

## ASSESSMENT OF CANDIDATE EFFICIENCY BASED ON PERSONALITY TRAITS ON RESKILLING PROGRAMS IN THE IT SECTOR

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### Abstract

In the labor market, there is a rapid change in the need for employee competencies, conditioned by the increasing degree of digitization and technological innovations. Adaptation to these changes is expected from the educational system when preparing young people for new positions and jobs that arise, but it also requires additional training and reskilling of already employed workers, to keep their jobs. Bearing in mind the high costs and time resources invested in reskilling programs, it is important to consider all the factors that influence the efficiency and success of that process. The key role is often played by the candidates, their willingness, motivation, and personality traits. The main objective of this paper is to test a model for evaluating the efficiency of candidates, based on personality traits, in the reskilling program for junior Java programmers. Research was conducted during the reskilling program of unemployed and employed workers (from different fields of work) into junior Java programmers, in the Republic of Serbia. The Data Envelopment Analysis (DEA method) was used to calculate the efficiency. The candidate's personality traits (reasoning (R), tough-mindedness (TM), self-control (SC), independence (I), anxiety (A), extraversion (E)) were observed as inputs, and the results achieved during and after the reskilling course (test results, professional practice gain and employment in a new field) were observed as outputs. Data on personality traits were collected in the process of candidates' selection for the reskilling program, the assessment of the candidate's knowledge was carried out during and after the course through knowledge tests, and data on participation in professional practice and data on employment in new jobs were collected after the program. The results presented in the paper shows differences in the efficiency of the candidates based on demographic characteristics (gender, age, education, employment) but not significant impact of personality traits.

**Keywords:** *Reskilling programs, efficiency, personality traits, DEA method.*

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### 1. Introduction

McKinsey & Company, in its study "Getting practical about the future of work" (Hancock, Lazaroff-Puck & Rutherford, 2020), announced that by 2030, 30 to 40% of the workforce will have to acquire new set of skills and change their occupations. Leading companies realize that they cannot hire enough new workers with necessary set of competencies, so they see reskilling programs as a solution for development competences among employees. On the other hand, after Covid19 pandemic, a lots of workers lost their jobs, and reskilling is one of the ways that they can return to the labour market and find employment. According to a study conducted by the World Economic Forum (Zahidi, 2020), it is predicted that 42% of the basic skills required for current work will be changed until 2022 and more than 133 million new jobs will be created. Reskilling programs for the unemployed workforce are an important instrument within policies designed to help unemployed people find work. Authors Philipp Grunau and Julia Lang (2020) state that in Germany, reskilling is an important measure in the active labor market policy. They showed that the unemployed are more often employed in the field for which they reskilled, and that reskilling leads to higher earnings (Grunau & Lang, 2020).

Reskilling programs are primarily suitable for unemployed workers, but also for all employees whose jobs are expected to change or disappear over time. Considering the high costs and time resources invested in reskilling programs, it is important to consider all the factors that influence the efficiency and success of that process. Often, it is the candidates who are key, their willingness, motivation, personality characteristics, because every reskilling program requires commitment, cognitive involvement and effort of the candidate. Personality characteristics and traits play an important role in understanding human behavior. Burger (2008) explains that personality represents "consistent patterns of behavior" that help us

understand and predict an individual's behavior. Many studies show that personality traits are related to behavior, attitudes and performance in the workplace (Bakker et al., 2002; Kumar & Bakhshi, 2010). The traits that are most often mentioned and analyzed in the work context are extraversion as important trait on managerial jobs, agreeableness for jobs with high level of interpersonal interactions, and openness to new experiences in situations that require continuous learning and developing new skills (Barrick et al., 2001; Mount et al., 1998). Openness to experience has a positive effect on the efficiency of workers since they show a higher degree of curiosity and engagement in certain activities than other employees (Louisburg et al., 2007), manage better in an unfamiliar environment (Bing & Louisburg, 2000), tend to learn new things, see the problem from multiple perspectives and manage in awkward situations

(Stewart & Nandkeolyar, 2006). Conscientiousness, emotional stability and extroversion affect the motivation and level of satisfaction of employees at the workplace (Judge & Ilies, 2002; Judge et al., 2002), and research conducted by Alarcon et al. (2009) shows that employees with these traits are more resistant to stressful situations. Conscientiousness-dominant employees also encourage positive organizational behavior, put in extra effort and do more than expected (Chiaburu et al., 2011). On the other hand, there are also personality traits that are associated with negative behavior and performance in the work environment. For example, employees with pronounced neuroticism often show anger, stress, grumpiness, unsociability, nervousness, insecurity, doubt, fear (Barrack & Mount, 1991; Judge, Bono & Locke, 2000), they lack self-confidence (McCrae & Costa 1991), they perceive any feedback as a threat, which further increases their anxiety (Smither, Londen & Richmond, 2005) and reduces their performance and efficiency at work. When it comes to adaptation to new jobs and occupations, people with pronounced neuroticism are not successful (Smithikrai, 2007).

