Knowledge Management in HRM: How the Content of Job Offers can Attract More Candidates

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Abstract: The fundamental aim of the research was to deepen knowledge of the influence of developing the wording of job offers on the number of candidates responding to them. It stems from the overarching aim consisting in improving human resource management (HRM) by knowledge management (KM) related to the job market and job seekers' reactions to information concerning competence requirements published in job offers. The specific objective was to answer two questions: are there words in job offers that increase the number of job seekers, and whether this number is dependent on the length of the wording of the selected module of an offer. Particular attention was paid to positive words. It was checked whether their number in relation to the number of all words in an offer matters. In order to answer the research questions, text processing methods such as tokenization and lemmatization were first used, followed by the analysis by means of such statistical methods as the chi-square test (χ^2) and the Mann-Whitney U test. The obtained research results allowed to illustrate job seekers' preferences. It was noted that the length of an offer is also important. However, it was not possible to confirm the assumption that positive words increase the attractiveness of an offer. Despite the limitations of a little diversified database (candidates were dominated by young people with little work experience), the research brought new value to competence and human resource management. The research resulted in extending the scope of knowledge on the use of the analysis of job offers in the area of effective communication with candidates for work in organizations.

Keywords: Knowledge management, Competence management, Human resource management, Text analysis,Jjob offers

1. Introduction

Knowledge management (KM) plays an important role in strengthening the competitiveness of companies (Marimuthu, Arokiasamy & Ismail, 2009). Its use is necessary in many areas of enterprise operation, also in human resource management (HRM) (Zaim et al., 2018). When relationships between KM and HRM are presented in the source literature (Turulja & Bajgoric, 2018), both the context of the impact of HRM on KM (Gope, Elia & Passiante, 2018) and the impact of KM on HRM (Zaim et al., 2018) can be encountered. Analyzing the latter type often concerns the flow of knowledge/sharing knowledge in organizations (Marouf, 2016) and the effect of generally defined main KM functions on generally defined HRM practices (Zaim, 2016).

When preparing this article, a scarcity of research work on specific operational effects of KM on HRM was noted, which ultimately influences companies' strategic results. The research presented here focuses on knowledge management related to the job market and the behavioural mechanisms of its participants, including their reactions to the content of job offers. It was observed that knowledge management in the indicated scope is favourable to the improvement of HRM functioning. It increases the chances of attracting the best candidates, which is a condition for the successful achievement of goals in enterprises.

The development of knowledge management in HRM is positively influenced by the dynamic development of methods and tools in the areas of IT and statistics. In the context of knowledge related to applicants' reactions to the content of job offers, they help to analyze job offers more and more accurately, and are more effective in performing the recruitment function, treated as a component of human resource management (Dubois & Rothwell, 2010, pp. 95-124; Goliński, 2020).

In a strategic dimension, the use of the aforementioned methods and tools improves the provision of the required competences in organizations. Currently, there are many directions of analyzing job offers, for example, for the purpose of determining recruitment effectiveness by improving the attractiveness of job offers (Garver et al., 2019; Kessler et al., 2009). It is important when it comes to reducing difficulties in quickly recruiting employees who meet competence-related requirements at workplaces. An offer may be perceived as attractive due to its many features such as: remuneration (Garver et al., 2019; Schlechter et al., 2014), employer image (Thornbury & Brooks, 2010), a large number of attractive benefits (Alniacik, 2016; Tato-Jimenez et al., 2019; Li et al., 2020), simple and understandable language (Nowak & Ohia-Nowak, 2022), information to meet the expectations of a target group it is specifically meant for (Born & Taris, 2010).

Although it may seem that the issue of preparing attractive job offers has been mastered for a long time, both the scientific literature and practical studies contain few results of research intended to deepen knowledge of factors that affect this attractiveness. This cognitive gap, which translates into real problems in human resource management, especially in the recruitment process, became the basis for conducting research, the results of which are presented in this article. It focuses on the impact of words used on the number of applications submitted in response to an electronic offer. The analyses concentrated on a selected part of offers which describes the benefits of taking up a job at a given position.

- With regard to the identified cognitive gap, the following research questions were formulated:
- Are there differences in the occurrence of words between offers for which no one applied and offers for which at least one person applied?
- Does the number of applications depend on:
    - saturating the "We offer" part with positive words?
    - the length of the "We offer" part?
    - the length of the "Responsibilities" part?
    - the total length of a job offer?

