

THE AHP APPROACH IN SELECTING CANDIDATES FOR THE POSITION OF STRATEGIC PLANNING MANAGER

*Dragana Gardašević¹ [0000-0003-4423-5947], Milanka Gardašević Filipović² [0000-0003-4604-2065]
Koviljka Banjević² [0000-0002-1596-5812]*

Abstract

Over the last few decades, strategic planning has been associated to organisation performance. This means that each organization needs “right” person (or persons) on the position of strategic planning manager. Therefore, one of the tasks of Human Resource Management (HRM) is to select this “right” candidate according to some criteria. The main idea of this study is to present the usefulness of multicriteria decision-making methods (MCDM) for selecting the most appropriate candidate for the position of Strategic Planning Manager. The applied method is the Analytical Hierarchy Process (AHP), as one of the most popular MCDM methods. The results show that this quantitative method can assist managers to effectively evaluate candidate’s overall suitability for the mentioned position.

Key words: AHP, HR, decision support systems, selection process

1. Introduction

Over the last few decades, the application of information and communications technologies (ICT) and decision-making techniques have influenced the problem of personnel selection (PPS) become an attractive area of research. The task of human resource management (HRM) is to select the candidates who best-match the needs of the organizational strategy by contemporaneously considering multiple and interdependent evaluation criteria (Wanous; Boerlijst and Meijboom, cited in Chang et al, 2013). Thus, to make more objective decisions, HRM has to consider the applicant’s characteristics, interests, potential impacts, and results. Seen as a multicriteria decision-making (MCDM) problem, the PPS can be solved faster and more efficiently. MCDM implies quantitative methods and techniques that minimize subjective judgment in the process of distinguishing

¹ The Academy of Applied Studies Polytechnic, Serbia, dgardasevic@politehnika.edu.rs

² University UNION, School of Computing, Belgrade, Serbia, mgardasevic@raf.rs

³ The Academy of Applied Studies Polytechnic, Serbia, kbanjevic@politehnika.edu.rs

between an appropriate and inappropriate candidate and give a hierarchical structure for selecting and evaluating the right candidate (Gholec & Kahya, cited in Shahhisseini & Sebt, 2011). The Analytic hierarchy process (AHP) is one of the most popular MCDM methods, for its simplicity of the application. As such, it fits for organizing and analyzing complex decisions based on math and psychology (Duan et al., cited in Salehzadeh & Ziaeiian, 2024).

The literature abounds with different examples of AHP application in HRM, but not for the position of strategic planning manager. By applying the AHP method, the main idea of this paper is to present an effective and efficient way of selecting candidate for the position of strategic planning manager.

1.1 Literature Review

PPS is a complex task that includes, at one side, the results of job analysis, and, at the other side, the analysis of personal and other characteristics of each candidate, making the base of parameters for finding the most appropriate candidate for needed job position. Dating from the end of the 19th century, when Hugo Münsterberg applied ability testing in selecting candidates for the job of electric train motormen (Khoranni & Ehsani, 2015); it has been developed rapidly over the last three decades, when the accelerated development of MCDM methods and artificial intelligence have enabled a wide range of application of these methods in many different sectors: health-care (Gajić-Stevanović & all, 2008), constructing projects (Shahhisseini & Sebt, 2011), tourism (Filipović, 2007; Gardašević-Filipović, 2012), banking (Kenger & Organ, 2017), marketing (Sadeghpour et al, 2017), information systems (Samanlioglu et al, 2018; Luo & Xing, 2019; Mishra et al, 2020; Karabasevic et al, 2018), production (Ulutaş et al, 2018), bussiness (Hanefi & Agarwal, 2021), in a ready to wear sector of textile industry (Danişan et al, 2022).

A sufficient number of organizations still use the approach to this problem that assumes a rational framework, where the objective qualifications of individuals are corresponded to the job requirements. This approach considers that a high-quality candidate is one who fits to organizational culture, values, etc. (Judge & Ferris, 2002). Therefore, the decision maker (DM) should select the best-match candidates who fulfill the needs of the organizational strategy by considering multiple and interdependent evaluation criteria (Chang et al, 2013). In this complex process, MCDM methods can contribute and facilitate the decision-making process using interdependent criteria.

