Progress in the use of tools for the selection of employees at the time of digitizing

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Abstract

INTRODUCTION: Employee selection is a process in which qualified employees of the organization, most often HR employees, should identify the most suitable candidates based on predetermined soft and hard criteria and then in cooperation with future direct superior or future colleagues, select the most suitable candidate in the context of both qualification and cultural and relational aspects. The employee selection tools used by the organization with the upcoming the fourth industrial revolution provide HR staff, but also candidates, with more comprehensive and in-depth information about the candidate's personality and the characteristics and life of the organization.

OBJECTIVES: In our paper, we will focus on finding out which selection tools organizations use in practice, which selection tools they experience from the past and what new tools are being promoted. We will also focus on how the choice of tools is influenced by the size and location of the organization and whether organizations focus on revising and changing them.

METHODS: We surveyed a relevant sample of Slovak organizations in the period 2014-2018. Based on the results of the questionnaire survey, the authors carried out several partial activities such as evaluation of the current state by descriptive statistics, statistical evaluation of formulated hypotheses and evaluation of the overall change of analyzed attributes in the observed period using the basic index of change.

RESULTS: The part of the survey focused on the selection of employees showed that the most important methods in the selection of employees are long-term one-to-one interviews and references. Although organizations are still expanding their portfolio of employee selection tools, the two tools are the most widely used. So far, organizations are hesitant to use the tools coming with the Fourth Industrial Revolution. And they use them on a much smaller scale than traditional selection tools.

CONCLUSION: Organizations in the selection process innovate only to a small extent the used tools of employee selection. Which can be described as a significant competitive disadvantage, as modern technologies not only speed up and improve their work, but also increase the attractiveness of the organization and the validity of the outputs.

1. Introduction

The need to adapt to rapid changes in the business environment presupposes, on the part of both employees and employers, mastering new challenges, acquiring new knowledge and skills, and taking on new tasks and responsibilities (Kucharčíková et al. 2015; Papula et al.

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2019; Hitka, Balážová 2015; Stangova, Vighova 2016; Pavlendova et al 2020). The starting point for companies is the availability of quali-fied human resources, which is provided by the personnel management department, primarily through an effective process of selecting employees. This is an important process for any organization (Kirchmayer et al., 2016, Belas et al. 2018), as deciding who to offer a job to can either save the organization's costs or significantly increase it (Hoek, 2017). A suitably selected candidate can adapt in a relatively short period of time (both professionally and organizationally) and begin to deliver the required or higher performance (Cagáňová, Čambál, Šujanová, 2012; Volná, Papula, 2013), which secondarily increases the goodwill of the organization (Hitka et al., 2017; Ju-renka et al., 2017; Mura, Kljucnikov 2018). Unlike an inappropriately selected can-didate, who quickly becomes a bottleneck both in the work team and in the work outputs. Such employees are gradually left or dismissed voluntarily by the organiza-tion and the recruitment and selection process needs to be repeated (Stachová et al., 2019).

Organizations use various selection tools to identify the most suitable candidates (Joniakova et al. 2016; Ližbetinová et al. 2016). From the history of their use, it is possible to divide these tools into three groups. And the tools used "historically" so-called. "historical selection tools" i.e. tools that have been used in business practice for more than 50 years. These tools were already used during the first and second industrial revolution. Priority is given to the tools by which the candidate's compe-tence to work in a given position could be ascertained very quickly. For this purpose, the so-called job skill test, i.e. execution of the given work activity directly during the selection, for example, the secretaries were dictated to the text, which they tran-scribed on a standstill, or recorded in shorthand, etc., but quite often the candidates were accepted only based on recommendation or education (certificate of appren-ticeship, certificate ...), without using a combination of selection methods. Already within this first period, it is possible to record the beginnings of writing biographies, although not yet in the form as we know them today.

