



Management and Business Research Quarterly

2017(3)39-49



The Application and Advantages of Data Mining to Improve Talent Management in School Staff's Performance

Sara Javan Amoli^{*1}, Mahsa Ebrahimifar², Farnoosh Aghshahi³

¹University of Shiraz, Iran

²University of Azad, Iran

³University of Tehran, Iran

Received 14 June 2017 Accepted 02 August 2017

ABSTRACT

Today, in order to succeed in teaching an effective generation and target students, institutions as well as educational and cultural centers have found that applying necessary talents in human resource field is their most important asset. Therefore, talent management emphasizes the identification, recruitment, training, development, and retaining talented employees to improve personal and organizational performances. In this regard, using data mining techniques can be considered as an effective tool. The accurate and precise adoption of a strategy in the field of human resource talent management is of particular importance, thus essential policies must answer this question that how an organization can discover talents. Therefore, this research studies the advantages and various applications of data mining techniques and algorithms in human resource talent management in order to make sure that the right rotation of talented human resource is in such a way that people are placed in the most appropriate posts in schools and educational centers.

Keywords: Data Mining, Talent Management, Human Resource

Introduction

The phrase “school staff’s performance” deals with items such as education and its human resources as well as training and selected educational system in the school. There are different viewpoints for training and education and training can be different, depending on people’s viewpoints (Motahari, 2012).

Generally, training humans must be based on developing their talents, thus the appropriate time for training is of great importance. According to The Prophet (blessings of God be upon him and his family), the age of formal training is seven years old and parents must pay great attention to their children's training after this age (Motahari, 2012).

Since children spend most of their time with teachers when they go to school, in the process of training, teachers' skills and knowledge as well as their characteristics, behavior, and external appearance are transferred to students (Soleimani, 2007).

The necessity of selecting qualified teachers and their effect on training an effective generation and target students is increasingly highlighted, thus in this research, it has been attempted to refer to those methods in talent management that can identify and apply efficient people.

Data mining is one of the methods of applying technology in this field. This method is one of the artificial intelligence technologies used to analyze a large amount of data to discover patterns and rules. If this sort of data is applied to the human resource process of an organization, it will be considered valuable. Human resource process is one of the widest and most important processes that can be effective in all the processes of an organization. This information in the data of human resources can provide a rich resource to discover knowledge and supportive tools.

India's schools are the pioneer of using information technology and the results of researches conducted in these schools indicate that studying effective factors in students' performances in previous years and applying data mining algorithms can improve the results of students' exams in future and predict their performance periodically (Singh, Nagar & Sant, 2016).

Background of the Study

More than 30 components in the field of human training have been introduced in the goals of education fundamental revolution document, which is the constitution of education system in Iran. Fundamental competencies are described as a combined group of individual and collective abilities monitoring all the aspects of identity (rational, emotional, voluntary, and practical) and all the components of the society according to the Islamic criterion system. These competencies help the trainers with reaching good life (Feiz, 2015).

In fact, good life is the pleasant condition of human's life according to the Islamic criterion system (the foundations and values accepted by Islam), that will pave the way for human to near God as the life goal.

Reaching this goal, which is the most part of the document, requires predicting special procedures and instructions. However, the education system cannot use the real potential of individuals due to imprudence, which includes managerial closed circle, the dominance of administrative attitude over scientific attitude, the dominance of relationships over rules, lack of realistic criteria for meritocracy, demotivating condition of all education system sections, and the impolite behavior of some employees (Aslani, 2005).

Data mining has various applications in different industries. Discovering customers and their needs as well as showing superiority in giving services to the customer are some of the

applications of data mining in industry. Discovering different groups of customers as well as their needs can bring customer satisfaction for financial institutions (Basiri, 2007).

Since in treatment industry, the data is very complicated, the application of data mining in treatment gains importance. Moreover, analyzing the data to adopt the best decision in treating the patients is a significant factor. Some of the applications of data mining in this industry are the categorization of patients' information, providing treatment for a special group, predicting the hospitalization period for the patient etc. (Tomar & Agarwal, 2013).