Recently, a nice review paper regarding the application of decision-making methods in HRM occurred (Salehzadeh & Ziaeiian, 2024). This paper includes the list of relevant articles that consider the application of decision-making methods (AHP, ANP, FAHP, Electre-AHP, TOPSIS, fuzzy neural networks, linear programming, SAW). Khorami's and Ehsani's (2015) earlier review of the application of MCDM methods used in selecting candidates besides the mentioned, has analysed the PROMETHEE and the fuzzy MULTIMOORA method. The application of the CoCoSo method in this area is given in (Popović, 2021). Hanefi and Agarwal presented in their paper the AHP application to the selection of a marketing manager among ten employees working in the marketing department of the observed organization

(Hanefi & Agarval, 2021). On the other hand, Shahhosseini and Sebt used the AHP for a competency-based selection of the most appropriate candidate in relation to customer satisfaction, performance value and number of projects (Shahhosseini & Sebt, 2021). Personal qualities of managers (HR manager (Danışan et al, 2022), health-care manager (Gajić-Stevanović et al, 2015), manager in bussiness (Hanefi & Agarval, 2021) and controller (Petrlić, 2021)) are considered in several papers.

As seen in existing literature, the problem of selection candidates demands development of decision-making criteria, based on job analysis and competency criteria. The competency hierarchies are mostly made for employees, not including the position of strategic planning manager.

1.2 Method

The study aims to apply the AHP method in the PPS for the position of strategic planning manager. In that context, the first phase was to define the objective and criteria. This included an investigation of the available literature, and the analysis of the selecting criteria for similar positions. The second phase involved consulting four HR experts and strategic planning managers, who wanted to remain anonymous, about the needed criteria. As a result, the criteria and sub-criteria for the desired position are created.

The AHP method, developed by T. L. Saaty (Saaty, 1980), proposes the most acceptable solution from a set of defined criteria and attribute values for each alternative. It decomposes complex problem into levels, creating unidirectional hierarchy structure that shows the relationships between the objective, criteria, sub-criteria, and alternatives. This method is implemented in several steps: defining objective; structuring elements in criteria, sub-criteria and alternatives in one direction hierarchy; making a pair wise comparisons of the elements in each group; calculating weightings and consistency ratio; evaluating alternatives according weighting for each observed criterion and ranking. The final order of alternatives in the model is determined and the most suitable option is selected according to the chosen criteria. The consistency of the pairwise comparison matrix is measured with consistency ratio (CR) index, according the formula $CR=CI/RI$, where CI is the consistency index $CI=(\lambda_{max}-n)/(n-1)$, with n (the order of the observed matrix) and λ_{max} (the maximal characteristic root of the observed matrix); and RI is random consistency index (see, for example, Haznadarević et al (2020)). If $CR < 0.1$, the pair wise comparison matrix is logically consistent. Otherwise, it is necessary to review pair wise comparisons and find the reasons for high inconsistency in the assessment (Shikdar et al, 2011, cited in Haznadarević et al, 2020). After that, the above calculations should be made again. Final step includes the selection of the alternative with the highest value. Saaty, Gardašević-Filipović, Haznadarević et al and Siekelova et al have presented in their papers a detailed explanation of the method (Saaty, 1980; Gardašević-Filipović, 2012, Haznadarević et al, 2020; Siekelova et al, 2021).

2. Results

Strategic planning manager is a middle management position. To apply the AHP, the following goal is defined: to select one person to the position of strategic planning manager.

The first phase of application of the AHP method included setting a goal and defining criteria. At this phase, the authors consulted literature and came up with proposals, and then, in a brainstorming session, together with HR professionals and strategic planning managers, defined criteria and sub-criteria. At the end of the process, three criteria (organizational, personal and communicational skills) and related sub-criteria were defined, according to importance (see Figure 1). Then, the proposed selection model was applied on the sample of three fictional candidates (A1–A3).

