

Evaluation of flexible working styles with MCDM techniques within the scope of SWOT analysis

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Abstract: The fact that being more agile and adapting faster has become one of the most important competitiveness factors necessitates the transformation of traditional working styles. With the rapid development of technology and pandemic, flexible working forms have begun to replace traditional face-to-face working. For this reason, recently, businesses make strategic decisions about the working styles of human resources, which are their most valuable input, has to take. This study includes the evaluation of flexible working styles with multi-criteria decision-making methods within the concept of SWOT analysis, which is one of the most important tools of strategic decision-making. For this purpose, in this study, a hierarchical model with 22 criteria and 5 alternatives was proposed. In this model, SWOT components were weighted with the ENTROPY technique, while alternative working styles were evaluated with the fuzzy VIKOR method under fuzzy environment. After all calculations Employment flexibility with the possibility of migration, Natural disaster and terror risk and Technology cost were found the most important criteria with the highest importance weight scores among 22 criteria and Working 3 days away from office in week was found the most preferable flexible working style for sample company with the highest Q index value among five alternative working styles.

Keywords: Flexible working styles, SWOT analysis, ENTROPY, fuzzy VIKOR.

Avaliação de estilos de trabalho flexíveis com técnicas de Tomada de Decisão Multicritério no âmbito da análise SWOT

Resumo: Ser mais ágil e adaptar-se mais rapidamente tornaram-se em dois dos mais importantes fatores de competitividade, requerendo a transformação dos estilos de trabalho tradicionais. Com o rápido desenvolvimento da tecnologia e com a pandemia, os modelos de trabalho flexível começaram a substituir o modelo tradicional de trabalho presencial. Por esta razão, recentemente, as empresas têm vindo a tomar decisões estratégicas sobre os modelos de trabalho dos recursos humanos, que são o seu contributo mais valioso. Este estudo inclui a avaliação de modelos de trabalho flexível com métodos multicritérios de tomada de decisão dentro do conceito de análise SWOT, que é uma das ferramentas mais importantes na tomada de decisões estratégicas. Para o efeito, neste estudo foi proposto um modelo hierárquico com 22 critérios e 5 alternativas. Neste modelo, os componentes SWOT foram ponderados com a técnica ENTROPY, enquanto os estilos de trabalho alternativos foram avaliados através do método Fuzzy VIKOR em ambiente Fuzzy. Depois de todos os cálculos, a Flexibilidade de emprego com a possibilidade de migração, o Risco de desastres naturais e de terrorismo e os Custos com tecnologia foram encontrados como sendo os critérios mais importantes, obtendo as pontuações mais elevadas entre 22 critérios, e trabalhar 3 dias por semana fora do escritório revelou-se como sendo o estilo de trabalho flexível preferível para a empresa da amostra, tendo o valor mais alto do índice Q entre cinco estilos de trabalho alternativos.

Palavras-chave: Trabalho flexível, análise SWOT, ENTROPY, Fuzzy VIKOR.

1. Introduction

Nowadays, the use of remote and flexible working models is increasing due to the rapid development of technology, the widespread use of computerization and mobile devices, and the COVID-19 epidemic that entered our lives in 2020. Companies that consider both employee satisfaction, company efficiency and operational costs, and public health are still trying to establish the most suitable flexible working system for them.

In this study, a multi-criteria model is proposed to find the most suitable flexible working styles for the employees of an insurance company. The multi-criteria model is structured by analyzing the strengths, weaknesses, opportunities and threats of flexible working under the SWOT analysis framework, and 5 different working styles were evaluated with 22 sub-criteria included in this structure. While the importance weights of 22 sub-criteria are determined by the ENTROPHY method during the evaluation phase, 5 different working styles, including the classical face-to-face working style, were evaluated with the help of fuzzy numbers using the VIKOR method. This proposed model is solved within the framework of fuzzy logic and the most suitable working style was found for the insurance company, which is considered as an example.

When the literature researches on the discovery and analysis of flexible working styles are examined, it is possible to come across the following studies on the subject in recent years: Kodama (2020) examined work styles that transformed digitally, Al-Habaibeh et al. (2021) examined the challenges and the opportunities of remotely working, Kotera and Vione (2020) examined the psychological impacts of the new work style and Chen (2021) examined the influence of working from home during the COVID-19 crisis.

In addition to these researches, in literature, there are some researches that examined the relationship between work style and some conditions such as organizational climate (Niculită, 2015; Moslehpour et al., 2019), personality factors (Ciucur & Pîrvut, 2012), national culture (Dankova & Droppa, 2015), job demands (Gavriloaiei & Constantin, 2014), organizational commitment and trust (Taborosi et al., 2020).

Differ from literature, in this study, multi-criteria decision-making structure is combined with SWOT analysis in a research area where it has never been applied, and the proposed model is solved with entropy and fuzzy VIKOR methods in a problem structure where it has not been applied before. The study will contribute to the literature with both the proposed model structure it proposes and the sequential solution techniques.

After the literature review on the subject, the study continues with the explanation of traditional and modern working styles in the second section. In the third section, the proposed model within the SWOT analysis structure, established with criteria and alternatives, and solution techniques are explained. The solution of the problem is carried out in section 4 with the proposed methods and the study is completed with the conclusions and suggestions for future studies in section 5.

2. Traditional and Modern Working Styles

Before the Industrial Revolution, work was defined as an action that a person performed only to meet his/her daily needs. After the Industrial Revolution, the concept of working evolved as working in an organization regularly, being employed and is paid wage in return for this labor.