The division of the analyzed job offers into individual parts is explained in Chapter 3.1.

Obtaining answers to the above-mentioned questions allowed to achieve the goal of deepening knowledge of the impact of developing the content of job offers on the number of responding candidates.

2. Theoretical Basis

Employee recruitment research has been one of the fundamental trends in management science for decades (Seear & Thurley, 1963). Sometimes authors focus on designing and improving the recruitment process (Armstrong, Taylor, 2014, pp. 225-245; Dubois & Rothwell, 2010, pp. 95-124), at other times they quite often study economic and demographic factors that may affect recruitment strategies in enterprises (Seear & Thurley, 1963; DeVaro, 2008). The variability of these factors means that it is necessary to constantly improve the processes of knowledge management related to recruitment and its elements.

One of the goals of recruitment is to source the best candidates, i.e. those who, among other things, as seen in the selection process, meet competence requirements to the highest possible extent (Whiddett & Hollyforde, 1999). Requirements should result from competence models implemented in companies and adapted to changing goals (Szafrański, 2022b). In smart economy, it is particularly difficult to attract candidates referred to as "talents" (Spychała, 2022) and this applies both to people with extensive professional experience as well as those who are just completing their studies or school. Therefore, in the recruitment process in companies, various actions are taken to stay ahead of competitors in reaching candidates. For example, some companies begin cooperating with schools in an attempt to source future employees (Szafrański, 2022a). One of the stages of the recruitment process is reaching candidates, which often involves the development and publication of job offers (Armstrong & Taylor, 2014, pp. 228-233). At this stage, particularly when using online recruitment, a problem arises as to how to prepare content so that, on the one hand, there would not be an excessive number of random answers, and on the other hand, the right candidates sought after in a company could respond quickly to an offer.

Košťálová et al. (2022) confirmed that the number of responses to an offer depends on its content and some of its features. The article contains an analysis of more than 170 features of offers, which were divided into 13 categories. The “content” category was described with variables such as the length of a job title, number of words in the description of the scope of responsibilities and the number of characters. Linear models and the random forest model were built to investigate which variables are the most significant. In addition to content, benefits offered by an employer as well as the classification of positions (examples of position classes are: accountants, pharmacists etc.) were important factors. Among them, there was the “content” category. However, the impact of individual words was not analyzed, which was intended to be checked in the following article. In addition, another method was used to analyze the length of the text to see whether longer or shorter content is more beneficial.

In another study (Wille & Derous, 2018), the authors showed that the way information is communicated can have a significant impact on a candidate's reception of an offer. This study was an inspiration to consider whether the presence of positive words increases the chances of becoming interested in an offer.

The above-mentioned not very numerous studies on the attractiveness of an offer are related to the research whose results are presented in this article.

3. Research Methodology

3.1 Data Used

The study made use of 480 electronic job offers in Polish available in a selected online database dedicated to pupils, students, and graduates who are entering the job market. It contained both offers for which no candidate applied (240 offers) and those for which at least one candidate applied (240 offers). The detailed distribution of the number of offers with regard to the number of applications is presented in Figure 1.