The tools used since the arrival of the third industrial revolution, the so-called "se-lection tools during the Third Industrial Revolution" that arose from the need for a significant change in the content of the workload of employees (Stearns 2012). The third industrial revolution was characterized by technological innovations in the field of electronics and IT for automation and production. Based on it, communication accelerated significantly, and business contacts reached a new level. This revolution created thousands of businesses and millions of jobs and laid the foundations for globalization in the 21st century. Businesses had to invest in new technologies to succeed in the labour market (Kohnová, L., Salajová, N., Šlenker, M., 2019; Vojtech et al 2019) and in the context of these changes and needs, the tools for selecting the most suitable employees changed. Organizations began to make extensive use of various types of tests, from ability tests, through intelligence, personality, and graphics. Psychometric testing, performance testing, and projective testing have also begun to be used. In the area of interviews, in addition to one-on-one interviews, in-terview panels and sequential selection interviews began to be used. The content of the interviews is shifted from the general inquiry area to more sophisticated and pre-pared interviews in which candidates solve various hypothetical problems, or are exposed to stressful situations, or a psychologist conducts an interview directly with them. CVs already take the form of current CVs, and at the end of this period, they are structured into so-called questionnaires. In multinational organizations, the meth-od of assessment centres is gradually being used in the selection of employees (Ka-chaňáková 2013).

With the arrival of the Fourth Industrial Revolution, the tools used for selection are gradually being supplemented by new, more technically and technologically ad-vanced ones, such as the use of social networks, online space, or completely new transcending real and contemporary boundaries. But more attention is also being paid to the candidate's integrity, values and commitment, and interview methods use behavioural interviews, group interviews with future colleagues, but also value orien-tation tests and integrity tests (Armstrong, 2007). Within these selection methods and tools, gamification elements are beginning to be implemented at this stage, because Game elements could also improve the selection process, since it is more difficult for test-takers to fake the assessment, as desirable behaviours may be less obvious to individuals playing the game, and as a result, improve prediction of job performance and hiring decisions (Armstrong et al., 2016). This could be especially the case for traditional selection methods, such as personality tests, which are prone to faking undermining thus their predictive validity (Murphy, Dzieweczynski, 2005). This, so far, the last period of employee selection tools development can be described as "se-lection tools of the fourth industrial revolution". The individual tools and methods of selection are listed in Table 1, in the context of the start of use for the selection of employees in Slovakia.

Table 1. Employee selection tools in the context of starting their use

Historical selection tools	Selection tools used during the third industrial revolution	Selection tools used during the fourth industrial revolution

Interview one to one	Interview panel	Assessment centres
References	Interview solving a problem	Profiles on social media
Work skills test (performance of the given work activity)	Stress conversation	Implemented elements of gamification into selection tools
Curriculum vitae	Interview with a psychologist	
Apprenticeship certificate / completed education	Questionnaire - structured CV	Online testing - remote selection
	Projective tests	
	Performance tests	Group interview with future colleagues
	Proficiency tests	
	Personality tests	Use of artificial intelligence
	Graphological tests	
	Intelligence tests	Virtual reality
	Ability tests	Behavioural interviews
	Psychometric testing	Value orientation tests
	Assessment centres	Integrity tests
	Sequential selection interview	

It should be noted that some tools, such as resume, interview one on one and last but not least, references, have passed, survived and are widely used to this day (References are still the most used method of selecting employees or have a significant impact on selection). But graphological tests, the availability of apprenticeship or other completed education, or interviews with psychologists have moved significantly into seclusion over time and are used only in cases where without the test, or confir-mation of education is not possible to perform the work (Kachaňáková 2016).

Over time, it also significantly changes the number of methods and tools used in the selection of employees. However, this has two levels. In the past, HR profession-als did not realize the need for a combination of several tools in the context of the quality of the selection, or they did not attach much importance to it. In the second and third period, we meet with at least two combinations of selection methods, but more often it is a higher combination of methods. With the arrival of the industrial revolution, which allows access to the entire selection (move the interview with the candidate) to move to the online space (distance examination, electronic transmis-sion of personal data, analysis of social networks and ...), organizations have been given the opportunity to obtain, combine and process all information about a candi-date

electronically, with selection tools with elements of artificial intelligence currently assisting them in evaluating such data. With the possibility of artistic intelligence, multiple possibilities are envisaged, without any significant increase in HR time.

