

Analysis of Human Resource Management System Using Data Flow Diagram

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ABSTRACT

يقترح هذا الورقة منهجية لتحليل لنظام إدارة الموارد البشرية (HRM) باستخدام مخططات تدفق البيانات (DFDs). إن مخطط تدفق البيانات هو رسم بياني لتدفق البيانات بين مختلف العمليات في الأعمال التجارية، وهو أيضاً تقنية رسم بياني تصوّر تدفق المعلومات التي تطبق في نقل البيانات من المدخلات إلى المخرجات. ويهدف مخطط تدفق البيانات بأنه الرسم الذي يوضح حركة البيانات بين الكيانات الخارجية والعمليات ومخازن البيانات داخل النظام. لتحقيق مخطط لتدفق البيانات لنظام إدارة الموارد البشرية نحتاج للعديد من الخطوات، حيث تتضمن الخطوة الأولى تحديد حدود النظام، والعمليات، والكيانات الخارجية، الخطوة الثانية مصادر النظام الأساسي (HRM) والكيانات أو الأنظمة الخارجية (Entities) وهذا الذي يمثل المستوى الأعلى للنظام (High Level) وهو ما يسمى ب (Context Level). تم تقديم وصلات البيانات والعمليات الفرعية على مخططات تدفق البيانات من المستوى 0 والمستوى 1 والمستوى 2 على التوالي، توثيق نموذج منطقي كامل يمثل تحليل نظام (HRM) باستخدام (DFD) إدارة عمليات الأعمال الناجمة تعتمد على نماذج فعالة لتدفق العمل، مع التركيز بشكل أساسي على مراقبة وتنسيق المهام مثل تقنية مخطط تدفق البيانات، يستخدم (DFD) كمخطط يمثل التدفق من خلال نظام المعلوماتية لتمثيل العمليات في إدارة الصيانة من وجهة نظر البيانات.

This paper search a system analysis methodology for Human Resource Management System (HRMS) using Data Flow Diagrams (DFDs). Several steps will be required to accomplish this work. The first step includes the determination of system boundaries, processes, and data entities. In the second steps, system sources and destinations will be presented on context diagram (level 0). Then data links, processes, and sub-processes will also be presented on data flow diagrams of level 1 and level 2 respectively. Finally, a complete logical model representing a system analysis of HRMS will be documented using DFDs. The use of DFDs lead directly into physical design, with processes suggesting programs and procedures, data flows suggesting composites, and data stores suggesting data entities; files; and database.

Keywords: Data Flow Diagrams, Human Resource Management

1. Introduction

In global knowledge economy, information is power for efficient management of Human Assets, HR Professionals requires accurate and timely data on recruitment, selection, training, development, career planning, compensation, productivity, skills inventory, attrition rate etc. [8]. Performance Management consists of three steps – planning, coaching and feedback which is ongoing and not an isolated event, and evaluation. The diagram shows, Figure 1, how the components and steps integrate to form a cohesive process [11].

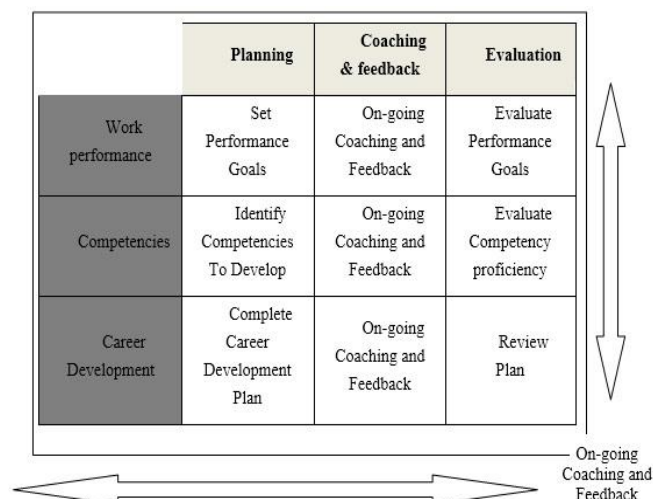


Fig. 1: The diagram of the components and steps integrate to form a cohesive process [11].