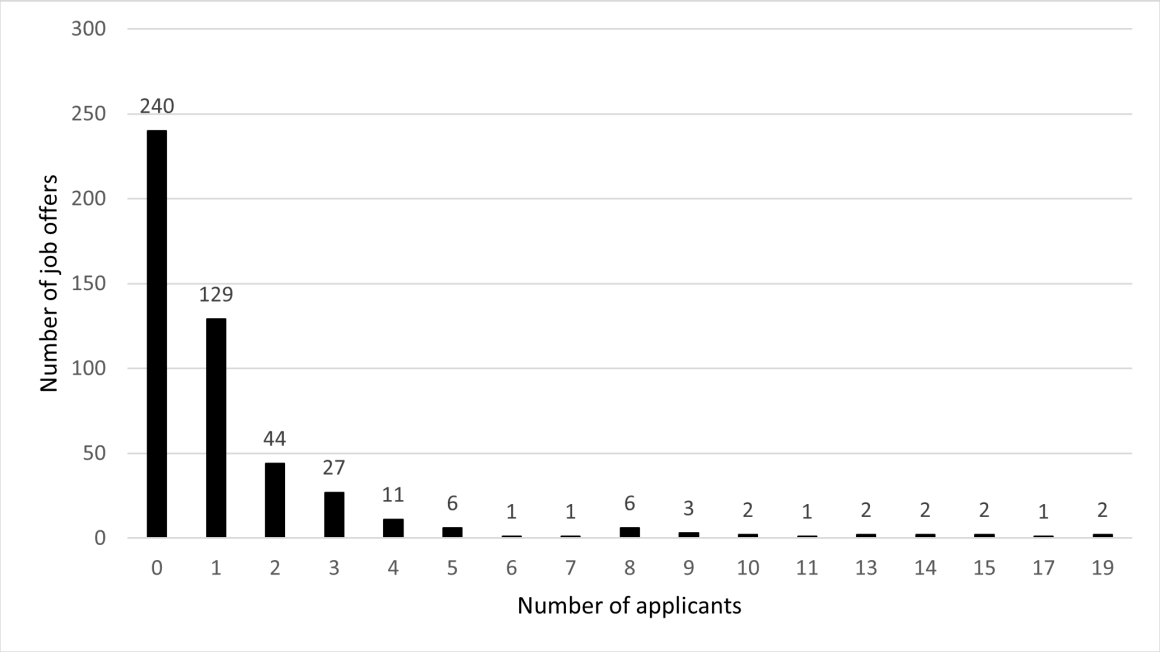

Figure1: Number of Offers with Regard to the Number of Applicants

Each downloaded offer had a structure divided into three parts:

- "We offer" – in this part an employer presents the benefits of taking up work and often mentions the form of cooperation (e.g: employment contract, internship);
- "Responsibilities" – this part lists a future employee's scope of responsibilities;
- "Content" – in this part an employer presents the remaining details and provides contact details.

Due to the fact that the offers concerned different workplaces and their responsibilities were very diverse, only the analysis of words from the "We offer" part was the aim of focus.

3.2 Preparation of Research Data

In order to answer research questions 1 and 2, which were presented in the introduction, it was first necessary to submit text to the normalization process, i.e. to reduce it to a form easier to analyze. The work by Vijayarani & Janani (2016) presents the process of text cleaning consisting of tokenization, stemming and removal of stop words. This article adapts it to the needs of the Polish language, which is an inflected language. Hence, stemming was replaced with lemmatization due to the fact that it is a more effective tool for inflected languages (Walkowiak & Malak, 2018; Mykowiecka, 2007, p. 79).

The first stage – tokenization – consisted in dividing text into smaller parts based on white space or punctuation marks. Words were separated with reference to a space or a line break mark, so any punctuation marks were removed. In addition, the size of letters was normalized.

Then, lemmatization was carried out. This method involves replacing an inflected word with its basic form (Balakrishnan & Lloyd-Yemoh, 2014). Due to the fact that the research was conducted on a set of offers published in Polish, a morphological analyzer of the Polish language called *Morfeusz 2* was used (Kieraś & Woliński, 2017). This tool gives possible basic forms for a given word and for each of the forms it presents a set

of morphological markers. Sometimes it happens that for one word it is possible to assign several basic forms. Then, the first option from the list was chosen to facilitate the study.

The last step was to remove the stop words, i.e. insignificant words that are not key to understanding content. In Polish, these are e.g. *oraz* (Eng. and), *lub* (Eng. or), etc. For this purpose, regular expressions were used in the Python programming language.

Both tokenization and lemmatization are necessary in the preparation of text for analysis in order to turn word sequence into a matrix form, facilitating further analysis. In the columns of the matrix there are individual words, and in the rows there are offer numbers. The values in the table state how many times a word appeared in each offer. The research included only those words that appeared in more than 10 offers (281 words). It constitutes the basis for answering question 1.

To answer question 2a, it was necessary to prepare a list of positive words. For this purpose, the Positive Words Research (2020) database was used. To determine the saturation of an offer with positive words, the percentage of positive words occupying the "We offer" part was determined.

To answer questions 2b, 2c and 2d, the number of all characters in a given part of a job offer was counted in the "We offer" and "Responsibilities" parts respectively and in an entire offer. Data prepared in this way were then able to be subjected to further analysis.

