SELECTION OF SUSTAINABLE BUSINESS MODEL DURING THE COVID-19 PANDEMIC IN SERBIA

Slavica Miletić[1]
Dejan Bogdanović[2]

[1]*Mining and metallurgy Institute Bor, MMI; e-mail:slavica.miletic@irmbor.co.rs*
[2]*Technical Faculty Bor, University in Belgrade, V. Jugoslavije 12, 19210 Bor; e-mail: dbogdanovic@tfbor.bg.ac.rs*

ABSTRACT

In order to better understand the business of companies in Serbia during the COVID-19 pandemic, ISO-Standard 45001: 2018 requires a detailed analysis. The paper presents an assessment of the impact of the consequences of COVID-19 on business using the AHP and PROMETHEE methods. Analysis of the condition of employees during COVID-19, provides an opportunity to see the socio-economic consequences of companies. The author's task is to choose a sustainable business model during the COVID-19 pandemic. The results of the research provide a picture of business models that can survive during the emergency measures caused by the COVID - 19 pandemic prescribed by the Government of the Republic of Serbia.

KEYWORDS:
COVID-19, Business, AHP and PROMETEE method

JEL: O1, O15, P51

1. INTRODUCTION

The assessment of the impact of the consequences caused by the COVID-19 pandemic on the operations of companies in Serbia is a requirement of the ISO 45001: 2018 standard. ISO 45001 is the new ISO standard for health and safety at work (OH&S). It is aimed at the top management of the company, which aims to provide a safe and healthy business environment for employees and customers. The requirement of the ISO standard is a constant analysis of employees' operations. The company's managers also need an assessment of the state of business during the pandemic caused by COVID-19.

COVID-19 is a virus of world proportions because it has spread to a large number of countries. With his appearance, it was declared a "public health emergency at the global level" (PHEIC). The coronavirus pandemic has a direct impact on public health (Paul & Chowdhury 2020). In addition to the impact on public health, the coronavirus disease 2019 caused a great economic shock everywhere in the world. For example, the COVID-19 pandemic has affected supply chains and their environmental performance, and economically sustainable growth (Chowdhury & Paul, 2020; Khan et al., 2019; Suhi et al. 2019; Paul et al.

2019; Khan et al., 2020; Moktadir et al. 2020). Many authors have conducted research on the impact of the consequences caused by COVID-19 on the business of companies.

For example. authors Bartik and his collaborators investigated the impact of COVID-19 on small and medium-sized enterprises in the United States (Bartika, et al., 2020); Impact of the pandemic caused by COVID-19, an analysis of the behavior of companies and consumers was performed (Donthu & Gustafsson 2020); Impact in the food and beverage industry from the consequences caused by COVID-19 (Chowdhury T. et al., 2020).

The Decree on Measures for the Prevention and Control of Infectious Diseases COVID-19 was published in the "Official Gazette of the RS", No. 151/2020. The regulation shows and determines all appropriate measures for overcoming infectious diseases and the manner of implementation of all measures for the protection of employees.

The spread of the pandemic caused by COVID-19, the business of companies is leading to uncertainty in Serbia. Covid -19 poses a growing threat to the economy and investments around the world. Today's modern business poses a serious global economic threat as a whole with the spread of the Corona virus pandemic. As the current situation requires, we see how company managers implement all measures prescribed by the Government of the Republic of Serbia, to protect employees and mitigate financial danger.

Taking into account the situation with COVID-19, the paper evaluates the impact of the consequences of the pandemic COVIDA - 19 companies in order to choose a sustainable business model. Because it is an estimation problem and appears to be a suitable AHP method (Analytical Hierarch Process) (Saaty, 1980) for evaluating the criterion. The PROMETEE method (Preference Ranking Organization Method for Enrichment Evaluation) was used to assess and select the most favorable alternative (Brans, et al., 1986; Benoit & Rousseaux, 2003). Each impact factor needs to be considered and the most favorable one to do business during a pandemic. The analysis was done using Super Decision (AHP) and Visual PROMETHEE (PROMETHEE) software.