Analyze data input or data flow systematically, processing or transforming data, data storage and information output within the context of a particular business. Analyze, design and

implement improvement in the functioning of business that can be accomplished thru the use of computerized information system. The System Analysis is the scientific study of the systems process, including investigation of inputs and outputs, in order to find better, more economical and more efficient means of processing. To improve the productivity of the system. Tools of Structured Analysis Modeling System Functions – ex. Data Flow Diagram, Modeling Stored Data – ex. Entity Relation Diagram, Modeling Program Structure – ex. Program Flowchart, Modeling Time – ex. Gantt chart [1].

Data Flow Diagram (DFD): a modeling tools use to describe the transformation of inputs into outputs. DFD is a graphic illustration that shows the flow of data and logic within the system [7].

2. Research Objectives

Workflow technology has become a standard solution to managing increasingly complex business processes [1]. Successful business process management depends on effective workflow modeling techniques. Recently, researchers have developed a variety of workflow models, focusing mainly on the control and coordination of tasks such as DFD, i.e. the control flow perspective. However, most of these workflow models found it have paid little attention to the data flow perspective. In this paper work, we investigate the data flow issues and propose a data flow modeling approach for HRM in the context of business process management.

A data flow diagram help managers to understand and facilitate the process of decision-making activities. DFD is graphically represent the flow of data through a system without any indication of time. Use DFD in business process model as a graphical representation of the flow of data through an information system, it enables the represent the processes in

Human Resource Management information system from the viewpoint of data. The DFD can be visualize how the system operates, what the system accomplishes and how it will be implemented, when it is refined with further specification. Data flow diagrams are used by systems analysts to design information-processing systems but also as a way to model whole organizations. The building of DFD at the very beginning of the business process modeling enables the functions of the system to be entered, carry out the interaction between those functions together, and will focuses on data exchanged between processes. It associates data with conceptual, logical, and physical data models and object-oriented models.

3. Human Resource Management

3.1. Introduction of Human Resource Management

The policies and practices involved in carrying out the “people” or human resource aspects of a management position, including recruiting, screening, training, rewarding, and appraising[4]. The term ‘human resource management’ (HRM) “That part of the management process that specializes in the management of people in work organizations. HRM emphasizes that employees are critical to achieving sustainable competitive advantage, that human resources practices need to be integrated with the corporate strategy, and that human resource specialists help organizational controllers to meet both efficiency and equity objectives.” Naturally, the definition of human resource management would be incomplete without further explaining what the terms ‘human resources’ and ‘management’ are. First, people in work organizations, endowed with a range of abilities, talents and attitudes, influence productivity, quality and profitability. People set overall strategies, goals, design work systems, produce goods, and services, monitor quality, allocate financial resources, and market the products and services. Individuals, therefore, become ‘human resources’ by virtue of the roles they assume in the work organization. Employment roles are defined and described in a manner designed to maximize particular employees’ contributions to achieving organizational objectives. In theory, the management of people is no different from the management of other resources of organizations. In practice, what makes it different is the nature of the resource, people. One set of perspective views the human being as potentially a creative and complex resource whole behavior is influenced by many diverse factors originating from either the individual or the surrounding environment. Organizational behavior theorists, for example, suggest that the behavior and performance of the ‘human resource’ is a function of at least four variables: ability, motivation role perception and situational contingencies. Another set of perspectives emphasizes the problematic nature of employment relations: The human resources differ from other resources the employer uses, partly because individuals are endowed with varying levels of ability (including aptitudes, skills and knowledge), with personality traits, gender, role perception and differences in experience, and partly as a result of differences in motivation and commitment. The main process of HR as shown in Figure (2). In other words, employees differ from other resources because of their ability to evaluate and to question management’s actions and their commitment and co-operation always has to be won. In addition, employees have the capacity to form groups and trade unions to defend or further their

economic interest. Human resource is often referred to as personnel, staff or workers [2].



Fig. 2: Main Process of HR [2].

