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PREDICTORS OF EMPLOYEES' VOLUNTARY TURNOVER INTENTIONS: ANALYTIC HIERARCHY PROCESS APPROACH

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Abstract: The possibility to prevent employees` turnover intentions are important issue for organizations but it is not easy without identifying risk factors. HR analytic methods are seen as the valuable tools for extracting and weighting predictors of employees` withdrawal behavior. This paper ilustrates the potential of analytic hierarchy process method for identifying key predictors of voluntary turnover intentions. The analysis is conducted on 665 production employees using five criteria: work satisfaction, work characteristics (job motivating potential), intrinsic motivation, life aspirations and needs, from the most to the least weighted. Two paramenters were included, sector where employees work and their shift. Results indicate the sectors and shift employing people with highest risk of turnover demonstrating the effectivness of using AHP method for the purpose. As previous studies that uses HR analytics tools in the domain mainly operated with demographic and general employees` data, while more orthodox HR approaches focus on direct effect of job satisfaction, we offered the combination of those two. We imply that the integration of more subjective data collected directly from employee, might

be integrated in the overal personnel database and available for processing with HR analytic tools.

Keywords: Analytic hierarchy process, turnover intentions, employees, predictors.

1. INTRODUCTION

Keeping loyal employees who have the intention to stay are very important assets of the organization. Their loyalty is linked with commitment and engagement causing effectiveness and productive capacity [1]. It is the force that makes employee stick to the company, not necessarily related with, or even despite the potential material gain, causing their retention when it is not economically sound for them [2]. Organizations and the labor market are facing workforce fluctuation, moving between organizations and industries, with seemingly no sense of attachment to their work, especially when millennials are in question [3]. It is often seen as the other side of the intention to leave, or so-called, turnover intentions.

Turnover intentions cover the development of the idea of leaving, sometimes involving behavioral engagement in searching for other job opportunities, that might lead toward actual quitting. The attitude that precedes the definite decision to leave is strongly linked with resigning [1], and it makes it very likely to occur. When turnover is initiated by the employee himself, it is called voluntary, and it might be harmful to the organization [4]. Still, it is costly for an employer that must find the replacement in short notice, while affecting also other employees` morale. Although it might be a very long and enduring process for employee, organizations are usually not aware of it and this individual decision comes suddenly and surprises the employer. Occasionally these intents are predictable and avoidable if we recognize the indices on time.

Loyalty and turnover intentions might sound vague concepts but in fact, studies corroborate that they can be measured and predicted by extracting the correct criteria and even prevented by implementing the right strategies. The usual predictors of turnover intentions are poor management, planning and organization, no growth and developmental opportunities, lack of job-person fit, lack of trust and confidence, work-life imbalance and so on. They can be categorized into behavioral, seen in the withdrawal process, job attitudinal, and environmental [5].

The research goal of this paper is to use predictive HR analytics tool of AHP method for identify "valuable" employees with high risk of turnover by recognizing their dissatisfaction points and intentions to leave in order to test the possibility to prevent turnover by predicting dysfunctional turnover among employees.

In the model of prediction, we included five criteria that are considered to be relevant: 1) perception of the objective characteristics of work (in the context of its motivating potential), 2) needs and 3) aspirations employees have toward their work, 4) their level and nature of motivation (level of their intrinsic motivation) and 5) work satisfaction (with supervisors, organization, organizational justice, need satisfaction).

The objective characteristics of work is represented by the well known Motivating Potential Score (MPS) formulated by Hackman and Oldham [6]. It is expected that perceiving job as meaningful, experiencing autonomy in their work and acquiring feedback from the working process are "critical psychological states" creating the perception of job as more motivating for employees. According to the theory meaningfulness of job is based

on the desired skill variety to perform it, the perception of the task significance and task identity. Autonomy creates the sense of responsibility and feedback brings psychological state of knowledge results. They are considered important because they are assumed to be associated with numerous outcomes, especially on motivation (high levels of job satisfaction, performance quality and which is of the main importance for us, low levels of absenteeism and turnover intentions) [6].

2. PREDICTING TURNOVER INTENTIONS

The so-called withdrawal process can be seen as the set of different assessments of employees` current situation involving stages of decision-making process, Mobley [7] tried to represent it through steps. It starts with focusing on the evaluation of the overall job situation, followed by the experiencing satisfaction or dissatisfaction, toward searching for alternatives and comparing them with present position. During the process many factors influence the perception and behavior are identified . Further, as some studies imply, different set of predictors actualize in different phases, some being more relevant for the willingness and others for attainment and the simple measure of turnover rate cannot give us enough data. Authors direct us toward concentrating on demographics and management practices when dealing with the issue [8]. This shows that it is essential to have more objective and pervasive measures.

As there are so many external and internal factors that influence the final decision of personnel to demonstrate an ultimate unloyalty toward company by leaving, some might advocate the unpredictable nature of human decision. Nevertheless, considering this complexity of circumstances and variety of antecedents, HR analytics offer models that might cope with the issue. By extracting the right criteria and combining them into a suitable model of predictors that correspond with the satisfactory level of probability to determine one`s intentions, we believe that loss of quality personnel might be prevented to some extent. At least two questions are raised here, the question of potential predictors and the question of the suitable approach considering which predictive technique to use.