In customer relationship management, data mining has different tools such as genetic algorithm and k-means algorithm to categorize customers, thus the capabilities of data mining make the customer relationship management more possible (Basiri, 2007).

In most companies, data mining is applied to analyzing the market basket, discovering the root reasons of quality, production, and manufacturing issues, preventing from customer reduction, reselling to the customers, and opening customer files (O'Brien & Marakas, 2016).

From the managerial perspective, since information is the main factor of a manager's authority and the most important resource of an organization (after human force), using data mining technique can conduct the process of decision-making and assign this process to managers through identifying the roots and factors of some human resource problems in the organization (Ahmadi, 2006; Azar, Ahmadi & Sabt, 2010; Shahrabi, 2013).

Data mining in human resource management can identify faulty employees, discover and use talented employees in profitable commercial units, encourage decent employees, discover talents in national fields, and study the competitors.

Talent management is a new concept in human resource management that emphasizes the identification, recruitment, training, development, and retaining talented employees in the organization. Talent management can improve individual and organizational performance through identifying, developing, and applying organizational talents effectively (Gharaeepour & Ale Ebrahim, 2014).

Unfortunately, in Iran's schools, due to wrong management and not using and analyzing the information in its proper time, knowledge is not gathered from data and human resource talents are not used appropriately. Sometimes programmers' negligence or lack of managers' information about collecting data and information may cause these problems.

In this research, it has been attempted to find the advantages and applications of data mining in improving human resource talent management of schools and direct people's minds towards this fact that by knowing individuals better, we can use their potential more. Moreover, head teachers can grow their students' talents through groundwork and reach the goals of education system, which is known as meritocracy.

The Importance and Necessity of Training

Differences in talents, capacities, needs, morale, demands, and tastes derived from different classes and environmental, geographical, cultural, theological, economic, and social effects can grow and survive human societies. In fact, without these differences, human being could not live

and develop. This fact must be included in different stages of training (DelshadTehrani, 2009). According to Imam Ali, differences in people's talents are beneficial to them and if they were the same in talents, they would perish, moreover, human being is a unique book and possesses exclusive characteristics (DelshadTehrani, 2009).

Due to the features of training in the book under the title of "The theoretical foundations of fundamental revolution in the formal and general education system of Islamic Republic of Iran", the importance of training has been studied from different aspects, which are summarized as following.

Training is a part of divine flow of human's creation and a holy attempt to near God as the creation goal (Supreme Council of Cultural Revolution, 2011).

Human's divine nature (fitrah) is their main asset to achieve perfection. However, a social flow is needed in order to develop it, because external factors or misuse of natural talents and obeying the rebellious inclinations will stop the growth of pure nature (Supreme Council of Cultural Revolution, 2011).

Therefore, training is the fundamental foundation of human's development and educational materials must be emphasized in all social decisions and planning. Helping to the process of training is the most important criterion for policy-making and determining social priorities (Supreme Council of Cultural Revolution, 2011).

Human Resources

Human resources are the most important factor in gaining competitive advantage for an organization (KhaefElahi, Mottaghi & Sabt, 2007). Human resource management and the administration of employees are relatively new concepts presented since 1970s and are aimed at the effectiveness of the organization (SeyyedJavadin, 2016; Stewart & Brown, 2016).

Human resource management is considered vital for organizations, since people are the main components of organizations and their effective management is the main responsibility of human resource management (Abbaspour, 2015).

The newest theory about human administration was proposed in 1980s under the title of human resource management and the administration of employees. According to this viewpoint, human resources and the administration of employees refer to the importance of labour force in reaching organizational goals and using in human resource activities, so that it can guarantee the personal benefits of employees, organization, and society effectively and fairly (Stewart & Brown, 2016).

Human resource management is a comprehensive group of managerial activities and responsibilities that attempts to develop and retain human force, facilitate organizational competitiveness, improve the quality and development of personal growth (Janatan, Hamdan & Othman, 2011).