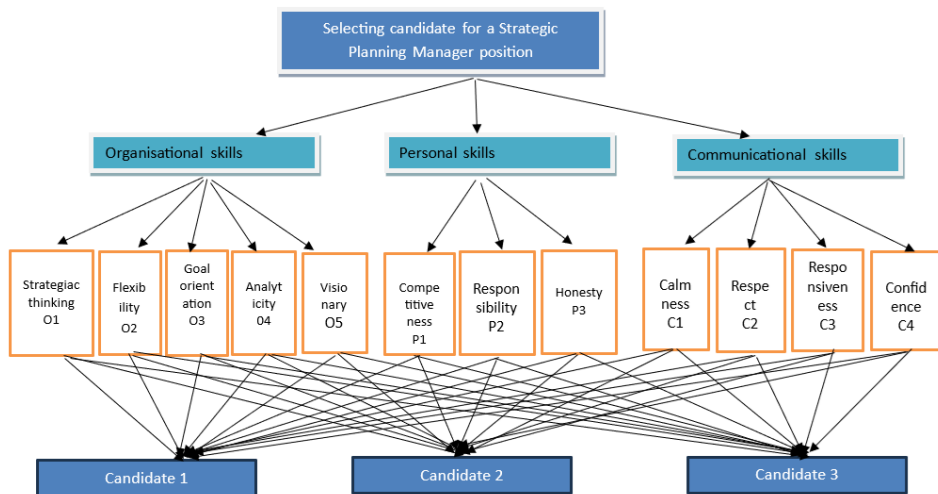


Figure 1: Categorization of criteria and sub-criteria for the AHP application

Source: Authors

The alternatives are evaluated according the proposed sub-criteria by the HR team, in scale 1-5, where 5 is the best matching, and 1 is the worst (see Table 1).

Table 1: The alternatives

Candidate	O1	O2	O3	O4	O5	P1	P2	P3	C1	C2	C3	C4
A1	4	5	3	4	4	5	5	5	3	5	4	4
A2	5	5	5	5	5	4	2	3	4	5	3	4
A3	4	2	3	3	3	5	5	5	5	3	4	4

2.1 Calculating the weights of criteria and consistency ratio

The next phase involved pair wise comparisons of elements in each group. The expert team, defined above, is asked to compare each pair of criteria and sub-

criteria, and to assign the corresponding evaluation based on Saaty's scale. Thus, a comparison matrices for criteria and sub-criteria are created. The normalized eigenvector is calculated as well as the maximal eigenvalue. These are required values for the verification of the subjectivity of decision making, and calculation of consistency.

The consistency is checked for each comparison matrix (see Table 2). For this purpose, the column sums are calculated and the matrix is normalized. Then, based on these comparison matrices, the weights of criteria are calculated (see the third column of Table 2). Then, to gain weight, the average of each row is calculated, for each matrix. CIs were less than 0.1 (see Table 2); therefore, the relative importance criteria were considered acceptable.

Table 2. CI and CR values of the relative importance matrix for each sub-criterion

Criterion		w	CI	CR	CR<0.1
Strategic thinking	O1	0,2449	0.02	0,04	YES
Flexibility	O2	0,0220	0.01	0.02	YES
Goal orientation	O3	0,1933	0.02	0.04	YES
Analyciticy	O4	0,0564	0.02	0.04	YES
Visionary	O5	0,0204	0.02	0.04	YES
Competitiveness	P1	0,1085	0.04	0.07	YES
Responsibility	P2	0,1286	0.02	0.03	YES
Honesty	P3	0,0308	0.05	0.08	YES
Calmness	C1	0,0185	0.04	0.07	YES
Respect	C2	0,1071	0.05	0.08	YES
Responsiveness	C3	0,0090	0.03	0.06	YES
Confidence	C4	0,0605	0.01	0.02	YES

2.2 Evaluating candidates

At this stage, HR experts evaluated each candidate according to the defined criteria, using a five-point numerical scale. Each candidate is evaluated according to the degree of possession of the corresponding characteristic defined as a sub-criterion (see Table 3).

