twenty years (1960-80) HR departments have become an integral part of the core activities in the company. During this period, computers (mainly mainframe) provided a new dimension in collecting, storing and processing HR information. At that time HR departments have become one of the most important users of computer's resources in company. Despite that, HRIS were only useful in transactional information processing. The new period started in the last twenty years of the 20th century when computers become available to many users (with commercial use of the Internet) and when companies started to use HR information for strategic management. Management started to relay on HRIS systems in the decision making process about human capital, even in small and medium enterprises. According to that, HRIS become integrated system with the objective to provide information for decision making on human resources. The base of their functioning are databases that are used for collecting, storing, searching and manipulating data on employees and other data related to human resources. Typical HRIS includes personal information about employees, information on income, information on various types of training, the most diverse reports etc. [9, 13, 14]

1.2. Vision of Human Resource Management

The Human Resource Management Information System (HRMIS) was developed in line with the human resource management vision, 'To be the leader in the Development and Management of Human Resource in Order to Achieve the Government's as well as INCs/MNCs Vision [1, 3.7].

1.3. HRMIS Mission

As one of the government's flagship applications, HRMIS has a clear mission so that all public sector agencies implement it in line with the vision of public service

human resource and e-Government aims. Therefore, HRMIS must remain relevant in public sector human resource management through its continuous application improvement and also with business sense gives virtualization to the HRM in business organization [6, 10, 11].

1.4. HRMIS Objectives in Public Sector

The objectives of HRMIS are designed to ensure that the developed application will be able to improve the performance of public sector delivery system. These objectives are designed to:

Enable planning of the workforce and determine the effective size of public service through human resource management information;

Automate the operation processes of human resource management;

Develop integrated and updated human resource information for the purpose of effective human resource planning;

Facilitate horizontal communication and integration, coordination of human resource processes and access through a single window;

Contribute to the creation of a paperless environment; and

Make available a human resource information system that is open, flexible and updated to meet the management needs of the various levels of agencies.

1.5. What General Conditions Should Be Complied with by the HRMIS?

Program modules shall be closely connected ensuring free information exchange;

Software shall be compatible with the information systems operating at the central level (e.g. electronic treasury, electronic budget, documents flow, central analytical base of the Civil Service Bureau etc).

The modules and/or entire software shall be technically easily modifiable and/or expandable (with respect of modification of the existing modules and adding of the new ones). At the same time, changes could be made with the consent of a person/organization with relevant authorities.

Program should be protected from unauthorized access. Information shall be available to the authorized persons/organizations only. In addition, setting of specific access restrictions for each of them should be ensured.

For the security purposes, any newly entered information shall be checked before final recording; program shall automatically respond to the identified discrepancies/errors and prevent saving of changes of the system algorithm; at the same time, the date and author of changes shall be automatically recorded;

The modules and entire program shall provide access to the initial data to the persons with relevant authorization.

All modules shall be structured so that manual data entry was minimized. This should be achieved via presentation in a form of unified classifier of all fields and linking of the program with existing databases. At the same time, no changes and/or additions to the unified classifiers in program modules without permit from the Civil Service Bureau;

Each module shall include the feature of generation of standard analytical reports related to the saved information;

Each module shall provide feature of uploading and handling of various files. At the same time, software shall provide printing of the documents prepared within the program. Printed documents shall have legal force.

All modules shall be structured intuitively/in understandable manner to ensure easy operation for the inexperienced users;

The system shall provide information archiving and allow viewing and printing of the archived information, at the same time, all files shall be generated (both, for electronically viewing and printing) in PDF format.

2. Architecture of Human Resources Management Program

2.1. Components should be included into the HRMIS

At a time of work on HRMIS standard, we have studied and analyzed the post popular programs at Georgian and international markets.[23,26] In result of this process the minimum of program components was identified, which is necessary and sufficient for dealing with the problems mentioned in the Introduction. Advantage of such minimalist approach is that it allows implementation of the offered change relatively "painlessly" (switching to the automated processes is implied) and this is very significant at the Civil Service bureau, with respect of avoiding of substantial destabilization of the work process. In addition, identification of the minimal components only, provides certain flexibility and freedom to the organizations for further improvement and diversification of the offered model [13, 18, 21, and 27].