The role of human resource unit is determined through different methods in the organization. One of these methods is to summarize the role of this field in two dimensions of

individuals and processes. According to this method, four roles are presented (Stewart & Brown, 2016):

1. Operational specialist
2. Supporter of employees
3. Strategic partner
4. Human capital developer

The identification of required competencies and abilities is the other method to establish this unit. These competencies are divided into three main groups (Abbaspour, 2015):

- Knowing the business
- Doing human resource activities
- Change management

Human resource specialist must have enough information about basic processes of the organization to attract the trust and respect of other people within the organization. Furthermore, they must find the answer of these two questions, i.e. what do the organization produce and how does this process occur? The specialist of this field can find patterns that may help to the improvement of the organization through the information and performance record archive of the employees. The experts of human resources in the education system can find procedures using the records of employees and talent scouts to place them in right posts. In fact, “employees in their right posts” is the key rule of human resources.

Human resource issue in a large organization such as the education system is one of the most essential issues. However, lack of human resources in terms of both quantity and quality is one of the most basic problems of developing human resources within the organization. Training human force and overcoming the shortage of employees require time and accurate planning. The education system should apply the optimization solutions of human resource planning in order to reach the proper point.

Jahanian in his research under the title of “The optimization solutions of human resource planning in the education system of Tehran” has referred to considerable points summarized here. These points include human resource standardization, legislation on recruiting and retaining human force, amending the payment system of human force, combination of educational and training activities, training creative human force, creating equal educational opportunities, predicting the number of human force, formulating the measuring system of teachers’ knowledge, amending teachers and employees’ evaluation system, employees’ participation in human force planning, estimating the human force required by the education system, evaluating the human force plans, developing technical and vocational training quantitatively and qualitatively, and developing information and communication technology.

Talent Management

In research literature, there are different definitions for “talent” and every researcher is required to define this term clearly before prioritization and measurement. SadeghiMalmiri (2014) in his research under the title of “The analytic model of the nature of intellect” introduced the

pyramidal system of human's inborn talents. The bottom of the pyramid indicates person's weaker talents, while its top shows the strongest ones. It also indicates that humans should discover and invest in their premier talents. He also answered three main questions on inborn talents and the criteria for talent discovery (SadeghiMalmiri, 2014).

In English, "talent" is defined as an inner ability displayed in a particular field. This definition, which refers to ability higher than the average in a particular performance, has been highly accepted by researchers (Azar, ShafieeNikabadi, Moghaddam & Sangi, 2017).

Talent management is a new concept in human resource management that emphasizes the identification, recruitment, training, development, and retaining talented employees to improve personal and organizational performances. Talent management in organizations discovers talents and applies them in appropriate professions. In fact, it is directly related to organizational performance.

Talent management is also the strategic management of talents in the organization and aims to develop an accessible resource of talents to place people in their right professions according to the strategic goals of business (Gharaeepour & Ale Ebrahim, 2014).

The success of twenty first-century organizations depends on their use of talented people. Talent-oriented organizations constantly search for new talents. In fact, their success is due to the produced knowledge and investment in talents rather than technology (Ali Mohammadlou, 2004).

Data mining researches in human resource field can be conducted on recruitment, job rotation and job development plan, training and management, and talent discovery. In order to discover human capitals' talents, studying people's characteristics can inform them about their character and recommend the appropriate job to them using MBTI method and job satisfaction formula (Tieger & Barron-Tieger, 2015).

People's needs, tastes, skills, values, and characteristics are different from each other. They choose different jobs depending on their characteristics and tastes. This fact is of great importance for school trainers. If a trainer is not able to interact with students, they will lack the most important feature of a right relationship, thus its effect will be revealed during the education process.

There are four character types generally: extroverted and introverted, sensing and intuition, thinking and feeling, and perceiving and judging (Tieger & Barron-Tieger, 2015). It must be considered that for a competent trainer which character type is preferred and in case one dimension is stronger how we can improve it.

After finding the character type of people, they must be placed in their appropriate job according to their character type. Through analyzing the job accurately, on the one hand, and studying the required competencies, on the other, jobs and their required competencies can be listed as a report.