2.2. Turnover predictors

When comes to the subjective internal process of losing loyalty and growing idea of leaving, current attitudes are the main guidelines. Researches show that the strongest predictors of turnover intentions in the category of job attitudes are job satisfaction and organizational commitment [1]. On the other side, organization can influence these perceptions through work environment. Relevant predictors seen in this category are work design, leadership and working relationships [9].

In one study, there were an appealing idea to analyze the motivation of the turnover intentions by identifying the motives among front line employees by exploratory factor analysis using Principle Component techniques. They included management practices, salary and reward system, potentials for career growth, training and development, social support, working conditions, communication and security systems. Findings corroborate direct link between supervisor`s behavior, job satisfaction and commitment, with turnover intentions [10].

As it was found that intrinsic motivation is negatively correlated with turnover intentions [11] researches also give indices that intrinsic motivation has indirect effect on

employee retention [12], while self-efficacy negatively moderate influence of extrinsic motivation toward turnover intentions. The implicit idea of the inherent satisfaction oin the core of intrinsic motivation, might be the cause of the reduced turnover in the context of its presence [13]. It also can mitigate the negative organizational practices that are sources of dissatisfaction and turnover intentions [14]. Also, feedback is the factor that negatively moderate effects of motivation on turnover intentions [12].

Studies show that there is a positive correlation between turnover intention and perception of job and negative with job satisfaction, implying partially mediated relationship between job mismatch and turnover intentions by satisfaction [3]. Satisfaction is continually related with employee retention (turnover) [15] but its mediating role is proven in couple of studies [9], [16].

One study in the automotive industry, showed that the most influential factor of organizational loyalty is the organizational support [17], and the loyalty itself is the important earned asset, based on trust, respect and commitment [18], related to job satisfaction and commitment [19].

Literature recognizes three clusters of turnover reasons [20]: work related that usually includes job satisfaction, organizational commitment, and material gain, followed by individual factors (usually demographics) toward external ones connected with perception of employment and the state of labor market. Among individual determinants of turnover sometimes personality factors are included but their effects are minor if they are seen directly. However, self-esteem, for example has indirect effect [20]. Also, employees expectations are relevant [9]. Organizational factors as recognition, career opportunities, working conditions, job stress, social support and so on, influence job satisfaction, which in turn leads toward retention [20]. It seems that the main factor to determine turnover is seen in the job satisfaction, that is susceptible to all other influences (organizational and individual). This affective perception of existing job circumstances is the most important thing to study, as well as all the various determinants that shape it and predict it.

2.1. HR analytics methods for predicting turnover intentions

Different techniques are available, and their relevance is considered in the context of the specific goal. For example, different data mining tasks can be implemented to classify employees (in those who might stay/leave), to create employee` clusters (based on their attitudes toward company), and so on. Regression can be used to predict the turnover rate, or time series to forecast turnover intention growth or attitude changing dynamics.

One extensive insight into the analytics tools available for studying employees turnover shows indecisiveness about the best method for the topic [4]. The comparison between decision tree, classification and regression tree, logistic regression model, binominal logit regression, support vector machines, naïve bayes, neural network, random forest does not prove the best total accuracy obtained. Autor nominate decision tree, naïve bayes and neural network as those with better predictive output stating that it depends on the particularities of the sample and the case.

There are some interesting previous studies of loyalty and retention versus turnover using data analytics tools. Rombaut and Guerry [9], tried to predict voluntary turnover based solely on a priory data provided in the employees` database. They used decision tree approach and logistic regression model on HR database set including gender, age, seniority, pay, marital status, and nationality. They hypothesized that the effect of these

variables is mediated by commitment and satisfaction leading toward turnover and they show the predictive potential of their model on an example. Yet, Frederiksen [21] is using combination of existing data and his own survey (available from personnel records) and conducted survey of employees satisfaction.

Further, Khera and Divya [22] developed predictive model of employee attrition based on supervised machine algorithm, support vector machine (SVM) with accuracy of 85%. Their model provides a tool for improving retention through successfully addressing different organizational issues, especially among IT companies. Their analysis covers features of attrition, department, job level, job profile and job role, work experience (in industry, in company, in current role, with particular manager), number of companies worked, training, salary, business travel, standard hours, promotion, overtime working, performance rating, as well as age, gender, education, income, and marital status. Nevertheless, the model predicts better who will leave the company than who will stay.

Many authors (Table 1) dealt with solving various problems in the field of HR using AHP method, with the idea that the results would be useful to managers when making decisions regarding employees. In this sense, as shown in Table 1, HR area where the AHP method is applied mostly by researchers is in the field of employee selection, then employee assessment, and somewhat less in human resources planning, development of competency models and green HR.

