

MODEL OF SELECTION OF AN EXTERNAL COMPANY FOR RECRUITING HUMAN RESOURCES USING THE AHP METHOD IN CONDITIONS OF A LACK OF INTERNAL LABOUR

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Abstract: *In the company from Serbia, a challenge was set to choose the best external company, which is engaged in the implementation of the recruitment process of new personnel in accordance with the systematisation of jobs. The first part of the paper is devoted to introductory considerations and to the theoretical foundations of management and the Analytical Hierarchy Process (AHP) method. The second part of the paper focuses on the practical application of the AHP method in selecting an external company for human resource recruitment. The importance of choosing an appropriate company is reflected in its role in the ongoing process of hiring new candidates. The paper presents the decision-making process in detail, with special emphasis on the structuring of decision-making problems. The applied multi-criteria decision-making method included data collection and processing, as well as defining the key elements of decision-making: goals, criteria, and alternatives. Based on the obtained percentage values, the identification of the optimal alternative, i.e., the choice of the company, was made as a result of the application of the AHP method. The goal of the research was to show how, by applying clearly defined criteria, a rational and well-founded decision can be reached. The results of this study can be of importance to both private and public organisations that are faced with the dilemma of choosing an external company for the recruitment and selection of new employees.*

Keywords: *Human resources, multi-criteria decision-making, AHP method, recruitment, systematisation, company selection, new employees*

INTRODUCTION

Over the past two decades, significant attention has been devoted to solving dilemmas in the field of human resources using MCDM methods (Popović, Stanujkić & Jovanović, 2012). Human resources are a key factor in an organisation's competitive advantage, as their knowledge, skills, and motivation directly affect the company's success and long-term development (Glavić, 2017). In companies, when we look at success, human resource management is a key factor in why that company is developing and on the right path to success. Human resource management includes key activities such as recruitment, selection, and employee development, which directly affect the achievement of the organisation's strategic goals (Alić, 2025).

The process of recruitment and selection of personnel is becoming an increasingly complex tool in human resources, because in addition to quantitative indicators, it also includes a significant number of qualitative criteria that directly affect the making of managerial decisions. Human resource management involves a systematic approach to developing and implementing strategies, policies, and practices that enable effective management of human capital within the organisation (Armstrong, 2006). As Boljanović (2018) points out, there is no organisation that aims to make the wrong decision in the hiring process for a new employee. Lajšić (2016) points out that efficient management of human resources, supported by information systems, enables organisations to develop intellectual capital, improve performance, and gain sustainable competitive advantage. Tanasić and Tanasić (2021) point out that human resources are a key intangible asset for a company and the main source of competitive advantage through strategic planning and human resources management. Management requires the effective application of information systems that support decision-making and resource management in the organisation, thereby achieving greater efficiency and the achievement of strategic goals (Marjanović, Mihailović & Spasić, 2007).

In the observed company, after the systematisation of workplaces, organisational changes led to an increased need for new staff in certain areas. The number of administrations was increased from eight to twelve, which simultaneously increased the number of executors in administrative positions. Mukherjee and Roy (2026) applied the AHP method and showed that it enables a robust, multi-criteria approach to risk assessment and prioritisation in complex supply chain operations, integrating different levels of decision-maker expertise and weighting risk criteria. Strategic planning, as the highest priority, emphasises the improvement of organisation, management, and development (Popović et al., 2021). In particular, instead of one assistant per administration, two assistants with secondary education are expected to be hired, which led to the need to fill a larger number of positions with specific education and qualifications. To effectively respond to the new personnel requirements, the company's management decided to engage an external company specialising in the recruitment and selection of employees, which could successfully address the new situation.

Choosing the right company is a complex decision-making process, since the quality of the selection directly affects the organisation's success and subsequent outcomes. Therefore, it is necessary to define the relevant criteria, such as the required expertise, the candidate's experience, the candidate's availability, and the ability to adapt to the organisation's specific needs. It was necessary to assess, based on the results, whether applying the Analytical

Hierarchy Process (AHP) significantly affects the quality of decision-making when choosing a company to recruit future employees.