AHP and PROMETEE methods belong to multi-criterion decision-making (MCDM) methods. The literature shows that due to the rapid development of operational research, there are many different MCDM methods such as: PROMETHEE (Brans & Vincke, 1985), ELECTRE (Roy, 1968), AHP (Saaty, 1977; Saaty 1980), TOPSIS (Hwang & Yoon, 1981).), VIKOR (Opricović, 1998) and others.

Recently, new MCDM methods have appeared, such as: SVARA method Kersuliene, 2010), FARE (Ginevičius, 2011), MULTIMOORA (Brauers & Zavadskas, 2010), MUSA, (Grigoroudis & Siskos, 2002), EDAS method, 2015) and others.

In a number of studies, MCDM methods have been successfully used for the purpose of: Assessing progress towards the goals of the Europe 2020 strategy using the MULTIMOOR method (Fedayev 2020), Assessment and selection of staff (Yalçın & Yapıcı Pehlivan 2019); Bogdanović & Miletić, 2014); selection of the optimal method of remediation of degraded areas (Bogdanović et. al., 2014); assessment of organizational culture (Miletić et.al., 2020) and others.

2. MATERIAL AND METHODS

In order for managers to have an approximate business situation during the COVID-19 pandemic in the coming period, an assessment of the impact of the consequences on the choice of a sustainable model was given. The results of the research are possible sustainable models that would serve other companies as a model for overcoming the socio-economic crisis during the pandemic COVID - 19. Sustainable models would meet the requirements of

the ISO 45001: 2008 standard, and provide managers and stakeholders with information and guidelines for further successful business.

Stakeholders can get the following information: managers on profit and sustainable business, employees on earnings and survival at work, suppliers on sustainable cooperation, customers on quality and sustainable price of products, community on sustainable environment, owners on profit and survival of the company (Miletić et al., 2015). The goal of all stakeholders is to mitigate the economic and social consequences of the pandemic caused by COVID - 19. Given the continued spread of the COVID-19 pandemic, it is important that society as a whole take action to prevent further transmission of the disease, as well as to support control measures (Bender, 2020).

The pandemic caused by COVID -19 has caused consequences that cause employees reduced work capacity, weakening of concentration, which leads to a reduction in business volume and job loss, which means a massive socio - economic crisis (Miletić & Stanojević Šimšić, 2020).

Business alternatives caused by the consequences caused by the COVID-19 pandemic are:

Alternative A1- Mass layoffs and company closures. Company closures in the United States were 43% and active employment fell to 39%. A special and sharp decline was in the Mid-Atlantic region, including New York, where 54% of employment fell and 47% of companies closed (Bartika, et a., 2020). This is just one example of many. Everywhere in the world, the pandemic caused by COVID-19 led to the closure and dismissal of workers. Tourist, catering companies, airlines and food processing companies suffered the most. COVID-19 has significantly influenced education, scientific organizations, fashion, clothing and other retail sectors.

Alternative A2- Risk of permanent closure of the company due to long-term crisis - financial collapse. This alternative plays a central role in the company's strategy during the COVID-19 pandemic. Managers' expectations were that companies would open more than they closed. The crisis has been going on for more than a year and there is still great uncertainty as to when it will end. Thus, uncertainty causes the company to close permanently. 50% of respondents in the Middle States thought that the crisis would last until mid-June, but the crisis has lasted and still lasts (Bartika, et al., 2020). Many companies made the wrong forecast about the ongoing crisis and experienced a financial collapse because they had small stocks of cash. In two weeks, the cash of the stock for the necessary expenses was used up. The companies were optimistic that they would remain open until the end of the year. The evolution of the crisis allows managers to believe and expect the call for a pandemic decision.

Alternative A3- The survival of the company.

Due to the consequences of the COVID-19 pandemic, companies are losing markets, reducing the processes of products and services. Managers make fact-based decisions for the company's survival. They take some of the following measures: downsizing, which means reducing the workforce, reducing the volume of work, abolishing certain departments and retraining employees.