In the offered model the HRMIS shall contain 3 necessary components (modules):

• Administration module;
• Attendance module; and
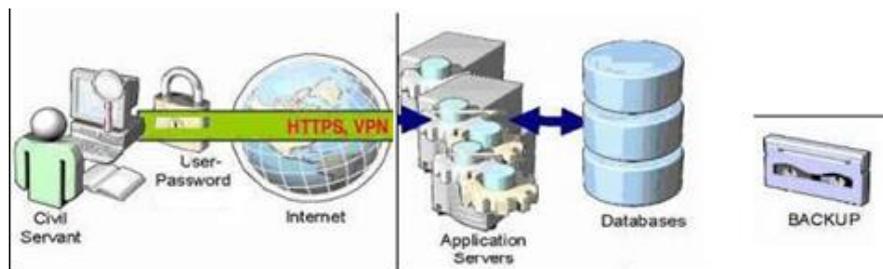• Payroll module

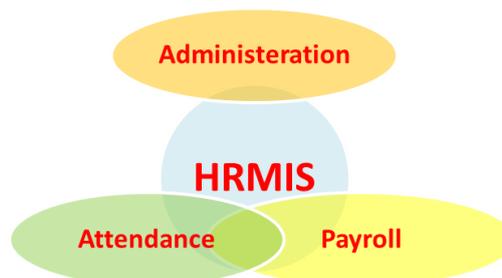*Figure 1.* HRMIS Architecture.

Figure 2. Components of HRMIS

It is emphasized that Bureau continues work on improvement of the policies and practices of HR management in the public sector and in result, in the nearest future, the issue of necessity of amendment of this standard will be put on the agenda. In particular, increase of the HRMIS necessary components is expected, including performance records, training and learning, task manager etc [29].

2.1.1. Administration Module

Administration module shall include the basic information about the organization and employed persons. This information shall be some kind of basis, support to the other program modules; it shall determine and direct operation of the other modules.

2.1.2. Attendance

This module shall provide accurate accounting of the time spent by the staff member at his/her job. Accumulated and finally verified information shall be automatically transmitted to the payroll module, for the purpose of remuneration calculation.

2.1.3. Payroll

This module shall ensure automatic calculation of the salaries and other payments to the staff members. The module shall be centrally linked with the administrative and attendance modules and central electronic treasury program.

3. HR Technology

How well is the HR function served by technology after 40 years of parallel evolution? Most organizations are caught in a continual process of 'technology tag': new developments in HR demand new approaches to HR computing, which in turn consume large amounts of time and budget whilst generally failing to deliver their promise. While this is happening, the organization inevitably develops further, leading to demands for newer technology, and thus the cycle repeats.

The result is that many HR organizations live with a multilayered set of technologies that chart the development of HR operations over many years but which add little value to the overall function.

3.1. HRMIS, the Complexity of the IT Challenge

The development of human resources is bound inextricably to the technology that serves it. The HR function has faced a succession of demands for changes to the way in which it delivers transactional services ranging from the development of more effective, integrated end-to-end processes to the development of knowledge- based centers of excellence. In the end, however, the ability of the HR function to deliver step changes in performance is dependent on its capability to manage administrative tasks, which in turn demands a firm grasp and control of HR processes and data. For instance even the frequent request for simple headcount figures raises issues in the production and interpretation of data, thus making difficult to grasp the complexity of fast-moving HR information, even after they may have invested considerable sums of money in systems to try to raise the capabilities of the HR function. The clue to the problem lies in the phrase itself: an employee headcount is rarely a 'simple figure'. For example, producing an accurate headcount often demands a clear definition of parameters:

• Does the figure include staff on maternity leave or career breaks?

• Does it count individual people or full-time equivalents (FTEs)?

• Does it include contractors, temporary and agency staff (regardless of how much of a permanent fixture they may be)?

• Given the fact that resourcing is a highly dynamic process, what day of the month is this figure taken from?

Once these questions are considered, it becomes apparent that seemingly simple data such as headcount in fact define a process for tracking an employee population. Further complications may arise when the headcount data are compared to similar figures produced by other systems. HR staff has often to succeed in reconciling their headcount figures with those of payroll or pensions, who may be using subtle variations on the parameters selected by HR. Similarly, finance operations may confound the issue further by viewing the organization differently from HR. Clearly when cost centers don't line up in an obvious way with organization structures, then aligning headcount with staff costs becomes a complicated task. These issues make many organizations wonder where the promised efficiency savings come from. The situation is no simpler around the management of integrated HR processes [15].

