



Talent management in manufacturing system using fuzzy logic approach



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ABSTRACT

Nowadays, manufacturing companies have been working based on people-oriented approach. Customer satisfaction is currently not only for external customers but also required for internal customers. In this context, human resource is one of the most important resources to manage and vital for manufacturing companies in terms of customers, employees and managers. With this perception, The Human Resource Management (HRM) issue is emerged. HRM enables effective and efficient management of human resources. Manufacturing companies considers that the existing abilities and qualification of its employees is insufficient for achieving their targets. The gap between desired level of capabilities and the existing capabilities of the human resources should be narrowed. Therefore talent management (TM) concept is introduced in order to deal with the gap and reveal the required personnel profile. TM raises institutional awareness and is a supportive tool for HRM. The TM contributes to remove wastes of the companies and supports self-improvement of its employees. In other words the TM is a key of success about exploring abilities. The aim of this study is to propose a model for investigating competency level of employees and utilizing this information in obtaining a yield in an optimal level from employees' emotional and intellectual capabilities, and experiences. The level of perception and job-ability match of each employee is different. The tests implemented in companies for TM purposes are usually evaluated in crisp logic like black and white. In this study, a fuzzy logic approach is proposed in order to deal with uncertainty and vagueness in assessment of TM.

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1. Introduction

Organizations must use their resources rationally in order to achieve competitive advantages. Human resource, in fact, is very difficult to control, yet provides high added value once utilized efficiently. It is the power of an organization. Using this power in the most efficient way would increase the performance of all other resources. For this reason, HRM is treated as a separate function in organizations.

HRM is exceptionally significant in manufacturing systems due to the system's complexity. Orientation of each employee is a labor intensive process, thus it is preferred to keep those employees within the system for a long time as well as to encourage them for demonstrating their competencies on the job. The competency analysis governs the recruitment processes, performance management, job design, employee development and employee reward

(Armstrong, 2003). The concepts 'competency' and 'competence' are usually used interchangeably. However, the former involves behavioural characteristics lying behind the performance, so called 'soft skills' while the latter describes the ability and knowledge of the employee to transfer these to the work, 'hard skills'. Throughout this paper, these concepts are exercised suitably (Armstrong, 2003).

According to Manoharan, Muralidharan, and Deshmukh (2011) "Each employee achieves certain skill levels in various factors and the resulting information can be overwhelming". Increased employee turnover will eventually lead the organization to a certain failure. Moreover, employees to be promoted are supported with constant trainings in manufacturing systems. For instance, Toyota uses funnel model (see Fig. 1) for the recruitment. At one end of the funnel, there are numbers of candidates and towards the other end, correctly matched employees, in terms of right job and right skills are acquired (Liker and Houses, 2008). The purpose is to pull as many as potential candidates into the system so that, selecting the optimum amongst many would be easier.

In manufacturing systems, it is an important decision to assign employees according to their competencies. A proper assignment

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should match the correct employee with the correct job. Identifying the most appropriate employee for a certain task is a multi-variable equation and such a decision usually takes form depending on the executives' vision. Discerning the potential in a candidate helps executives to reach better decisions, otherwise promotion decision is not easy to reach in a short time. It requires close monitoring of each employee's career for being able to assess and bring out the potential and the performance.

Intelligence Quotient (IQ) and Emotional Quotient (EQ) are some of the determiners of human potential. Although IQ plays an important role to verify our analytical and mathematical intelligence, without EQ, it is not viable to experience success in our social and professional lives. For this reason, EQ is the most critical factor when assessing performance of an employee Emotional intelligence which has active role in transferring employee's information, experience to the business environment, is directly proportional with many properties besides employee's communication, harmony and adaptation.

Loyalty is another essential instinct which is vastly emphasized by today's organizations. Employers would like their staff to embrace and adopt their work places as if their homes because such engagement affirms improved performance. On the other hand, employees prefer to work within the organizations that they can feel safe as well as they can work enthusiastically, without fear. As a result, loyalty creates mutual performance, happiness and profit.

According to [Teo, Clerc, and Galang \(2011\)](#) human capital enhancing HRM system was found to have a direct and indirect impact on manufacturing performance outcomes. Frontline employees' performance was found to mediate the impact of human capital enhancing HRM system on manufacturing performance outcomes.

