

ICT APPLICATION TO HUMAN RESOURCES MANAGEMENT SYSTEM DESIGN

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Abstract - Humans are the most difficult beings to manage, due to the complexity of their nature, which gives rise to complications in management of people at work. A simple definition of management by Frederick Taylor is “knowing exactly what you want people to do and then seeing that they do it in the best and cheapest way.” Management in practice is more complex than the simple definition leads us to believe. Human Resource Management is a specialised aspect of management that is concerned with the development and effective utilisation of man as a resource towards achieving organizational objectives. This research is on a Human Resources Management System (HRMS). HRMS is an online personnel application package that meets the requirements of an organization. It focuses on the personal and personnel development of all employed staff in an organization. The development of the HRMS was done using object-oriented and event-driven programming techniques - Visual Basic 6.0. Pre-defined, separate and well-tested components called objectives were used during the application development, and integrated to perform defined functionality. The HRMS application aids managers in selecting the best applicant to fill a particular position and determining their best position in the organizations; determining when members of staff are due for training; and, recommending employees for promotion or redeployment. It assists in staff recruitment, notifies of vacancies and promotes staff discipline. In essence, the HRMS application is an improved replacement for conventional methods, which usually leaves room for being bias, favouritism and nepotism. The HRMS application improves processes, procedures and transactions, to provide for efficiency, effectiveness, reliability and general high performance.

Keywords – HRM; IT; Management; Organization; Resources.

I. INTRODUCTION

An organization is a deliberate arrangement of people to accomplish some specific purpose. There are various types of organizations, such as business organizations, charitable organizations, non-profit organizations, governmental organizations, non-governmental organizations, etc., each with a diverse set of predetermined goals and objectives. However, all organizations have three common characteristics. First, each organization has a distinct purpose. This purpose is typically expressed in terms of a goal or set of goals that the organization hopes to accomplish. Second, each organization is composed of people. One person working alone is not an organization, and it takes people to perform the work that is necessary for the organization to achieve its goals. Third, all organizations develop some deliberate structure, so that their members can do their work. That structure may be open and flexible, with no clear and precise job duties, or strict adherence to explicit job arrangements. In another vein, the structure may be more traditional, with clearly defined rules, regulations and job descriptions, and some members identified as “bosses” who have authority over other members. But, no matter what type of structural arrangement an organization uses, it does require some deliberate structure, in terms of employee work relationship functions.

All organizations have a genre of people who are responsible for coordinating and overseeing the work activities of others, so that their activities are completed efficiently and effectively. However, management of an organization involves making conscious choices about what happens to the organization and taking action to make those things happen. Meanwhile, a manager can be referred to as an employee whose major duties involve providing technical and administrative direction for other employees, and whose responsibilities include directing the work of an organizational unit, and accountability for the success of the specific function [5], design, development, production and marketing of a product or service.

Management, on the other hand, involves the process of planning, organizing, leading and controlling the efforts of organizational members, and using all other organizational resources to achieve set goals [16]. Management is used to direct the design, development, production and marketing of a product or services. To ensure maximal output, the management should utilize all the factors of production to the fullest [16]. Management includes the action of planning, organization, directing, coordinating, controlling and evaluating the use of people, money, materials and facilities, to accomplish missions and tasks. Effectiveness in management implies the ability to achieve maximum results with the use of the minimum amount of resources, and efficiency refers to getting the most output from the least amount of inputs [4]. This is rooted in an appropriate repertoire of knowledge, attitudes and skills. The optimum combination of these varies according to the nature of the organization and level of responsibility or function.

The factors of production are economic resources which are employed in the process of production. These are usually divided into two main categories: human resources and non-human resources. Human resources includes two main composites: (a) labour – which includes all human physical and mental talents and efforts employed in producing goods or services, such as manual labour, managerial and professional skills, etc., and

(b) entrepreneurial organization, which encompasses everything that facilitates the organization of the other composite factors for productive purposes – such as innovation, risk taking, and applications analysis. Non-human resources include two other composites:

(a) land – which includes the entire stock of a nation's natural resources, such as territory, mineral deposits, forest, airspace, territorial waters, water power, wind power and the like, and

(b) capital which includes all man-made aids to production, such as buildings, machinery and transportation facilities.