For example, the benefits of an integrated HR and payroll operation, whilst well documented, are still frequently unrealized. A lack of integration around legacy systems frequently shows up in HR as separate HR and payroll systems.Consequently the organization and delivery of HR and payroll services is defined not by what works best for the customer/employee, but by where the boundaries of the software lie. Interfaces between systems too often define the divisions between departments, for example where HR data on employee movements are passed summarily across to payroll, causing the process to wade through and requiring manual intervention, recalculation and double entry of data. Such data and process management problems and resultant inferior service quality have been a recurring historical problem in HR that has, arguably, been a contributing factor in the inability of the function to participate fully in the strategic agenda. Against this background of struggling to make technology deliver, HR is now facing a new challenge in terms of the way its services are organized and delivered. The separation of administrative/operational activity into shared service centers, together with the development of the role of the HR business partner to deliver strategic advice and support directly to the business, have set new standards of process and data management for HR to achieve.However, there is unlikely to be much tolerance for HR failing to deliver benefits from the new HR model and blaming the historic problems on poor technology. Many organizations are pushing the operational effectiveness agenda hard, motivated by clear success stories around shared services in different organizations. In some sectors, such as government, the objectives have been formalized for example demanding fixed levels of operational improvement in a given timescale (Cedar, 2009).

The move to more effective HR operations and technology is not simply inspirational; it is a clear demand from the business. This demand is given added edge as, for many organizations, the development of HR shared services is simply one option, with the other being to source such services from commercial external providers. An increasing number of organizations approach the transformation of HR operations with an open mind as to whether the solution should be 'built' or 'bought' (Raymond, 1985). The implications for HR are clear: delivery of HR services needs to

make a change in performance to keep pace with demand from stakeholders and shareholders, or be considered a prime target for outsourcing. Against this background, reliance on legacy technologies with their inherent problems and high cost is simply not going to cut it.

The HR technology architectures that support our proposal of a new HR model illustrate how organizations can best leverage technology to serve the process of HR change. We will look at the implications of this HRMIs model in terms of new users' roles and their needs. In particular, the model will help illustrates how the HR infrastructure can evolved to accommodate the needs of HR business partners, centers of excellence and HR shared service centers. This model will serve for us to ex plain the integration of different HR processes into a single management system that supports the HRIS transformation process. Before introducing the model, it is of primary importance to take an in-depth glance at the new HR processes structure resulting from the interrelation between ICT technology and work/information flow[16, 18].

3.2. Structure of HRM Processes in the ICT Age with Examples

HRIS emerged from the confluence of several important changes in society and business. First the nearly universal availability of personal computers was necessary to provide managers and employees with the hardware needed to conduct human resource transactions on line. PCs provided an important part of the infrastructure on which HRIS could build. Second, widespread computer literacy was necessary for employees and managers to take advantage of the opportunities that advances in technology offered. It is not enough to have requisite technology.

People must know how to use it. Third, the Internet provided the means for linking personal computers and computer literate employees and managers in real time. Connecting people and data removed many of the physical barriers thatpreviously hindered interactions and slowed business processes. Fourth, enterprise resource planning software and its various derivates made it possible to link people working in the same business operation together. ERP provided themodel – and sometimes the software – for linking often disparate databases into a seamless whole for a real time transaction processing and decision making. Fifth, human resource professionals along with information technology specialists created software and systems that moved HR information and decision making from file drawers to computers (Lengnick-Hall and Moritz, 2003). According to Lengnick-Hall and Moritz (2003), HRIS has developed through three major forms. The simplest and easiest to implement is publishing information. More involved forms of HRIS included automated transactions. Finally, the most complex forms of HRIS transform the way HR is conducted in the organization. The first form of HRIS is simply publishing information. This involves oneway communication from the company to the employees or managers. This form of HRIS typically uses intranets as the primary information delivery medium. Earliest information publishing efforts involved generic content (e.g. company policies and procedures; benefits; directories of services; current events, etc). This was often followed by the introduction of personalized content (e.g. job openings tailored to individuals).

Simply publishing information on the web provides several benefits to the organization. Expensive printing costs can be virtually eliminated. Changes in published information can be made immediately and users can be easily and