3.1.1. What is HRM and HRD?

HRM is best understood as the “process of managing human talents to achieve organization’s objective”. The process of managing human talents is said to include the process of recruitment and selection, compensation and benefits, labor and industrial relations and the management of employees’ safety and health in organizations. On the other end, researchers and writers have proposed numerous definitions for HRD. These definitions varied from the perspectives of an individual researcher or theorists to definitions of HRD by country. In addition, theorists have even tried to define HRD from a global and international perspective. Indeed, many definitions have been suggested; even before the emergence of HRD in 1970s through today. A definition by Nadler and Nadler in 1970s described HRD as “a series of organized activities conducted within a specified time and designed to produce behavioral change” through training activities. The latest definition by DeSimone, Werner & Harris (2002) for HRD was defined as “a set of systematic and planned activities designed by an organization to provide its members with the opportunities to learn necessary skills to meet current and future job demands”. These systematic and planned activities are said to include training and development, career planning and development, performance appraisals and management and change management for organizational development. In the context of professionals, this activity is termed as continuing professional education and development. To all intents and purposes, the continuing professional education and development activities are the same as in training and development but it is labeled differently directed to professionals’ education and development [6].

3.1.2. The relationship of HRM and HRD

Traditionally, some writers suggested that HRD is a component of HRM in which HRD supports the HRM function in employees’ training and development and the notion of training and development fitting in or integrated with HRM as in the ‘HRM’s wheel’. All the four components of HRD, namely; training and development, performance appraisals and management, career planning and development as well as change management [5]. At Table (1) comparison of HRM and HRD

Components was advocated as positioned under the ‘umbrella’ or function of HRM along with other components

such as recruitment and selection, compensation and benefits, employee and industrial relations as well as safety & health [2].

Table 1: Comparison of HRM and HRD

HRM	HRD
Definition: HRM is process of managing human talents to achieve organization's objective	Definition: HRD is a series of <u>organized activities</u> conducted within a specified time and designed to produce behavioral change
Process: 1. Recruitment and selection 2. Compensation and benefits 3. Labor and industrial relations 4. Safety and health management	Activities: 1. Training and development 2. Performance and appraisals 3. Career planning and development 4. Change management

3.1.3. HRM and productivity

HRM effects on productivity as:

- Increase in productivity from individual and group pay schemes
- True across many sectors/firms
- Large selection effect but also incentive effect
- More effective when introduced as a package of complementary practices – Teams
- Human Capital – ICT
- Non-pay HRM practices have (i) had less high quality studies, (ii) positive correlations tend to disappear when fixed effects included [5].

3.2. Strategic Human Resource Management

Today, HRM has become more important to strategic management, mainly because of its role in providing competitive advantage and the rush to competitiveness. [14]. Human resources management in the context of finding, attracting and selecting employees has a significant effect on improving the effectiveness of staff, it effective in the evaluation of their performance, effectiveness of employees` performance in designing and implementing training programs of development [12.]

The nature of management skills are culturally specific, a management technique or philosophy that is appropriate in one country is not necessarily appropriate in another, In addition, cultural dimensions namely, Individualism/Collectivism; Power Distance; Masculinity/ Femininity; there are impact of national culture on human resource management practices [13]. theory in strategic human resource management must continue to increase if the field of strategic is to move forward. Strategic in reality is not usually a formal, well –articulated and linear process which flows logically from the business strategy. However, there is a growing literature on the impact of HRM practice on organizational performance [14].

4. Data Flow Diagrams

4.1. Introduction of Data Flow Diagrams

A picture of the movement of data between external entities, the processes, and data stores within a system. DFDs depict logical data flow independent of technology. May be used as a discovery technique for processes and data, or as a technique for verification of a Functional Decomposition and Entity Relationship Diagram that have already been completed. Most users find these diagrams quite easy to understand generally considered a useful analysis deliverable to developers in a structured programming environment [9].

4.2. Data flow diagram symbols

There are four primary symbols used to create a data flow diagram shown in figure (3).

- A source or destination (sink) is represented by a (shaded) square. Sources and destinations define the system's boundaries; each one represents a person, organization, or other system that supplies data to the system, gets data from the system, or both.
- A process, or transform (a round-cornered rectangle) identifies an activity that changes, moves, or otherwise transforms data.
- A data store (an open-ended, horizontal rectangle) represents data at rest and implies that the data are held (for some logical reason) between processes.
- A data flow (an arrow) represents data in motion. Additionally, Gane and Sarson use thick arrows to show physical or material flows.