It is widely acknowledged that the most important factor in production is labour. Without its human resources, all other input into an organizational system would be meaningless. Human capital theory indicates that the knowledge and skill a worker has – which comes from education and training, including the training that experience brings – generates a certain stock of productive capital [3]. Human beings are the lifeblood of an establishment, and as such, all issues pertaining to the workforce of a business must be given top priority. This is one of the major duties of the management of an organization. However, the process involved in managing a business are various and complicated, with human resource management being one of the most important processes.

A. Research Scope

Due to the fact that human resource management varies from one organization to another and based on time constraints, this research will be as general as possible, being limited to development of modules for entering and retrieving employees' personal data, entering comments on employees' work attitudes, and entering official employee data. It will, however, be possible to develop additional modules to satisfy unique demands from different organizations, and the modules can easily be integrated into the existing one. The system to be designed will enhance the productivity of human resources managers, by improving their efficiency and effectiveness. It will provide a well-defined guideline for actions, as well as a yardstick for precise decision making. A great deal of emphasis and attention are to be paid to ease of use, attractiveness, robustness and familiarity of the interfaces – for example, the use of forms to keep records, as it is done in the manual system. The system will be able to grow with the needs of its users. Finally the system will attempt to be as comprehensive as possible.

Cost-benefit analysis of the system will ensure that the cost is kept as low as possible, and that benefits accruable from the system are worthwhile and desirable. The central processing unit will be microcomputer based. A standard machine with an efficient storage unit, as well as input and output facilities, will be required. When the system is fully implemented, it will increase the efficiency and reliability of the human resource management process. It will also reduce job dissatisfaction in an organization, build motivation, improve employee-to-management relations and communication, aid objective recruitment evaluation and performance appraisal, and provide a means of planning and controlling workforce expenditure.

B. Significance of Research

An organization using the Human Resources Management (HRM) tool (such as Human Resources Manager) proposed in this thesis, will benefit from a wide range of advantages that cannot be obtained when Human Resources activities are undertaken manually. In any organization, time is of great essence. As the saying goes – time is money. The execution of HRM activities can be tedious and time consuming, especially if the organization is a large one; therefore, the introduction of a tool that automates these activities, and requires as little human intervention as possible, is most desirable.

Performing HRM activities by hand, leads to introduction of errors – some of which can be very costly. Therefore, the adoption of ICT application in HRM design does not only lowered the expenses in terms of cost but also brought about an increase in both accuracy and efficiency in the organization's operation. This clearly justifies the cost of producing the software proposed in this paper. Also worth mentioning is the fact that the database concept which is central to the operation of the proposed scheme

affords this software a number of features that are not possible with manual methods. These include the ability to cross reference information in different files, hunting for trends and patterns in the organization's human resource (HR) information, and so on.

II. LITERATURE REVIEW

Most organizations have three core values for existence: mission, vision and objectives. The mission of an organization is the most obvious purpose – which may be, for example, to make soap. The vision of an organization reflects its aspirations, and specifies its intended direction or future destination. The objectives refer to the ends or activity at which a certain task is aimed. One component in achieving these core values, arguably the most important component, is staff who do great work that is directed towards the mission and strategies of the organization. Those policy makers, planners and administrators responsible for running a business, otherwise known as the management, are solely in charge of the administration, control and supervision of the organization's workforce. In other words, managers are charged with the responsibility of taking actions that will make it possible for individuals to make their best contribution to group and organizational objectives.

Management has been given many different definitions by different people. Some people see it as the act of managing something or the people who administer a company, create policies, and provide the support necessary for implementing the owner's business objectives. Frederick Winslow Taylor defined management as the act of directing and controlling the affairs of the business. Peter F. Drucker who is widely acknowledged as the "father of management", defines management as getting things done through others [10]. Donald J. Cough defines management as the art and science of decision making and leadership. Management of a place involves making conscious choices about what happens to the place, and taking action to make those things happen. Management includes the widest possible range of actions – such as planning and decision making, organizing, leading

and controlling – directed at an organization's resources (human, physical, information and financial) [9], the act of directing and controlling the affairs of the business, the act of controlling production processes and ensuring that they operate efficiently and effectively, and so on. The last phrase of the above definition is very important, because it highlights the basic purpose of management. Efficiency entails using resources wisely and in a cost-effective manner, while effectiveness implies the ability to achieve maximum results with the use of the minimum amount of resources [4]. Simply put, successful businesses are both effective and efficient. Each of the various definitions of management has its virtues; however, none of them is all encompassing in scope. To truly grasp the meaning of management, it is necessary to break the concept down into its essential processes.