Table 1: Overview of the application of AHP methods in the field of HR

Publication year	Area/field in HR	Reference No
2022	Employee selection	[23]
2021	Employee selection	[24]
2019	Employee selection/E-recruitment - CV ranking	[25]
2018	Employee selection	[26]
2017	Employee selection	[27]
2015	Employee selection	[28]
2012	Employee selection	[29]
2011	Employee selection	[30]
2011	Employee selection/E-recruitment - CV ranking	[31]
2009	Employee selection	[32]
2022	Employee Performance evaluation/assessment	[33]
2020	Employee Performance Evaluation/assessment	[34]
2018	Employee Performance Evaluation/assessment	[35]
2017	Employee Performance Evaluation/assessment	[36]
2016	Employee Performance Evaluation/assessment	[37]
2006	Employee Performance Evaluation/assessment	[38]
2017	Competency model development	[39]
2016	Competency model development	[40]
2010	Competency model development	[41]
2007	HR planning	[42]
2001	HR planning	[43]
1997	HR planning	[44]
2022	Green HRM	[45]
2022	Green HRM	[46]
2022	Green HRM	[47]
2017	HR trends	[48]
2009	HRM practicies – organizational performance	[49]

2022	HRM strategy	[50]
2017	HRIS	[51]

Based on the presented literature review, it can be concluded that many authors tried to predict employee's turnover by using different quantitative analyses. Otherwise, a large number of authors have used the AHP method for various problems in the field of human resources, such as candidate selection or employee assessment, but so far, according to our knowledge, it has not been used in the field of turnover prediction, which is proposed in this paper.

3. METHODOLOGICAL APPROACH

In this paper Analytic Hierarchy Process is used to predict potential turnover, with criteria considering objective characteristics of work measured by Motivating Potential Score (MPS), needs and aspirations at work, as well as, Relative Autonomy Index (RIA) (referring to motivation), and work satisfaction (with supervisors, organization as whole, organizational justice, and need satisfaction provided in organizational context). This research combines subjective measures with quantitative approach and demonstrate that AHP method might be used in this context.

In this study there were four steps in assessing employees' risk of turnover as following:

1. In the first step, based on literature review and the authors expertise in the field of HR, we have identified five criteria that are important for turnover (MPS, RIA, LIFE GOAL, NEEDS, SATISFACTION).
2. Employees filled out questionnaires to obtain the value of subjective perception of work criteria (MPS, RIA, LIFE GOAL, NEEDS, SATISFACTION)
3. HR experts and domain experts in the factory gave an assessment of the importance of the criteria (applied AHP) and
4. By using the results of the AHP method, the values of the criteria for predicting turnover were obtained and this was applied to determine the risk of turnover in relation to the shift and the sector in which the employees work.

3.1. Measuring work criteria from the employee's perception

The database with the demographic and general data of 665 employees varying in their age, gender, years of tenure and work positions, as well as their sector and shift was created. From individual characteristics and perception of employees. All five measures are obtained by five degree Likert scale. Measures for calculating Motivating Potential Score are based on ten questions covering five indicators (two questions per each): task variety, task identity, task significance, autonomy and feedback at work (MPS=(task variety + task identity + task significance)/3*autonomy*feedback). The questionnaire for needs from work and life goals and aspirations are based on Maslow`s hierarchy of needs, as well as on Deci and Ryan`s concept of self-determination [52]. The scale of what employees need from work consisted of 30 questions covering need for autonomy, competence and relatedness, as well as existential, security and need for power (five item for each). Survey of life aspirations (its importance, achievement and expectations) are assessed on three levels: their importance for person, the level of achievement and expectations and they include developmental, belonging, society, wealth and security, self-image preservation admiration and fame goals. They are all assessed on 14 items (2 for

each goal and at three domains). This measuring conception is done according to Deci and Ryan conceptual frame. The level of intrinsic motivation that is seen in the level of autonomous behavior regulation, as it is considered in Self-determination theory of motivation [53] is represented in the Relative Index of Autonomy. Seven situations are simulated in order to evaluate the behavior that might be categorized into nonmotivated, extrinsic, introjected, identification based and internal motivation. According to the employees answers the index is calculated according to the formula [52]: RIA=2*internal + identified – introjected -2*exernal. Nonmotivated answers are used to identify amotivated individuals that are extracted from the further analysis. Finally, satisfaction is covered with the perception of supervisors, organization as overall, organizational justice and needs satisfaction in organization. There are 43 scaled items.

3.2. Applying AHP

The AHP method was applied because it represents a methodological approach that should help in making a business decision [27]. It represents a framework for structuring problems through criteria, relative values and their comparison. The AHP model allows the results to be presented and quantified at the end.

AHP (Analytic Hierarchy Process) method as a multi-criteria decision-making method (MCDM)was used to provide the solution for facing a complex problem of predicting turnover intention among employees. The Analytic Hierarchy Process (AHP) is a method of "measurement through pairwise comparisons and relies on the judgments of experts to derive priority scales" [54]. AHP has been one of the most widely used multiple criteria decision-making tools. The AHP method is used to create a comparison matrix between criteria, a comparison matrix between sub-criteria and to test the consistency of the pairwise comparison matrix [55]. AHP method starts with defining: the main purpose of the decision-making process, secondary objectives that together meet the primary objective, the alternatives and calculate the priorities of each alternative. As there are multiple, potentially conflicting and combining subjective and objective criteria (data) there is an expectation that this method will give evidence for ranking them and preparing foundation for identifying risk factors of turnover and insight into potential strategies of preventing it.

The application of the AHP method consisted of two steps. In the first step, we set up a hierarchy consisting of goals and criteria (Figure 1).