In order to investigate the human capital information of schools, raw data collected from annual evaluation process is required. Employees' performance evaluation is one of these processes. In performance evaluation, employees are evaluated formally and at regular intervals,

so that their characteristics are studied according to the positive or negative feedback on their performance while doing their duties (Stewart & Brown, 2016; Saadat, 2016). Performance evaluation and giving employees feedback will improve their performance, thus the performance of the organization will improved as well.

It is obvious that managing the performance of the organization is proportional to it changing needs. During the performance evaluation process, by specifying indices, we can measure the accessibility of system to the expected outputs and help to make right decisions.

In order to find competent employees, special indices in order to relate behavior and performance with the strategy of the organization must be identified, thus the organization can inform the employees from their role in implementing the strategy (Tajeddin & Darvish, 2009).

Studying the employees' performance, they can be trained properly and attempt to substitute inappropriate behavior for the appropriate one. Therefore, the efficiency of employees and the organization will be enhanced. In fact, the main goal of performance evaluation is meritocracy and doing the duties properly.

In order to implement an accurate performance evaluation, employees must be fully aware of their career, thus they need a list of standard analyzed jobs. Using this list, employees can extract the evaluation index of each job and study the information about it.

Data Mining

Human being has produced a fixed flow from birth and it can be claimed that data exists in any aspect of human's life. In recent years, the science of data mining has indicated that its time for big data. Although scientists have provided different definitions for big data, they have found that big data includes four features of volume, variety, speed, and value (Zang & Ye, 2015).

Data mining is a step of knowledge discovery process that includes analyses and methods for finding the implicit patterns, procedures, and relationships of data. It is aimed at gaining the necessary knowledge for the future decision-makings. The analysis of data information includes anomaly detection, relationship analysis, cluster modeling, and prediction (EsmaieeliSikaroudi, Ghousi & Sikaroudi, 2015).

The abundant production of data created in organizational areas is similar to gold derived from copper processing. Therefore, in today's world, data and initial information are not that much important and are widely accessible, however, processing them and producing knowledge in data enrichment process are of great importance. In fact, it is believed that information is the most important resource after human force in any organization (Ahmadi, 2006).

In reality, our ability to analyze and perceive big data is lower than our ability to collect and retain it. Therefore, a new generation of tools is developing that can smartly help humans to analyze a large amount of data and gain knowledge. Data mining is one of these tools. As in all tools, before finding out that how data mining works, we must find out that how we can use it. In fact, data mining is aimed at finding patterns in previous data. Data mining analyzes and studies a large amount of data in order to discover meaningful patterns and rules (Shahrabi, 2013).

In most organizations and companies dealing with a large amount of data, data mining is used to:

- analyze the market basket
- discover root reasons of quality, production, and manufacturing issues
- prevent from customer reduction, attract new customer, and resell to customer
- reduce extra costs and increase profitability (O'Brien & Marakas, 2016).

In fact, strategic planning without using data mining is similar to driving with closed eyes. If a strategist wants to be successful in applicable and executive planning, they must use data mining (Abrisham Road Intelligent System Company, 2014).

Organizations require information in order to make decision and plan. In fact, an important part of information is derived from the organization (the previous data and performance patterns of the organization), which implement the process of decision-making and assign it to managers.

Choosing a group of techniques to apply them in a particular situation depends on three factors of “the nature of data mining”, “the nature of data”, and “the skills and preferences of data miners”.

In talent management, data mining refers to analytic techniques to transform data such as performance evaluation and psychological and personality tests into the knowledge of identifying and discovering talents appropriate for the jobs of an organization. Data mining also refers to the process and method of using tools and techniques.

Regarding the method used by the researchers of data mining and human resources, they have all used decision tree method. However, the algorithms are different, i.e. QUEST, CHAID, CART, and C5.0 (Prabhu, 2010). Extracting regulations is the process of studying the trees and defining each regulation simply for the experts. Since the extracted regulations are not usable, they are presented to the experts of human resources especially schools and education systems, so that the knowledge of final regulation is gained (Laudon & Laudon, 2012; Janatan, Hamdan & Othman, 2011).