As the number of selection tools used has been influenced, as has been shown in several surveys (also our article about selection) is also influenced by the number of job applicants, which is directly related to the economic situation in the country. If there is high unemployment in the country and there are enough candidates for indi-vidual positions, companies, in some cases even excessively, test candidates to get the best. Conversely, at a time of low unemployment, companies use a minimum of selection tools and rely on training candidates during adaptation (Stachová 2012).

Based on the above, we were interested in our survey which selection tools are cur-rently used in Slovak organizations and whether they focus on their revision and change.

2. Methodology

In this paper, our goal is to present the results of a survey conducted in the period since 2014 - 2018. The main goal of the survey was to find out whether and how human resources management is currently taking place in Slovak organizations. Given the scale of the issue, the survey was divided into ten sub-objectives, one of which was to identify selection tools and processes for selecting employees in Slovak organizations. Based on the results of the questionnaire survey, the authors carried out several partial activities such as evaluation of the current state by descriptive statistics, statistical evaluation of formulated hypotheses and evaluation of the overall change of analyzed attributes in the observed period using the basic index of change.

The research questions were formulated and conditioned concerning the objective of the article. The hypotheses were formulated based on the defined research questions and tested in the questionnaire survey and subsequent statistical evaluation.

1. Research Question: What was the score achieved by the surveyed organizations in their activities regarding the existence of a standardized selection process? Are there statistically significant differences between the regions of activity of the organizations?

2. Research Question: What score do the surveyed respondents achieve within the activities related to the innovation of the used staff selection tools? Are there statistically significant differences between the regions of operation of the organizations?

Hypothesis H1: There is a statistically significant relationship between the region in which the organization operates and the implementation of a standardized staff selection process.

Hypothesis H2: There is a statistically significant relationship between the region in which the organization

operates, and the implementation of activities related to the innovation of the tools used to select employees.

For the needs of this article, data obtained from research conducted between years 2014-2018 were applied, and the top representatives of Slovak companies were interviewed. Its objective was to uncover the present state of the recruitment process in Slovak organisations. A questionnaire in which the participants in the study responded to 90 questions focused on the issue of formal human resources management in the organisation was used as a research tool. The answers to the questions focused on the recruitment process were used for the needs of this article. The amount of the interviewed companies was approx. 600 every year (depending on the availability of personal contacts of external students, which were used to address the participants in the research), while the response rate of comprehensively completed questionnaires was 62–67%.

To define a sufficient research sample, two stratification criteria were determined. The first criterion is the region of operation of the organisation based on the NUTS classification (La Nomenclature des Unités Territoriales Statistiques – Nomenclature of territorial units for statistics created by the Statistical Office of the European Union.); Slovakia is divided according to the NUTS 2 category, while the structure of the research sample was based on the data provided by the Statistical Office of the Slovak Republic.

As a second stratification criterion, the authors set a minimum company size of 50 employees, thus excluding small enterprises from the research sample, on the one hand, however, the importance of focusing on a formal human resources management system in the organizations with 50 and more employees was followed on the other hand.

The data provided by the Statistical Office of the Slovak Republic during the monitored period indicated that the number of organisations with 50 and more employees in individual regions was oscillating around similar values, while the regional structure of the organisations with over 50 employees in the given years is provided in the following Table 2.

Table 2. Regional structure of organisations with more than 50 employees (source: data processed accord-ing to the Statistical Office of the Slovak Republic)

Region NUTS II.	Bratislava Region	Western Slovakia	Central Slovakia	Eastern Slovakia
Districts	BA	TT, TN, NR	BB, ZA	KE, PO
Number of organisations 2014	1.098	904	644	612
Number of organisations 2015	1.105	916	651	613
Number of organisations 2016	1.114	923	649	621
Number of organisations 2017	1.123	926	654	623
Number of organisations 2018	1.131	933	657	622

Determining an optimal research sample of the given basic group of organisations, Confidence Level of the research was set at 95%, and Confidence Interval of the research was set at H = +/–0.10. On the grounds of the given criteria an additional, or relevant research sample for individual regions of Slovakia was set in the analysed years (see Table 3).