A. Human Resources Management

Human Resources Management (HRM or simply HR) is the management of an organization's workforce or human resources. It involves all processes and activities aimed at managing the human resources of an organization: manpower planning, recruitment, training and development, career management and human performance [8]. It is responsible for the attraction, selection, training, and assessment and rewarding of employees, while also overseeing organizational leadership and culture, and ensuring compliance with employment and labour laws. HR is a product of the human relations movement of the early 20th century, when researchers began documenting ways of creating business value through the strategic management of the workforce.

HRM is the function, within an organization, that focuses on the recruitment of, management of, and providing direction for, the people who work in the organization. It deals with issues relating to people, such as compensation, hiring, performance management, organization development, safety, wellness, benefits, employee motivation, communication, administration and training. HRM is also a strategic and comprehensive approach to managing people and the workplace.

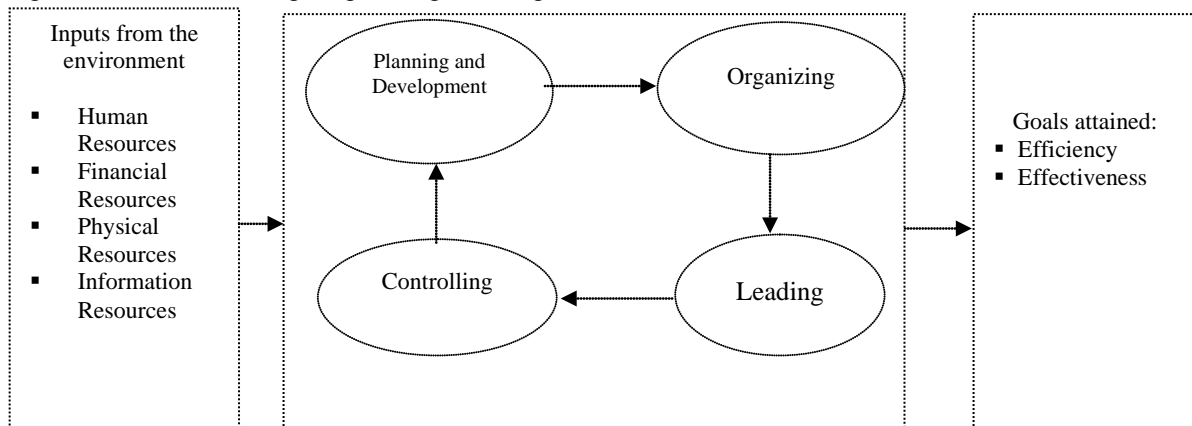


Fig. 1. Management in Organisation

Effective HRM enables employees to contribute effectively and productively to the overall company direction and the accomplishment of the organization's goals and transactional roles away from traditional personnel, administration and transactional roles, which are increasingly outsourced. HRM is now expected to add value to the strategic utilization of employees and impact the business in measurable ways. The new role of HRM involves strategic direction using HRM metrics and measurements, to demonstrate value. HRM incorporates a number of interrelated job functions and work processes, whose primary goal is to acquire and retain qualified employees as a source of competitive advantage for an organization. However, due to globalization, company consolidation and technological advancement, HR now focuses on strategic initiatives such as mergers and acquisitions, talent management, succession planning, industrial and labour relations, and diversity and inclusion. In startup companies, HR's duties may be performed by a handful of trained professionals – or even by non-HR personnel but in larger companies, an entire functional group is typically dedicated to the discipline, with staff specializing in various HR tasks, and functional leadership thereby engaging in strategic decision making across the business.

However, a human resource management system (HRMS) refers to the system and processes at the intersection between human resource management (HRM) and information technology (IT). It merges HRM as a discipline and, in particular, its basic HR activities and processes with the IT field. HRMS evolves from a data processing system, as organization activities become more formalised and complex. The function of human resource departments is generally administrative, and common to all organizations. Over the years, organizations have formalised the selection, evaluation and payroll processes. Efficient and effective management of "human capital" has progressed to an increasingly imperative and complex process.

