

VYUŽITÍ FUZZY VÍCEKRITERIÁLNÍHO ROZHODOVÁNÍ PRO HODNOCENÍ FAKTORŮ PODNIKOVÉ KULTURY APPLICATION OF FUZZY MULTICRITERIA DECISION MAKING ON THE FACTORS OF CORPORATE CULTURE

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Abstract

The paper deals with application of fuzzy AHP method in multicriteria decision making. The decision on the final goal is made considering the weights of criteria and alternatives. Application of fuzzy AHP was demonstrated on selecting process of the most significant factors of corporate culture based on Denison's model of corporate culture and determination of its weights. The described weights are depending on expert's assessments, which may vary depending on different experiences and priorities. In order to overcome this problem, some researchers and authors made the Saaty's AHP modified and fuzzified to formulate and control the uncertainty. It was used linguistic weights and the assessments are away from certainty. In the analysis under imprecision judgements, the criteria weights are presented as triangular fuzzy numbers to get more reasonable and realistic solutions.

Key words: Human Resources, Corporate Culture, Multicriteria Decision Making, Fuzzy, AHP

Abstrakt

Článek se zabývá aplikací metody fuzzy AHP v multikriteriálním rozhodování. Cílem rozhodování je stanovení vah kritérií a alternativ. Aplikace metody fuzzy AHP je prezentována na příkladu hodnocení nejvýznamnějších faktorů podnikové kultury na základě Denisonova modelu podnikové kultury a určení jejich vah. Váhy závisejí na expertním hodnocení, které vychází z odlišných preferencí a zkušeností rozhodovatelů. Tento problém někteří autoři řeší prostřednictvím modifikace a fuzzifikace Saatyho metody AHP, aby bylo počítáno s neurčitostí. Při stanovení vah byla použita slovní škála, která často vyjadřuje velmi neurčité hodnocení. V párovém srovnávání jsou váhy reprezentovány trojúhelníkovými čísly, která poskytují realističtější výsledky.

Klíčová slova: lidské zdroje, podniková kultura, multikriteriální rozhodování, fuzzy, AHP

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Literatura

- [1] AYAG, Z., ÖZDEMİR, R. G. A fuzzy AHP approach to evaluating machine tool alternatives. *Journal of Intelligent Manufacturing* [online]. 2006, vol. 17, iss. 2 [cit. 2010-08-01], s. 179-190. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1007/s10845-005-6635-1>. ISSN 0956-5515.
- [2] BOZBURA, F. T., BESKESE, A., KAHRAMAN, C. Prioritization of human capital measurement indicators using fuzzy AHP. *Expert Systems with Applications* [online]. 2007, vol. 32, iss. 4 [cit. 2010-08-01], s. 1100-1112. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.eswa.2006.02.006>. ISSN 0957-4174.
- [3] BUCKLEY, J. J. Fuzzy hierarchical analysis. *Fuzzy sets and systems* [online]. 1985, vol. 17, iss. 3 [cit. 2010-09-09], s. 233-247. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/0165-0114\(85\)90090-9](http://dx.doi.org/10.1016/0165-0114(85)90090-9). ISSN 0165-0114.
- [4] BUCKLEY, J. J., FEURING, T., HAYASHI, Y. Fuzzy hierarchical analysis revisited. *European Journal of Operational Research* [online]. 2001, vol. 129, iss. 1 [cit. 2009-11-08], s. 48-64. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/S0377-2217\(99\)00405-1](http://dx.doi.org/10.1016/S0377-2217(99)00405-1). ISSN 0377-2217.
- [5] CEBECI, U. Fuzzy AHP-based decision support system for selecting ERP systems in textile industry by using balanced scorecard. *Expert Systems with Applications* [online]. 2009. vol.