In the traditional working style, employees are employed in the same workplace, face to face and often doing the same job throughout their contracts (Soga et al., 2022; Yu et al., 2019). On the other hand, in new working styles, it has become a necessity for

companies to adapt constantly the number employees, skills and qualifications of employees to changing conditions and to ensure employee satisfaction.

Flexible working means leaving the classical/traditional working order. In other words, it is the establishment of an open and free system that allows the employer and the employee to regulate the working conditions differently according to the needs, using legal instruments such as contracts, instead of working with predetermined rules in a workplace under the protection and regulation of the laws (Hensher et al., 2023). In the flexible working system, there are non-standard working styles and times (Kolasa et al., 2021). The employee can mutually determine the working order with the employer, different from the standard form.

The benefits of flexible working styles can be listed as follows (Crompton, 2002): It contributes to the solution of the traffic problem; Labor productivity is increased by arranging the working hours according to the time period in which the performance is high; thus increasing the efficiency of the business. Problems such as taking frequent leave, absenteeism and changing jobs in a short time are reduced (Harris et al., 2010); flexibility of working hours increases the ability of the business to meet the service needs of customers; the regulation of the daily working time by the employee prevents overtime. Operational costs are reduced; the employer gains the ability to use its employees, machinery and equipment for a much longer and more effective time.

In addition to its many advantages, it should not be forgotten that flexible working has some disadvantages for both employees and companies. First of all, those who work from home are away from the social environment and opportunities offered by the business environment. This situation leads to the loneliness of them and causes weakening of their social skills (Soga et al., 2022). Hours away from the office and teammates create a lack of team motivation and sense of belonging. In addition, working from home is increasing the blurs between work and non-work life (Naswall et al., 2008). In flexible working system, employees work overtime in an effort to prove that they work efficiently (Soga et al., 2022). Another disadvantage of flexible working for employees is the regulations related to wages and social rights (Kavi & Koçak, 2010). The most important disadvantages of flexible working for the employer are the administrative costs that are difficult to control, the communication that needs to be established between flexible teams, the audit that is difficult to perform, the distribution of responsibilities that become complicated and the delays (Öztürkoğlu, 2013).

As a result, costs are reduced due to the efficient use of resources. The motivation of the employees' increases and in the working time organized in line with the demand of the employee, the employee becomes more motivated, makes fewer mistakes and works more efficiently. The employee's self-determination of the working time improves his/her ability to carry personal responsibility and self-confidence. His/her commitment to the business increases. It gives the ability to employees to use time well. An employee arranges his/her own working time in line with his/her needs and preferences work more efficiently. Being able to set the working hours, he/she enables the employee to carry out his work life and private life in harmony.

2.1 SWOT analysis

SWOT analysis which includes four aspects such as strengths, weaknesses, opportunities, and threats is a perfect tool for identifying internal and external factors as well as formulating and evaluating alternative strategies (Longsheng et al., 2022). This

approach can be utilized to locate positive and negative variables in a particular environment, understand the problems and challenges met, and decide tactical plans (Nilashi et al., 2023).

The SWOT analysis is formed with four parts, among which strengths and weaknesses are internal factors and opportunities and threats are external factors (Hosseini et al., 2021a). The strengths are capabilities of the organization that are different from its competitors (Hosseini et al., 2021a). The weaknesses are the negative factors for the organization that lead to unfavorable scenarios (Olabi et al., 2022). Opportunities are the influencers that can impact the organization success positively in the future (Olabi et al., 2022) and threats are unpleasant situations in the external environment of the organization that can cause trouble and danger for the organization (Hosseini et al., 2021a).

3. Evaluation of Face-to-face and Flexible Working Styles with SWOT analysis context

The fact that flexible working styles are not fully known by companies and employees causes avoidance of this new working system. Contrary to the prejudice brought about by the concept of flexibility, thanks to these new working styles that provide independence in terms of space and time, employees contribute more to the company. In addition, the happiness of the employee in the working environment brings his/her loyalty to the company.

3.1 Evaluation techniques

In this paper, two different techniques are used for the solution of the research problem. First, for determining the importance weights of the criteria entropy method is used, the secondly fuzzy VIKOR method is used for evaluating and ranking the alternative working styles. The solution methodology of the problem is shown in Figure 1.