## 2. Objective and methods

The aim of this paper is to investigate the importance of personality traits for the efficiency of candidates on reskilling programs.

The research considered the personality traits defined by Cattell in his personality model (Cattell, 1949). Cattell's personality model includes 16 personality dimensions (warmth, reasoning, emotional stability, dominance, liveliness, awareness of rules, social boldness, sensitivity, caution, abstractness, privacy, timidity, openness to change, self-sufficiency, perfectionism, tension), of which it is possible to single out 5 general factors: tough-mindedness, self-control, independence, anxiety, and extraversion. In our model, we include 5 general factors and reasoning.

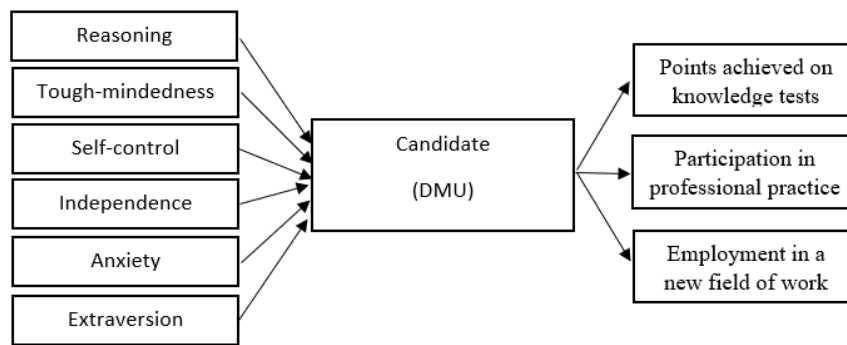
Data Envelopment Analysis (DEA - non-parametric approach for efficiency assessment) was used as a method for calculating the efficiency of candidates during the reskilling process (Savić & Martić, 2017). This method integrates measures of partial efficiency in one index and provides objective assessment and comparisons of efficiency among decision-making units for (Lotfi & Shirouiehzad, 2010). DEA is used in calculating the efficiency of various non-profit organizations, schools, universities, health, and social institutions (Dugelova & Strenitzerova, 2015), but also the efficiency of human resources within organizations (Zbranek, 2013; Yu et al., 2012; Manoharan et al., 2009).

The research was conducted during the program of reskilling of unemployed and employed workers from various fields of work into Junior Java programmers, in the Republic of Serbia. Reskilling program included 250 hours of teaching, 5 different chapters, 3 workshops, 5 internal knowledge tests, consultations, and special discussions, as well as a final exam. After the course, successful candidates were provided with an internship, and as a confirmation of their work, they were also employed as junior Java programmers in the most successful companies on the market.

### 2.1. Creating a model

Candidates who participated in the reskilling program (a total of 88 candidates) represent decision-making units (DMUs). The candidate's personality traits (reasoning, tough-mindedness, self-control, independence, anxiety, extraversion) were considered as inputs, and the results achieved during and after the retraining course (number of points the candidates achieved on knowledge tests, participation in professional practice, employment in a new areas of work) were considered as outputs, which is presented in Figure 1.

Figure 1. DEA model.



## 2.2. Sample and data collection

Candidates (N=88) from the territory of the Republic of Serbia participated in the reskilling program, without previous knowledge and work experience in the field of information and communication technologies. There was a total of 60 men and 28 women, ages 20 to 48. All candidates graduated from high school, and 56 of them also obtained a university degree in another field. Before and during the reskilling program, 38 candidates were employed, while 50 candidates were unemployed. During the selection process, almost all candidates expressed their desire to completely change their occupation and workplace through reskilling.