The Advantages of Applying Data Mining in Schools

The knowledge hidden in periodic data of performance evaluation is extracted using data mining methods. The information gathered during this process is applied to human force planning, validation of selection tests, human resource training, finding the career path and job rotation in the organization, and discovering and using talents. It is obvious that reaching these goals in schools is of great importance and the need for a scientific method such as data mining in data on regular performance evaluation of schools is felt more than ever.

Worksheets, teachers' gradebooks, the documents of educational processes, personnel documents, executive documentation, and the quality system are big data and hidden patterns must be extracted from the documents of schools. Therefore, the advantages of data mining are categorized here that must be completed and implemented by specialists:

- reengineering the existed processes
- implementing performance evaluation properly

- collecting scattered information and data of schools
- data screening
- knowledge discovery and analysis
- effacing the previous documents and extracting useful reports and information

Conclusion

Due to the vital importance of training, providing it in the fields of talent management and human resources and using data mining in these fields will place people in their right organizational posts. In this regard, in order to reach the goals of organization, using human capitals and place them in their right post is of great importance.

Training is also important in the education system and educational centers. First, target students as the appropriate human capitals in education system are determined. Then, using the methods of talent management, the abilities of human force are identified. Finally, using data mining widely and professionally, people are placed in their right organizational posts.

Investigating the theoretical and scientific backgrounds, 140 competencies of teachers were identified. After studying these competencies, 98 of them were selected and categorized into seven dimensions. Among these dimensions, teachers' prerequisites were selected as the first category. Teachers' prerequisites include five competencies regarding teachers' verbal skill and content knowledge. Among these competencies, verbal ability to transfer meanings to students is the most important competency. Selecting one or two competencies and focusing on them to determine the right post can produce effective results.

Since schools are good examples of a data-based system and the data is collected from students and human resources' cultural, educational, and entertaining performances in the education system during successive years, designing a system and extracting the data is increasingly required.

In school libraries, there is a particular amount of data that needs specialists to apply technology tools, study it, and help the process of training. Therefore, students as the vital capitals of the country will be successful in the future, teachers' talents will be used appropriately in schools, and the motto of efficiency as "doing right the right work" will be accomplished.

Recommendations

Applying human force accurately and scientifically in order to develop training in schools is of great importance and using data mining and discovering hidden knowledge are quite effective. We aimed to study the advantages and results obtained in this study and direct concerned people's minds in the education system towards the optimum use of technology, so that the vital role of human capital in this field will be highlighted. Therefore, it is recommended that the specialists of this field implement data mining in schools in order to find raw data, collect data, and discover knowledge and regulations. Data mining approach can be considered as an extremely useful approach in education and human capital evaluation. Moreover, it can be

applied to analyzing the educational condition of students by means of training performance variables.

