

# APPLICATION OF DECISION SUPPORT SYSTEM IN HUMAN RESOURCE MANAGEMENT IN MFIS- A SYSTEM DYNAMICS APPROACH

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**Abstract:** *Absence of any formal employment makes the poor population non-bankable. The problem of today is worsening due to population growth. Microfinance has been deemed to be one of the most effective instruments to alleviate poverty and recognized with widening participation by both governments and banks. MFIs provide credit, savings, and other financial services to the poor and must manage large volumes of small transactions in order to remain viable. There are different activities in HRM which involves a lot of unstructured processes such as staffing, training, motivation and maintenance (DeCenzo & Robbins, 2005). Besides that, decision making for unstructured processes in HRM usually depends on human judgment and preferences. Computer applications as decision support tool can be used to provide fair and consistent decisions. But the increased usage of computer based DSS is perceived as transferring decision authority to software programs. System dynamics is a computer-aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economic, or ecological systems -- literally any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality. This paper tries to find the effectiveness of the strategic role of HR with the help of DSS. The paper begins with introduction and background of DSS, SD, and MFI. Finally conceptual Models are presented and discussed in this paper.*

**Keywords:** *Decision Support System, Information System, Human Resource Management, Microfinance, System Dynamics.*

## 1. INTRODUCTION

“Microcredit, or microfinance, is banking the unbankables, bringing credit, savings and other essential financial services within the reach of millions of people who are too poor to be served by regular banks, in most cases because they are unable to offer sufficient collateral”. (Van Maanen, 2004). This definition of microfinance depicts it as a provision of financial services to

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those who have been neglected by the mainstream banking system. Some of the reason for this neglect can be summed as poorness, lack of education, live in remote areas etc. In India microfinance loans are ranged in between Rs. 5,000 to Rs. 20,000 (the Development and Regulation Bill, 2007, defines micro finance loans as loans with amounts not exceeding Rs. 50000 in aggregate per individual/ small enterprise).

Decision support system (DSS) is the area of Information Systems discipline that is focused on supporting and improving managerial decision making. Decision support system help decision makers better understand the issues underlying the situation and to make decisions in situation where the extent to which certain variables influence the activity or outcome are not initially clear or only part of the information is available in advance. The use of DSS is an interactive process. The answers to the questions are not ends in themselves, but raise other questions in consideration that need to be run through the decision support system. Decision support systems can help decision makers in such situation by providing the information and structure needed to make a rational decision.

Human resource management includes recruitment jobs, training, incentives and other daily works and processes. These tasks include strategic planning, management control and practical implementation of different levels. These activities are a set of interlocking processes.

System dynamics is an important lens to view poverty alleviation [ii]. It is an aspect of system theory and a method for understanding the dynamic behavior of complex systems (Sterman, 2001; Radzicki and Taylor, 2008). System dynamics is a computer-aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economic, or ecological systems. Literally this technique can be used in any dynamic systems characterized by interdependence, mutual interaction, information feedback, and circular causality.

Information visualization can be done by the technology of stratification. All the automated tasks, such as data transmission, racking, sign off, query, statistics and analysis can be done by using this technology. This external assistance is helpful in reducing costs, improve efficiency and improve the management mode of working of HRM. DSS are interactive system, flexible enough, adaptable and specifically developed to support the solution of a non structured management problem for improved decision making.

In order to improve human resource decisions, the high quality HRM applications are required to produce high and reliable decisions.

## 2. OVERVIEW OF DECISION SUPPORT SYSTEM

Markets needs are shaped by numerous factors including political realities, advances in technologies and changing cultural expectation. To be competitive in this environment, business cannot be static, but need to grow and change to meet the needs of marketplace. Decoding trends and translating them into business strategies are neither simple nor obvious process. To help management make such complex decisions, many organizations use decision support systems. Decision Support System (DSS) is the area of Information Systems discipline that is focused on supporting and improving managerial decision making. Decision Support System help decision makers to understand the issues underlying the situations and to make decisions where the activities or outcomes are not initially clear or only a part of the information is available in advance. The use of DSS is an interactive process. The answers to the questions are not ends in themselves, but raise other questions in consideration that need to run through the Decision Support System. Decision Support Systems can help decision makers in such situation by providing the information and structure needed to make a rational decisions. The Decision Support System creates a quantitative model of the situation and then process data to show the impact of the variables under consideration on the outcomes. DSS helps the decision maker to get the answer of the questions concerning conditions under which an outcome might happen if the value of a variable change.