3. Discussion

This phase included evaluation of the alternatives according weighting. By calculating the relative weights concerning each criterion, an optimal alternative is selected. The calculated weight vector of criterion w (see Table 3, column w) indicates that the criterion "organisational skills" (O1) has the greatest significance (0.2449) compared to other criteria. In addition to the above, the criterion "responsiveness" (C3) with a specific weight of 0.009 has the lowest impact to the selection.

Table 3. Optimal alternative selection

	w	A1	w×A1	A2	w×A2	A3	w×A3
01	0,2449	4	0,9795	5	1,2244	4	0,9795
02	0,0220	5	0,1101	5	0,1101	2	0,0440
03	0,1933	3	0,5800	5	0,9666	3	0,5800
04	0,0564	4	0,2255	5	0,2819	3	0,1692
05	0,0204	4	0,0816	5	0,1020	3	0,0612
P1	0,1085	5	0,5427	4	0,4342	5	0,5427
P2	0,1286	5	0,6432	2	0,2573	5	0,6432
P3	0,0308	5	0,1541	3	0,0925	5	0,1541
C1	0,0185	3	0,0556	4	0,0741	5	0,0926
C2	0,1071	5	0,5353	5	0,5353	3	0,3212
C3	0,0090	4	0,0359	3	0,0269	4	0,0359
C4	0,0605	4	0,2418	4	0,2418	4	0,2418
			4,185227		4,346985		3,865325
	LEVEL		2		1		3

The optimal alternative was chosen by multiplying relative weights of the alternatives (according to the appropriate criterion) by the weight vector w , and then by summing the corresponding results (see the last row of the Table 3). According to this calculation, candidate A2 has the highest value and is the one that is considered optimal. The results also show that there is little difference between candidate scores in the ranking (3,86 vs 4,18).

4. Conclusions

Selecting the right candidate for the job position is one of the key tasks of HRM. Therefore, selection requires objective decision-making process rather than the personal judgments. This study examined possible application of AHP in selection process for the position of strategic planning manager. HR professionals were consulted and the AHP method was used to obtain dependence weights of the criteria and the modified, and then to rank the candidates. The assessments of the relative importance were confirmed by checking the consistency ratio. The proposed model was created for the application within a real manufacturing system and has increased the objectivity of the selection by quantifying the required criteria, and reducing the selection time. Although it is adopted to manufacturing organization, this model can be used for selecting strategic planning manager in any organization. By applying the AHP method, one can see how much each sub-criterion affects the choice of an alternative. Those with the smallest influence can be omitted and others can be considered instead. In this sense, the application of the

AHP method provides not only the selection of candidates, but also the validity of the criteria.