B. Information Technology Management

Information technology (IT) management is the discipline whereby all of the technology resources of a firm are managed in accordance with its needs and priorities. These resources may include tangible investments, such as computer hardware, software, data, networks and data centre facilities, as well as the staff who are hired to maintain them. Managing this responsibility within a company entails many of the basic management functions, such as budgeting, staffing, organising and controlling, along with other aspects that are unique to technology, such as change management, software design, network planning, and technical support.

IT management differs from management information systems (MIS): MIS refers to management information methods tied to the automation or support of human decision making. On the other hand, IT-

related management activities in organizations using MIS focus mainly on the business aspect of the organization, with a strong input into the technology phase of the business [8]. The concepts below are commonly investigated under the broad term IT management [14]:

- ❖ Business/IT alignment
- ❖ IT governance
- ❖ IT financial management
- ❖ IT service management
- ❖ Sourcing
- ❖ IT configuration management

III. GOALS OF HUMAN RESOURCE MANAGEMENT

The main goals or responsibilities of HRM are the following:

A. Boosting Productivity

HRM plays a pivotal role in lowering labour costs in today's globally competitive environment. It also plays a central role in planning and implementing corporate downsizing. It helps employees adapt to the increased pressure in their downsized departments, by helping people to prioritise tasks and reduce job stress.

B. Responsiveness

HR makes enterprises more responsive to product innovation and technological change. All organizations aim at facilitating communication and making it easier for decisions to be made, and for the company to respond quickly to its customers' needs and its competitors' challenges.

C. Quality and Service

HR is the one producing the products or services offered by an organization, so it must be included in identifying quality and services blockages, and redesigning operational services. The involvement of all employees, not just managers, in problem solving, often requires a change in corporate culture, leadership style and HR policies. However, as more and more managers have been discovering, the quality and composition of human resources available to organizations today are dramatically different from those in previous decades.

D. Employee Commitment

Intense global competition, and the need for more responsiveness, puts a premium on employee commitment. Building employee commitment is the creating of a synthesis of employees' and employers' goals, so that employees want to do their jobs as if they own the company, and thus make a multi-branched effort. It has also helped in establishing career-oriented performance appraisal procedures, and open job posting and job transfer practices. Therefore, high-commitment companies are very careful about whom they promote to a managerial position. Many management training courses in today's firms' leadership institutes the use of lectures and exercises to reinforce the firm's people-oriented

values, and indoctrinate the new managers in the values of the firm.

E. Staff Motivation

In recent years, emphasis has been placed on the important role motivation plays in getting employees to give of their best. It is now recognised, more than ever, that people are the pivot on which any organization revolves. The success of any organization therefore depends on the effective mobilisation of the efforts of all the people making up the organization [16]. Hence, much attention today is being paid to motivation. Various social science findings have revealed that people can only give of their best if their needs are satisfied. Good motivation must emerge as a result of all the systems and techniques. One finds that a good motivation saturates basic needs, and releases work capacity. It is able to do this because it depends on proper selection and adequate orientation of personnel. It will be productive, since "all hands are on deck", as a result of which output will be in excess of input, and be comprehensive, and integrate with external sources of motivation such as the needs of dependants, and the desire for the respect of neighbours and friends.

IV. SOFTWARE DEVELOPMENT

Software development is the process of developing software through successive phases, in an orderly way. It is a complicated process, as it requires careful planning and execution to meet the goals. Different phases in this development process include the actual writing of code, preparation of requirements and objectives, the design of what is to be coded, and confirmation that what is developed has met the set objectives. Prior to the advent of software development, the development of new systems or products was often carried out by using the experience and intuition of management and technical personnel. However, the complexity of modern-day organizations has led to the need for some kind of orderly planned and structured development system.

Software can be developed for a variety of purposes, the three most common being the following:

- To meet specific needs of a specific client or business (the case with custom software employed in this dissertation)
- To meet a perceived need of some set of potential users (the case with commercial and open source software)
- For personal use (e.g a scientist may write software to automate a mundane task) [2].