3.3 Course of Research

The analysis started with data visualization. For this purpose, word clouds were created. They allow to quickly check the most frequently occurring words as well as initially verify whether the data preparation process was carried out correctly.

However, data visualization did not allow to answer question 1 (see Introduction). For this purpose, a statistical test was performed. First, it was determined in how many offers from the first group (for which no one applied) and in how many offers from the second group (for which at least 1 person applied) a given word appeared. Afterwards, the χ^2 test was carried out, which also finds other uses in text analysis (Chen & Chen, 2011; Meesad et al., 2011). In this study, this test allowed to determine whether there is a relationship between the occurrence of a given word and the number of applications. The strength of this relationship was measured using the Yule ϕ coefficient, which is a strength indicator for the 2×2 contingency tables.

To answer questions 2a-2d, a statistical test was performed to analyze the similarity of the two groups. Due to the fact that variables determining the degree of saturation with positive words and the length of text do not have a normal distribution, the Mann-Whitney U test was used (Mann & Whitney, 1947).

All calculations were carried out in the Python programming language. The adopted significance level was α=0.05.

4. Research Results

In accordance with the described course of research, in the first place there was a preliminary analysis of the occurrence of words in job offers in the "We offer" part. The result of this analysis is presented graphically in Figure 2, which features words from offers for which no application was submitted. Figure 3 shows the most frequently occurring words from offers for which at least one person applied. There were 240 offers in both groups. The larger the font, the more often a given word appeared.

Figure 1: Map of Words Appearing in the "We Offer" Part in Job Offers for Which Candidates did not Apply

Figure 2: Map of Words Appearing in the "We Offer" Part in Job Offers for Which at Least one Candidate Applied

The preliminary analysis did not allow to capture clear differences between the investigated sets of words. Both were dominated by: *umowa* (Eng. contract), *praca* (Eng. work), *rozwój* (Eng. development), *możliwość* (Eng. opportunity), *zatrudnienie* (Eng. employment), *stabilny* (Eng. stable).

In order to check whether there are words that occur much more often in one group than the other, the χ^2 test was carried out. Table 1 shows 15 words with the greatest strength of dependence, i.e. those that assume the highest values of the Yule ϕ coefficient. A qualitative analysis of offers in which a given word appeared was then carried out and the most frequent context was given.

Table 1: Words with the Greatest Strength of Dependence

Word (Polish, original)	Word (English)	Offers without applications	Offers with min. 1 application	χ^2	p-value	Yule φ	Context
staż	internship	7	37	21.04	0.0000	0.21	completion of an internship
opiekun	supervisor	3	24	15.70	0.0001	0.18	with regard to the support of a traineeship/internship supervisor
ukończenie	completion	0	16	14.55	0.0001	0.17	completion of a traineeship/internship and the possibility of further employment
praktyk	practitioner	6	26	12.09	0.0005	0.16	in the context of a traineeship
zdobyć	gain	4	22	11.75	0.0006	0.16	gaining experience
płatny	paid	8	28	10.84	0.0010	0.15	paid internship
doświadczyć	experience	36	66	10.47	0.0012	0.15	gaining experience
wakacyjny	vacation	2	16	9.75	0.0018	0.14	vacation traineeships/internships
informacja	information	1	13	8.90	0.0028	0.14	feedback
zwrotny	returnable	1	13	8.90	0.0028	0.14	feedback
cenny	valuable	6	22	8.53	0.0035	0.13	valuable experience

Word (Polish, original)	Word (English)	Offers without applications	Offers with min. 1 application	χ^2	p-value	Yule φ	Context
lipiec	July	1	12	7.91	0.0049	0.13	as the month of commencing employment
praktyka	traineeship	1	12	7.91	0.0049	0.13	completion of a traineeship
miesięczny	monthly	7	22	7.19	0.0073	0.12	in relation to several months of employment
siłownia	gym	4	17	7.17	0.0074	0.12	gym pass

In Table 1, it can be observed that all of these words appeared more often in offers that were applied for at least once than in offers for which no one submitted their application. This means that these words can increase the attractiveness of an offer. This relationship is confirmed by the p-values of the test statistics, which do not exceed the assumed level of significance.