Alternative A4- Work of companies with a stimulus package provided by the state (minimum work with state social assistance). Many companies took advantage of stimulus packages prescribed by the Government of the Republic of Serbia during the COVID-19 pandemic. Analysis of medium-sized companies shows that over 70% of respondents expected to use the assistance program offered by the Government that looks like a salary (Bartika, et al., 2020). Most business owners have taken out loans in the form of loans to ensure the company's liquidity. Company liquidity is important for owners. Such financing

also affected other jobs and qualities of managers, such as the survival of the company and the dismissal of employees.

All previous alternatives need to be considered and assessed which is viable for the company's business while the state of uncertainty persists. The evaluation of alternatives is performed using the PROMETHEE method and the criterion by AHP analysis. As a result, a mutual assessment of the criterion and an assessment of each criterion individually with each alternative is necessary. By assessing the criterion and alternatives, we obtain possible sustainable business models during the pandemic caused by COVID-19.

The hierarchy of solutions to this problem has three levels:

1. LEVEL I - the goal is to assess and select the most favorable business alternative during a pandemic caused by COVID-19.

2. LEVEL II evaluation of criterion, and

3. LEVEL III assessment of alternatives.

The criterion that has an impact on the choice of the best alternative for the company's operations are determined on the basis of the analysis of the consequences of the employees caused by COVID 19 (Table 1).

Table1. *The criterion*

The criterion	Operation	Connotation
C_1	Digital technology	The impact of digital business is very important for companies and many authors call it industrial revolution (Degrise, 2016; Tihinen, Iivari, et al., 2016). Digital technologies bring a new era of business, the digital age. The digital age has been identified as one of the most important trends changing current business (Tihinen, et al., 2016) and especially during the COVID-19 pandemic. The analysis of employees in one scientific organization shows that 49.9% could do housework with the help of digital technology, 34.8% depending on the job and only 16.3% did work in the organization (Miletić and Stanojević, Šimšić, 2020) .
C_2	Increased costs	Operating costs during the COVID-19 pandemic may increase depending on the increase in taxes and contributions for employees, duties and taxes paid by the company.
C_3	Reduced consumption	During the COVID-19 pandemic, a large number of employees at many companies did their work from home. Thus, the consumption of electricity and water has been reduced.
C_4	Reduced offer of services and sales	The offer for services and sales to users during the COVID-19 pandemic was reduced due to special measures of the Government of the Republic of Serbia (movement prohibited, etc.).
C_5	Reduced revenue	Due to the weak purchasing power of consumers of products and services, the price of products and services decreases. Reducing the demand for a product and service reduces the price and thus the profit. Example of services: The International AIR

		Transport Association estimates that the pandemic cost global air transport between $ 63 billion and $ 113 billion in 2020 alone, which means that revenue has decreased so much (Segal and Gerstel, 2020). Product example: The price of crude oil has fallen by about 70% since the beginning of the year due to the price war and declining demand. https://www.mainstream.rs/uticaj-covid-19-na-globalnu-ekonomiju-i-kako-cloud-moze-da-pomogne/
C_6	Disturbed supply chains	The pandemic caused by COVID-19 has brought risks to supply chains because disruption can affect their sustainability (Moktadir et.al., 2018).
C_7	Changing user (consumer) behavior	The behavior of users (consumers) is changing due to poor communication with users. It becomes difficult to contract jobs and collect receivables from customers. Users use little or no digital technology.

3. AHP-PROMETHEE CONTROL METHOD

Analytical hierarchical process, the AHP method has a strong mathematical basis and was chosen for a quality economic assessment of the criterion that affect the business of companies during the COVID-19 pandemic. The process of choosing the most favorable alternative and determining the criterion is important for making the final decisions of the manager. The AHP and PROMETHHE process gives us the opportunity to find possible sustainable business models of companies. Sustainable business models provide guidance to managers on how and how to overcome the current crisis caused by the COVID - 19 pandemic.