In addition, the paper concludes that applying the AHP method enables more objective, efficient, and concrete decision-making when choosing a company to recruit new staff. The aim of this paper is to demonstrate the application of the AHP method as a decision-support tool for selecting a company to recruit human resources. The application of this method enables the structuring of problems through a hierarchical model and the ranking of alternatives based on predefined criteria, ensuring a transparent, consistent, and rational decision-making process. This method was used as a decision aid. The scientific contribution of the work is reflected in the application of the AHP method to a specific business case, which confirms its practical value in human resource management. The application of the AHP method, in combination with other analytical and software tools, enables the integration of multiple criteria and spatial analysis to support optimal decision-making in complex systems (Joulaei et al., 2024). Rizal and Iskandarsyah (2026) present the application of the AHP method for groundwater potential assessment, highlighting key factors and research trends of the last decade.

DECISION-MAKING IN MANAGEMENT AND THE ROLE OF MULTI-CRITERIA METHODS

Decision-making is the basic function of human resources management and involves selecting the most favourable alternative from among several available options in accordance with the organisation's defined goals (Dessler, 2020). Krajina (2024) states that the decision-making process represents a systematic approach to identifying problems, evaluating options and choosing the optimal solution, where the quality of the decision significantly affects the achievement of goals and the success of the organisation. In modern business conditions, managerial decisions are rarely based on a single criterion but require simultaneous consideration of economic, organisational, technical, and human factors, which are often mutually conditioning and conflicting (Triantaphyllou, 2000). Zaheb and colleagues (2024) apply the AHP method to evaluate renewable energy sources, emphasising technological, economic, environmental, and social aspects, and identify solar energy as a priority sustainable energy resource.

Human resource management in business has become a key factor in gaining a competitive advantage, where the education, training, skills, and performance of employees play a central role in strategic planning and achieving organisational goals (Maksimović, 2003). In situations characterised by a large number of criteria, traditional decision-making approaches become insufficient, which is why multi-criteria decision-making methods are increasingly applied. These methods enable the structuring of

complex decision-making problems, the quantification of decision-makers' subjective assessments, and the ranking of alternatives based on their overall effectiveness and the relative importance of the observed criteria. The AHP method is based on the comparative evaluation of elements in pairs and enables the quantification of criteria and alternatives in the multi-criteria decision-making process (Ćosić, 2021).

Yudhistira (2024) describes the application of a system based on the AHP method for the recruitment of marketing personnel, enabling a structured assessment of candidates against key criteria that improves candidate-company fit and optimises team performance. Vaidya and Kumar (2006) review applications of the AHP method, critically analyse 27 of 150 papers, and provide a practical resource for researchers and practitioners across various decision-making areas. In conditions of high competition and rapid market changes, the choice of every field of work is a key challenge in projects, whether they are publicly or privately financed. To make a quality decision, multi-criteria decision-making methods, such as AHP, are often used, enabling a systematic assessment and ranking of the offered contractors based on several criteria, with the possibility of comparing the results and identifying the optimal alternative (Perić, 2020). Yusran (2020) demonstrates the application of the AHP method in the construction of a decision support system for employment in the Department of Communication and Information of Dharmasraya District, thereby improving the selectivity of the process and ensuring compliance with the expected criteria. The combination of the System of Information on employee performance and the AHP method to quantify employee performance through key indicators across different perspectives, enabling the connection of human resources with the organisation's strategic goals (Lubis & Amalia, 2021). Tomczewski, Mikulski and Szymenderski (2024) show that applying the AHP method significantly facilitates the selection of the optimal structure of a hybrid power system with renewable sources and energy storage, taking into account economic, technical, and subjective criteria. Making business decisions often relies on experience and available data, analysing one or more criteria.