Following are the types of DSS used by various organizations:

- **Personal DSS (PDSS)** are small scale systems that are normally developed for one manager, or a small number of independent managers, for one decision task. They effectively replaced MIS as the manager support approach of choice.
- In **group support system (GSS)** decision responsibility is shared by a number of managers and they are involved in the decision process. These systems enable workgroups to process and interpret information together even when they are not physically collocated. These system use network and communication technologies to foster collaboration and communication in support of decision making.
- **Negotiation support systems (NSS)** also operate in a group context but they involve the application of computer technologies to facilitate negotiations (Rangaswamy and Shell, 1997).

- **Artificial intelligence (AI)** techniques have been applied to decision support and these systems are normally called Intelligent DSS. Intelligent DSS can be classified into two generations: the first involve the use of rule based expert systems and the second generation uses neural networks, genetic algorithms and fuzzy logic (Turban et al, 2005).
- **Executive information systems** are data oriented DSS that provide reporting about the nature of an organization to management (Fitzgerald, 1992). If a manager notice from an EIS report that the business is not performing in any critical area, the EIS enables the manager to drill down through a report hierarchy to discover the possible source of the variance.
- A **data warehouse** is simply a set of database created to provide information to decision makers (Cooper et al 2000); they provide raw data for user focussed decision support through PDSS and EIS. Large organizations were faced with significant challenges in maintaining an integrated view of their business. This paved the way for the birth of data warehousing.
- **Knowledge Management based DSS:** The action taken by organizations to manage what they deem as knowledge is vital in its ability to increase innovation and competitive advantage and support decision making. KM affects the entire organization and involves the management of several areas including IT, organisational behaviour, organisational structure, economics and organisational strategy.

## 2.1. Overview of System Dynamics

System dynamics is a computer aided approach to policy analysis and design. It applies to dynamic problems arising in complex social, managerial, economical or ecological systems. The field developed initially from the work of J.W. Forrester. System Dynamics is a policy modeling methodology based on the foundation of (1) decision making, (2) feedback mechanism analysis and (3) simulation. Decision making focuses on how actions are to be taken by the decision makers. Feedback deals with the way information generated provide insight to decision making. Simulation provides decision makers with a tool to work in a virtual environment where they can view and analyze the effects of their decision in future. It is characterized by interdependence, mutual interaction, information feedback and circular causality.

The application of system dynamics approach involves the following steps [iii]:

- Defining problems dynamically, in terms of graphs over time.
- Striving for an endogenous, behavioral view of the significant dynamics of a system, a focus inward on the characteristics of a system that themselves generate or exacerbate the perceived problem.
- Thinking of all concepts in the real system as continuous quantities interconnected in loops of information feedback and circular causality.
- Identifying independent stocks or accumulations (levels) in the system and their inflows and outflows (rates).
- Formulating a behavioral model capable of reproducing, by itself, the dynamic problem of concern. The model is usually a computer simulation model expressed in nonlinear equations, but is occasionally left unquantified as a diagram capturing the stock-and-flow/causal feedback structure of the system.
- Deriving understandings and applicable policy insights from the resulting model.
- Implementing changes resulting from model-based understandings and insights.