References

- Abbaspour, A. (2015). *Advanced human resource management: Approaches, processes, and functions*. Tehran, Iran: SAMT Publications.
- Abrisham Road Intelligent System Company (2014, October 7). *Data mining*. Retrieved July 2, 2017, from <http://www.Aminsaffar.ir/index.php/news/blog-joomla-7/328-2017-07-02-10-48-29>.
- Ahmadi, H. (2006). *The revolution of information systems in today's management*. Mashhad, Iran: Sonboleh Publications.
- Ali Mohammadlou, M. (2004). Knowledge management and talents. *Tadbir*, 15(147), 29–32.
- Aslani, E. (2006). *The issues of Iran's education system*. Isfahan, Iran: Publishing of Islamic Azad University Isfahan (Khorasgan) Branch.
- Azar, A., Ahmadi, P., & Sabt, M. (2010). Determining the effective indices in selecting human resources with data mining approach. *Quarterly Journal of Education*, 25(100), 87–110.
- Azar, A., ShafieeNikabadi, M., Moghaddam, A., & Sangi, M. (2017). Designing a smart model for the compatibility between job and job holders based on talent through data analysis. *Journal of Research in Human Resources Management*, 8(4), 1–34.
- Basiri, M. (2007). The application of data mining technique in customer relationship management: *The 4th E-Commerce Conference*. Tehran, Iran.
- DelshadTehrani, M. (2009). *Kind disposition: the methods of training in Nahj al-Balagha*. Tehran, Iran: Darya Publications.
- EsmaieeliSikaroudi, A., Ghousi, R., & Sikaroudi, A. (2015). A data mining approach to employee turnover prediction (Case study: Arak automotive parts manufacturing). *Journal of Industrial and Systems Engineering*, 8(4), 106–121.
- Feiz, M. (2015). The concept of competency in the education fundamental revolution document. Ettelaat Newspaper. Retrieved July 2, 2017, from <http://www.ettelaat.com/etiran/?p=165508>.
- Gharaeepour, R., & Ale Ebrahim, E. (2014). Talent management and its role in improving individual and organizational performance: *The First National Conference on Educational Science and Psychology*. Marvdahst, Iran.
- Jahanian, R. (2010). The optimization solutions of human resource planning in the education system of Tehran. *Curriculum Planning*, 23(24), 61–84.
- Janatan, H., Hamdan, A. R., & Othman, Z. A. (2011). Towards applying data mining techniques for talent management. *International Conference on Computer Engineering and Applications IPCSIT*, 2, 476–481.
- KhaefElahi, A., Mottaghi, P., & Sabt, M. (2007). An investigation of the effect of applying the recruitment model based on data mining on employees turnover: *The First Conference on Data Mining*. Tehran, Iran.
- Laudon, K. C., & Laudon, J. P. (2012). *Management information systems* (S. Mostafavi & S. Hosseini, Trans.). Tehran, Iran: FadakIsatis Publications.
- Motahari, M. (2012). Education and training from the viewpoint of martyr Motahari. *Porseman*, 112, 36–38.
- O'Brien, J. A., & Marakas, G. M. (2016). *Management information systems* (A. Manian, M. Fattahi & B. Vasegh, Trans.). Tehran, Iran: Negah-e-Danesh Publications.
- Prabhu, C. S. R. (2010). *Data warehousing Concepts, techniques, products, and applications*. New Delhi, India: PHI.
- Saadat, E. (2016). *Human resource management*. Tehran, Iran: SAMT Publications.
- SadeghiMalmiri, M. (2014). The analytic model of the nature of intellect. *Journal of Research in Human Resources Management*, 5(2), 53–80.
- SeyyedJavadin, S. (2016). *The foundations and applications of human resource management and employees' affairs*. Tehran, Iran: Negah-e-Danesh Publications.
- Shahrabi, J. (2013). *Data mining*. Tehran, Iran: Gita Data Mining Research Institution.
- Singh, M., Nagar, H., & Sant, A. (2016). Using data mining to predict primary school student performance. *IJARIE*, 2(1), 43–46.
- Soleimani, M. (2007). The role of teacher in human's training and life. *Pasdere-Eslam Magazine*, 24(27), 22–50.

- Stewart, G. L., & Brown, K. G. (2016). *Human resource management: Linking strategy to practice* (M. A'rabi & M. Fayyazi, Trans.). Tehran, Iran: Mahkameh Publications.
- Supreme Council of Cultural Revolution (2011). *The theoretical foundations of fundamental revolution in the formal and general education system of Islamic Republic of Iran*. Tehran, Iran: The Secretariat of Supreme Council of Cultural Revolution.
- Tajeddin, M., & Darvish, M. (2009). The pillars of evaluating human resource performance. *Tadbir*, 20(203), 41–47.
- Tieger, P. D., & Barron-Tieger, B. (2015). *Do what you are* (M. GharacheDaghi & H. Rahim Monfared, Trans.). Tehran, Iran: NAghsh-o-Negar Publications.
- Tomar, D., & Agarwal, S. (2013). A survey on data mining approaches for healthcare. *International Journal of Bio-Science and Bio-Technology*, 5(5), 241–266.
- Zang, S., & Ye, M. (2015). Human resource management in the era of big data. *Journal of Human Resource and Sustainability Studies*, 3(1), 41–45.