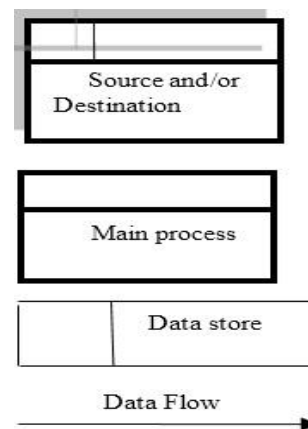


Fig. 3: Symbols of data flow diagram [4].

4.3. Logical and physical data flow diagrams

A logical data flow diagram's symbols are used to describe logical not physical entities. A process might eventually be implemented as a computer program, a subroutine, or a manual procedure. A data store might represent a database, a file, and a book, a folder in a filing cabinet, or even notes on a sheet of paper. Data flows show how the data move between the system's components, but they do not show the flow of control. The idea is to create a logical model that focuses on what the system does while disregarding the physical details of how it works.

A physical data flow diagram uses data flow diagram symbols

to represent the system's physical processes (programs, manual procedures) and physical data stores (files, databases, reports, screens, etc.) and shows how the system works. Some analysts like to start the analysis process by preparing a physical data flow diagram of the present system. Following the analysis stage, physical data flow diagrams can be used to document alternative solutions [10].

4.4. Why use DFD for analysis of HRMS

The data for the HR system project could be termed in the operational, technical and economic feasibility. A project needs two types of information to compute the feasibility that are primary and secondary data [1]. The data is transmitted after analyzing and checking the effectiveness and the usefulness of the information for the project. It is also essential for that the information, which is gathered, should be dependable and suitable. The information or data collecting procedure should be efficient to examine the system. For it, a new and efficient data move policy should be adopted. To investigate the effectual data transfer. The data flow diagram could be used to determine the validity of the fact of data [2].

5. Discussion and Results

The overall methodology of the proposed research work can be summarized into phases

- Understanding the business requirements of the HRMS.
- Identifying the business processes of the HRMS.
- Preparing a high-level business design. Present and review the completed high level business process design.
- Determining the processes, external entities, data stores and data flows of every identified process [4].
- Drawing the data flow diagrams corresponding to these identified elements.
- Presenting numerous a DFD by decomposition, Child diagrams and Balancing.

Decomposition: is the process of representing the system in a hierarchy of DFD diagrams. **Child diagrams:** show a portion of the parent diagram in detail. **Balancing:** involves insuring that information presented at one level of a DFD is accurately represented in the next level DFD.

The steps involved in Building DFDs are summarized as follows:

- Build the context diagram
- Create DFD fragments for each use case
- Organize DFD fragments into level 0 diagram
- Decompose level 0 processes into level 1 diagrams as needed; decompose level 1 processes into level 2 diagrams as needed; etc.
- Validate DFDs with user to ensure completeness and correctness. [9]

Benefits of data flow diagrams: The data flow diagrams are the basis of structured systems analysis. A data flow diagram acts as a bridge between users and systems developers. Thus, a data flow diagram is a:

- Graphical representation that eliminates thousands of words;

- Logical representations that represents WHAT a system does, rather than physical models showing HOW it does it;
- Hierarchical representation illustrating systems at any level of detail and
- Jargon less representation that allow user to clearly understand and review the system.

The advantages of data flow diagram include:

1. It helps technical and non-technical users to easily understand systems design.
- a. It helps in validating the correctness of the system. It is therefore easy to determine whether requirements are correct. The probability of a better system is increased.
2. It allows the analyst to abstract to whatever level of detail is required so that it is possible to examine a system in overview and at a more detailed level.
3. It specifies the system at a logical level rather than a physical level i.e. it shows what the system will do rather than how it will be done.
4. It helps to understand the inter-relatedness of systems and subsystems of the system.
5. It provides a means of analysis of a proposed system to determine if the necessary data and processes have been defined [1].

6. Conclusion

The general objective of this research work is to develop a Data Flow Diagram for Human Resource Management System. In order to achieve this objective the following specific objectives have to be accomplished:

- Investigation some of the existing HRMS to understand how the systems boundaries, processes and data entities are logically related.
- Developing the context diagram (level 0) which documents the systems boundaries by highlighting its sources and destinations.
- Developing the level 1 data flow diagram, which shows the system reviewing, processes, data stores, sources and destinations linked by data flows.
- Developing level 2 data flow diagrams which consists of several sub process that are listed on the process description.
- Reporting a final logical model, which consists of a complete set of data flow diagrams for HRMS.