Then, an analysis of the attractiveness of offers was carried out in relation to factors presented in table 2.

Table 2 presents also the test results (U statistics and p-value) and the medians obtained in the studied groups of offers to illustrate differences between them.

Table 2: Mann-Whitney U Test Results

Factor	U statistics	p-value	median for offers without applications	median for offers with min. 1 application
Saturation of the "We offer" part with positive words (%)	25652	0.5512	3	2
Length of the "We offer" part	27388	0.0168	275	333
Length of the "Responsibilities" part	29556	0.2944	344.5	369
Length of a job offer	26944	0.0077	1074.5	1222

As can be seen in Table 2, both in the case of offers for which no applications were submitted and offers for which at least 1 candidate applied, the median value of saturating the "We offer" part with positive words was very low. The difference between the groups was statistically insignificant. Hence, we cannot conclude that saturation with positive words is related to candidates' interest.

However, it was noted that both the length of the "We offer" part and the length of the content of the entire offer differed significantly between groups of offers. Both variables assume higher values in the case of offers for which an application was submitted.

5. Conclusion and Discussion

The article proposes ways how to manage knowledge in the field of HRM to better understand how the content of job offers affects the number of applicants in the recruitment processes.

The conducted analysis showed that in the examined job offers there are words that are significantly more often found in offers for which at least one candidate applied than in offers for which no one applied. They include *staż*, *opiekun*, *ukończenie*, *praktyk*, *zdobyć*, *płatny*, *doświadczyć*, *wakacyjny*, *informacja*, *zwrotny*, *cenny*, *lipiec*, *praktyka*, *miesięczny* and *siłownia*. The context of the occurrence of these words is very important in the interpretation. It allows to build a picture of a candidate's expectations for work. The surveyed offers were mainly addressed at people looking for a paid internship, traineeship or first job, who wanted to gain valuable experience and were interested in starting work most often during the vacation period, e.g. in July. These people looked for work for a few months. The results of the research confirmed that the platform on which the

examined offers were posted meets its own assumptions, because it is intended for pupils, students and graduates starting their professional career.

In addition to the words used, the length of the "We offer" part and the overall length of an offer, which are measured by the number of characters, are also important. It turns out that in the group of offers for which at least one application was submitted, the median number of characters in an offer and the "We offer" part is higher than in the case of offers for which no candidate applied. This may mean that a longer one is more attractive to a candidate. However, it would be necessary to investigate the reason behind it. At the same time, longer offers may have more attractive benefits or a more detailed description may also increase interest. A study by Liu (2020) shows that an important factor in assessing the attractiveness of an offer due to its length is the nature of a candidate. Some people will look for the best solution, will appreciate a detailed offer, and in case of shortages, they will look for information themselves. Others, on the other hand, look for specific information in offers and content that is too long can discourage them.

There was no significant impact of the presence of positive words on the number of applicants, although it was assumed that a more positive character would be more attractive. It is possible that for candidates the nature of content did not matter so much. In addition, some may consider saturation with positive words to be a disadvantage of an offer. Surveys show (Fisher et al., 1979) that providing negative aspects of work increases an employer's credibility. Therefore, it is possible that saturation with positive words can be both an encouraging and a discouraging factor.

6. Summary

The conducted research complements and expands the range of IT tools and statistical methods for the needs of knowledge management in HRM. It also allows to better understand their impact on the development of this scientific discipline. This impact is presented in the article on the example of inexperienced job seekers' reactions to the content of job offers, including their length and information related to benefits drawn from employment. In this way, research carried out so far in the field of HRM was supplemented, indicating, at the same time, the implications of its results on the development of knowledge management in enterprises for the needs of improving the area of human resource management.

Of course, the conducted research reveals several important limitations. The intentionally introduced limitations include the selection of a narrowly defined target group (candidates for work with little professional experience) and the subject of research which is selected content in job offers and selected features of these offers. Among the limitations independent of the authors one should mention the use of only one database of offers, and in this way focusing only on the content of offers in Polish.

These limitations did not hinder the development of a satisfactory research methodology that can be implemented in broader data sets, different target groups and content in different languages. In addition, this methodology may supplement research methods indicated in the article and proposed by other authors.