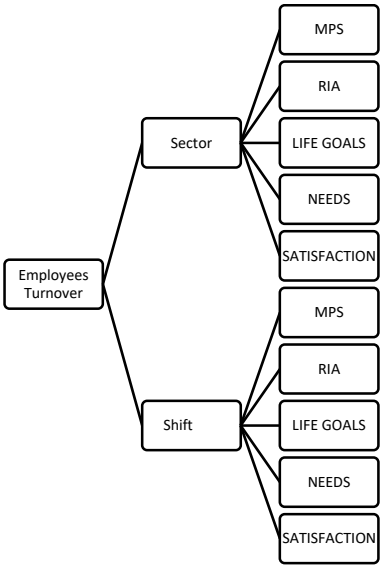

Figure 1: Employees turnover model

In the second step, data from 665 respondents were collected and finally analyzed. By using a scale that includes values from 1-9, a pairwise comparison of the criteria was made [56], [57]. Using formula 1, matrix elements were obtained, if $i \neq j$:

$$a_{ij}^{(k)} = \frac{1}{a_{ij}^{(k)}} \tag{1}$$

By arithmetic averaging of the elements of individual comparison matrices, the elements of the unique pairwise comparison matrix are obtained using formula 2 [56]:

$$a_{ij} = \sum_{i=1}^{n} \frac{{a_{ij}}^{k}}{n} \tag{2}$$

The values of the relative weights that need to be obtained are determined using formula 3:

$$w_i = \frac{\sum_{j=1}^{n} {a_{ij}}'}{n} \tag{3}$$

Formula 4 was used to obtain the degree of consistency of the results, which should be less than 0.1

$$CR = \frac{CI}{RI} \tag{4}$$

Within this research it is suggested to combine subjective measures with quantitative approach, namely to test employee's perception of work characteristics to rank their importance as a turnover predictor using AHP. Created model is presented in Figure 1. Two parameters used in the data processing are employees' sector and their shift. Sector and shift might make a difference due to the fact that the work conditions are not the same everywhere and all the time. For example, researches state that some shifts have more harmful effects on workers health than other work arrangements [58].

3.4. Sample

The research is conducted at the sample of 665 production workers employed in automotive industry. The final number of employees are gained after removing those with low performance results and those showing the highest level of amotivation state. This maneuver is used in order to focus on the subsample of workforce that are considered to be valuable and whose retention is important for company. From total employee sample 76 are on some supervisor or managerial position (white collars), with 50 of them being male and 26 female, and 533 blue collars (96 female and 437 male) and others not identified, with avarage age in the category younger of 30 years old with secondary educational level and three years of tenure. Distribution of the sample in sectors and shifts are given in the Table 2.

Table 2: Characteristics of the sample of employees

shift	**Sector**										**Total**
	press	body	paint	assembly	CGS	control	logistics	quality	support	DM	
A	11	49	17	68	5	0	31	11	9	29	230
B	0	53	17	81	6	1	23	14	0	0	195
C	9	48	19	72	0	0	30	8	0	0	186
Total	20	150	53	221	11	1	84	33	9	29	611

4. RESULTS

The main challenge in AHP analysis was to determine the weight coefficients of included predictors. Weights for the criteria are based on pairwise comparisons. In assigning values to pairwise comparisons, Saaty's scale was followed, by systematically translating qualitative differentiations to a quantitative framework. The values were assigned based on a qualitative synthesis, integrating the authors' insights and experiences based on previous research results [59]. In the Table 2. these coefficients are given. After analyzing the overall importance of concepts in the context of turnover intentions, the highest weight is given for overall satisfaction, expecting that it represents the perception of the workplace in the most general terms. Also, job characteristics that imply the evoking of motivational states are expected to be the predictor of relevance, followed by the

intrinsic motivation and the self-determined behavior. Finally, needs and life goals are gained the least weight assuming that they are less linked with the work situation and less likely to interfere with someone`s desire to leave once he is already in organization. The consistency ratio was used as a method of verifying and refining the comparison values.

In the first step, the aggregation of the obtained data was performed by applying formula 2.. The weights of the criteria were set based on pairwise comparisons, applying formula 3, and the results can be seen in Table 3.

Table 3: Average matrix of pairwise comparisons

Criterion	MPS	RIA	LIFE GOAL	NEEDS	OVERALL SATISFACTION	Rank
MPS	1	3	6	4	0.5	2
RIA	0.33	1	4	3	0.25	3
LIFE GOAL	0.17	0.25	1	0.5	0.14	5
NEEDS	0.25	0.33	2	1	0.25	4
OVERALL SATISFACTION	2	4	7	4	1	1

The degree of consistency was calculated using formulas 6-9 and is 0.038 (CR = 0.038). Given that the value obtained is less than 0.1, the results obtained are consistent.

The criteria weights in Table 4 were calculated based on the values from pairwise comparisons laid out in Table 3 using formulas described earlier in the chapter.

Table 4: Criteria weights

Criterion	MPS	RIA	LIFE GOAL	NEEDS	OVERALL SATISFACTION
Ponder	0.30	0.15	0.05	0.10	0.40

In the Table 5, combination of predictors is given according to sector parameter. The score was calculated by multiplying each turnover criteria gained from testing employees and criteria weights (Table 4) calculated using AHP. Results show the highest score for Bodyshop sector which is ranked 10 and the lowest for decision makers (different level managers) ranked as 1.