V. FUNCTIONAL MODEL DESIGN

A system is a group of related parts working together, while a design is a plan on how a group of related parts should work together. It is a creative task, which attempts to develop systems superior to those which currently exist, mainly to achieve

improved efficiency. It involves studying how proposed system works. The end product of the design phase is a set of operating procedures, including computer programs and hardware specifications needed to implement the new system. The design of the proposed system ideally allows for the replacement of all manual operations by computer operations.

The operating system must have the ability to support an end-user query language, and provide adequate system security and control. The operating software chosen is Microsoft Windows XP. The major requirements of the software to be used for development and implementation of this application, are portability, capacity, flexibility and ease of use. The programming software chosen for this development is Visual Basic 2010.

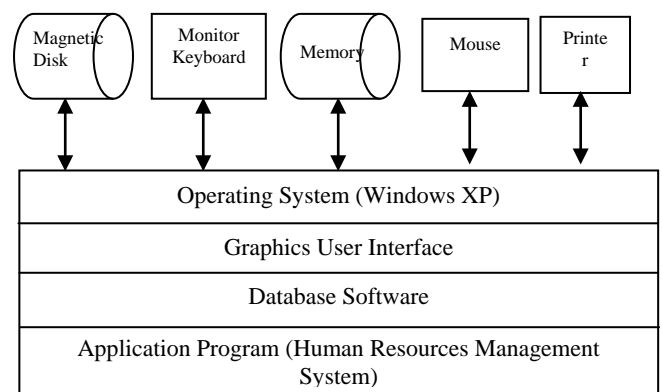


Fig. 2. HRMS Hardware & Software Environment

VI. PROGRAM FLOWCHART

Flowcharts are symbolic diagrams of sequence, data flow, control, and information processing logic. The system flowchart depicts the flow of data through the major parts of the system, with minimum detail. It shows where input enters the system, how it is processed and controlled, and how it goes on to storage or is presented as output. The program flowcharts describe the sequences of operations and logic for a particular computer program. In the development, the flowchart's processes were identified, analysed and illustrated. Some HR tasks were automated, while others were left as completely human procedures – based on the following reasons:

- Relative ease of manipulation by man or machine
- Development constraints and resources
- System scope
- Control and security requirements
- Estimated cost of automation
- Usefulness to the firm

The system flowcharts for this application are shown in Fig. 3:

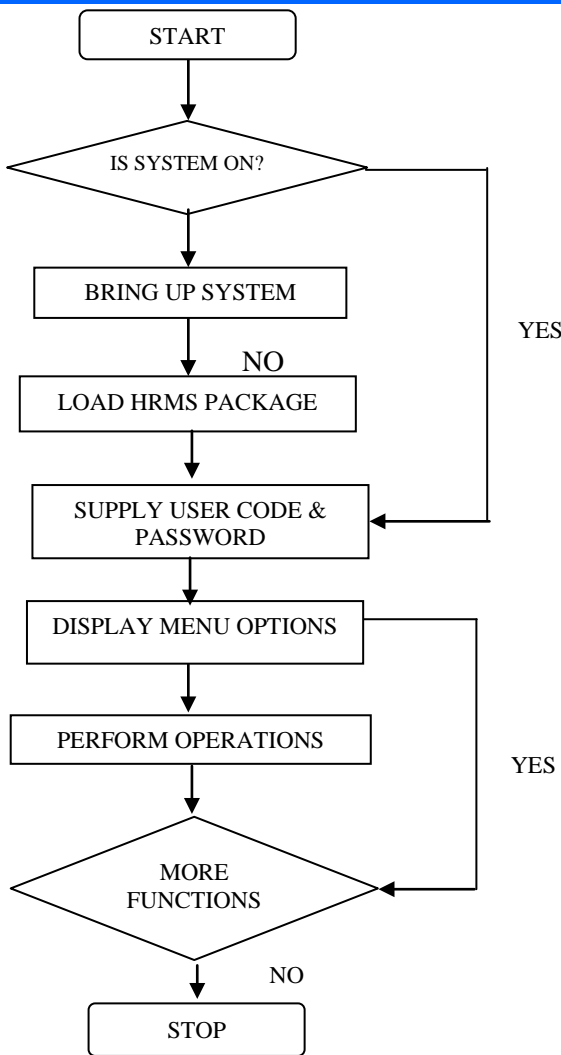


Fig. 3: Program flowchart for HRMS

VII.SYSTEM LOGICAL DESIGN

The system design is a plan of how a group of related processes should function together within a system. The result of the system design is a specification of the program flow and procedures of the application. This system is designed with a high level of flexibility. Any user can operate the system with little or no assistance. The system is user friendly, making it easy to work with. The system design consists of two sections: logical design and physical design. The logical design describes the flow of program execution and the program logic. The program begins by requesting a username and password. If the correct information is entered, the program then presents the user with a list of menus, and, depending on the user's choice, an appropriate module is brought up. Upon exiting the module, the user is taken back to the menu list. In case he/she wants to perform another task, there are only two ways to exit the program: either from the original login dialog box or from the menu form. Fig. 4 below shows the flow of the program logic:

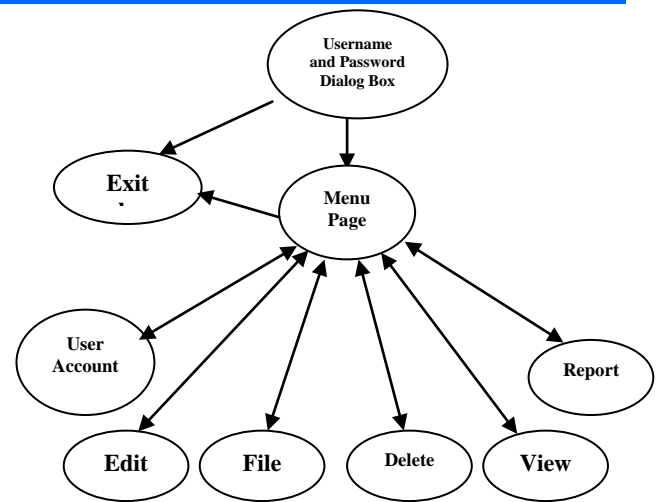


Fig. 4. Flow of Program Logic

VIII.SYSTEM MODULES

There are six major system modules (fig. 4), namely –

- Creating new employee records
- Editing an existing employee record
- View an existing employee record
- Delete an existing employee record
- View technical report on employee record
- Administrative/user account

A. Create New Employee Record

This module is accessed by choosing the appropriate option from the welcome menu option. It allows an authorised user to perform/create a record for a new employee in the system, by supplying the appropriate information and selecting the right fields, as follows (fig. 5):

Fig. 5. Creating New Employee Record Module

B. View Existing Employee Record

This module allows authorised users to view the details of a specified employee. The module is simple, and requires that an employee's identity number be entered before it displays information about the

employee. It also allows the user to print the displayed employee information by entering the required employee's ID (fig. 6):



Fig. 6. View Existing Employee Record Module

C.Edit Existing Employee Record

This module allows authorised users to edit existing employee records. It also requires the input of an employee's identification number, to display the employee's information. Unlike the module described above, however, this module allows the user to make changes to any of the fields in an existing employee's record.

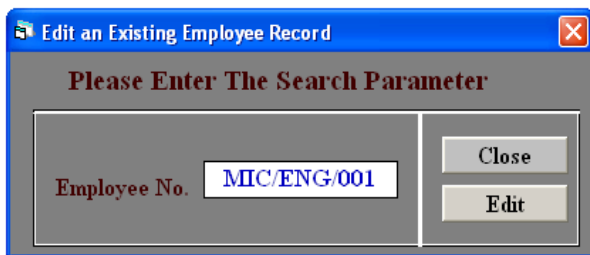


Fig. 7. Edit Existing Employee Record Module

D.Delete Existing Employee Record

This module allows authorised users to delete an existing employee record. It also requires the input of an employee's identity number, to delete (Fig. 8) the employee's information.

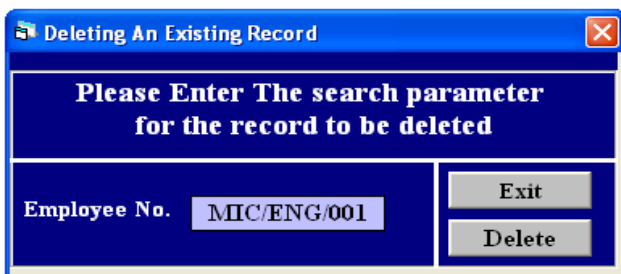


Fig. 8. Deleting Existing Employee Record Module

After the employee record has been deleted, the deleted record is stored in 'trash' (where deleted records are stored in the database) – which is different from the active employee's record, and can be further recovered through the report menu at any time.