In complex decision making problems involving ambiguous cases, human-perception and decision-like processes are inevitably to be utilized. According to [Zhang, Huang, Ngai, and Chen \(2010\)](#) one of the disadvantages of using conventional approaches for describing vague system is that the parameters obtained may not be easily to be interpreted by human beings. These are realized by artificial intelligence techniques (such as neural networks and fuzzy logic), Analytic Hierarchy Process (AHP) etc. These are potent, efficient and flexible methods worked out in the literature extensively. They have found numerous applications in industry.

One of the remarkable application areas is the employee selection which is a function of HRM department. Actually, this turns out to be a talent management problem, starting from the recruitment through the development and the rewarding of the personnel.

According to [Ayağ and Özdemir \(2011\)](#) for a proper and effective evaluation, the decision-maker may need to analyse a large amount of data and to consider many factors. In this context, proposed system provides more objective decision-making for HR managers. [Kubat \(2012\)](#) gives an interesting application example about talent management in his book on MATLAB in which there

are several artificial intelligence implementation examples using such as Fuzzy, ANN and GA toolboxes. This study aims to obtain a more objective method for assigning proper talented employees to proper jobs in manufacturing systems.

[Cannavacciuolo, Capaldo, Ventre, Volpe, and Zollo \(1994\)](#), introduced the fuzzy set theory for the evaluation of the personnel. [Drigas, Kouremenos, Vrettos, Vrettaros, and Kouremenos \(2004\)](#), made use of the expert systems for the job matching of the unemployed by Neuro-Fuzzy techniques.

A competency based fuzzy model using Analytic Hierarchy Process (AHP) associated with employee evaluation and selection system is another study by [Göleç and Kahya \(2007\)](#).

In this study, as for the recruitment process and the evaluation of an employee, the fuzzy logic is chosen as the basic analysis presented because of its efficiency and flexibility.

2. Human Resource Management

The major goal of HRM is to improve organizational effectiveness through individual performance because human resource is the key component of organizations. HRM is concerned with many aspects of managing people such as recruitment and selection, resourcing (workforce planning), keeping motivation high to improve overall performance, developing reward system, etc. Briefly, HRM is an organizational function that aims to improve work life quality in general.

HRM is a strategic approach which is directly related to managing the process of employment and development of people who, as the key player, can and will influence performance levels of all other resources of the organization. In the meanwhile, HRM involves all management decisions that affect the nature of relationship between employees and the organization ([Demir, Birbil, Atalay, & Yıldırım, 2000](#)). HRM is based on activation and assessment of employees in optimum level ([İnce, 2005](#)).

Organizations must practice value adding activities with the aim of complying with ever changing economic conditions through utilizing human resources management proactively ([Akgeyik, 2011](#)). Competition process requires development of new job profiles that grounds on human resource in the organization from top-level manager to lower-level employees and contain necessary all arrangements for making them more efficient, productive and beneficial as well as for having job satisfaction and being happy ([Öğüt, Akgemci, & Demirsel, 2004](#)).

Human resource is most unwieldy because differently from other resources of company, human has psychology and is a complex creature. Therefore the performance should not be the sole criterion for personnel talent assessments. Productivity and happiness of personals in work life majorly depend on their potential. Thanks to the psychological studies and researches, now there are a number of ways of assessing potential through psychometric questionnaires.

HRM is entangled to all departments of an enterprise fundamentally as a resource for work and performance of the personnel. The impact of HRM and performance examined by several authors can be found in [Armstrong \(2003\)](#).

According to [Manoharan et al. \(2011\)](#) the face of traditional human resource services in progressive organisations is currently undergoing a dramatic change. Along with the changes and developments in professional life, talent management (TM) becomes increasingly important in HRM ([Doğan & Demiral, 2008](#)).

According to [Holbeche \(2009\)](#), ideally human resource managers should have a conversation with each of the high flyers in their organization to find out what really motivates them and to see to what extent their needs can be accommodated. Through such individual attention it may be possible to give people at different

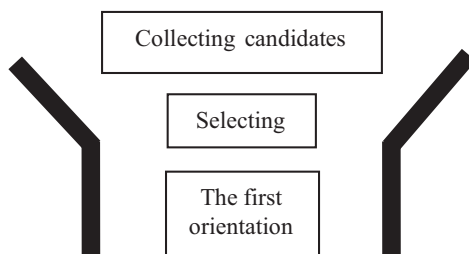


Fig. 1. Selecting human resources funnel ([Liker and Houses, 2008](#)).

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