- 36, iss. 5 [cit. 2010-08-01], s. 8900-8909. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.eswa.2008.11.046>. ISSN 0957-4174.
- [6] CELIK, M., KANDAKOGLU, A., ER, I. D. Structuring fuzzy integrated multi-stages evaluation model on academic personnel recruitment in MET institutions. *Expert Systems with Applications* [online]. 2009, vol. 36, iss. 3 [cit. 2009-06-08], Part 2, s. 6918-6927. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.eswa.2008.08.057>. ISSN 0957-4174.
- [7] DENISON, D. R., HAALAND, S., GOELZER, P. Corporate culture and organizational effectiveness: Is Asia different from the rest of the world? *Organizational Dynamics* [online]. 2004, vol. 33, iss. 1 [cit. 2010-08-01], s. 98-109. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.orgdyn.2003.11.008>. ISSN 0090-2616.
- [8] ERTUGRUL, I., KARAKASOGLU, N. Performance evaluation of Turkish cement firms with fuzzy analytic hierarchy process and TOPSIS methods. *Expert Systems with Applications* [online]. 2009, vol. 36, iss. 1 [cit. 2010-08-01], s. 702-715. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.eswa.2007.10.014>. ISSN 0957-4174.
- [9] GILLESPIE, M. A., DENISON, D. R., HAALAND, S., et al. Linking organizational culture and customer satisfaction: Results from two companies in different industries. *European Journal of Work and Organizational Psychology* [online]. 2008, vol. 17, iss. 1 [cit. 2010-08-01], s. 112-132. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1080/13594320701560820>. ISSN 1359-432X.
- [10] HSU, P. F., CHEN, B. Y. Developing and implementing a selection model for bedding chain retail store franchisee using Delphi and fuzzy AHP. *Quality & Quantity* [online]. 2007, vol. 41, iss. 2 [cit. 2009-12-01], s. 275-290. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1007/s11135-006-9004-z>. ISSN 0033-5177.
- [11] JABLONSKÝ, J. *Operační výzkum. Kvantitativní modely pro ekonomické rozhodování*. 2. vyd. Praha: Professional Publishing, 2002. 323 s. ISBN 80-86419-42-8.
- [12] JAGANATHAN, S., ERINJERI, J. J., KER, J. I. Fuzzy analytic hierarchy process based group decision support system to select and evaluate new manufacturing technologies. *International Journal of Advanced Manufacturing Technology* [online]. 2007, vol. 32, iss. 11-12 [cit. 2010-08-01], s. 1253-1262. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1007/s00170-006-0446-1>. ISSN 0268-3768.
- [13] JIE, H. L., MENG, C. M., CHEONG, W. C. Web Based Fuzzy Multicriteria Decision Making Tool. *International Journal of The Computer, the Internet and Management* [online]. 2006, vol. 14, iss. 2 [cit. 2010-09-01], s. 1-14. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1007/s00170-006-0446-1>. ISSN 0858-7027.
- [14] KAHRAMAN, C., CEBECI, U., RUAN, D. Multi-attribute comparison of catering service companies using fuzzy AHP: The case of Turkey. *International Journal of Production Economics* [online]. 2004, vol. 87, iss. 2 [cit. 2009-12-08], s. 171-184. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/S0925-5273\(03\)00099-9](http://dx.doi.org/10.1016/S0925-5273(03)00099-9). ISSN 0925-5273.
- [15] KAHRAMAN, C., VASANT, P., ABRAHAM, A., et al. *Fuzzy Multi-Criteria Decision Making: Theory and Applications with Recent Developments* [online]. New York: Springer, 2008. 590 s. ISBN 978-0-387-76812-0.
- [16] KAUFMAN, A., GUPTA, M. M. *Introduction to Fuzzy Arithmetic: Theory and Applications*. New York: Van Nostrand Reinhold Company, 1985. 350 s. ISBN 978-0442008994.
- [17] LEE, A. H. I., CHEN, W.-C., CHANG, C.-J. A fuzzy AHP and BSC approach for evaluating performance of IT department in the manufacturing industry in Taiwan. *Expert Systems with Applications* [online]. 2008, vol. 34, iss. 1 [cit. 2010-08-01], s. 96-107. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.eswa.2006.08.022>. ISSN 0957-4174.
- [18] LEUNG, L. C., CAO, D. On consistency and ranking of alternatives in fuzzy AHP. *European Journal of Operational Research* [online]. 2000, vol. 124, iss. 1 [cit. 2010-07-01], s. 102-113. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/S0377-2217\(99\)00118-6](http://dx.doi.org/10.1016/S0377-2217(99)00118-6). ISSN 0377-2217.
- [19] LIANG, G.-S., DING, J.-F. Fuzzy MCDM based on the concept of alpha-cut. *Journal of Multi-Criteria Decision Analysis* [online]. 2003, vol. 12, iss. 6 [cit. 2008-01-01], s. 299-310. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1002/mcda.366>. ISSN 1099-1360.
- [20] MAHMOODZADEH, S., SHAHRABI, J., PARIAZAR, M., et al. Project Selection by Using Fuzzy AHP and TOPSIS Technique. *International Journal of Human and Social Sciences* [online]. 2007, vol. 1, iss. 3 [cit. 2010-07-01], s. 135-140. Dostupný také z WWW: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.123.4107&rep=rep1&type=pdf>. ISSN 1307-8046.
- [21] NOVÁK, V. *Základy fuzzy modelování*. 1. vyd. Praha: BEN - technická literatura, 2000. 176 s. ISBN 80-7300-009-1.
- [22] SAATY, T. L. Scaling method for priorities in hierarchical structures. *Journal of Mathematical Psychology* [online]. 1977, vol. 15, iss. 3 [cit.