Table 5: Parameter - sectors

Sector	MPS	RIA	LIFE GOAL	NEEDS	OVERALL SATISFACTION	Score	Ranking
Press shop	3.80	4.90	7.30	6.97	5.90	5.297	8
Body shop	3.80	4.06	7.28	6.83	5.72	5.083	10
Paint shop	3.77	4.30	7.64	6.77	6.17	5.305	6
Assembly shop	3.73	4.32	7.71	6.71	6.20	5.301	7
Central general service	3.45	4.73	7.18	6.45	6.45	5.332	5
Production plant and control	3.00	8.00	8.00	5.00	7.00	5.800	2
Logistics	4.14	4.59	7.32	6.60	5.53	5.167	9
Quality	3.47	5.13	7.63	6.66	6.72	5.544	4
Finance, ICT, HR, WCM support, ME	3.56	5.67	7.89	6.56	6.67	5.633	3
Decision makers	3.74	6.30	7.11	5.48	7.63	6.022	1

As second parameter employees shift was analyzed. Calculations were made as in the previous case. Results show that second shift with highest rank and third with lowest.

Table 6: Parameter – shifts

Shift	MPS	RIA	LIFE GOAL	NEEDS	OVERALL SATISFACTION	Score	Ranking
1	3.81	4.73	7.47	6.57	6.06	5.309	2
2	3.71	4.36	7.60	6.88	5.91	5.200	3
3	3.82	4.34	7.49	6.59	6.34	5.365	1

Summing up the results it can be concluded that highest score is gained for so called decision-makers that are middle managers and supervisors. It seems that there is the least risk of losing them, as well as those working in production plant and control. Two sectors are in potential risk of employees' turnover, with body shop leading. Looking from the perspective of employees shift it is showed that employees working in second shift as the most problematic in the context of potential turnover meaning that employees working in this shift are more prone to turnover intentions. If the results are generalized it can be concluded that the in the highest risk of turnover are employees working in bodyshop sector who are mostly working in second shift.

5. CONCLUSION

One of the main ideas of the research was to demonstrate the potential of AHP method in predicting potential voluntary turnover among employees. This important issue in the organizational context is usually linked with predictors as job satisfaction in classic HR research methodology. On the other side, HR analytics often use demographic and other general data provided from the personnel record, as indirect predictors. This research include more subjective data collected directly from employees and integrate them into employee database.

Results on our sample show that the category of employees that are in the most risk of leaving organization are those working in second shift and working in production in body shop. The main criterion that has the highest ponder is overall satisfaction and the motivating potential of the work itself, so we can conclude that these parameters should be dealt with first if we want to retain employees.

This case proved the potential of AHP method in HR predictions and decision-making, implying that organizations might include measures of intrinsic motivation, satisfaction and perception of their work into a regular procedure of collecting data for the employee database. It would provide the opportunity to monitor this important information about employees, indicating their intentions.

This approach is very useful and it can be improved trough future research by taking into a consideration more competing predictors and compare their prediction potentials. It would affect the ponders and the question of re-weighting them. Also, there should be additional analysis of potential conditions as factors to drive toward turnover. Nevertheless, it is demonstrated that qualitative approach gives a more realistic picture and make decision process more efficient, objective, and precise. Still the question remains is it enough to rank the potential risk factors and identify the areas of amendment in order to prevent turnover? For further analysis and concrete corrective action, qualitative approach might be advised, as a valuable extension that provides deeper insight into the areas identified as vulnerable and susceptible to turnover. Combining AHP method, that accurately spot the risk areas and other approaches might lead to the better result in preventing turnover.

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REFERENCES

[1] S. M. Jex and T. W. Britt, Organizational psychology: A scientist-practitioner approach. John Wiley & Sons, 2014.

[2] L. Benraiss-Noailles and C. Viot, "Employer brand equity effects on employees well-being and loyalty," J. Bus. Res., vol. 126, pp. 605–613, 2021. https://doi.org/10.1016/j.jbusres.2020.02.002

[3] C. A. Chavadi, M. Sirothiya, and V. MR, "Mediating role of job satisfaction on turnover intentions and job mismatch among millennial employees in Bengaluru," Bus. Perspect. Res., vol. 10, no. 1, pp. 79–100, 2022. https://doi.org/10.1177/2278533721994712

[4] S. Erkkilä, "Managing voluntary employee turnover with HR analytics," 2020. https://urn.fi/URN:NBN:fi-fe2020100277852