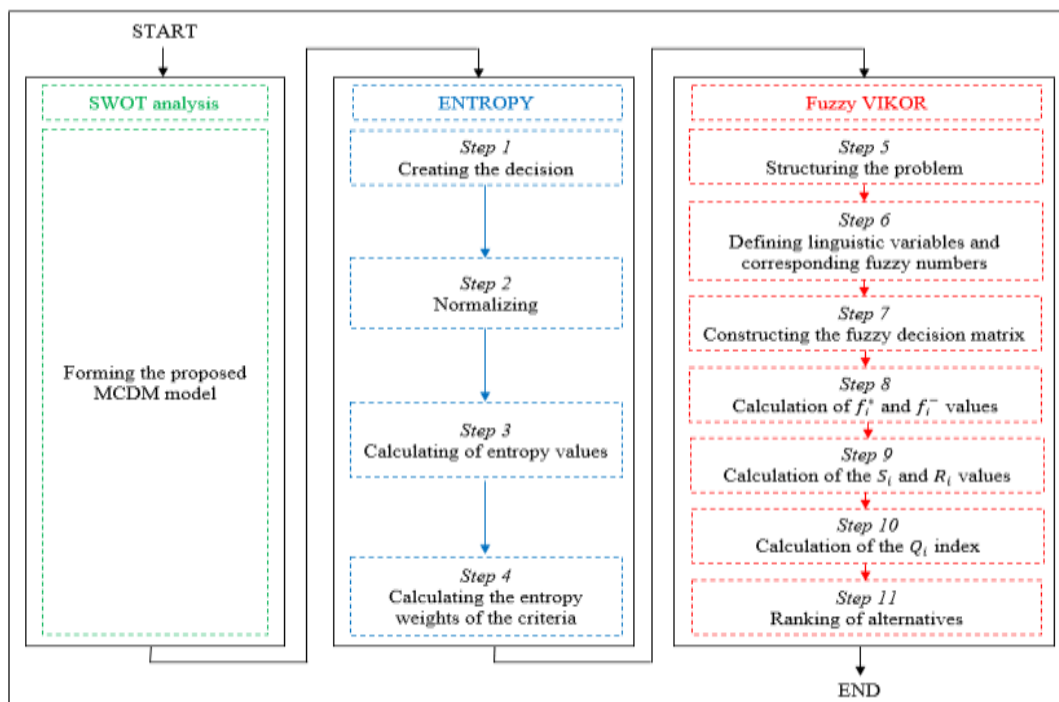


Figure 1: Proposed solution methodology with SWOT – ENTROPY - FUZZY VIKOR

3.1.1 Entropy for finding criteria importance weights

The concept of entropy was first defined in the literature by Rudolph Clausius (1865) as a measure of disorder and uncertainty in a system, and was adapted to information theory by Shannon (1948). According to information entropy, the number or quality of available information is one of the most important determinants of the accuracy and reliability of the decision to be made in a decision-making problem (Poongavanam et al., 2021). In this context, the entropy weight method is used to measure the amount of useful information provided by the available data. As the entropy weight of the evaluation index increases, the useful information rate of the index increases.

The entropy weight technique is a suitable scale that can be used to evaluate in different decision-making processes, and it is possible to come across studies using this technique in the literature. For example, Poongavanam et al. (2021) selected the best refrigerant in automobile air conditioning system, Chodha et al. (2022) selected the industrial arc-welding robot, Jatin et al. (2022) selected the water purifier and Ali et al. (2022) planned the future energy systems of developing countries by combining entropy and other MCDM techniques.

The most important advantage of the method is the ease of use. This advantage provides more objective results on the scores of the alternatives without the need of the evaluation of the decision makers.

In this study, entropy weight method was used to determine the criteria importance weights. The application steps of the method are as follows (Jatin et al., 2022):

» **Step 1** - Creating the decision matrix: For m alternatives and n criteria, the X decision matrix is formed as seen in Eq. (1) to represent the value of the i alternative in the x_{ij} element matrix according to the j criterion.

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \quad (1)$$

» **Step 2** - Normalizing: Since the values in the decision matrix have different measurement units, it is necessary to normalize the decision matrix in order to ensure consistency. Benefit-based criteria are normalized with the help of Eq. (2), and cost-based criteria are normalized with the help of Eq. (3).

$$r_{ij} = x_{ij} / \max_{ij} \quad (2)$$

$$r_{ij} = \min_{ij} / x_{ij} \quad (\min_{ij} \neq 0) \quad (3)$$

At the end of the normalizing the characteristics of the criteria, the initial matrix is normalized with the help of Eq. (4).

$$R_{ij} = \frac{x_{ij}}{\sum_{i=1}^m x_{ij}} \quad (4)$$

» **Step 3** - Calculating of entropy values: Entropy values are obtained with the help of Eq. (5).

$$e_j = -k \sum_{i=1}^m R_{ij} \cdot \ln(R_{ij}) \quad (5)$$

Here, k is a constant number satisfying $0 \leq e_j \leq 1$ and is calculated as $k = 1/\ln(m)$.

» **Step 4** - Calculating the entropy weights of the criteria: The entropy weight value of each criterion is calculated with the help of Eq. (6).

$$w_j = \frac{1 - e_j}{\sum_{j=1}^m e_j}, \sum_{j=1}^m w_j = 1 \quad (6)$$

The criterion with a larger entropy weight is more important for decision making/evaluation, as the entropy weight indicates the degree of useful information.

3.1.2 Fuzzy VIKOR for ranking alternative working styles

In classical multi-criteria decision-making techniques, it is assumed that the criteria weights and evaluations are known precisely. However, in real life, it is not possible to use precise expressions in some cases. In such cases, fuzzy sets based on the fuzzy logic theory developed by Zadeh in 1965 can be used (Liang et al., 2021). Thus, variables that cannot be expressed precisely can be expressed with linguistic variables.

One of the methods in which fuzzy logic theory is integrated is the VIKOR method. VIKOR (*ViseKriterijumsa Optimizacija I Kompromisno Resenje*) is a method used in multi-criteria decision-making, proposed by Opricovic in 1998, and focuses on the selection of the most suitable alternative by ranking the alternatives when there are conflicting criteria in the decision-making process (Liang et al., 2021). The aim of the method is to find a compromise solution that will establish maximum group benefit and minimum individual regret with a compromise solution.

The fuzzy VIKOR method, whose biggest advantage is to focus on ranking the alternatives as a mediator in the optimization of complex and conflicting criteria systems, has been used in the solution of many different MCDM problems in recent years. For example, Liang et al. (2021) evaluated the service level of bike-sharing companies, Hosseini et al. (2021b) investigated recovery solutions for ecotourism centers and Kizielewicz and Baczkiwicz (2021) selected the house by using fuzzy VIKOR. On the other hand, Zhu et al. (2022) used fuzzy VIKOR technique in failure mode and effects analysis; Bahrami and Rastegar (2022) used this method at security-based critical power distribution feeder identification.

