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USING METHOD OF REFLECTIONS IN HUMAN RESOURCE MANAGEMENT

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Abstract: The efficient functioning of the Human Resource Management (HRM) is vital for every organization. Due to increasing mobility of workforce and diversification in their knowledge and skills, the HRM is facing new challenges, especially in the field of selection of potential employees and comparison of existing ones. For that reason, there is a need for usage of new method(s) which can quickly differentiate between the employees based on the information given to the HRM. This paper presents the possible novel use of Method of Reflections throughout human resources with a goal of obtaining important information which is encoded in relative position of employees and their skills (knowledge) relative to each other.
Keywords: Human Resource Management (HRM), Method of Reflection, graphs, organization, strategy

1. INTRODUCTION

Human Resource Management (HRM) has various meanings and approaches. In literature, authors are using mostly two meanings: one meaning describes the activity of management and other is used to denote a particular approach to people management (Panic et.al. 2016). HRM strategies and planning has great importance for the efficient and effective functioning of organizations in the open market. Human Resource Planning is a continuous process of developing strategies which enables organizations to align the number of quality employees and profits within the needs of business (Lajsic, 2019). HRM contains various set of policies premeditated to maximize organizational profit through optimization of organizational integration and employee flexibility and commitment and work quality (Guest, 1987).

HRM considers large variety of management activities that involves providing, developing, maintaining, directing and utilizing human resources in accordance with the organization goals while respecting the individual needs and employee goals (Panic, 2016). Human Resources consist of total knowledge, skills, abilities, creative opportunities and employee motivation disposed in the organization.

Modern society is characterized by rapid changes due to progress in information technology and globalization trends and open market. Thus the company must transform and adapt new trends. New trends which have great influence on HRM are: growing competition, international business management, growing technological innovations, new regulations, union acts, new business ethics and interpersonal relations (Sojka, 2016).

Therefore, the HRM are continuously developing new strategies to maximise their efficiency and effectiveness. For modern organizations, information technology plays the important role in changing standard HRM strategies (Zheng, 2017). Due to rapid development, the amount of data and information in HRM is increasing rapidly, so development of new ways and methods of processing and collecting data is needed. The new technologies that can help with that are Cloud computing (Zhengbao et at., 2018), Big Data (Shen, 2016) IoT and other. Reduction in process, developing and test time as well as developing new methods and solutions for collecting and analysing data has major role for every organizational aspect (Jałmużna et al.2018), not just HRM.

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Therefore, the main research question in this paper is when the data is collected, is there an efficient way to categorize employees regarding some important variables. Authors think that the most important variable is employee skill whose features depend on the job requirements. When the needed skills are recognized by well-known standard methods (for example interview with the manager), the standard procedure is to note them and find the candidates (employees) that can possess certain skills. But sometimes the employees do not have all demanded skills which is not a rare case for complicated knowledge demand or "novel" jobs (especially in IT industry). Therefore, development of the further in-depth analysis is needed in HRM practice which can diversify the employees regarding the ubiquity of their skills and the diversity of skills possessed by the employees.

This paper presents the possibility of using a well-known method Method of Reflections in the field of Human Resource. This paper is an example of novel usage of that method, previously only used in economic sciences for predicting future country economic growth. The use of Method of Reflections in HRM can provide important data regarding employee diversification with respect to their skills and knowledge. The method can be useful in the process of evaluation and comparison between existing employees (which is one of conditions for a fair employee reward process) and comparison and evaluation of potential candidates for a specific job during the selection process.

2. THE METHOD OF REFLECTIONS

Method of Reflection was introduced in the work form by Hidalgo and Hausmann (HH) in 2009 who used this method as a technique to analyse the structure of country-product bipartite graphs. In their work authors calculated the complexity of national output by metric generated by that method. Authors used a bipartite network graph based on country-product matrix M with elements M_{cp} (c= country, p= products) where $M_{cp} = 1$ if node c is connected to node p and zero otherwise. The authors define the method as the recursive set of observables (Hidalgo and Hausmann, 2009):

$$k_{c,N} = \frac{1}{k_{c,0}} \sum_{p} M_{cp} k_{p,N-1} \tag{1}$$

$$k_{p,N} = \frac{1}{k_{p,0}} \sum_{c} M_{cp} k_{c,N-1} \tag{2}$$

For n>0, with:

$$k_{c,0} = \sum_{p} M_{cp} \tag{3}$$

$$k_{p,o} = \sum_{c} M_{cp} \tag{4}$$

where $k_{c,0}$ represents diversity of a country which is the number of products exported by selected country and $k_{p,0}$ represents the ubiquity of a product which is the number of countries which are exporting selected product.

Table 1. Interpretation of first three pairs of variables in bipartite network (Hidalgo and Hausmann, 2009)

Name	Short Summary	Question Form
$k_{c,0}$	Diversification. Number of product exported by country a.	How many products are exported by country a?
$k_{p,0}$	Ubiquity. Number of countries exporting product p.	How many countries export product p?
$k_{c,1}$	Average ubiquity of the products exported by country a.	How common are the products exported by country a?
$k_{p,1}$	Average diversification of the countries exporting product p.	How diversified are the countries that export product p?
$k_{c,2}$	Average diversification of countries with an export basket similar to country a.	How diversified are countries exporting goods similar to those of country a?
$k_{p,2}$	Average ubiquity of the products exported by countries that export product p.	How ubiquitous are the products exported by product's p exporters?