[5] P. C. Bryant and D. G. Allen, "Compensation, benefits and employee turnover: HR strategies for retaining top talent," Compens. Benefits Rev., vol. 45, no. 3, pp. 171–175, 2013. https://doi.org/10.1177/0886368713494342
[6] J. R. Hackman and G. R. Oldham, "Motivation through the design of work: Test of a theory," Organ. Behav. Hum. Perform., vol. 16, no. 2, pp. 250–279, 1976. https://doi.org/10.1016/0030-5073(76)90016-7Get rights and content
[7] W. H. Mobley, "Intermediate linkages in the relationship between job satisfaction and employee turnover.," J. Appl. Psychol., vol. 62, no. 2, p. 237, 1977. https://doi.org/10.1037/0021-9010.62.2.237
[8] G. Cohen, R. S. Blake, and D. Goodman, "Does turnover intention matter? Evaluating the usefulness of turnover intention rate as a predictor of actual turnover rate," Rev. Public Pers. Adm., vol. 36, no. 3, pp. 240–263, 2016. https://doi.org/10.1177/0734371X15581850
[9] E. Rombaut and M.-A. Guerry, "Predicting voluntary turnover through human resources database analysis," Manag. Res. Rev., vol. 41, no. 1, pp. 96–112, 2018. https://doi.org/10.1108/MRR-04-2017-0098
[10] S. Dubey, "Employees' Turnover Intention in Indian Retail Industry-An Exploratory Study," Themat. Artic., vol. 16, no. 1, pp. 7–20, 2017.
[11] B. Kuvaas, R. Buch, A. Weibel, A. Dysvik, and C. G. Nerstad, "Do intrinsic and extrinsic motivation relate differently to employee outcomes?," J. Econ. Psychol., vol. 61, pp. 244–258, 2017. https://doi.org/10.1016/j.joep.2017.05.004
[12] S. Miao, J. Rhee, and I. Jun, "How much does extrinsic motivation or intrinsic motivation affect job engagement or turnover intention? A comparison study in China," Sustainability, vol. 12, no. 9, p. 3630, 2020. https://doi.org/10.3390/su12093630
[13] J. Zheng, X. Gou, H. Li, and H. Xie, "Differences in mechanisms linking motivation and turnover intention for public and private employees: Evidence from China," SAGE Open, vol. 11, no. 3, p. 21582440211047567, 2021. https://doi.org/10.1177/21582440211047567[14] K. Hussain, Z. Abbas, S. Gulzar, A. B. Jibril, and A. Hussain, "Examining the impact of abusive supervision on employees' psychological wellbeing and turnover intention: The mediating role of intrinsic motivation," Cogent Bus. Manag., vol. 7, no. 1, p. 1818998, 2020. https://doi.org/10.1080/23311975.2020.1818998
[15] S. M. Rahman, "Relationship between job satisfaction and turnover intention: Evidence from Bangladesh," Asian Bus. Rev., vol. 10, no. 2, pp. 99–108, 2020. https://doi.org/10.18034/abr.v10i2.470
[16] R. Khalida, "The effect of person-organization fit on turnover intention with job satisfaction as mediating variable," BISNIS BIROKRASI J. Ilmu Adm. Dan Organ., vol. 23, no. 3, p. 2, 2016. https://doi.org/10.20476/jbb.v23i3.9173[17] N. Hassan et al., "Quality of work life as a predictor toward employee loyalty at malaysian automotive industry," Int. J. Arts Sci., vol. 10, no. 1, pp. 23–35, 2017.
[18] G. S. Priya and U. Raman, "A Study on Strategy of Employer Branding and its impact on Talent management in IT industries," Elem. Educ. Online, vol. 20, no. 5, pp. 3441–3441, 2021. doi: 10.17051/ilkonline.2021.05.378
[19] C. S. Long, M. A. Ajagbe, K. M. Nor, and E. S. Suleiman, "The approaches to increase employees' loyalty: A review on employees' turnover models," Aust. J. Basic Appl. Sci., vol. 6, no. 10, pp. 282–291, 2012.
[20] S. Jha, "Determinants of employee turnover intentions: A review," Manag. Today, vol. 9, no. 2, 2009.
[21] A. Frederiksen, "Job satisfaction and employee turnover: A firm-level perspective," Ger. J. Hum. Resour. Manag., vol. 31, no. 2, pp. 132–161, 2017. https://doi.org/10.1177/2397002216683885
[22] S. N. Khera and Divya, "Predictive modelling of employee turnover in Indian IT industry using machine learning techniques," Vision, vol. 23, no. 1, pp. 12–21, 2018. https://doi.org/10.1177/0972262918821221

[23] C. de S. Rocha Junior, M. Â. Lellis Moreira, and M. dos Santos, "Selection of interns for startups: an approach based on the AHP-TOPSIS-2N method and the 3DM computational platform," 8th Int. Conf. Inf. Technol. Quant. Manag. ITQM 2020 2021 Dev. Glob. Digit. Econ. COVID-19, vol. 199, pp. 984–991, Jan. 2022, doi: 10.1016/j.procs.2022.01.124. https://doi.org/10.1016/j.procs.2022.01.124

[24] A. L. Hananto, B. Priyatna, A. Fauzi, A. Y. Rahman, and Y. Pangestika, "Analysis of the Best Employee Selection Decision Support System Using Analytical Hierarchy Process (AHP)," presented at the Journal of Physics: Conference Series, IOP Publishing, 2021, p. 012023.DOI 10.1088/1742-6596/1908/1/012023

[25] S. Nawzad and C. Top, "Using ahp for the recruitment system: A case study at lafargeholcim company in kurdistan region of iraq," Int. J. Econ. Commer. Manag., vol. 7, no. 6, pp. 183–194, 2019.