In this study, fuzzy VIKOR method was used to evaluate and rank the alternatives due to criteria importance weights that were obtained by entropy method. The application steps of the method are as follows (Hosseini et al., 2021b):

» **Step 1** - Structuring the problem: For the solution of the problem, k number of decision makers, n alternatives and m criteria are determined.

» **Step 2** - Defining linguistic variables and corresponding fuzzy numbers: The linguistic variables used in this study and their corresponding are shown in Table 1.

Table 1. Linguistic variables and their corresponding fuzzy numbers

Linguistic variables			Fuzzy numbers		
VP	Very poor	(0.00-0.10-0.10-0.20)	MG	Medium good	(0.50-0.60-0.70-0.80)
P	Poor	(0.10-0.20-0.20-0.30)	G	Good	(0.70-0.80-0.80-0.90)
MP	Medium poor	(0.20-0.30-0.40-0.50)	VG	Very good	(0.80-0.90-0.90-1.00)
M	Medium	(0.40-0.50-0.50-0.60)			

» **Step 3** - Constructing the fuzzy decision matrix: A fuzzy decision matrix $\tilde{D}$ is created with integrated values for all criteria and alternatives with the help of Eq. (7).

$$\tilde{D} = \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \dots & \tilde{x}_{1j} \\ \tilde{x}_{21} & \tilde{x}_{22} & \dots & \tilde{x}_{2j} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{x}_{i1} & \tilde{x}_{i2} & \dots & \tilde{x}_{ij} \end{bmatrix}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \quad (7)$$

» **Step 4** - Calculation of f_j^* and f_j^- values: In the fuzzy decision matrix, the best and worst values of all criterion are calculated with the help of Eq. (8) and Eq. (9), depending on whether they are benefit or cost based.

$$f_j^* = \max_i\{x_{ij}\} \text{ and } f_j^- = \min_i\{x_{ij}\} \text{ for benefit-based criteria} \quad (8)$$

$$f_j^* = \min_i\{x_{ij}\} \text{ and } f_j^- = \max_i\{x_{ij}\} \text{ for cost-based criteria} \quad (9)$$

» **Step 5** - Calculation of the S_i and R_i values: S_i value, which gives the sum of the distance of alternative i to the best value, and R_i value, which gives the maximum distance of alternative i to the worst values according to criterion j , are obtained with the help of Eq. (10) and Eq. (11).

$$S_i = \sum_{j=1}^n [w_j(f_j^* - f_{ij}) / (f_j^* - f_j^-)] \quad (10)$$

$$R_i = \max_j [w_j(f_j^* - f_{ij}) / (f_j^* - f_j^-)] \quad (11)$$

» **Step 6** - Calculation of the Q_i index: The Q_i index, which evaluates group utility and individual regret together, is calculated with the help of Eq. (12).

$$Q_i = v((S_i - S^*) / (S^- - S^*)) + (1 - v)((R_i - R^*) / (R^- - R^*)) \quad (12)$$

Here, $S_i^* = \min_i S_i$, $S_i^- = \max_i S_i$, $R_i^* = \min_i R_i$ and $R_i^- = \max_i R_i$. Also, while v value expresses the importance of the strategy that provides maximum group benefit, $(1 - v)$ expresses individual regret value. Generally, $v \approx 0.5$ is taken.

» **Step 7** - Ranking of alternatives: Alternatives are ranked according to the obtained Q index values. The best alternative has the smallest Q value.

In addition, whether the alternative determined as the best is a conciliatory solution is checked according to the following two conditions.

» **Condition 1 - Acceptable advantage:** This condition involves proving that there is a significant difference between the best and the closest option with the help of Eq. (13).

$$Q(A'') - Q(A') \geq DQ; DQ = 1/(m - 1) \quad (13)$$

Here, m is the number of alternatives, A' is the first-ranked alternative and A'' is the second-best alternative in the ranking.

» **Condition 2 - Acceptable stability:** Alternative A must be the best alternative sorted by S and/or R values.

If Condition 1 is not met and if $Q(A^m) - Q(A') \leq DQ$ is, then $A^{(m)}$ and A' are the same compromise solution.

If Condition 2 is not accepted, inconsistency in decision-making occurs even though A'' has a relative advantage. Therefore, A' and A'' mediator solutions are the same. The best alternative with the minimum Q value is selected.

3.2. Evaluation problem

The effects of rapidly developing technology with globalization causes changes on the way companies work as well as in every field, and classical working styles evolve into flexible working styles. In recent years, the almost disappearance of economic borders, the production and supply of goods and services in a shorter period of time, and the increasing global competition have made it necessary to be changed business organizations and have led companies to flexible working styles. In this study, it was investigated which flexible working style would be more suitable for an insurance company in order to adapt to the conditions of the age in an intensely competitive environment. The sample insurance company is the one of top insurance companies in Turkey.