Roberts et al (1983) have suggested that the feedback thinking is an important way of looking at and making decisions concerning social, economic, environmental, managerial and political problems. In essence, feedback thinking consists of three concept areas, each of which contributes to the system dynamics view of solving problems. These are [iii]:

- Thinking in terms of feedback loops: this draws attention to the fundamental causes of the problems under investigation
- Thinking over time: this concept implies that feedback system problems are problems that show varying pattern of behavior over time.
- Exploring how system structure, especially feedback loops and time delays, cause change over the time

## **2.2. Overview of Human Resource Management**

Human Resource Management provides an institution with an effective work force in order to meet its growth in short term and its mission and vision in long term. Effective HRM uses systems and tools to bring together the right number of people, with the right attitude and skills, in the right place at the right time. The goal of HR system, tools and activities is to help the

individual employee to make the organization to be successful. HRM involves a lot of managerial decisions. Primary HR activities are as follows:

- **Staffing:** is to locate and secure competent employees.
- Salary, benefits and incentives: are to motivate employee in the organisation.
- Training and development: is to adapt competent workers to the organisation and help them obtain up to date skill, knowledge and abilities.
- **Motivation:** is to provide competent and adaptable employees who have up to date skill, knowledge and abilities with an environment and encourages them to exert high energy level.
- **Maintenance:** is to help competent and adaptable employees who have up to date skill, knowledge and abilities and exerting high level energy to maintain their commitment and loyalty to the organisation.

## 2.4 Overview of Microfinance

According to International Labour Organisation, “Microfinance is an economic development approach that involves providing financing services through institutions to low income clients”.

The concept of Microfinance emerged in need of meeting special goals to empower under privileged class of society, women and poor. It is the process of granting small loans to poor people, especially to women. It is believed that these women tend to use their income to benefit their households and children. The principles of microfinance are founded on the philosophy of cooperation and its central values are equality, equity and mutual self help.

To achieve targets management must decide on [8]:

- The right mix of personnel
- The geographical distribution of offices
- Whether to offer individual loans or loans to group
- The amount of information to be gathered
- An interest rate structure that will yield sufficient demand for credit and supply of savings

This is where Application of DSS in HRM comes in play. It is also known as HRDSS.

### 3. HUMAN RESOURCE DECISION SUPPORT SYSTEM:

HR DSS is used for the specific HRM domains and most of them use expert system or Knowledge based system (KBS) approaches. Most of the new HR decision system research uses other intelligent approaches such as in personnel selection, they use Data Mining and Neural Network approach. The problem domains that they try to solve are also limited to specific domains, and that most of the human resource DSS applications use expert system approach.

Expert system in HRM activities has its limitations such as incorrect knowledge because of the difficulty in obtaining knowledge from appropriate experts, difficulty in representing that knowledge in a computer model and not being able to handle complex cognitive tasks (inability of the system to learn)(Hooper et al., 1998). Due to these reasons, to solve problems in expert system approach, other intelligent techniques such as hybrid intelligent techniques can be most effective when they are embedded with the HR DSS. In HRM, there are several tasks that can be solved using this approach, for examples, selecting new employees, matching people to jobs, planning career paths, planning training needs for new and old employee, predicting current employee performance, predicting future employee and et.

**Application of HR DSS in MFIs:** HR DSS support an organization in two ways [12],

- (a) By facilitating the daily tasks of personnel and
- (b) By providing useful outcomes to decision makers.

HR DSS uses sophisticated tools and techniques and methods in order to be tied to a well designed HRM system. In that way it will provide output of high quality and precision that the administration at every level can use and make decision at any time.

HR application and type of DSS used is given in the table below:

**Table1.**  
**DSS techniques used for various function of HR**

<i>Category</i>	<i>DSS Techniques used</i>
Staffing and Personnel Selection	Knowledge based system (Hooper et al, 1998) Data Mining (M.J Huang et al, 2006)
Training and development	Knowledge based system (Liao, 2007)
Motivation, Performance Appraisal	Artificial Neural Network (Tung et al, 2005)
Administration and scheduling	Software agent (Glenzer, 2003)

*Source:* DSS for HRM of the organisation

Current research in this area suggests that DSS, if implemented and used correctly can improve the quality of decision making significantly by minimizing the negative effects of decision making and maximizing the benefits of organization. Results show that while internet has made it easier and less costly to use DSS than ever before, the social effects of group decision making can have a significant effect on the quality of decisions made in group setting using DSS. By manipulating things such as visuals cues, group versus individual based incentives, anonymity, group size, feedback, leadership role, communication methods, types of tool used social presence, face to face versus distant, shift work or non shift work, the fit between facilitation style and agenda and finally, a relationship versus a task focus, it is possible to significantly impact the quality of decision made by administration using DSS.