[26] B. H. Prasetyo, D. Anubhakti, and A. Widjaja, "Selection of Prospective Employees Using Analytical Hierarchy Process (AHP) and ISO 9126," presented at the 2018 International Conference on Applied Information Technology and Innovation (ICAITI), IEEE, 2018, pp. 41–45. DOI: 10.1109/ICAITI.2018.8686733

[27] R. E. Sari, A. Meizar, D. H. Tanjung, and A. Y. Nugroho, "Decision making with AHP for selection of employee," presented at the 2017 5th International Conference on Cyber and IT Service Management (CITSM), IEEE, 2017, pp. 1–5. DOI:10.1109/CITSM.2017.8089285

[28] R. P. Kusumawardani and M. Agintiara, "Application of fuzzy AHP-TOPSIS method for decision making in human resource manager selection process," Procedia Comput. Sci., vol. 72, pp. 638–646, 2015. https://doi.org/10.1016/j.procs.2015.12.173

[29] B. D. Rouyendegh and T. Erkart, "SELECTION OF ACADEMIC STAFF USING THE FUZZY ANALYTIC HIERARCHY PROCESS(FAHP): A PILOT STUDY," Teh. Vjesn., vol. 19, no. 4, pp. 923–929, 2012.

[30] W.-H. Hsiao, T.-S. Chang, M.-S. Huang, and Y.-C. Chen, "Selection criteria of recruitment for information systems employees: Using the analytic hierarchy process (AHP) method," Afr. J. Bus. Manag., vol. 5, no. 15, p. 6200, 2011.

[31] E. Faliagka, K. Ramantas, A. K. Tsakalidis, M. Viennas, E. Kafeza, and G. Tzimas, "An Integrated e-Recruitment System for CV Ranking based on AHP.," presented at the WEBIST, 2011, pp. 147–150.

[32] Z. Güngör, G. Serhadlıoğlu, and S. E. Kesen, "A fuzzy AHP approach to personnel selection problem," Appl. Soft Comput., vol. 9, no. 2, pp. 641–646, 2009. https://doi.org/10.1016/j.asoc.2008.09.003

[33] M. Shojaie, T. Mojibi, and A. M. Ashrafi, "Identifying and Ranking the Factors Influencing the Performance of Human Resources in Mostazafan Foundation Using Fuzzy Delphi-AHP and BSC Methods," Discrete Dyn. Nat. Soc., vol. 2022, pp. 1–15, 2022, doi: 10.1155/2022/5680545. https://doi.org/10.1155/2022/5680545

[34] I. M. D. P. Asana, I. G. I. Sudipa, and I. M. A. Wijaya, "Decision Support System For Employee Assessment At PT. Kupu-Kupu Taman Lestari Using AHP And BARS Methods: Decision Support System For Employee Assessment At PT. Kupu-Kupu Taman Lestari Using AHP And BARS Methods," J. Mantik, vol. 4, no. 1, pp. 97–106, 2020.

[35] L. Lidinska and J. Jablonsky, "AHP model for performance evaluation of employees in a Czech management consulting company," Cent. Eur. J. Oper. Res., vol. 26, no. 1, pp. 239–258, Mar. 2018, doi: 10.1007/s10100-017-0486-7. https://doi.org/10.1007/s10100-017-0486-7

[36] U. M. Mutmainah and A. T. Panudju, "Employee performance appraisal model using human resources scorecard and Analytical Hierarchy Process (AHP)," J. Sci. Technol. Res., vol. 6, no. 11, pp. 81–84, 2017.

[37] M. T. Amini, E. Keshavarz, A. Keshavarz, and S. M. Bagheri, "Prioritisation and performance evaluation of employees at strategic human resource management process using fuzzy AHP and fuzzy TOPSIS methods," Int. J. Product. Qual. Manag., vol. 17, no. 1, pp. 61–81, 2016. https://doi.org/10.1504/IJPQM.2016.073275