3.3 Evaluation model with its criteria and alternatives

In this section, 4 criteria accepted within the scope of SWOT analysis and 22 sub-criteria created under these criteria are explained. The parameters listed in the SWOT analysis were arrived at literature review, expert opinions and the contribution of the author:

» **Strengths:** refers to aspects that allows companies the state of being more effective and efficient than its competitors in the specified areas. Advantageous aspects of flexible working styles constitute the sub-criteria of this section:

- *S₁ Working time flexibility:* Employees' working hours are flexible (Vasconcelos et al., 2015).
- *S₂ Quick problem solution:* Problems are solved quickly.
- *S₃ Productivity:* Productivity is high.
- *S₄ Operational cost:* Operational costs such as transportation, food, electricity and water, are reduced (Crompton, 2002).
- *S₅ High life quality:* The quality of life of employees increases (Vasconcelos et al., 2015).
- *S₆ Managing work stress:* Work stress is more easily managed with flexible work activities (Vasconcelos et al., 2015).
- *S₇ Support to family life:* Family life is supported (Vasconcelos et al., 2015).
- *S₈ Possibility of wellness activity:* Healthy life activities are supported.
- *S₉ Natural disaster and terror risk:* Since all employees will not be in the same environment, those who work in a natural disaster or terror risk will not be affected at the same time and at the same rate.

» **Weaknesses:** refers to aspects and activities in which companies are less efficient or effective than its competitors. Disadvantageous aspects of flexible working styles constitute the sub-criteria of this section:

- *W₁ Need for socialization:* The possibility of socialization is reduced (Soga et al., 2022).
- *W₂ Effective communication:* Effective communication may not be established (Öztürkoğlu, 2013).
- *W₃ Information integrity:* Information integrity between teams cannot be ensured (Vasconcelos et al., 2015).
- *W₄ Possibility of control:* It becomes difficult for employees to control.
- *W₅ Technology cost:* The cost of technology investment in the remote working environment is high.

- *W₆ Organizational culture*: Organizational culture may not form or be damaged (Naswall et al., 2008).

» Opportunities: Opportunity is the provision of profit or advantage to the company by means of the formation of favorable time and other conditions for any activity of a company. Opportunities that can be obtained with flexible working styles constitute the sub-criteria of this section:

- *O₁ Creating a sense of responsibility*: Employees take more responsibility and take initiative.
- *O₂ Employment flexibility with the possibility of migration*: Employees can work flexibly in any part of the world.
- *O₃ Employee turnover*: The employee turnover rate decreases with the increase in the number of satisfied employees (Crompton, 2002).

» Threats: A threat is adverse conditions that makes it difficult or impossible for a company to achieve its objectives. Anything that hinders or harms success is a threat for company. Threats posed by flexible working styles constitute the sub-criteria of this section:

- *T₁ Institution loyalty*: Organization loyalty may decrease (Soga et al., 2022).
- *T₂ Fair workload distribution*: Fair workload distribution may not be realized (Öztürkoğlu, 2013).
- *T₃ Information reliability*: Secure access to reliable information may not be possible.
- *T₄ Performance management*: Effective performance management systems may not be implemented.

With the emergence of flexible working styles, the labor market becomes more flexible and this necessitates organizational changes in accordance with flexible and competitive conditions. Within the scope of this study, besides the face-to-face classical working style, four different flexible working styles were determined to be evaluated and alternative working styles to be evaluated are listed as follows:

- *A₁ Working in office all time*: It is the classical working style that is face to face by going to the office every working day.
- *A₂ Working 1 day remote from office in week*: In this working type, the employee works at outside the office in one of his/her working days, while the other days work face-to-face in the office.
- *A₃ Working 3 days away from office in week*: In this working type, the employee works at outside the office in three of his/her working days, while the other days work face-to-face in the office.
- *A₄ Working 1 week away from office in month*: In this working type, the employee works at outside the office in one week of his/her working month, while the other weeks work face-to-face in the office.
- *A₅ Working away from office all time*: It is the type of working that results in a product or service determined by the employee in his/her own home or in another place of his/her choice, excluding the employer's workplace. In this working style, the employee never goes to the office.

The proposed research model is shown in Figure 2 with its problem, criteria and alternatives.