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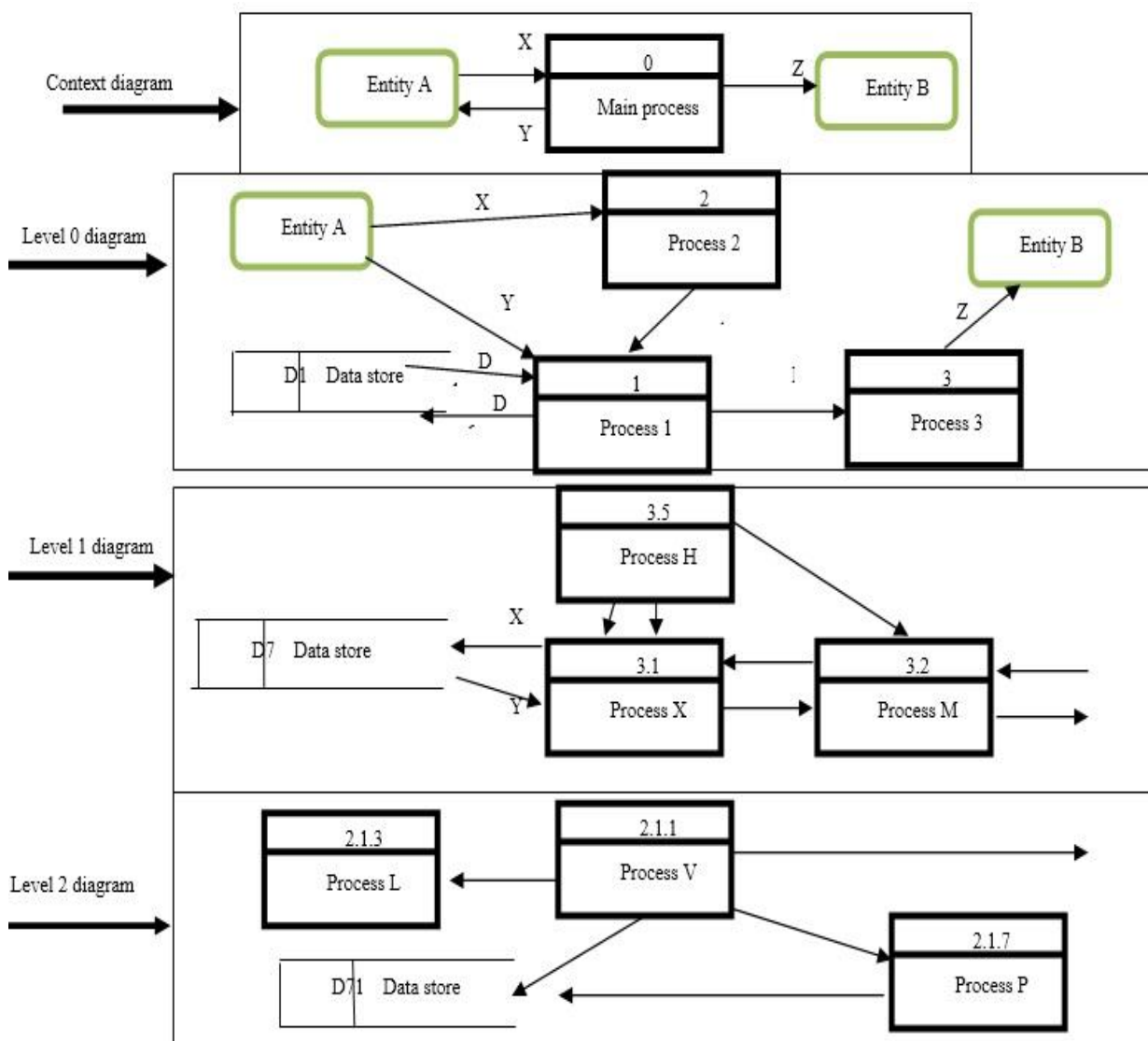


Fig. 3: Relationship among levels of DFDs [1].