AHP is a decision support system (DSS). Thomas Saaty gave the conceptual and mathematical setting of the AHP (Saaty, 1980). The AHP process belongs to the class of methods for soft optimization. This method belongs to the methods of multi-criterion decision-making and is based on the decomposition of a complex problem into a hierarchy where both qualitative and quantitative aspects of the problem are included. It consists of a goal, a criterion, perhaps a sub-criterion and an alternative. The goal is at zero level, the highest level since you start. The criteria are at the first level and the sub-criteria are below them. The alternatives offered are on another level, a lower level. The criteria are compared with each other in pairs in relation to the zero level, the higher level. A further procedure is to compare each criterion with each alternative in relation to the goal, the lower level.

Authors Saaty, 1986; Harker & Vargas, 1987; and Alphonce, 1997; have defined the axioms on which the AHM method is based:

Reciprocity which reads: element A if n times more significant than element B, then element B is 1/n times more significant than element A.

Homogeneity is if the elements are comparable by comparison and significance if not then there is no effect.

Dependence, if the comparison is lower, it depends on the goal, the higher level.

The expectation when changing the structure of the hierarchy is normal that there is a re-prioritization of calculation in the new hierarchy.

The comparison of criteria and alternatives is done with the help of Satie's scale (Table 1).

Table1. *Satie's scale for evaluating the two elements j and k in relation to the target*

$$S=\left\{\frac{1}{9},\frac{1}{8},\frac{1}{7},\frac{1}{6},\frac{1}{5},\frac{1}{4},\frac{1}{3},\frac{1}{2}, 1,2,3,4,5,6,7,8,9\right\}\left\{\frac{1}{9},\frac{1}{8},\frac{1}{7},\frac{1}{6},\frac{1}{5},\frac{1}{4},\frac{1}{3},\frac{1}{2}, 1,2,3,4,5,6,7,8,9\right\}$$

Value a_{jk}	Interpretation of results
1	The elements j and k are equally important
3	The element j is somewhat more important than k
5	The element j is more important than k
7	The element j is very important than k
9	The element j is absolutely more important than k
2,4,6,8	Intermediate values between two elements

The results of the comparison criteria placed in the matrix have the following form:

$$W=\begin{bmatrix}\frac{w_i}{w_j}\end{bmatrix}=\begin{bmatrix}\frac{w_1}{w_1} & \frac{w_1}{w_2} & \cdots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \cdots & \frac{w_2}{w_n} \\ \cdots & \cdots & \cdots & \cdots \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \cdots & \frac{w_n}{w_n}\end{bmatrix}\begin{bmatrix}\frac{w_i}{w_j}\end{bmatrix}=\begin{bmatrix}\frac{w_1}{w_1} & \frac{w_1}{w_2} & \cdots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \cdots & \frac{w_2}{w_n} \\ \cdots & \cdots & \cdots & \cdots \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \cdots & \frac{w_n}{w_n}\end{bmatrix} \dots \dots (1)$$

Furthermore, the pairs of alternative A are compared with respect to each criterion, thus obtaining a comparison matrix A in which the element a_{ij} represents the ratio of the weight coefficient of alternative Ai in relation to alternative Aj.

$$A=\begin{bmatrix}a_{ij}\end{bmatrix}=\begin{bmatrix}1 & a_{12} & \cdots & a_{1n} \\ \frac{1}{a_{12}} & 1 & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ a_{1n} & a_{2n} & \cdots & 1\end{bmatrix}\begin{bmatrix}a_{ij}\end{bmatrix}=\begin{bmatrix}1 & a_{12} & \cdots & a_{1n} \\ \frac{1}{a_{12}} & 1 & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ a_{1n} & a_{2n} & \cdots & 1\end{bmatrix} \dots \dots (2)$$

The elements A_{ij} represent the relationship between the weighting coefficients w_i / w_j where w is the weight vector of each alternative.

$$w=\frac{w_i}{w_j}=\frac{w_i}{w_j} \dots \dots (3)$$

Matrix has a reciprocal properties, which are:

$$a_{ji}=\frac{1}{a_{ij}}\frac{1}{a_{ij}} \dots \dots (4)$$

After the comparison, the weight coefficients w are calculated, which is calculated on the basis of the Satie scale in two steps..

$$w = [w_1, w_2, . . . ,w_n] \dots \dots (5)$$

First, a matrix comparing pairs normalize, and then calculate the weight.