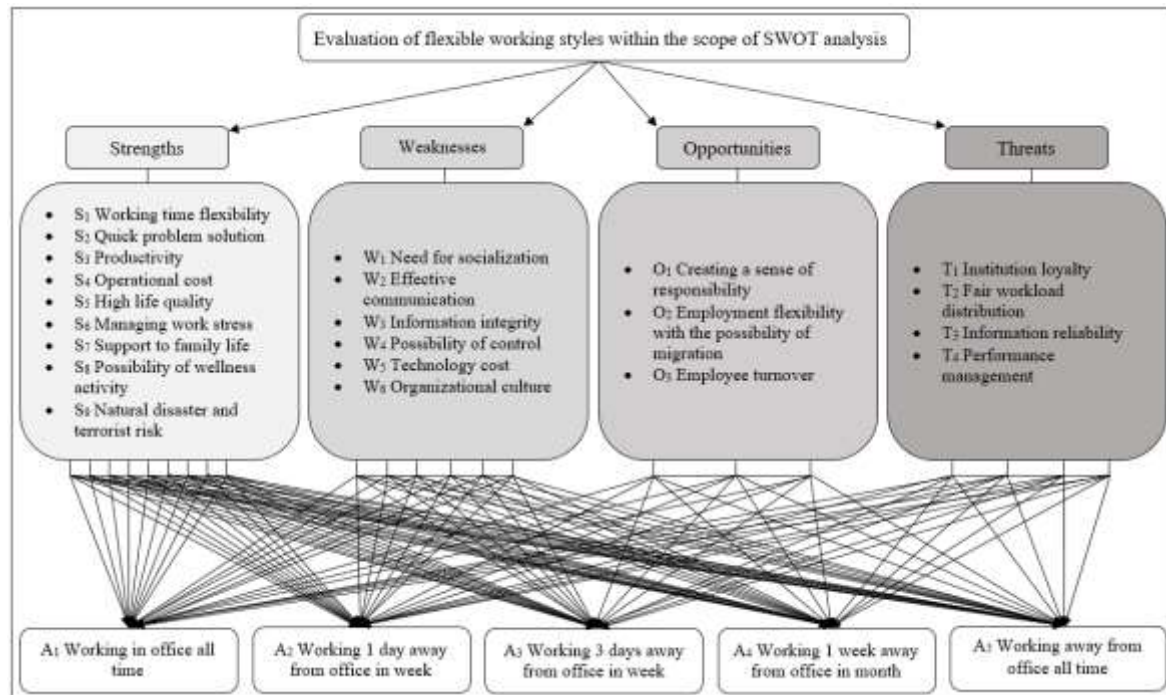


Figure 2: The proposed research model for evaluating working styles

4. Application results

In the solution phase of this study, entropy and fuzzy VIKOR methods were used successively and the problem solution was obtained. In literature, several researches used these two techniques. For example, Li et al. (2020) selected the machine tool, Narayanamoorthy et al. (2019) selected the industrial robots, Rani et al. (2019) evaluated renewable energy technologies and Zhao et al. (2013) selected the manufacturing vendor.

When the literature is examined, there is not any paper in social sciences that uses these techniques. This study is important and unique due to its application area.

The company that functioned as case study was included only in the evaluation phase of working styles according to proposed multi-criteria decision making model. All the evaluations in this study were carried out with the help of the blue-collar employees and the human resources department in the insurance company, which was taken as an example, and the tables were structured by reflecting the average values of the evaluations.

The insurance company, where this practice was carried out, had some practices related to stretching the ways of working before the idea of transition to flexible working systems was formed. In these applications, which existed before the COVID-19 pandemic, all employees had the opportunity to work remotely one day a week and to work 8 hours whenever they want between 07:00 a.m. and 07:00 p.m. on the condition of completing 8 hours of work.

In the company, it was aimed to make the flexible working conditions that were tried little by little before the pandemic even more flexible after the pandemic. Because it has been proven that with people working from home during the pandemic, things work to a great extent when working remotely. However, which of the flexible working conditions, which is obvious that it reduces the urge to feel belonging to an institution, is suitable for this company, was discussed in this research and became the subject of study conducted.

The steps of the solution phase were followed in order as follows:

The decision matrix seen in Table 2 was created with 22 dimensions of the SWOT analysis as criteria and 5 alternative flexible working styles.

Table 2. Generated decision matrix

	S ₁ Benefit	S ₂ Benefit	S ₃ Benefit	S ₄ Cost	S ₅ Benefit	S ₆ Benefit	S ₇ Benefit	S ₈ Benefit	S ₉ Cost	W ₁ Benefit	W ₂ Benefit
A ₁	20	80	60	100	50	40	20	20	100	100	80
A ₂	50	75	85	80	85	70	50	45	60	90	75
A ₃	60	60	75	60	75	90	75	70	40	70	55
A ₄	80	50	50	40	70	75	80	60	20	30	30
A ₅	85	40	40	20	40	85	90	85	10	5	5
	W ₃ Benefit	W ₄ Benefit	W ₅ Cost	W ₆ Benefit	O ₁ Benefit	O ₂ Benefit	O ₃ Cost	T ₁ Benefit	T ₂ Benefit	T ₃ Benefit	T ₄ Benefit
A ₁	85	95	80	90	30	5	30	90	75	90	85
A ₂	80	90	75	80	50	15	40	90	65	90	85
A ₃	70	80	70	65	65	25	45	60	50	75	75
A ₄	60	60	50	60	70	50	80	45	25	60	50
A ₅	50	40	15	10	80	95	95	20	35	65	70

First, the initial decision matrix was normalized with Eq. (2) and Eq. (3) according to the criteria being benefit and cost based. Then the last normalized was obtained with Eq. (4) and shown in Table 3.

Table 3. Last normalized decision matrix

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	W ₁	W ₂
A ₁	0.068	0.262	0.194	0.088	0.156	0.111	0.063	0.071	0.050	0.339	0.327
A ₂	0.169	0.246	0.274	0.109	0.266	0.194	0.159	0.161	0.083	0.305	0.306
A ₃	0.203	0.197	0.242	0.146	0.234	0.250	0.238	0.250	0.124	0.237	0.224
A ₄	0.271	0.164	0.161	0.219	0.219	0.208	0.254	0.214	0.248	0.102	0.122
A ₅	0.288	0.131	0.129	0.438	0.125	0.236	0.286	0.304	0.496	0.017	0.020
	W ₃	W ₄	W ₅	W ₆	O ₁	O ₂	O ₃	T ₁	T ₂	T ₃	T ₄
A ₁	0.246	0.260	0.099	0.295	0.102	0.026	0.322	0.295	0.300	0.237	0.233
A ₂	0.232	0.247	0.105	0.262	0.169	0.079	0.241	0.295	0.260	0.237	0.233
A ₃	0.203	0.219	0.113	0.213	0.220	0.132	0.215	0.197	0.200	0.197	0.205
A ₄	0.174	0.164	0.158	0.197	0.237	0.263	0.121	0.148	0.100	0.158	0.137
A ₅	0.145	0.110	0.526	0.033	0.271	0.500	0.102	0.066	0.140	0.171	0.192

Entropy values are obtained with the help of Eq. (5) and shown in Table 4.