Table 3. Size of the research sample for individual regions of Slovakia (source: own research)

Region NUTS II.	Bratislava Region	Western Slovakia	Central Slovakia	Eastern Slovakia
Districts	BA	TT, TN, NR	BB, ZA	KE, PO
Number of organisations	1105-1131	904-933	644-657	612-623
Size of research sample	89	87	84	83

The measured values were statistically processed and assessed by calculated chain indices (values changed since the previous year), and fixed-base indices (values changed since the first year).

3. Results and discussion

As the main goal of the selection of employees is to select the most suitable candidate from the selection group, it is important to obtain as much relevant and useful information about each of the candidates as possible. It is desirable that the applicant, in addition to the competences and abilities to perform a given job position, also meets the so-called contextual criterion in which it is necessary to consider whether the candidate meets the requirements arising from the specificities of specific working groups (whether the candidate has such characteristics that are desirable for effective cooperation in these groups, or does not have characteristics that would disrupt the hitherto good functioning of the working group in which he is to be included) and whether the candidate will contribute to the creation of the desired cultural content of the organization. The quality and efficiency of obtaining information during the process of selecting employees are most influenced by the choice of tool or combinations of selection tools. The survey showed us, see Table 4, that organizations use the

most interview one on one and references when selecting employees. We recorded a positive trend in the increase in the use of assessment centres and psychometric testing. We also saw a significant increase in the use of profiles on social networks and online tests. On the contrary, we recorded a decrease in the use of individual selection tools in the use of interview panels and application forms.

Table 4. Tools used in employee selection (source: own research)

Tools used in employee selection	2014	2015	2016	2017	2018
Interview panel	38,2	35,7	39,1	36,1	19,6
Interview one on one	66,9	62,4	57,5	67,2	79,3
Psychometric testing	7,9	9,7	11,7	12,2	20,6
Assessment centres	6,3	7,3	9,4	11,2	13,4
Profiles on social media	3,9	8,9	9,4	11,3	14,5
References	49,6	51,7	50,2	55,5	50,1
Ability tests	30,9	36,7	40,8	37,8	40,2
Technical testing	17,9	25,7	28,1	28,6	34,2
Work skills test (performance of the given work activity)	37,8	40,0	43,1	39,5	40,1
Online tests	5,7	5,7	7,7	7,6	10,2
Curriculum vitae	77,2	79,2	81,3	81,1	80,5
Application forms (questionnaires)	16,9	13,9	14	11,8	11,6

T As part of the survey, we also focused on the analysis of the current state of focus of Slovak organizations, on the systematic process of staff selection and regular development of staff selection tools in the context of technological progress and changing labour market requirements. (see Table 5). As the comparison of the outcomes of individual years shows, a slight increase was recorded in all years.

Table 5. Chain index of the companies focusing on recruitment process (source: own research)

Chain index of the companies focusing on recruitment process	ci15/14	ci16/15	ci17/16	ci18/17
Organizations implement a standardized selection process	1.011	1.041	1.059	1.020
Organizations regularly innovate the selection tools used	1.017	1.001	1.010	1.012
Σ	1.014	1.021	1.035	1.016

Authors consider the evaluation of the overall change in the analyzed attributes in the monitored period to be necessary. The following Table 5 presents the data processed within the performed analysis. It can be concluded based on this outcome (Table 6) that the share of the organizations focusing on the activities related to the effective recruitment process of employees increased in the monitored period. The overall increase in the monitored attributes represented the level of 8.3% in the monitored period, which the authors consider to be a positive trend.

Table 6. Fixed-base index of the companies focusing on recruitment process (source: own research)

Fixed-base index of the companies focusing on recruitment process	bi15/14	bi16/14	bi17/14	bi18/14
Organizations implement a standardized selection process	1.011	1.041	1.102	1.107
Organizations regularly innovate the selection tools used	1.017	1.020	1.037	1.058
Σ	1.014	1.031	1.070	1.083

In addition to the development trends of the monitored attributes during the observed period, the authors also ascertained the relative level of attributes in the context of the company's region of operation. Table 7 shows the numbers of organizations according to the score of the examined attributes achieved in individual regions in the year 2018.