$A = [a_{ij}]_{nxn}$ ………………………………………..………..(6)

Normalization is performed as follows:

$$a_{ij}^* = a_{ij} \Big/ \sum_1^n a_{ij} \qquad a_{ij}^* = a_{ij} \Big/ \sum_1^n a_{ij}$$

…………………….......................………………………….(7)

For everything $j = 1, 2, ... , n$.

The weight coefficient is calculated:

$$w_i w_i = \sum_1^n a_{ij}^* \Big/ n = \sum_1^n a_{ij}^* \Big/ n$$

……………………….......................………………………….(8)

For everything $j = 1, 2, ... , n$.

After comparison, the degree of consistency is checked. The degree of consistency has a value less than 0.1. Otherwise, the values entered in the comparison matrix must be reconsidered.

In order to calculate the degree of consistency, the consistency index is first calculated according to the formula:

$$CI = (\lambda_{max} - n) \Big/ (n - 1) \qquad CI = (\lambda_{max} - n) \Big/ (n - 1)$$

………………………………… (9)

λ_{max} represents a significant parameter in the AHP method. λ_{max} is used as a reference index to display information in consistency degree (CR) calculations. The rule is that the closer λ_{max} x is to the number n, the lower the consistency will be.

CR is calculated according to the formula:

$$CI = \frac{CI}{RI} \qquad CI = \frac{CI}{RI}$$ ……………….......................……………………………………………… (10)

RI is a random consistency index taken from Table 2. In Table 2, the first row represents the row of the matrix, and the second the random indices.

Table 2. *Random indices (Saaty, 1980)*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0,0	0,0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48	1,56	1,57	1,59

If the degree of consistency (CR) is less than 0.10 the result is correct, in case it is greater than 0.1 then a re-analysis of the inconsistency is required until we get that the degree of consistency is less than 0.1.

PROMETHEE is a ranking method for a finite number of alternatives (Brans et al., 1984). In this method, the appropriate preference function is firstly determined, and then the weight of coefficients for each criterion is determined. The preference function determines the way in which a certain alternative is ranked in relation to another and translates the deviation between two comparative alternatives into a unique parameter that is related to the degree of preference. The degree of preference represents a growing function of deviation. If the deviation is small it refers to a weak preference, while otherwise, if the deviation is large it

represents a strong preference of the alternative. There are six forms of preference functions (Usual, U-shape; V-shape; Level, Linear, Gaussian), each form depending on two thresholds of indifference (Q and P). The indifference threshold (Q) represents the largest deviation that the decision maker considers irrelevant, while the preference threshold (P) represents the smallest deviation that is considered decisive for the decision maker, where P must not be less than Q. The Gaussian threshold (s) represents the mean value of the thresholds P and Q, (Brans, 1982; Brans & Vincke, 1985).

The PROMETHEE method is based on determining the positive flow (Φ +) and negative flow (Φ-) for each alternative according to outranking relations, and in accordance with the obtained weight coefficients for each criterion. The positive flow of preference expresses how much a certain alternative dominates in relation to other alternatives, so if the value is higher ($\Phi + \rightarrow 1$) the alternative is more significant.

The negative flow of preference expresses how much a particular alternative is preferred by other alternatives. The alternative is more significant if the value of the output the flow is smaller ($\Phi- \rightarrow 0$). Complete ranking (PROMETHEE II) is based on the calculation of net flow (Φ), which represents the difference between positive and negative flow of preference. The alternative that has the highest net flow value is the best ranked (Anand & Kodali, 2008).