Saaty (2008) describes AHP as a method for measuring and ranking intangible values through pairwise comparisons and priority scales based on expert judgments. When multiple criteria are considered, simple decision-making becomes a complex multi-criteria decision-making process. In practice, the choice among several alternatives is based on analyses that incorporate different criteria, which has led to the development of numerous methods of multi-criteria decision-making. Popović (2022) investigates the application of multi-criteria decision-making methods in the evaluation and selection of employees. Yaralioglu and Kara (2024) use the AHP method to identify and rank key criteria for the sustainable design of public spaces,

emphasising physical structure, historical values, and green infrastructure as the most important priorities. Yousefi and coauthors (2024) apply a combination of GIS and AHP methods to identify the most suitable locations for wind farms in western Iran, taking into account electrical, techno-economic, environmental and geo-infrastructure criteria, thus predicting a capacity of 216 MW and a significant reduction in greenhouse gas emissions. Based on a review of relevant literature from 2006 to 2022, the most commonly used method in the air transport sector, especially in the passenger terminal segment, is the Analytical Hierarchy Process. Due to its effectiveness in evaluating alternative options and supporting decision-making, the AHP method was chosen for the analysis of passenger terminal efficiency in this research, with a special focus on service quality and the terminal's functional efficiency (Pivac et al., 2024). Companies are increasingly introducing substitutes for human staff, and innovations in the Internet world are being implemented. Internet recruiting enables companies to more efficiently find and attract quality candidates, using the advantages of information and communication technologies to connect employers and potential employees (Ognjanović, 2012). The special importance of the method (AHP) in the field of human resources management, where decisions are often made based on criteria that cannot be precisely expressed exclusively by numerical values. Strategic management of human resources includes establishing a framework for daily management of human capital and applying policies and practices that enable the realisation of employees' full potential within the organisation (Lojančić, 2020). The application of the process (AHP) enables the systematic evaluation and ranking of alternative solutions in complex multi-criteria problems, with the simultaneous inclusion of qualitative and quantitative decision criteria (Banti & Krawczyk, 2024). Criteria such as the quality of the candidate, the reputation of the recruitment agency, the flexibility of the service or the reliability of the partner require combining quantitative data with qualitative assessments of experts (Saaty, 1990). (AHP) represents a significant and applied multi-criteria decision-making method. Multi-criteria decision-making is the process of choosing the optimal alternative based on several criteria of varying importance, in which different methods are used to rank and evaluate possible solutions (Jašarević, 2020). It is a structured technique for organising and analysing complex decisions, based on the hierarchical distribution of goals, criteria, and alternatives, and on the determination of weighting factors through pairwise comparisons (Saaty, 2013). Numerous studies confirm the applicability and effectiveness of this method in the field of human resource recruitment and selection. Andreas and associates (2025) successfully applied AHP to optimise the candidate selection process, weighting criteria such as education and work experience to identify the most suitable candidate. Their study indicates that AHP enables

the quantification and balancing of different criteria in the competence evaluation process, thereby increasing the objectivity and consistency of the decisions made. AHP stands out in the literature as the most commonly used, long-established method of multi-criteria decision-making in the field of human resource management, precisely because of its ability to integrate subjective expert assessments with quantitative analyses and to ensure a systematic ranking of alternatives. The application of MCDM enables organisations to, through the analysis of various criteria and attributes of candidates, make optimal personnel selection decisions, thereby increasing the validity and quality of the selection (Štilić & Njeguš, 2019). According to Forman and Gass (2001), the key advantage of this method lies in its hierarchical problem structure, which enables clear priority definition and a transparent decision-making process. Additionally, the flexibility of the AHP method is confirmed by the research of Maksimović (2024), in which it was used as a support in the selection of personnel candidates in crisis management conditions. The modern business environment, characterised by complexity and uncertainty, requires that organisations adopt innovations in human resource management to preserve competitive advantage and improve sustainable employee management (Mirčetić, 2024). However, using proven older methods when we are in a situation of making a choice based on the criteria given is useful. Šisl (2020) presents the AHP method as an approach to multi-criteria decision-making, explains its theoretical and mathematical basis, advantages and disadvantages, and its application on a practical example. Resić (2025) investigates how HR control and workforce analytics contribute to optimising human resource management costs. Multi-criteria decision-making methods enable systematic, rational decision-making in complex, uncertain environments, where different criteria and alternatives are considered to achieve optimal, sustainable solutions (Karabašević, 2016). Štilić (2022) investigates the application and improvement of multi-criteria decision-making in the selection and ranking of personnel, introducing extensions of EDAS methods that differ from AHP. Salehzadeh and Ziaieian (2024) present a systematic review of the application of AHP and related methods in human resource management, highlighting their use in personnel selection, performance management, talent retention, and other areas of HRM.