Table 4. Obtained entropy values for the criteria

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	W ₁	W ₂
A ₁	-0.182	-0.351	-0.318	-0.213	-0.290	-0.244	-0.175	-0.189	-0.149	-0.367	-0.365
A ₂	-0.301	-0.345	-0.355	-0.242	-0.352	-0.318	-0.292	-0.294	-0.206	-0.362	-0.362
A ₃	-0.324	-0.320	-0.343	-0.281	-0.340	-0.347	-0.342	-0.347	-0.259	-0.341	-0.335
A ₄	-0.354	-0.296	-0.294	-0.333	-0.332	-0.327	-0.348	-0.330	-0.346	-0.232	-0.257
A ₅	-0.359	-0.266	-0.264	-0.362	-0.260	-0.341	-0.358	-0.362	-0.348	-0.069	-0.079
	W ₃	W ₄	W ₅	W ₆	O ₁	O ₂	O ₃	T ₁	T ₂	T ₃	T ₄
A ₁	-0.345	-0.350	-0.228	-0.360	-0.232	-0.096	-0.365	-0.360	-0.361	-0.341	-0.339
A ₂	-0.339	-0.345	-0.237	-0.351	-0.301	-0.200	-0.343	-0.360	-0.350	-0.341	-0.339
A ₃	-0.324	-0.333	-0.246	-0.329	-0.333	-0.267	-0.330	-0.320	-0.322	-0.320	-0.325
A ₄	-0.304	-0.297	-0.291	-0.320	-0.341	-0.351	-0.255	-0.282	-0.230	-0.291	-0.272
A ₅	-0.280	-0.242	-0.338	-0.112	-0.354	-0.347	-0.232	-0.179	-0.275	-0.302	-0.317

The entropy weight value of each criterion was calculated with the help of Eq. (6) and shown in Table 5.

Table 5. E_j , d_{ij} and w_j values

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	W ₁	W ₂
E_j	0.944	0.981	0.978	0.889	0.978	0.980	0.941	0.945	0.812	0.852	0.870
d_{ij}	0.056	0.019	0.022	0.111	0.022	0.020	0.059	0.055	0.188	0.148	0.130
w_j	0.036	0.012	0.014	0.072	0.014	0.013	0.038	0.036	0.121	0.096	0.084
	W ₃	W ₄	W ₅	W ₆	O ₁	O ₂	O ₃	T ₁	T ₂	T ₃	T ₄
E_j	0.989	0.974	0.833	0.915	0.970	0.783	0.948	0.933	0.956	0.992	0.990
d_{ij}	0.011	0.026	0.167	0.085	0.030	0.217	0.052	0.067	0.044	0.008	0.010
w_j	0.007	0.017	0.108	0.055	0.019	0.140	0.034	0.044	0.028	0.006	0.008

According to Table 5, *Employment flexibility with the possibility of migration* (O_2) is the most important criteria for deciding the working styles with 0.140 importance weight. This important criterion is followed by *Natural disaster and terror risk* (S_9) and *Technology cost* (W_5) with 0.121 and 0.108 importance weight scores, respectively. On the other hand, *Quick problem solution* (S_2) is the least important criteria for deciding the working styles with 0.002 importance weight. This criterion is followed by *Information reliability* (T_3) and *Information integrity* (W_3) with 0.006 and 0.007 importance weight scores, respectively.

After finding the importance weights of all criteria, the solution phase continues with VIKOR method for evaluating and ranking the alternatives. The decision making team evaluated all alternative working styles according to criteria with the linguistic variables shown in Table 1. Table 6 shows this linguistic evaluation matrix.

Table 6. Decision matrix created with linguistic variables

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	W ₁	W ₂
A ₁	P	G	M	VG	MP	G	P	P	G	VG	G
A ₂	G	G	G	MG	VG	G	MG	M	M	VG	G
A ₃	MG	M	MG	M	G	VG	G	MG	MP	MG	M
A ₄	G	MP	MP	MP	MG	G	MG	MG	MG	MP	MP
A ₅	M	P	MP	P	P	MG	G	MP	MP	VP	VP
	W ₃	W ₄	W ₅	W ₆	O ₁	O ₂	O ₃	T ₁	T ₂	T ₃	T ₄
A ₁	G	VG	G	VG	MG	VP	P	G	MG	VG	G
A ₂	G	VG	M	G	MG	P	MP	G	MG	VG	G
A ₃	MG	G	MG	MG	G	MP	M	MG	M	G	MG
A ₄	M	MG	G	MG	MG	MG	MG	M	P	M	M
A ₅	MP	MP	M	P	MP	G	G	P	MP	MG	MG

After formed the decision matrix with linguistic variables, *defuzzification* phase was conducted and the decision matrix formed with crisp numbers after and f^+ , f^- values were obtained. Table 7 shows all these calculation results.

Then, the weighted decision matrix formed by using importance weights of criteria that obtained by entropy method. After this calculation S , R and Q indexes are calculated and the ranking of the alternatives was found that seen in Table 8.

After all calculations, according to Table 8, *Working 3 days away from office in week* (A_3) is the most preferable flexible working style for sample insurance company. This alternative's Q index is 0.11255504. This alternative is followed by *Working 1 day remote from office in week* (A_2) and *Working away from office all time* (A_5) with 0.29998001 and 0.39098256 Q index values, respectively.

On the other hand, *Working in office all time* (A_1) is the worst alternative for sample company with 1.000 Q index value. This result is a proof that due to today's requirements and the effect of the pandemic, employees no longer want to work face-to-face in the offices for all time.