4. A REAL EXAMPLE OF A HYBRID METHOD

The proposed methodology considers the assessment and selection of the most favorable business alternative in companies during a pandemic caused by COVID-19. Due to the COVID-19 pandemic, company managers are forced to reduce their business.

Figure2. *Schematic representation of the proposed method*
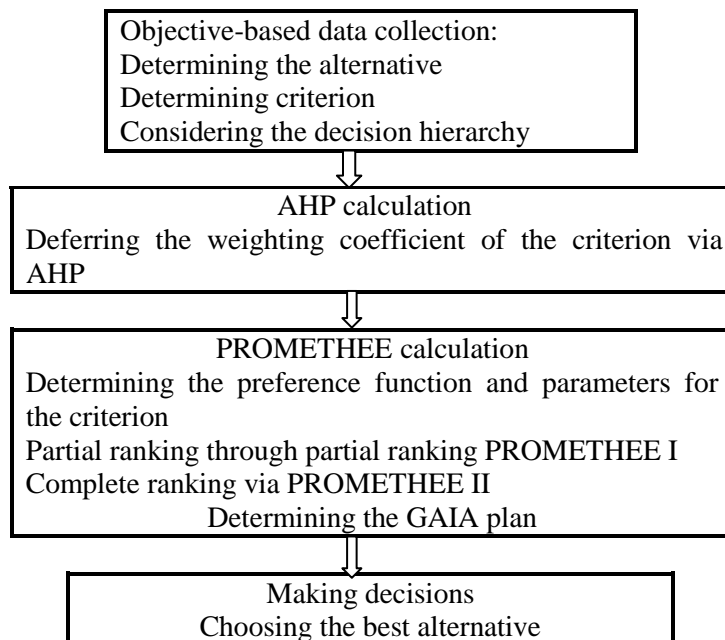
(Bogdanović & Miletić, 2014)

4.1. Ahp calculation

Based on the hierarchy, the weight coefficients of the criterion are firstly calculated using the AHP method - Figure 3.

Let A = {A1, A2, A3, A4} be a set of given alternatives and C = {C1, C2, ..., C7} a set of selection criterion. The decision maker forms an individual matrix of pair comparisons using a scale (Table 1).

Table 3. Shows a 7x7 comparison matrix to express the empirical assessment of the decision maker.

The results are given in Figure 4. The figure shows that the most influential criterion is C2 (Increased costs), followed by criterion C3 (Reduced consumption) and criterion C6 (Disturbed supply chains). Other criteria have a significantly smaller impact on the ranking results of alternatives.
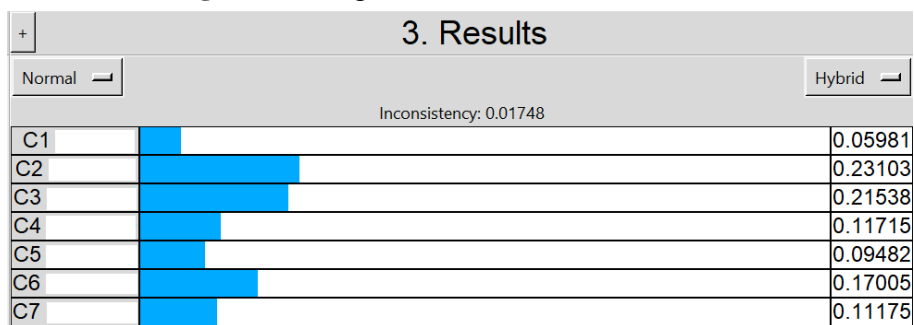
Figure 3. *Hierarchy of AHP methods*
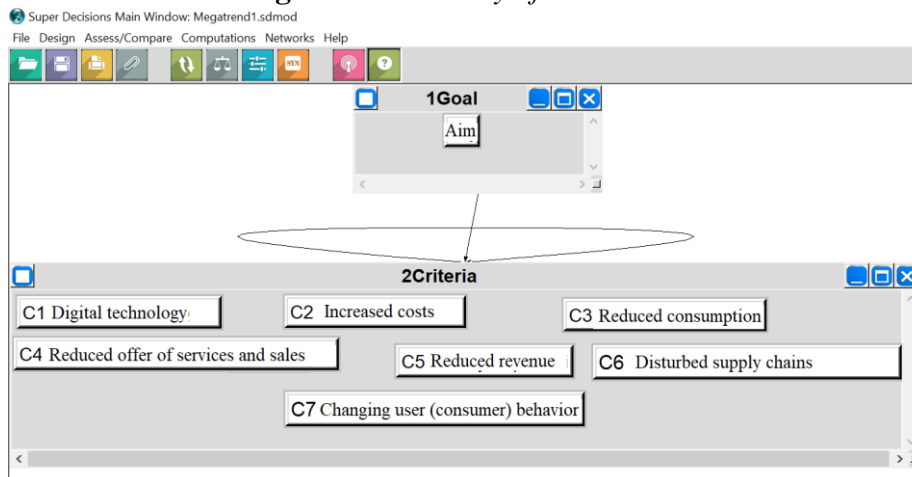
Table 3. *Pair comparison matrix*