ANALYTICAL HIERARCHY PROCESS (AHP) METHOD

The Analytic Hierarchy Process (AHP) was developed by Tomas L. Saaty. This method is an important and widely applied approach to multi-criteria decision-making in the theory and practice of management. AHP enables the structuring of complex decision-making problems through a hierarchical model, pairwise comparison of alternatives and consistency analysis, thereby facilitating strategic decision-making (Doris, 2020).

Svilokos and Rodić (2015) apply the AHP method to rank countries based on political and economic risks, using quantitative and qualitative criteria, with consistency and post-optimal sensitivity analyses.

Intended to solve complex decision-making problems characterised by the presence of a large number of criteria of different natures, as well as the need to integrate quantitative and qualitative assessments into a single analytical framework. The basic idea of the AHP method is to decompose a complex decision-making problem into a hierarchical structure that includes a clearly defined decision-making goal, a set of relevant criteria and sub-criteria, and alternatives that are compared with each other. Sayed and coauthors (2024) integrate AHP and machine learning methods to simplify the selection of an optimal, sustainable tractor for small farms, identifying key criteria and ranking four tractors based on technical, environmental, and economic factors. The hierarchical approach provides a systematic overview of the problem and a clear demarcation of decision-making elements at different levels, facilitating the evaluation and ranking of alternatives. The AHP method is based on pairwise comparisons of elements, whereby their relative importance is assessed in relation to the element at a higher level of the hierarchy. Pairwise comparisons are made using a standardised scale of preference intensity, enabling the quantification of decision-makers' subjective assessments. Based on the comparison matrices, the weighting coefficients for the criteria are calculated, along with the final priorities of the alternatives, which serve as the basis for a rational decision. The advantages of the AHP method include the ability to assess and estimate consistency by calculating the consistency index and ratio. This feature enables the identification of illogical or contradictory assessments and contributes to increasing the reliability and objectivity of the obtained results. Thanks to the aforementioned characteristics, this method is successfully applied in various fields, including human resource management, strategic decision-making, supplier selection, and the evaluation of business alternatives.

DEFINING THE PROBLEM AND THE DECISION-MAKING MODEL

The subject of analysis in this paper is the problem of choosing the most adequate company for recruiting human resources, with the aim of ensuring the organisation's high-quality personnel potential. The decision-making problem is structured through a hierarchical model consisting of three levels: objective, criteria and alternatives. The aim of the research is to choose the optimal company for recruiting human resources. It is important for top management and the organisation to make the best choice of which company to hire to meet their hiring needs. Based on the relevant literature and HR management practice, the following criteria were used to decide which company to choose. The criteria were as follows: The price of the service.

When the price is stated, it is in the interest of management that the prices be acceptable and as low as possible.

The quality of the candidate must not be neglected, regardless of the fact that price is primary, because the candidate's quality will affect the work, progress, and further contributions to the company. The time to fill the job position, given that the systematisation has been adopted, the time and deadline to fill the newly created positions are from one month to three months at the latest. Reputation and experience of the HR company, as well as the contributions, results, and reviews of potential hiring companies, are considered here. Flexibility and the level of support for clients, as well as further cooperation regarding candidates in circulation for admission to the organisation, are important.