Table 7. Focus of organizations on the effective recruitment process of employees in regions according to NUTS II. (source: own research)

NUTS II region	Bratislava Region	Western Slovakia	Central Slovakia	Eastern Slovakia
Districts	BA	TT, TN, NR	BB, ZA	KE, PO
Organizations implement a standardized selection process	72	68	67	61
Organizations regularly innovate	41	25	23	17

the selection tools used

The major share of the companies executing the activities related to the standardized recruitment process of employees was recorded in the region of Bratislava (n = 72), representing 80,89% of all the analyzed organizations from this region.

The area of regular innovation of the employee selection tools used turned out to be the worst in the survey. Overall, only (n = 106) 30.9% of Slovak organizations regularly innovate the tools used in the selection of employees, while in the region of eastern Slovakia it is even only (n = 17) 20.48%.

The parametric Pearson's correlation test (r) was used for the statistical evaluation of individual correlations.

H1: The result of Pearson's correlation test shows a statistically significant relationship between the region of the organisation's activities and the activities related to the standardized recruitment process that will be performed in it. Since the given variable correlates at the significance level of sig. = 0.01 with the value of the Pearson correlation coefficient r = 0.382, the required level of significance value was reached. Based on the above, this hypothesis was not rejected, and it is possible to confirm a slight relationship between the analyzed variables.

H2: The result of Pearson's correlation test proves to be a statistically significant relationship between the organisation's region of activity and the organisation's focus on investigating the resources used. Since the given variable correlates at the significance level of sig. = 0.01 with the value of the Pearson correlation coefficient r = 0.917, the required level of significance value was reached. Based on the above, this hypothesis was not rejected and a strong relationship between the analyzed variables can be confirmed.

4. Summary and conclusion

The part of the survey focused on the selection of employees showed that the most important methods in the selection of employees are long-term one-to-one interviews and references. Although organizations are still expanding their portfolio of employee selection tools, the two tools are the most widely used. So far, organizations are hesitant to use the tools coming with the Fourth Industrial Revolution. And they use them on a much smaller scale than traditional selection tools. In the context of the results declared by the Cranet network conducting a similar survey in 40 countries around the world, it can be stated that Slovakia is still lagging behind in the use of profiles on social networks in the selection of employees. According to the study, in the European countries, Estonia (42%), the Netherlands (36%), Belgium (35%), Spain (38%) and Sweden (28%) (Blštáková 2018).

The survey showed us that the human resources departments try to comply with established standards in the selection of employees. It follows from the above that if we look at the results of the survey from the context of the upcoming technological change in the context of industry 4.0, it can be seen that Slovak organizations are not yet focused on using new selection tools. Organizations in the selection process innovate only to a small extent the used tools of employee selection. Which can be described as a significant competitive disadvantage, as modern technologies not only speed up and improve their work, but also increase the attractiveness of the organization and the validity of the outputs. A simple example in this area is the assessment of information in CVs, which can be done manually, or, using CV sorting software, which can be used to search for suitable candidates for specific vacancies (Hoek, 2017). Using appropriate online tests (ie integrity test, value orientation test, etc.) it is possible to proactively detect the preferred values and behaviour of candidates.

It is also possible to proactively detect candidates' unethical behaviour when answering questions during the selection process using appropriate software (Jackson, Wroblewski, 2000; Kubinger, 2009; McFarland, Ryan, 2002; Vecchione et al., 2014). Also, the use of tools based on the gamification of selection tools leads to both attractiveness, efficiency and increased involvement of candidates, but also positive perception of the organization, as it also signals that it is at the forefront of technology that offers a competitive advantage in the war for talent (Fetzer et al., 2017). These are also confirmed by Chow and Chapman (2013) who state that gamification can be effectively used in the recruitment process to attract a large number of candidates (preferably belonging to Generation Y), improve the image of the organization and attractiveness, which has a positive impact on employment towards the organization.

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