Criterion	C_1	C_2	C_3	C_4	C_5	C_6	C_7
C_1	1	1/3	1/3	1/2	1/2	1/3	1/2
C_2		1	1	2	3	1	3
C_3			1	2	3	1	2
C_4				1	1	1	1
C_5					1	1/2	1
C_6						1	1
C_7							1

Figure 4. Weight coefficients of the criterion

4.2. Promethee calculation

Based on the criterion, the evaluation of alternatives is performed and an evaluation matrix is formed. In this process, the criterions have a qualitative or uncertain structure that cannot be precisely determined and measured. Table 4 gives a qualitative scale that has five levels, as well as the corresponding numerical values for each qualitative assessment.

Table 4. *Qualitative scale*

Qualitative values	Very weak	Low	Medium	High	Very high
Numerical values	1	2	3	4	5

The evaluation of the four alternatives according to the above criterion is shown in Table 5.

Tabela 5. *Evaluation matrix*

Criterion	C_1	C_2	C_3	C_4	C_5	C_6	C_7
Unit	-	-	-	-	-	mm/t	%
Max/min	max	min	min	min	min	min	min
Weight coefficient	0.0598	0.2310	0.2154	0.1172	0.0948	0.1700	0.1118
Function preferences	Level	Level	Level	Level	Level	Level	Level
A_1	3	5	4	4	4	4	3
A_2	3	5	5	4	5	3	3
A_3	4	4	3	3	3	3	3
A_4	4	2	2	3	3	4	3

After forming the evaluation matrix, the evaluation of alternatives is performed using the Visual PROMETHEE software. Table 6 shows the values of positive ($\Phi +$), negative ($\Phi-$) and net flows (Φ).

Complete ranking of alternatives was performed using PROMETHEE II (Figure 5). The values of net flows from the last column of Table 6 were used.

Table 6. *PROMETHEE preference flows*

Alternative	Φ^+	Φ^-	Φ
A1	0,0000	0,0952	-0,0952
A2	0,0000	0,2381	-0,2381
A3	0,0952	0,0476	0,0476
A4	0,2857	0,0000	0,2857

The results show that the best alternative is A4 (operation of companies with a stimulus package provided by the state), while the others are ranked in the following order: A3 (survival of the company), A1 (mass relaxation of workers and closure of the company) and A2 (Risk of permanent closure due to a prolonged crisis - financial collapse).

The convenience of this software package is reflected in the implementation of the GAIA plan. Based on the GAIA plan, it is possible to easily determine the discriminatory force of

each criterion, aspects of consistency and inconsistency as well as the quality of each alternative by every criterion. The eccentricity of the position of the criterion represents the strength of the influence of that criterion, while the agreement between the individual criterions is defined by approximately the same orientation of the axes of those criterions. In the ranking, the agreement was found between criteria C5, C3 and C2, while the other criterions are evidently not consistent with the other entire criterion. Also, the position of the alternative determines its strength or weakness in relation to the criterion.