quicklynotified of those changes. Users (managers and employees) can get current, relevant information whenever they need it and from wherever they have access to computers with linkages to the internet. Of course, issues of web design, information quantity and quality, and information control could limit the utilities of these efforts, but the best designed and the best implemented systems produce noticeable benefits. The second, higher-level form of HRIS involves the automation of transactions, workflow, and even supply-chain integration. This form of HRIS typically uses intranets along with extranets, and frequently combines several different application programs. In this form of HRIS, paperwork is replaced by electronic input. Managers and employees can access databases, update information, search for needed information, and make decisions. For example, employees can access a back-end database that provides employee-specific data for enquiries such as: paid time-off accruals and balances, current benefit coverage, personal demographic data, work schedules, and retirement plan balances. Procedures that required much time, paperwork passing among staff, and multiple approvals, can now be accomplished by end users without face-to-face administrative support. Workflow applications enable users to complete an entire process with built-in checks to assure compliance with organizational policies. Furthermore, functional processes (e.g. finance, accounting, purchasing, etc.) which may maintain separate databases and applications, are integrated into user-friendly presentations for end users. The higher level of automation occurs with supply chain integration, which allows organizations to coordinate human resource processes (e.g. assuring quality by using similar performance appraisal processes) among suppliers and distributors, improving efficiency and effectiveness along the entire value chain[26,29].

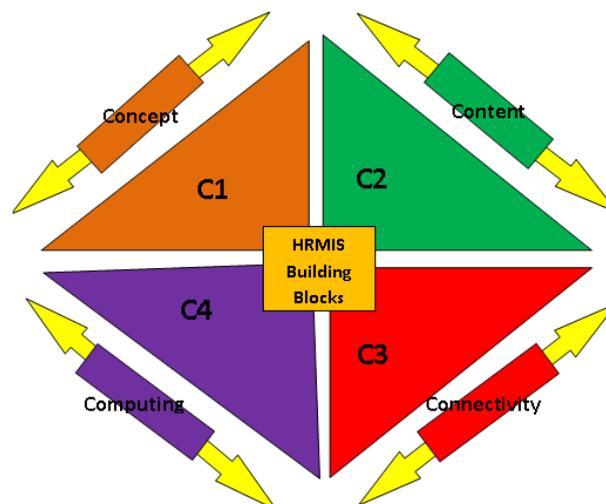## 4. Result & Discussion

4.1. HRMIS 4Cs Model:

Figure 3. HRMIS 4Cs Model.

Source: Prof. Md. Sadique Shaikh & Prof. Tanveer Sayyed

This is our first purposed model for HRMIS Analysis & designing labeled "HRMIS 4Cs Model". The name 4Cs given on the basis of four major analysis & design domains of HRMIS in Public or private organizations as "C1=Concept, C2=Content, C3=Connectivity and C4=Computing". The first aspect Concept C1 sense to how should public & private organizations visualize different formats, layouts, forms,

formats, applications, registrations, reports, reporting's, online submissions, complaint, draft, communication. Information sharing and feedback on remote HRMIS clients from servers of Public/Private organizations. The second Content C2 is analysis, decisions and designing of the HRMIS databases, MDDBs, Knowledge Bases etc for empty format and structures of C1 Concept. The third C3 i.e. Connectivity with intention High bandwidth Computer Network & Internet which must engineer sophisticatedly and precise to achieve instant HRMIS content/information delivery, HR information sharing, reporting and data uploading and downloading with all HR processes and procedures. The C4 Computing whereas emphasized to Computing software, network drivers and hardware needs to be configured up to the mark to implement and execute HRMIS successfully.
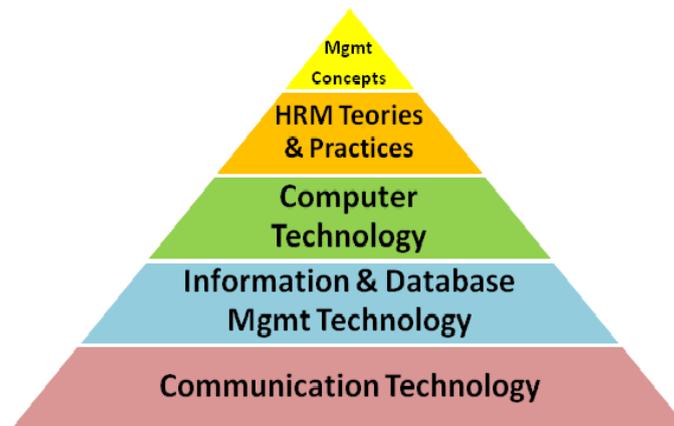
4.2. HRMIS Design Pyramid

Figure 4. *HRMIS Design Pyramid*

Source: Prof. Md. Sadique Shaikh & Prof. Tanveer Sayyed

This is second model we developed "HRMIS Design Pyramid" based on 5 design layers where each layer one of the designing criterion. The first layer with the sense for effective HRMIS engineering Public/Private organizations must have to make detail analysis of management science and then after move for layer 2 .i.e. HRM theories and practices to integrate with first layer. In third layer organization should analysis and engineer for excellent computing with advanced H/Ws, S/Ws, F/Ws and drivers. At layer 4 cares must need to take about HR databases designing and data structure for them, algorithms, procedures, processes and storage. In last layer 5 excellent quality computer network and internet need to design and implement for instant HRMIS connectivity across all head quarters of organization to access HRMIS.