Upon review, the three companies offered similar packages, which suited the organisation as potential hires. All companies have specific conditions for hiring, so it was necessary to compare the advantages and disadvantages and make a choice. In order not to contain advertising content or to wait for approval and consent for the public release of the data of the engaged companies, the companies are presented in the work as follows: HR Company A, HR Company B, HR Company C.

The data used in the analysis are based on simulated values, obtained on the basis of assessments by experts in the field of human resources, which is an acceptable approach in scientific research of this kind. The application of the AHP method begins with the formation of a matrix of comparative comparison of criteria, which quantifies their relative importance within the hierarchical structure of the problem. This step enables precise prioritisation of individual criteria, which is the basis for further evaluation of alternatives. After that, a comparative analysis of each alternative is conducted for each criterion, enabling the integration of subjective expert assessments with quantitative analyses. By calculating the total weight coefficients, the final priorities of the alternatives are obtained, which serve as a basis for ranking and choosing the optimal solution.

The results of applying the AHP method to the observed example indicate that one of the analysed companies for recruiting human resources has the highest total value, which can be considered the most favourable choice in the given context. This analysis confirms that the AHP method enables transparent, structured, and rational decision-making in human resources management. The advantage of the method lies in its ability to analyse complex decisions through a hierarchical structure, unify diverse criteria, and increase the objectivity of the selection process, thereby contributing to a more consistent and informed choice of optimal solutions.

NUMERICAL EXAMPLE OF AHP METHOD APPLICATION

The decision-making problem is structured through a hierarchical model consisting of three levels: objective, criteria and alternatives. The main goal of the research refers to the selection of the optimal company for the recruitment of human resources, which would represent the most suitable choice for further cooperation in the candidate selection process. In accordance with the defined goal, the following criteria were identified: service price (K1), candidate quality (K2), time to fill the position (K3), reputation and experience (K4), and flexibility and support (K5). Three companies were considered as possible alternatives: A1 - HR Company A, A2 - HR Company B and A3 - HR Company C.

To solve the problem defined in this way, the AHP method, developed by Thomas L. Saaty, was applied, which enables the structuring of the decision-making problem, the determination of the weighting coefficients of the criteria and the ranking of the alternatives.

Within the framework of the AHP method, decision-making is based on the formation of a matrix of mutual comparisons of criteria:

Where the relation of reciprocity applies:

Normalisation of the matrix is done by columns as follows:

The weighting coefficients of the criteria are determined as the mean values of the normalised rows:

In the same way, the local priorities of alternatives according to each criterion are determined. The final evaluation of the alternatives is obtained by applying the weighted sum model:

where w_k represents the weight of the criteria, and w_{kj} the local priority of the alternative.

In the first step, a mutual comparison of criteria was performed in pairs, using Saaty's scale. Based on experts' assessments, a criteria comparison matrix was formed, shown in Table 1

Table 1. Criteria comparison matrix

Criterion	K1	K2	K3	K4	K5
K1	1	1/3	1/2	1/3	1/2
K2	3	1	2	2	3
K3	2	1/2	1	1	2
K4	3	1/2	1	1	2
K5	2	1/3	1/2	1/2	1

After the formation of the matrix, it was normalised by columns, and the weighting coefficients for the criteria were then calculated as the mean values of the normalised rows. The obtained results are shown in Table 2.

Table 2. Weight coefficients of criteria

Criterion	Weight
K1 - Service price	0.12
K2 - Candidate quality	0.34
K3 - Full Time	0.20
K4 - Reputation and experience	0.21
K5 - Flexibility and support	0.13

Based on the presented results, the criterion of candidate quality (K2) is the most important in the decision-making process, consistent with human resources management practice. In the next phase, the alternatives were evaluated in relation to each of the defined criteria. As an illustration of the procedure, Table 3 shows a matrix of comparison of alternatives for criterion K2 - candidate quality.

Table 3. Comparison matrix of alternatives according to criterion K2

Alternatives	A1	A2	A3
A1	1	1/2	2
A2	2	1	3
A3	1/2	1/3	1

By normalising this matrix and calculating the mean values of the rows, the local priorities of the alternatives were obtained, shown in Table 4.