The authors concluded that when the N is large (N=18) the $k_{c,N}$ values are correlated with log GDP per capita, so they use that as a limit for effectively solving an eigenvalue problem (Kemp-Benedict,

2014). Authors also recognized strong negative correlation between variables $k_{c,0}$ and $k_{c,1}$ which gave them conclusion that more diversified countries export less ubiquitous products (Hidalgo and Hausmann, 2009). This method is one of the starting points for determination of growth opportunities and further economic analysis for every country. Authors publish their results periodically in their Atlas of Economic Complexity.

The authors' interpretation of the first three pairs of variables describing the country-product bipartite network is given in Table 1. The Table 1 is presented due to better understanding of proposed model in the next section of this paper.

3. IMPLEMENTING THE METHOD IN HRM

In this section the possible implementation of Method of Reflections in the field of Human Resources is presented. The method can be used for the purpose of analysing the current employees and their skills or during the selection process while analysing the potential candidates. The method has big potential because it is capable of in-depth differentiations of employees based on employees' knowledge (skills).

The analysis procedure is shown in precedence graph (Figure 1).

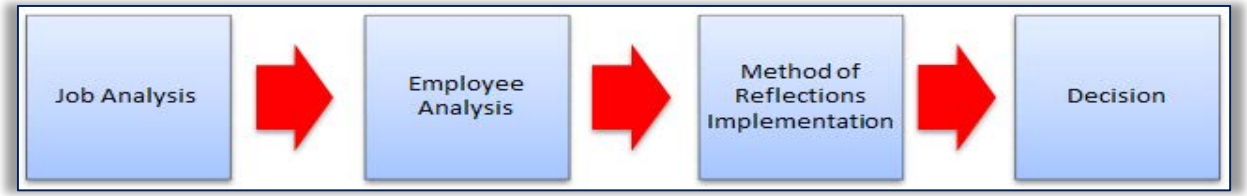

Figure 1. Precedence graph

First step in implementing the method is Job Analysis – that step is crucial for identification of skills needed for efficient accomplishment of a particular job. It is important to use in consideration skills necessary for employee current (or potential if the analysis is made for potential employee) position. Second step is Employee Analysis where the employee skills are recognized and noted. The third step is Method of Reflections Implementation where the method is implemented according to gathered data. The final step is Decision – if the analysis is made in Selection process that can be decision which candidate has most valuable set of skills or if the analysis is made by comparing existing workers the decision can be connected to reward process, training, promotion/ degradation or similar.

The Method of Reflection Implementation step is presented using a simple example (Figure 2). In present example the diversification between employees and ubiquity of skills is given by:

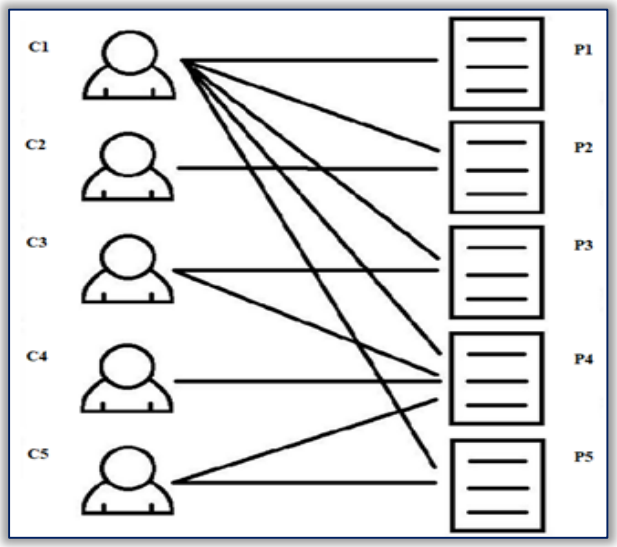

Figure 2. A simple bipartite network – example

$$k_{c1,0} = 5 \qquad k_{p1,0} = 1 \tag{5}$$
$$k_{c2,0} = 1 \qquad k_{p2,0} = 2 \tag{6}$$
$$k_{c3,0} = 2 \qquad k_{p3,0} = 2 \tag{7}$$
$$k_{c4,0} = 1 \qquad k_{p4,0} = 4 \tag{8}$$
$$k_{c5,0} = 2 \qquad k_{p5,0} = 2 \tag{9}$$

First iteration (reflection) presents the average ubiquity of employee skills and the average diversification of skilled employees.