REFERENCES

- [1] Filipović, M. (2007). The Analytic Hierarchy Process as a Support for Decision Making, *Spatium*, 15–16, 44–59. <http://dx.doi.org/10.2298/SPAT0716044F>
- [2] Gajić-Stevanović, M., Teodorović, N., Vukša, A., & Živković, S. (2008). The role and characteristics of a manager in the strategic transformation of the health care system, *Serbian Dental Journal*, 55(4), 247–253. <http://dx.doi.org/10.2298/SGS0804247G>
- [3] Filipovic, M. G. (2012). A new prioritization method in the Analytic Hierarchy Process applied on a case study of the convention site selection. *JP Journal of applied mathematics*, 3(2), 63–80.
- [4] Haznadarević, L., Milošević, N., Gardašević, D., Ćurčić, N., & Stojiljković, E. (2021). Ergonomic approach to workplace (re) design during loads handling. *Safety Engineering*, 11(1), 7–13. <https://doi.org/10.5937/SE2101007H>
- [5] Calp, M. H., & Agarwal, S. (2021). An AHP-based Decision Support System for Personnel Selection for Manager Position in Businesses. In *Proceedings of the 2021 International Conference on Research in Management & Technovation* (pp. 1–7). <https://doi.org/10.15439/2021KM98>
- [6] Judge, T. A., & Ferris, J. R., (1992). The elusive criterion of fit in Human Resources Staffing Decisions. *Human Resource Planning*, 15(4), 47–68.
- [7] Karabasevic, D., Zavadskas, E.K., Stanujkic, D., Popovic, G., & Brzakovic, M. (2018). An Approach to Personnel Selection in the IT Industry Based on the EDAS Method. *Transformations in Business & Economics*, 17(2), 54–65.
- [8] Khorami, M., & Ehsani, R. (2015). Application of Multi Criteria Decision Making approaches for personnel selection problem: A survey. *International journal of engineering research and applications*, 5(5), 14–29.
- [9] Luo, S. Z., & Xing, L. N. (2019). A hybrid decision making framework for personnel selection using BWM, MABAC and PROMETHEE. *International Journal of Fuzzy Systems*, 21, 2421–2434. <https://doi.org/10.1007/s40815-019-00745-4>
- [10] Raj Mishra, A., Sisodia, G., Raj Pardasani, K., & Sharma, K. (2020). Multi-criteria IT personnel selection on intuitionistic fuzzy information measures and ARAS methodology. *Iranian Journal of Fuzzy Systems*, 17(4), 55–68. <https://doi.org/10.22111/ijfs.2020.5406>
- [11] Petrić, A. (2021). *Karakteristike kontrolera i menadžera u funkciji efikasnoga donošenja odluka u uvjetima digitalizacije* (Doctoral dissertation, University of Rijeka. Faculty of Economics and Business). <https://urn.nsk.hr/urn:nbn:hr:192:974983>
- [12] Popović, M. (2021). An MCDM approach for personnel selection using the CoCoSo method. *Journal of process management and new technologies*, 9(3–4), 78–88. <https://doi.org/10.5937/jpmnt9-34876>
- [13] Saaty, T. L. (1980). *The Analytic Hierarchy Process*, McGraw-Hill, New York

- [14] Samanlioglu, F., Taskaya, Y. E., Gulen, U. C., & Cokcan, O. (2018). A fuzzy AHP–TOPSIS-based group decision-making approach to IT personnel selection. *International Journal of Fuzzy Systems*, 20, 1576–1591.
<https://doi.org/10.1007/s40815-018-0474-7>
- [15] Sadeghpour, F., Far, M. G., Khah, A. R., & Amiri, M. A. A. (2017). Marketing strategic planning and choosing the right strategy using AHP technique (case study: Ghavamin Bank Mazandaran). *Dutch Journal of Finance and Management*, 1(2), 45. <https://doi.org/10.29333/djfm/5821>
- [16] Salehzadeh, R., & Ziaieian, M. (2024). Decision making in human resource management: a systematic review of the applications of analytic hierarchy process. *Frontiers in Psychology*, 15, 1400772.
<https://doi.org/10.3389/fpsyg.2024.1400772>
- [17] Shahhosseini, V., & Sebt, M. H. (2011). Competency-based selection and assignment of human resources to construction projects. *Scientia Iranica*, 18(2), 163–180. <https://doi.org/10.1016/j.scient.2011.03.026>
- [18] Chang, S. H., Huang, M. R., Tseng, H. E., Jiang, Y. C., & You, L. C. (2013). Decision support model for employee selection: A strategic human resource management (HRM) perspective. *African Journal of Business Management*, 7(7), 559–571. <https://doi.org/10.5897/AJBM11.210>
- [19] Siekelova, A., Podhorska, I., & Imppola, J. J. (2021). Analytic Hierarchy Process in Multiple–Criteria Decision–Making: A Model Example. *SHS Web of Conferences*, 90, 10–19. <https://doi.org/10.1051/shsconf/20219001019>
- [20] Ulutaş, A., Özkan, A. M., & Tağraf, H. (2018). Personnel selection by using fuzzy analytic hierarchy process and fuzzy grey relational analysis. *Electronic Journal of Social Sciences*, 17(65), 223–232.
<https://doi.org/10.17755/esosder.317209>



© 2024 Authors. Published by the University of Novi Sad, Faculty of Technical Sciences, Department of Industrial Engineering and Management. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>).