- 2010-08-01], s. 234-281. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/0022-2496\(77\)90033-5](http://dx.doi.org/10.1016/0022-2496(77)90033-5). ISSN 0022-2496.
- [23] SAATY, T. L. *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*. New York: McGraw Hill International, 1980. 287 s. ISBN 0-07-054371-2.
- [24] SAATY, T. L., TRAN, L. T. On the invalidity of fuzzifying numerical judgments in the Analytic Hierarchy Process. *Mathematical and Computer Modelling* [online]. 2007, vol. 46, iss. 7-8 [cit. 2010-09-01], s. 962-975. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.mcm.2007.03.022>. ISSN 0895-7177.
- [25] SALO, A. A. On fuzzy ratio comparisons in hierarchical decision models. *Fuzzy Sets and Systems* [online]. 1996, vol. 84, iss. 1 [cit. 2010-08-01], s. 21-32. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/0165-0114\(95\)00303-7](http://dx.doi.org/10.1016/0165-0114(95)00303-7). ISSN 0165-0114.
- [26] SHEU, J. B. A hybrid fuzzy-based approach for identifying global logistics strategies. *Transportation Research Part E-Logistics and Transportation Review* [online]. 2004, vol. 40, iss. 1 [cit. 2010-07-01], s. 39-61. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.tre.2003.08.002>. ISSN 1366-5545.
- [27] SOYER, A., KABAK, Ö., ASAN, U. A fuzzy approach to value and culture assessment and an application. *International Journal of Approximate Reasoning* [online]. 2007, vol. 44, iss. 2 [cit. 2010-08-01], s. 182-196. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.ijar.2006.07.008>. ISSN 0888-613X.
- [28] VAHIDNIA, M. H., ALESHEIKH, A. A., ALIMOHAMMADI, A. Hospital site selection using fuzzy AHP and its derivatives. *Journal of Environmental Management* [online]. 2010, vol. 90, iss. 10 [cit. 2009-11-01], p. 3048-3056. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1016/j.jenvman.2009.04.010>. ISSN 0301-4797.
- [29] WU, C. R., CHANG, C. W., LIN, H. L. FAHP sensitivity analysis for measurement nonprofit organizational performance. *Quality & Quantity* [online]. 2008, vol. 42, iss. 3 [cit. 2008-11-01], s. 283-302. Dostupný také z WWW (DOI): <http://dx.doi.org/10.1007/s11135-006-9046-2>. ISSN 0033-5177.
- [30] YIN, B., LU, L. Y. Corporate Culture Quantitative Measurement based on Discrete Choquet Fuzzy Integral. *Ieee/Soli'2008: Proceedings of 2008 Ieee International Conference on Service Operations and Logistics, and Informatics* [online]. vols 1 and 2 [cit. 2010-07-08], 2008, s. 2525-2529, 978-1-4244-2012-4. Dostupný také komerčně z WWW (DOI): <http://dx.doi.org/10.1109/SOLI.2008.4682961>.
- [31] ZADEH, L. A. Fuzzy Sets. *Information and Control* [online]. 1965, vol. 8, iss. 3 [cit. 2010-07-01], s. 338-353. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/S0019-9958\(65\)90241-X](http://dx.doi.org/10.1016/S0019-9958(65)90241-X). ISSN 0019-9958.
- [32] ZADEH, L. A. Fuzzy logic and the calculi of fuzzy rules, fuzzy graphs, and fuzzy probabilities. *Computers & Mathematics with Applications* [online]. 1999, vol. 37, iss. 11-12 [cit. 2010-06-06], s. 35-35. Dostupný také z WWW (DOI): [http://dx.doi.org/10.1016/S0898-1221\(99\)00140-6](http://dx.doi.org/10.1016/S0898-1221(99)00140-6). ISSN 0898-1221.
- [33] ZEKI, A., ÖZDEMİR, R. G. A combined fuzzy AHP-goal programming approach to assembly-line selection. *Journal of Intelligent & Fuzzy Systems* [online]. 2007, vol. 18, iss. 4 [cit. 2010-08-01], s. 345-362. Dostupný také z WWW: <http://portal.acm.org/citation.cfm?id=1368418>. ISSN 1064-1246 (Print), 1875-8967 (Online).

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