In further research, it is worth taking into account other factors influencing candidates' reactions to the content of job offers, such as, for example, working time, remuneration and other working conditions. In the database used by the authors, there were numerous deficiencies of such data. Hence, it was not possible to include them in the analyses.

Attention should be paid to the interdisciplinary nature of research and results. The postulated development of knowledge management in HRM leads to the effect of synergy in the context of achieving goals set in enterprises.

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References

Alniacik, E. (2016) "Attractiveness of Recruitment Advertisements: Impact of Information Specificity", *Ege Academic Review*, Vol. 16, No. 1, pp 161–175.

Armstrong, M. and Taylor, S. (2014), *Armstrong's Handbook of Human Resource Management Practice*, 13th ed., Kogan Page, London.

Balakrishnan, V. and Lloyd-Yemoh, E. (2014) "Stemming and lemmatization: A comparison of retrieval performances", *Lecture Notes on Software Engineering,* Vol. 2, No. 3, pp. 262-267.

Born, M. and Taris, T. (2010) "The Impact of the Wording of Employment Advertisements on Students' Inclination to Apply for a Job." The Journal of Social Psychology, Vol. 150, No. 5, pp 485–502.

Chen Y.-T. and Chen M.C. (2011) "Using chi-square statistics to measure similarities for text categorization", Expert Systems with Applications, Vol. 38, No. 4, pp 3085-3090.

DeVaro, J. (2008) "The labor market effects of employer recruitment choice", European Economic Review, Vol. 52, No. 2, pp 283–314.

Dubois, D.D. and Rothwell, W.J. (2010) *Competency-Based Human Resource Management: Discover a New System for Unleashing the Productive Power of Exemplary Performers*, Nicholas Brealey, Boston.

Fisher, C.D., Ilgen, D.R. and Hoyer, W.D. (1979) "Source Credibility, Information Favorability, and Job Offer Acceptance", *Academy of Management Journal*, Vol. 22, No. 1, pp. 94–103.

Garver, M.S., Goffnett, S.P., Williams, Z., Divine, RL. and Davis, CF. (2019) "Analysis of the Job Preferences for Undergraduate Supply Chain Students", *Operations and Supply Chain Management-An International Journal*, Vol. 12, No. 1, pp 31–41.

Goliński, M. (2020) The Influence of Modern Technologies on Employee Recruitment. In: Graczyk-Kucharska, M., Spychała, M., Goliński, M., Szafrański, M. (eds), *Challenges of Modern Human Resource Management*, INW "Spatium", Radom, pp 45–55.

Gope, S., Elia, G. and Passiante, G. (2018) "The effect of HRM practices on knowledge management capacity: a comparative study in Indian IT industry", Journal of Knowledge Management, Vol. 22, Issue 3, pp. 649-677.

Interactive analysis of the NAWL database, [online]. Available at: https://exp.lobi.nencki.gov.pl/nawl-analysis (Accessed: January 20, 2023).

Kessler, R., Béchet, N., Torres-Moreno, JM., Roche, M. and El-Bèze, M. (2009) "Job Offer Management: How Improve the Ranking of Candidates". In: Rauch, J., Raś, Z.W., Berka, P., Elomaa, T. (eds), *Foundations of Intelligent Systems. ISMIS 2009. Lecture Notes in Computer Science, LNAI* 5722, pp 431–441 Springer, Berlin, Heidelberg.

Kieraś W. and Woliński M. (2017) "Morfeusz 2 – analizator i generator fleksyjny dla języka polskiego", Język Polski, Vol. 97, No. 1, pp 75–83.

Košťálová, Z., Lyócsa, Š. and Štefánik, M. (2022) "Online job vacancy attractiveness: Increasing views, reactions and conversions", *Electronic Commerce Research and Applications*, Vol. 55, Issue C, [online]. Available at: https://www.sciencedirect.com/science/article/abs/pii/S156742232200076X (Accessed: January 20, 2023).

Liu, Y-L. (2020) "Providing more or less detailed information in job advertisements—Does it matter?" *International Journal of Selection and Assessment*, Vol. 28, No. 2, pp. 123-214.

Mann, H. and Whitney, D. (1947). "On a test of whether one of two random variables is stochastically larger than the other". *Annals of Mathematical Statistics*. Vol. 18, No. 1, 50-60.