$$k_{c1,1} = \left(\frac{1}{5}\right)(1+2+2+3+2) = 2 \qquad k_{p1,1} = \left(\frac{1}{1}\right)(5) = 5 \tag{10}$$
$$k_{c2,1} = \left(\frac{1}{1}\right)(2) = 2 \qquad k_{p2,1} = \left(\frac{1}{2}\right)(5+1) = 3 \tag{11}$$
$$k_{c3,1} = \left(\frac{1}{2}\right)(2+4) = 3 \qquad k_{p3,1} = \left(\frac{1}{2}\right)(5+2) = 3{,}5 \tag{12}$$

$$k_{c4,1} = \left(\frac{1}{1}\right)(4) = 4 \qquad k_{p4,1} = \left(\frac{1}{4}\right)(5+2+1+2) = 2{,}5 \tag{13}$$

$$k_{c5,1} = \left(\frac{1}{2}\right)(4+2) = 3 \qquad k_{p5,1} = \left(\frac{1}{2}\right)(5+2) = 3{,}5 \tag{14}$$

The second iteration is calculated by the average values of first iteration:

$$k_{c1,2} = \left(\frac{1}{5}\right)(5+3+3{,}5+2{,}5+3{,}5) = 3{,}5 \qquad k_{p1,2} = \left(\frac{1}{1}\right)(2) = 2 \tag{15}$$

$$k_{c2,2} = \left(\frac{1}{1}\right)(3) = 3 \qquad k_{p2,2} = \left(\frac{1}{2}\right)(2+2) = 2 \tag{16}$$

$$k_{c3,2} = \left(\frac{1}{2}\right)(3{,}5+2{,}5) = 3 \qquad k_{p3,2} = \left(\frac{1}{2}\right)(2+3) = 2{,}5 \tag{17}$$

$$k_{c4,2} = \left(\frac{1}{1}\right)(2{,}5) = 2{,}5 \qquad k_{p4,2} = \left(\frac{1}{4}\right)(2+3+4+3) = 3 \tag{18}$$

$$k_{c5,2} = \left(\frac{1}{2}\right)(2{,}5+3{,}5) = 3 \qquad k_{p5,2} = \left(\frac{1}{2}\right)(2+3) = 2{,}5 \tag{19}$$

This example illustrates how the Method of Reflections differentiates between employees based on information regarding their skills. The interpretation of the first three pair of variables is presented in Table 2.

Table 2. Interpretation of first three pairs of variables in bipartite network – HRM model

Name	Short Summary	Question Form
$k_{c,0}$	Diversification. Number of skills which possess employee a.	How many skills does employee a possess?
$k_{p,0}$	Ubiquity. Number of employees that possess skill p.	How many employees possess skill p?
$k_{c,1}$	Average ubiquity of the skills possessed by employee a.	How common are the skills possessed by employee a?
$k_{p,1}$	Average diversification of the employees possessing skill p.	How diversified are the employees that possesses skill p?
$k_{c,2}$	Average diversification of employees with a skill knowledge similar to employee a.	How diversified are employees that have skill knowledge similar to those of employee a?
$k_{p,2}$	Average ubiquity of the skills possessed by employees that possessed skill p.	How ubiquitous are the skills possessed by skill's p possessors?

In the given example the most diversified employee is employee C1 – the employee possesses the most skills. Two employees possess only one skill. Only skill that employee C2 possess is on the first sight relatively non-ubiquitous skill that possesses only the employee C1, and skill of employee C4 is possessed by all other employees.

By further iteration, the information encoded in the relative positions of employees and skills relative to one another is noticeable. After the second iteration it is evident that the employee C1 is the most valuable employee to the organization (according to possessed skills). Employee C2 has same score as the employees C3 and C5 despite that it has only one skill – that one skill is more ubiquitous skill compared to the skills that have other two employees (one of the possibilities is that the skill P2 is more complex and needs more time to maser compared to other skills P3, P4 and P5). Workers C2 and C4 have the same number of skills but the methods differentiate between them and consider that employee C2 possess more complex (non-ubiquitous) skill than the employee C3. The further iterations are not needed for HRM practice because it becomes increasingly harder to interpret the generated variables. This example shows potential use of the method in HRM, the usage of the method is particularly valuable because of its in-depth analysis of employees' skills and their quantitative evaluation. First step of the method is simple addition of employee skills which is similar to standard HRM procedure, but by providing further iterations, the differentiation between the employees is visible, which is not possible by implementing the standard procedures (even with the well-known multivariate pondering techniques).

4. CONCLUSION

Human resource management encounters many challenges due to its important roles in every organization. One of the roles is selection of potential candidates and comparison/evaluation of existing ones. This paper presents the novel usage of method Method of Reflections in HRM practice. This novel usage can revolutionise HRM practice regarding evaluation of employees and their skills.

The method takes in consideration encoded knowledge and information hidden in bipartite employee -skills relation. The method can resolve the ubiquity of skills dispersed between employees (existing or potential) and quantitatively evaluate employees based on their skills (knowledge). The application of the method should be preceded by two analysis steps as presented in the paper. First step is Job Analysis in which manager must recognize which qualities (skills) are needed for certain position and Employee Analysis step where the skill analysis for every employee is needed (identify and record).

The disadvantage of using this method in its unique approach is establishment and familiarity of standard methods in HRM practice. Authors deliberate that the more research is needed particularly in the form of case studies to further develop and present this original use of the Method of Reflections in the field of HRM.

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