There are three options for setting DSS technologies [10]:

- (a) One of them is in a special purpose decision room,
- (b) another is at multiple use facility and
- (c) The third is a web based group ware with clients running wherever the group members are.

#### ***Why does MFIs need HR DSS?***

Answer to following questions can give a clear picture to firm about use of DSS [9]:

- What are the factors that changed the primary role of HRM from caretaker of records to a strategic partner?
- How does technology help deliver transactional, traditional and transformational HR activities more effectively and efficiently?
- What is the need of HR DSS in the firm?

Following are the several advantages to firms in using HR DSS [14]:

- Providing a comprehensive information picture as a single, comprehensive database; this enables organisations to provide structural connectivity across units and activities and increase the speed of information transactions (Lengnick- Hall & Lengnick Hall, 2006)
- Increasing competitiveness by improving HR operation and improving management process



- Collecting appropriate data and converting them to information and knowledge for improved timeliness and quality of decision making.
- Producing a greater number and variety of accurate and real time HR related reports.
- Streamlining and enhancing the efficiency and effectiveness of HR administration functions.
- Reengineering HR process and functions.
- Improving employee satisfaction by delivering HR services more quickly and accurately to them.

DSS share several characteristics which are helpful in quick problem solution. These characteristics are as follows [10]:

- A focus on critical points: controls are applied where failure cannot be tolerated or where costs cannot exceed a certain amount.
- Integration into established processes: it controls most function harmoniously within the processes and should not be bottleneck operation.
- Availability of information when needed: deadlines, time needed to complete the project, costs associated with the project, and priority needs are apparent in these criteria. Costs are frequently contributed to time shortcomings or failures.
- Accuracy: effective control system provides factual information that are useful, reliable, valid and consistent.

But the ability of firm to harness the potential of HR DSS depends on a variety of factors such as [14]:

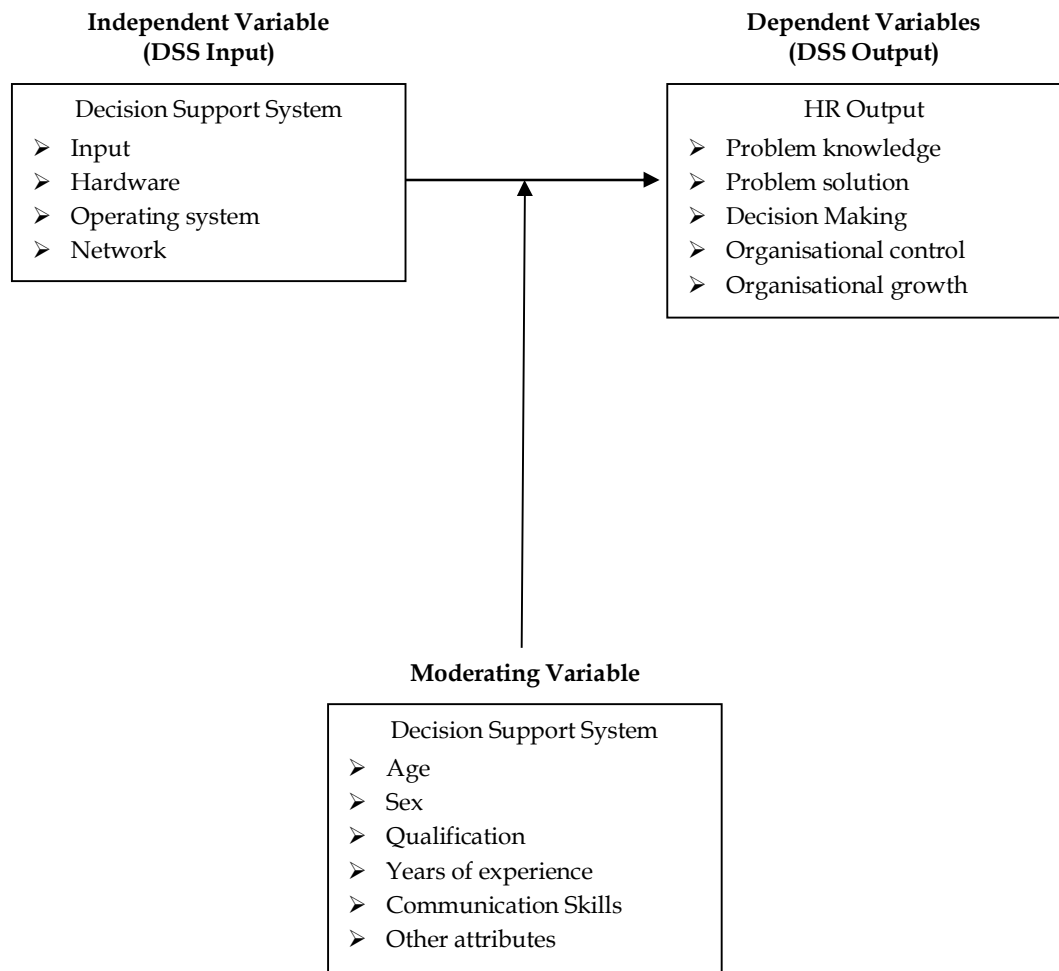
The size of organisation, with large firms generally reaping greater benefits.