E.User Account

This module can only be accessed by a user with administrative privileges. Here, the user can create

user accounts. The function and module accessible to this user account created, is limited to viewing an existing employee record only.

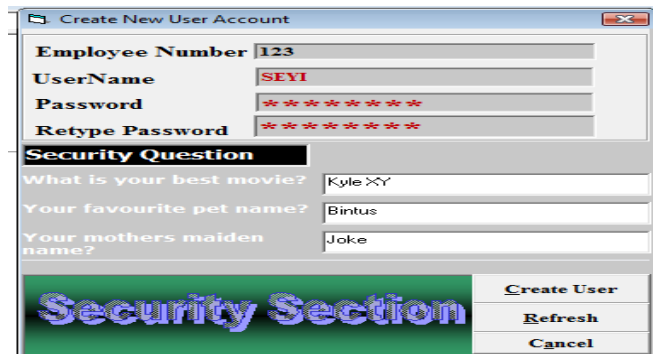


Fig. 9. Creating New User Account Module

F.System Administrator Account:

This module can only be accessed by the system administrator. Only the system administrator has the full privilege to access all the functions and modules in the system by mere signing in (Fig. 9) onto the system, to perform the desired operation:

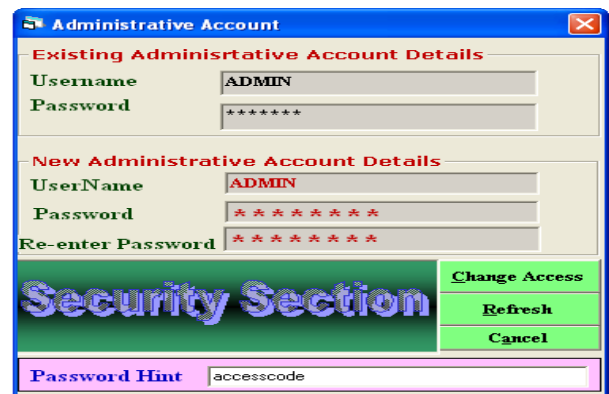


Fig. 10. System Administrative Account Module

IX.SYSTEM BACK END

The Database Management Software (DBMS) used as the system back end for the development, was Microsoft Access Database. The database file format used was Access 2000 for easy accessibility on all computer systems, regardless of the versions installed on their systems. The database was initially created by design and sundry tables as required by the HRMS system, so as to house myriads of related users' data. The programming language used to design the application was Microsoft Visual Basic 6.0, and it was directly linked with the database through the systems internal configurations for data entry and retrieval from the database. This database possesses a high level of security, which is authenticated through the front end by disapproving unregistered login data into the system by an unauthorised user.

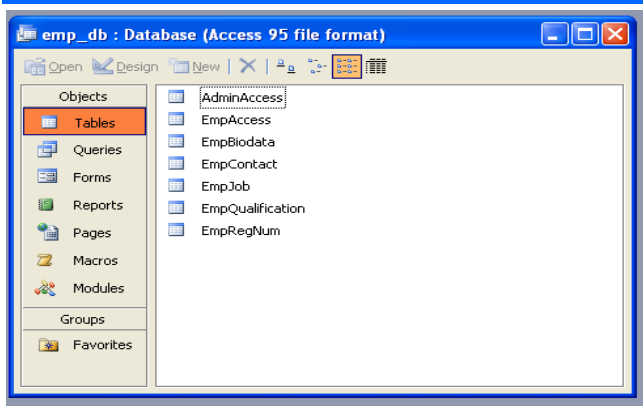


Fig. 11. Database View of Human Resources Manager

CONCLUSION

The package developed in this research facilitates fast and accurate employee information storage, editing and retrieval, which, in the long run, will reduce the problems associated with manual undertaking of human resources activities, and, by and large, improve the efficiency of HR departments in general, and HR managers in particular. It can therefore be concluded that this research work will improve the conventional (manual) method of keeping records and rendering services, and will be an invaluable tool for HR managers to guide an informed decision-making process. Furthermore, monitoring of employee training, development, transfer and deployment will be greatly enhanced.

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