

Fuzzy Driven Decision Support System for Enhanced Performance Appraisal

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Abstract: Employees' performance appraisal is often considered as a core management task in most standard organizations because it could potentially inspire an employee towards the pursuit of organizational goals and objectives. Meanwhile, issues such as delay in appraisal processes, inevitable human error, and emotional status of the appraiser, are common with the traditional appraisal methods. Hence, this research proposes a fuzzy decision support system based on Henri Fayol's 14 principles of management for the appraisal of employees' performance. A questionnaire consisting of 44 structured questions was designed based on these principles and administered to the employees of Babcock University, Ilisan-Remo, Ogun State, Nigeria. Fuzzy inference system that incorporates Mamdani computational technique was built based on the feedback extracted from the questionnaires, and used for appraising the employee performance. Experimental results show that the proposed system could predict the appraisal status of an employee with 75% accuracy in comparison to the conventional appraisal method.

Keywords: Employee performance appraisal, Human resource manager, Fuzzy logic, Decision support system, Henri Fayol's principles of management

1. Introduction

In standard organizations, performance as it relates to employee is basically perceived as the extent to which the member of staff contributes towards achieving organizational goals and objectives. Performance appraisal (PA) involves identifying and evaluating the performance of employees with the aim of effectively rewarding their efforts in order to motivate them towards incessant pursuit of organizational objectives (Lansbury, 1988). Aside from compensation, PA have other important functions such as career planning, service quality assurance, employee motivation, and helping employees to position or reposition themselves in their organization. The concept of PA is equally viewed as the assessment of an individual's performance in a systematic way which often represents a significant tool used for all round development of the employee and the organization. Terminologies such as performance assessment, performance evaluation, and performance management are also commonly used to describe PA. Appraisals are generally viewed to have positive influence on employees' performance, but they also may have negative impact on motivation, role perceptions, and turnover when poorly designed and administered (Churchill, 1985). The performance of an employee in an organization is usually measured against factors such as job knowledge, quality and quantity of output, initiative, leadership abilities, supervision, dependability, co-operation, judgment, and versatility among others. In addition, at times behavioral and health status of employees are considered as they have been proved to affect job results. Therefore, the most controversial yet indispensable human resource tool that has drawn the attention of researchers and practitioners is undoubtedly PA (Murphy and Cleveland 1991; Andy et al., 2000). Effectively appraising the performance of employees' constitute a core part of any corporate establishment since it determines the status of employees and as well provides the organization's management with information on proper remuneration plan for its employees. In line with this, a number of methods have been proposed in previous studies for appraising the performance of employees in an organization. Most of these methods have one form of limitation or the other when used to evaluate the performance of an employee and this eventually results to inconsistent, unreliable, and invalid appraisal (Folger et al., 1992; DeNisi and Williams, 1988). These inadequacies have undesirably affected the performance of employees in such organization and as well discouraged a number of them from properly carrying out their job functions. Another important point is that such ineffective appraisal methods might reduce the chances of attaining organizational objectives (Martin and Bartol, 1998). Based on these

limitations, the development of an efficient decision support system for appraising the performances of employees in an organization is of great significance. The above stated limitations associated with the conventional appraisal systems serve as the key motivating factors behind this research.

It is worthy to note that appraisal of employees' performances is a key part of managerial task that organizations need to perform at certain interval of time. As a result, effective management principles could provide a substantial base upon which adequate PA system could be built. Henri Fayol, a French industrialist proposed 14 core management principles which have been widely practiced across all forms of business enterprise (small, medium, and large scale business enterprises) globally (Rodrigues, 2001). Also, these principles are found to exhibit certain characteristics that could be used to effectively evaluate the performance of the organization and its employees.

Advances in technology have led to the incorporation of intelligent Soft computing techniques into decision support systems with the aim of enhancing their performance. Among several soft computing techniques, fuzzy logic has been extensively used for modeling decision support systems built to address real life problems (Samuel et al., 2013; Ojokoh et al., 2012). Therefore, this study proposes a fuzzy logic decision support system based on Henri Fayol's principles of management for the appraisal of employees' performance in an organization. The proposed PA system is aimed at providing human resource managers in corporate organizations with a tool that promotes effective decision making and motivates employees towards earnestly pursuing organizational goals.

2. Related works

Employee PA became a widely used human resource management (HRM) tool in businesses around 1980's to measure the frameworks set by organizations regarding their employees (Taylor, 2005). Since then, PA has served as an integral component of HRM in

From the 14 principles, a total of 45 questions that relate to the operational procedure of the organization were coined and the response of an employee to each of the question was quantified with a Likert scale that range from 1 (Strongly Agree) to 5 (Strongly Disagree) as shown

most organizations as well as a strategic approach being used to connect the aims of the organization to the performance of their employees. Basically, an employee's performance is measured against factors such as job knowledge, quality and quantity of output, initiative, leadership abilities, supervision, dependability, co-operation, judgment, versatility and health among others (Singh and Gupta, 2013). PA is used to track individual contribution and performance against organizational goals and to identify individual strengths and opportunities for future improvements. In addition, it provides a means to assess whether organizational goals are achieved and offers a basis for the company's future planning and development.

Over the years, PA has remained one of the most widely research area in human resource management according to report in literature (Amie, 2013). Recent findings from research works reveal that several computing tools such as fuzzy logic in addition to different appraisal methods (top-down evaluation, peer review, probationary review, self-assessment, 360 degree and 720-degree evaluation), have been employed by human resource managers to measure and evaluate employee's performance in an organization aside the conventional methods (Shaout and Yousif, 2014). For instance, Maheswari and Kumari (2013), demonstrated the application of Fuzzy multi criteria group decision making (FMCGDM) for ranking appraisal methods in human resource management. Using Schwartz Beat Path method, they were able to rank employees in an organization based on performance. They quantified performance variables using trapezoidal fuzzy numbers in order to capture the uncertainties with human judgment. They used a private software company in India known as Inforyas Software limited as a case study to validate the effectiveness of their model. Neogi et al. (2017), presented a technique based on cascaded fuzzy inference techniques (FIS) to study performance evaluation of non-teaching staff of a university based on specific performance appraisal criteria. The proposed method was based on Mamdani type fuzzy inference system that has five FISs sub-modules namely: fuzzy communication block, fuzzy motivation block, fuzzy interpersonal block, fuzzy decision making block and fuzzy knowledge level block. They compared their method with existing methods and found out that their method could be used to improve the efficiency of PA for University staff with large availability of datasets. Shaout and Yousif (2014), designed and implemented a performance appraisal system using fuzzy logic technique. Their system consists of a stepwise inference engine which was demonstrated by the min operator, algebraic product, sup-min and sup-product in a relational manner. The performance of their system was evaluated based on certain assessment factors relating to employees in a number of oil companies in Sudan. Singh and Kharola (2013), proposed a methodology based on Stage-