Table 7. Decision matrix formed with crisp numbers after defuzzification and f^+ , f values

	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	S ₇	S ₈	S ₉	W ₁	W ₂
w_j	0.036	0.012	0.014	0.072	0.014	0.013	0.038	0.036	0.121	0.096	0.084
A ₁	0.20	0.80	0.50	0.90	0.35	0.80	0.20	0.20	0.80	0.90	0.80
A ₂	0.80	0.80	0.80	0.65	0.90	0.80	0.65	0.50	0.50	0.90	0.80
A ₃	0.65	0.50	0.65	0.50	0.80	0.90	0.80	0.65	0.35	0.65	0.50
A ₄	0.80	0.35	0.35	0.35	0.65	0.80	0.65	0.65	0.65	0.35	0.35
A ₅	0.50	0.20	0.35	0.20	0.20	0.65	0.80	0.35	0.35	0.10	0.10
f^+	0.80	0.80	0.80	0.20	0.90	0.90	0.80	0.65	0.35	0.90	0.80
f	0.20	0.20	0.35	0.90	0.20	0.65	0.20	0.20	0.80	0.10	0.10
	W ₃	W ₄	W ₅	W ₆	O ₁	O ₂	O ₃	T ₁	T ₂	T ₃	T ₄
w_j	0.007	0.017	0.108	0.055	0.019	0.140	0.034	0.044	0.028	0.006	0.008
A ₁	0.80	0.90	0.80	0.90	0.65	0.10	0.20	0.80	0.65	0.90	0.80
A ₂	0.80	0.90	0.50	0.80	0.65	0.20	0.35	0.80	0.65	0.90	0.80
A ₃	0.65	0.80	0.65	0.65	0.80	0.35	0.50	0.65	0.50	0.80	0.65
A ₄	0.50	0.65	0.80	0.65	0.50	0.65	0.65	0.50	0.20	0.50	0.50
A ₅	0.35	0.35	0.50	0.20	0.35	0.80	0.80	0.20	0.35	0.65	0.65
f^+	0.80	0.90	0.50	0.90	0.80	0.80	0.20	0.80	0.65	0.90	0.80
f	0.35	0.35	0.80	0.20	0.35	0.10	0.80	0.20	0.20	0.50	0.50

Table 8. S, R, Q values and the ranking of alternatives

	A ₁	A ₂	A ₃	A ₄	A ₅
S	0.5830000	0.25597712	0.32959562	0.52946119	0.47595308
R (S_{max})	0.1400000	0.12004351	0.09003264	0.10803948	0.09549598
Q	1.0000000	0.29998001	0.11255504	0.59814198	0.39098256
Ranking	5	2	1	4	3

As a conclusion, if MCDM research model that proposed in this study was evaluated for selecting the most suitable flexible working styles and the most suitable alternative is found. By working remotely three days a week, the problems of frequent leave and absenteeism for employees as predicted by Harris et al. (2010) are avoided. In addition, as Crompton (2002) predicts, the flexibility of working hours prevents overtime and reduces operational costs. The risk of loneliness and weakening of social skills, which can be caused by flexible working as predicted by Soga et al. (2022), is prevented by working 3 days away and 2 days in the office. Two days spent in the office is an opportunity to experience the corporate culture and socialize. In addition, subjects such as control of administrative costs, audit and fair distribution of responsibilities, which Öztürkoğlu (2013) predicted and defined as the most important disadvantages of flexible working, are successfully achieved with a planned 2-day office work.

The results obtained with this application study are in accordance with the structure of the insurance company taken as an example. Because most of the work done in the company is individual work and teams working remotely 3 days a week will be able to complete their individual work within this period. Nevertheless, employees also have jobs that need to be in the office to a certain extent. For this reason, two office days are quite suitable for the company in terms of the structure of the company, the execution of the works and the work culture, so that the corporate belonging is not lost.

5. Conclusion

Flexible working methods, the effectiveness of which has increased due to the COVID-19 pandemic, will play a more important role in the relations between the parties involved in the working life in the near future, despite the decrease in the effect of the pandemic. The demand for flexible working methods by both employees and employers will gradually gain momentum.

This study, which was carried out with this foresight, firstly discussed flexible working styles within the concept of SWOT analysis, a multi-criteria model consisting of the strengths, weaknesses, opportunities and threats of flexible working was proposed, and 5 different working styles were evaluated according to these criteria with this proposed model.

According to evaluations of proposed model with proposed solution methodology, employees no longer want to work face-to-face in the offices for all time. For this reason, it is a necessity of our age for companies to take action to switch to flexible working models, including working conditions away from the office. This result will accelerate the emergence of new and flexible organizational structures.

For this purpose, the research model in this study, which was carried out to guide and give ideas to companies, can be further expanded by increasing the number of alternative flexible working styles and criteria, the established models can be solved with different MCDM techniques and the study can be applied for different sectors.

This study has some limitations for other companies. First of all, here is a fact that some jobs may require being physically in the office or having employees together. There are some such departments in the insurance company taken as an example in this study. It can be a problem to stretch and increase remote working in institutions where the number of such departments and this type of work is high.

In addition, each institution has its own culture. Although remote work is successful in making employees happy and has a positive impact on their living standards, it negatively affects feelings such as belonging to a team and working in a team. Although this situation poses a relatively less problem since individuality comes to the fore especially in organizations with young generation, this individual working environment may not be adopted very much, especially in organizations where the number of middle-aged employees is high.

As the demand for flexible and part-time work continues to increase in the coming period, the pursuit of flexibility in the workplace will require more creativity. This study is brought to the literature in order to guide businesses that want to find a flexible working system suitable for them.

As a result, companies that diversify their classical office work with remote work and focus on the value created by supporting the traditional working model with flexible working models such as remote working, project-based working and on-call working will thus achieve a more efficient operational structure.

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