**Assessment of the candidate's personality traits:** Cattell's personality model (Cattell, 1949) is operationalized through the 16 Personality Factors Questionnaire (16PF), and an adapted version translated into Serbian and standardized for the Serbian population was used in the selection process. Standardization was carried out on 504 respondents aged 15 to 59, from all regions of Serbia (Mitrović, Smederevac, & Čolović, 2015).

**Evaluation of the tests:** During the retraining program, the progress of the candidates was continuously evaluated through internal tests that were conducted after each chapter. A total of five internal tests and a final exam were organized.

**Participation in professional practice:** During the internship, a questionnaire was conducted that examined the success and satisfaction of the trainees during the internship, as well as whether the internship was successfully completed.

**Employment in a new field of work:** Candidates were monitored for 6 months after the reskilling program. Questionnaires were periodically conducted asking whether candidates had found employment in a new field of work.

## 3. Results

The results obtained using the mixed-integer DEA model (Lozano & Villa, 2006) indicate that in the selection process 56 candidates (63.64%) were assessed as relatively inefficient, while 32 candidates (36.36%) were assessed as relatively efficient. The structure of efficient candidates according to demographic characteristics is shown in the Table 1.

Table 1. Efficiency by gender, education, employment.

Category		N	Number of efficient candidates	% of efficient candidates	Average results	Age average
<b>Gender</b>	Male	60	23	26,14%	69.76	29,74
	Female	28	9	10,23%	65.89	35,33
<b>Education</b>	High school	32	12	13,64%	67.35	29,17
	Faculty	56	20	22,73%	69.47	32,60
<b>Employment</b>	Employed	38	13	14,77%	65.48	32,92
	Unemployed	50	19	21,59%	70.85	30,21

Observed by gender, 23.14% of the sample are efficient male candidates, and 10.23% are inefficient female candidates. Most of the efficient candidates are those who have completed university in some other field (22,73%), and those who were unemployed at the time of reskilling program (21,59%). The assumption is that those candidates were more ready for the learning process and had more time to devote to the reskilling process.

The relationship between personality traits, reskilling results, practice and employment in new filed was observed, and it can be concluded that there is no significant relationship between personality traits, results, practice, new employment and efficiency (Table 2).

Table 2. Correlation between traits, reskilling results, practice, employment in new filed and efficacy.

	<i>R</i>	<i>TM</i>	<i>SC</i>	<i>I</i>	<i>A</i>	<i>E</i>	<i>Res.</i>	<i>P</i>	<i>NE</i>	<i>Eff</i>
<b>Results</b>	0,27	-0,02	-0,21	-0,07	-0,02	-0,09	1,00			
<b>Practice</b>	0,22	0,19	-0,17	0,07	0,05	-0,03	0,60	1,00		
<b>New employment</b>	0,24	-0,06	-0,04	-0,05	-0,16	0,01	0,48	0,25	1,00	
<b>Efficiency</b>	-0,22	-0,38	-0,20	-0,33	-0,29	-0,13	0,44	0,15	0,25	1,00

According to this research and model, personality traits are not key indicators when looking at candidate efficacy during the reskilling process. Reasoning is the only personal characteristic that is positively related to results during reskilling, participation in practice and employment in a new field of work, although not positively related to efficiency.

#### 4. Discussion and conclusion

As the process of reskilling is increasingly important, the idea of this paper was to investigate the importance of personality traits (reasoning, tough-mindedness, self-control, independence, anxiety, and extraversion) for the success of the candidate, and to evaluate the efficacy of the candidates using a quantitative approach. As personality traits can be good predictors of success in learning (Barrick et al., 2001; Mount et al., 1998) and work behavior (Judge et al., 2002; Matzler et al., 2011), and their assessment is often done in the selection process, we wanted to test the model of efficiency assessment based on them, by applying the DEA method.

Results showed that personality traits, which were observed, do not have a significant statistical correlation with efficiency, so it is a suggestion for further research to take some other traits and characteristics of candidates into account. It would be useful to create a scale that would consist of factors that are proved to be good predictors for successful reskilling and candidate efficiency, including general competencies and some specific to a given profile.

The application of quantitative methods can support the decision-making in HR processes. Unlike traditional methods of decision-making and performance assessment, the DEA model presented in the paper enables the comparison of candidates based on defined criteria and determines the relative efficiency of one candidate in relation to other observed candidates. It also leaves the possibility of the evaluation of the results by the decision-maker (experts in the field), so that the weights determined by the DEA method agree with the preferences of the decision-maker.

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