- The amount of top management support and commitment.
- The availability of resources (time, money and personnel).
- The HR philosophy of the company as well as its vision, organisational culture, structure and systems.
- Managerial competence in cross functional decision making, employee involvement, and coaching

- The ability and motivation of employees in adopting change, such as increased automation across and between functions (Ngai & Wat, 2004)

**Framework for HR DSS is in :**

A frame work for HR DSS has been developed. This diagram presents relation between various variables: Decision Support System, Human resource Management and other variables controlling decisions in MFIs.



**Fig 1. Framework for HR DSS**

From the framework for HR DSS, following points can be concluded:

**Independent Variable (DSS):** A DSS is a system for incorporating and integrating disparate data sources to better allow decision makers to access

and compile data in a useful format[ ]. In general most decision support systems include the hardware, network technologies and operating systems.

- (i) **Hardware:** Hardware is a physical device that makes up a computer. It comprises of the computer physical devices such as key board, monitor, mouse, cpu etc.
- (ii) **Operating system:** An operating system is a software program that enables the computer hardware to communicate with computer software. It is an interface between hardware and the user.
- (iii) **Network:** Network is group of computers and other devices connected by some kind of transmission media. Its importance lies in the fact that it enables multiple users to share devices and data.

### **Dependent variable (HR Output)**

**Problem knowledge:** Managers are hired to make subjective decisions. For them it is very necessary to have full hand knowledge of the problem. The managers are routinely called upon a shift of data available to take decisions based on personal judgement and biases. DSS can suggest actions to managers through understanding of problem and skill at solving these problems.

**Problem solution:** Many a time managers face delayed decision making, information overload, selective use of information and mental fatigue during decision making. Often the result is fast, careless decisions or even no decisions at all. DSS not only helps in saving time but they support in making a substantial decisions.

**Decision making:** DSS supports decision making process, with the goal of improving decision quality in human judgement. Decision quality is judged by decision's compatibility with existing constraint, its timeliness and its incorporation of the optimal amount of information.

**Organisational control:** organisational control includes any process designed to assure that organisation plans are carried out the way they are designed. To control organisational control DSS often makes business transaction data available for performance monitoring.

**Organisational growth:** pertaining to their role in problem knowledge, problem solution, decision making and organisational control DSS is helpful in overall organisational growth.

#### 4. CONCLUSION:

The ability to continually change and obtain new understanding is the power of DSS. DSS application and intelligent techniques that are applied are developed towards the expertise orientation and DSS application development is a problem orientated domain [4]. In depth analysis of the relationship among HR practices in order to clearly define the exact of outcome, the choice of the suitable technique to support each HR practice and relationships among practices, at every level of analysis is very important. To a great extent DSS enhances the decision making process in an organization.

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