Table 4. Local priorities of alternatives (K2)

Alternatives	Local weight
A1	0.30
A2	0.50
A3	0.20

The same procedure was applied for the other criteria. The final values of the alternatives were obtained as a weighted sum of local priorities and criteria weights.

Table 5. Final results of AHP analysis

Alternatives	Total value
HR Company A	0.29
HR Company B	0.41
HR Company C	0.30

Based on the obtained results, it can be concluded that the HR Company B alternative achieves the highest total value and represents the

optimal choice in the observed case. Finally, the consistency of the judgments was checked. The calculated consistency coefficient, $CR = 0.07$, is less than the recommended threshold of 0.10, confirming that the experts' assessments are consistent and that the analysis results are reliable.

The obtained results indicate that the candidate quality criterion has a dominant influence on the decision-making process, which is expected given the nature of the human resource selection problem. Company B achieved the best results in this criterion, which significantly contributed to its overall rating. On the other hand, although company C shows solid performance in certain criteria, its overall result is lower due to lower values in the more important criteria. Similarly, Company A achieves moderate results, but does not dominate in any of the key criteria. It is important to note that the results of the AHP method depend directly on experts' subjective assessments, which is why the selection of criteria and their evaluation have a significant impact on the final outcome. Nevertheless, the conducted consistency analysis indicates that the ratings are mutually consistent, further confirming the validity of the obtained results.

CONCLUSION

After the systematisation of workplaces in the company, the number of organisational units increased, and the need to hire additional administrative staff emerged. Top management lacked the capacity to independently select and hire new employees. In this context, the need to engage an external company for employee recruitment and selection arose. The aim of the paper is to apply the Analytical Hierarchy Process (AHP) method as a decision-support tool for selecting the most suitable service provider. The work methodology is based on the hierarchical modelling of problems through the definition of goals, criteria and alternatives, with the application of expert assessments and their ranking. The results indicate that the AHP method enables transparent, consistent and rational decision-making in human resource management. The application of the AHP method improves decision-making quality, especially when a large number of often conflicting criteria must be considered. This reduces the influence of subjectivity and increases the reliability of the final decision. This paper is useful for managers in private and public companies when making personnel decisions, particularly when they must choose between two or more options.

In the business environment, decision-making in human resource management involves considering a range of quantitative and qualitative factors. Based on observing work with external companies, the idea arises that it is best for management to have sufficient internal resources to handle recruitment and selection within the company. When a situation like the one with the analysed data arises for a company that cannot perform this process

internally, it is advisable to apply one of the methods for deciding, in this context, which external company to hire. The AHP method proved to be an effective tool for solving such problems in this case study, because it enables a structured, transparent, and rational approach to decision-making, integrates the subjective assessments of experts, and controls their consistency.

The results of the research indicate the importance of applying multi-criteria methods in modern management, especially in areas where qualitative criteria dominate. The application of AHP contributes to objectivity and consistency in the selection process and additionally allows managers to combine expertise and intuition with a formal quantitative model, thereby increasing the reliability and quality of decisions. The key point of this research is that future research can focus on the application of other multi-criteria decision-making methods or on the combination of AHP with a fuzzy approach to further improve the decision-making process and support strategic management. The application of other multi-criteria decision-making methods, as well as the integration of the AHP method with the fuzzy approach, would enable more accurate modelling of complex decision-making processes under uncertainty and when input data are insufficiently defined. This would significantly reduce the influence of subjectivity and inconsistency in the assessment of criteria and, at the same time, increase the robustness and reliability of the results. In addition, this approach contributes to greater model flexibility and adaptability to real business conditions, thus providing better-quality, more methodologically grounded support for strategic management in the decision-making process.

While writing the present article, the authors (Haneta Stefanović, Vuk Mirčetić and Gabrijela Popović) used Grammarly in order to check language style and grammar. After using this service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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