4.3. HRMIS Design Process Model

This is our last model HRMIS Design Process Model can say blueprint of HRMIS development. This model takes four different inputs .i.e. Management inputs, Information Technology inputs, Communication Technology inputs and Computer Technology inputs. Management inputs claimed to say all business inputs specially related to HR processes and function. At all four inputs hub respective inputs exhibits in model which doesn't need further explanation after observing model to engineer HRMIS.
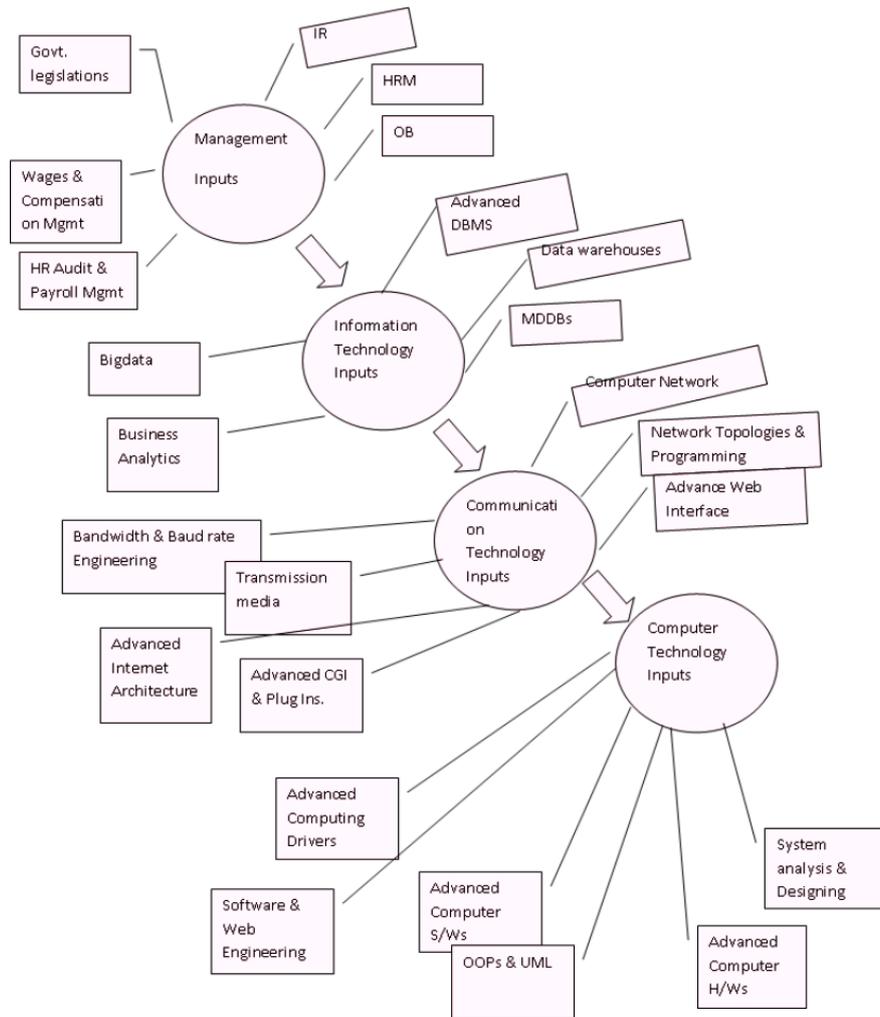
Figure 5. *HRMIS Design Precess*

Source: Prof. Md. Sadique Shaikh & Prof. Tanveer Sayyed

5. Conclusions

HRMIS is an integrated system used to gather, store and analyze information regarding an organization's human resources' comprising databases, computer applications, and hardware and software necessary to collect, record, store, manage, deliver, present and manipulate data for human resources function. The study concludes that HRMIS is an excellent tool for Human Resource Planning (HRP). It enhances the identification of unfilled positions accurately and analyzes each job position with its title in an organization. It also provides insight into organizational training needs, selects the right persons to be trained and evaluates the effectiveness of training programs, but has the challenges of forecasting demand and supply of labour, access to information, cost of recruitment and workforce shortage.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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