Marimuthu, M., Arokiasamy, L. and Ismail, M. (2009) "Human Capital Development and Its Impact on Firm Performance: Evidence from Developmental Economics", *Journal of International Social Research*, Vol. 2, No. 8, pp. 265-272.

Marouf, L. (2016) "The role of knowledge sharing culture in business performance", Vine Journal of Information and Knowledge Management Systems, Vol. 46, Issue 2, pp. 154-174.

Meesad, P., Boonrawd, P. and Nuipian, V. (2011) "Chi-Square-Test for Word Importance Differentiation in Text Classification". In: *2011 International Conference on Information and Electronics Engineering IPCSIT*, Vol. 6.

Nowak, P., Ohia-Nowak, M. (2022) „Plain language and natural order of things in modern recruitment (on the example of job advertisements)", *Poradnik Jezykowy*, Issue 8, pp 53–63.

Schlechter, A., Hung, A. and Bussin, M. (2014) "Understanding talent attraction: The influence of financial rewards elements on perceived job attractiveness", *SA Journal of Human Resource Management*, Vol. 12, No. 1, pp 1-13.

Seear, B.N. and Thurley, K.E. (1963), "Problems of Employee Recruitment to a Factory in a Rural Area", *British Journal of Industrial Relations*, Vol. 1, No. 2, pp 241–259.

Spychała, M. (2020) "Talent Management in an Enterprise". In: Graczyk-Kucharska, M., Spychała, M., Goliński, M., Szafrański, M. (eds), *Challenges of Modern Human Resource Management*, INW "Spatium", Radom, pp 77–86.

Szafrański, M. (2022a) "Evaluation of the Results of Support for Schools by Manufacturing Enterprises – a Competence Management Aiding Model", *Management and Production Engineering Review*, Vol. 13, No 2, pp 102-116

Szafrański, M. (2022b) *Modelowanie wymagań kompetencyjnych na stanowiskach pracy. Ujęcie teoretyczne i praktyczne*, Wydawnictwo Politechniki Poznańskiej, Poznań.

Tato-Jimenez, J.L., Buenadicha-Mateos, M. and Gonzalez-Lopez, O.R. (2019) „Evolution and Sustainability of Benefits Offered to Employees in On-Line Recruitment", Sustainability, Vol. 11, Issue 16, DOI: https://doi.org/10.3390/su11164313

Thornbury, E. and Brooks, M. (2010) "Signals of Employer Impressiveness and Respectability to Job Market Entrants", *Corporate Reputation Review*, Vol. 13, pp 172–183.

Turulja, L. and Bajgoric, N. (2018) "Information technology, knowledge management and human resource management: investigating mutual interactions towards better organizational performance", VINE Journal of Information and Knowledge Management Systems, Vol. 48, Issue 2, pp. 255-276.

Tyrańska, M., Łapczyński, M., Walczak, M. and Ziębicki, B. (2021) "The gap between higher business education and business expectations: The case of Poland", *Sustainability*, Vol. 13, No. 24, DOI: http://dx.doi.org/10.3390/su132413809

Vijayarani, S. and Janani, R. (2016), "Text Mining: Open Source Tokenization Tools – An Analysis", *Advanced Computational Intelligence: An International Journal (ACII)*, Vol. 3, No.1, pp 37-47.

Walkowiak, T. and Malak, P., (2018) “Polish Texts Topic Classification Evaluation”. In: *Proceedings of the 10th International Conference on Agents and Artificial Intelligence (ICAART 2018)*, Vol. 2, pp. 515-522.

Wille, L. and Derous, E. (2018) “When Job Ads Turn You Down: How Requirements in Job Ads May Stop Instead of Attract Highly Qualified Women”, *Sex Roles*, Vol. 79, No. 7, pp 464–475.

Zaim, H. (2016) “Analysing the effects of knowledge management processes on human resource management practices: a case study on an oil company in the Gulf region”, Middle East Journal of Management, Vol. 3, Issue 3, pp. 230-243.

Zaim, H., Keceli, Y., Jaradat, A. and Kastrati, S. (2018) "The effects of knowledge management processes on human resource management: Mediating role of knowledge utilization", *Journal of Science and Technology Policy Management*, Vol. 9, Issue 3, pp. 310-328.