[38] R. Islam and S. bin Mohd Rasad, "Employee performance evaluation by the AHP: A case study," Asia Pac. Manag. Rev., vol. 11, no. 3, 2006.
[39] Y.-P. Chao, Y.-C. Chou, and W.-H. Lai, "AHP competency model in the service chain industry," Adv. Manag. Appl. Econ., vol. 7, no. 3, p. 1, 2017.
[40] K. Kashi, "AHP IN PERSONNEL MANAGEMENT: CAN THE KEY COMPETENCIES CHANGE WITH COMPANYâ€TM S STRATEGY?," Int. J. Anal. Hierarchy Process, vol. 8, no. 1, 2016. https://doi.org/10.13033/ijahp.v8i1.297
[41] C.-H. Fang, S.-T. Chang, and G.-L. Chen, "Competency development among Taiwanese healthcare middle manager: A test of the AHP approach," Afr. J. Bus. Manag., vol. 4, no. 13, p. 2845, 2010.
[42] T. L. Saaty, K. Peniwati, and J. S. Shang, "The analytic hierarchy process and human resource allocation: Half the story," Decis. Mak. Anal. Hierarchy Process Anal. Netw. Process, vol. 46, no. 7, pp. 1041–1053, Oct. 2007, doi: 10.1016/j.mcm.2007.03.010.
[43] R. H.-L. Tsoi, "Using analytic hierarchy process (AHP) method to prioritise human resources in substitution problem," Int. J. Comput. Internet Manag., vol. 9, no. 1, pp. 36–45, 2001.
[44] N. K. Kwak, K. J. McCarthy, and G. E. Parker, "A Human Resource Planning Model for Hospital/Medical Technologists: An Analytic Hierarchy Process Approach," J. Med. Syst., vol. 21, no. 3, pp. 173–187, Jun. 1997, doi: 10.1023/A:1022812322966.
[45] E. Rajabpour, M. R. Fathi, and M. Torabi, "Analysis of factors affecting the implementation of green human resource management using a hybrid fuzzy AHP and type-2 fuzzy DEMATEL approach," Environ. Sci. Pollut. Res., vol. 29, no. 32, pp. 48720–48735, Jul. 2022, doi: 10.1007/s11356-022-19137-7.
[46] P. Goel, S. Mehta, R. Kumar, and F. Castaño, "Sustainable Green Human Resource management practices in educational institutions: An interpretive structural modelling and analytic hierarchy process approach," Sustainability, vol. 14, no. 19, p. 12853, 2022. https://doi.org/10.3390/su141912853
[47] A. Khatoon, N. A. Khan, F. Parvin, M. S. Wahid, M. T. Jamal, and S. Azhar, "Green HRM: Pathway towards environmental sustainability using AHP and FAHP in a nascent parsimony," Int. J. Manpow., vol. 43, no. 3, pp. 805–826, 2022. https://doi.org/10.1108/IJM-04-2020-0164
[48] A. Joshi, N. Sunny, and S. Vashisht, "Recent trends in HRM: A qualitative analysis using AHP," Prabandhan Indian J. Manag., vol. 10, no. 10, pp. 41–52, 2017. DOI:10.17010/pijom/2017/v10i10/118814
[49] Y.-F. Tseng and T.-Z. Lee, "Comparing appropriate decision support of human resource practices on organizational performance with DEA/AHP model," Expert Syst. Appl., vol. 36, no. 3, pp. 6548–6558, 2009. https://doi.org/10.1016/j.eswa.2008.07.066
[50] J. Wang, W. Bai, and Y. Liu, "Optimization for the Human Resources Management Strategy of the IoT Industry Based on AHP," Comput. Intell. Neurosci., vol. 2022, p. 3514285, May 2022, doi: 10.1155/2022/3514285.
[51] K. Phudphad, B. Watanapa, W. Krathu, and S. Funilkul, "Rankings of the security factors of human resources information system (HRIS) influencing the open climate of work: using analytic hierarchy process (AHP)," 8th Int. Conf. Adv. Inf. Technol., vol. 111, pp. 287–293, Jan. 2017, doi: 10.1016/j.procs.2017.06.065.
[52] E. L. Deci and R. M. Ryan, "Self-determination theory: A macrotheory of human motivation, development, and health.," Can. Psychol. Can., vol. 49, no. 3, p. 182, 2008. https://doi.org/10.1037/a0012801
[53] M. Gagné and E. L. Deci, "Self-determination theory and work motivation," J. Organ. Behav., vol. 26, no. 4, pp. 331–362, 2005. https://doi.org/10.1002/job.322[54] T. L. Saaty, "Decision making with the analytic hierarchy process," Int. J. Serv. Sci., vol. 1, no. 1, pp. 83–98, 2008. https://doi.org/10.1504/IJSSCI.2008.017590
[55] R. Hermawan, M. T. Habibie, D. Sutrisno, A. S. Putra, and N. Aisyah, "Decision Support System For The Best Employee Selection Recommendation Using Ahp (Analytic Hierarchy

Process) Method," Int. J. Educ. Res. Soc. Sci. IJERSC, vol. 2, no. 5, pp. 1218–1226, 2021. https://doi.org/10.51601/ijersc.v2i5.187

[56] T. L. Saaty, "Decision-making with the AHP: Why is the principal eigenvector necessary," Eur. J. Oper. Res., vol. 145, no. 1, pp. 85–91, 2003. https://doi.org/10.1016/S0377-2217(02)00227-8

[57] Đ. N. Đukić, I. Petrović, D. Božanić, and B. Delibašić, "Selection of Unployed Aircraft for Training of Small-Range Aircraft Defense System AHP–TOPSIS Optimization Methods," Yugosl. J. Oper. Res., vol. 32, no. 3, pp. 389–406, 2022. http://dx.doi.org/10.2298/YJOR211125007D

[58] M. C. Bolino, T. K. Kelemen, and S. H. Matthews, "Working 9-to-5? A review of research on nonstandard work schedules," J. Organ. Behav., vol. 42, no. 2, pp. 188–211, 2021. https://doi.org/10.1002/job.2440

[59] A. L. Rubenstein, M. B. Eberly, T. W. Lee, and T. R. Mitchell, "Surveying the forest: A meta-analysis, moderator investigation, and future-oriented discussion of the antecedents of voluntary employee turnover," Pers. Psychol., vol. 71, no. 1, pp. 23–65, 2018. https://doi.org/10.1111/peps.12226