Figure 5. *PROMETHEE II complete ranking of alternatives*
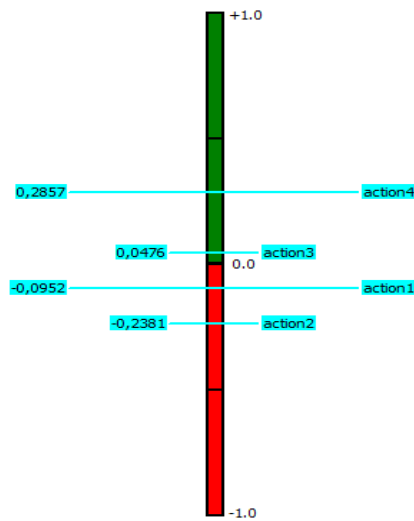
If it is closer to the direction of the axis of a certain criterion, the alternative itself is better according to that criterion. Alternative A3 in Figure 6 is the best option, because it is closest to the direction of the axis of those criterions that have the greatest impact (C3 and C2) and is closest to the direction of the decision stick pi, which defines the compromise solution according to the given weighted criterion. In contrast, alternative A2 is the worst option because it is located opposite the direction of the decision rod pi.

Figure 6. *GAIA plan*
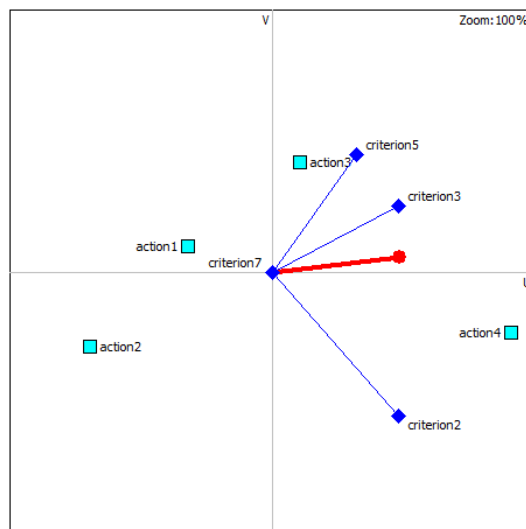
5. CONCLUSION

This paper provides an assessment of the impact of the consequences of COVID-19 on the business of companies. Assessing and selecting the optimal sustainable business model is one of the most important decisions during a pandemic. Choosing an appropriate sustainable business model requires consideration of a number of criteria. An integrated AHP and PROMETHEE method was applied in the proposed approach to assess and select a sustainable business model during a COVID-19 pandemic. In this example, AHP is used to determine the weighting coefficients of the criterion. The PROMETHHE method is applied for complete ranking of alternatives where it uses weights obtained by the AHP method that have a low degree of subjectivity. PROMETHEE uses the preference function of each criterion. PROMETHEE I give partial ranking while PROMETHE II provides full ranking. The GALA plan provides an opportunity to determine the discriminatory force of each criterion, aspects of agreement and disagreement. Based on the Gala Plan, the quality of each alternative is determined according to each criterion.

Based on the obtained results of alternatives A3, the survival of the company is the best option. Alternative A3 is closest to the direction of the axis of those criterions that have the greatest impact C3 (reduced consumption) and C2 (increased costs). A3 is the closest in the direction of the decision stick pi, because it defines a compromise solution in accordance with the given weighted criterion. While alternative A2 (risk of permanent closure of the company due to a long-term crisis - financial collapse) is the worst option because it is located opposite to the direction of the decision stick pi.

The proposed model was applied to the problem of assessing and selecting sustainable business models of companies during the emergency measures caused by the COVID-19 pandemic adopted by the Government of the Republic of Serbia.

ACKNOWLEDGMENTS

REFERENCE

Anand., G., & Kodali., R. (2008). Selection of lean manufacturing systems using the PROMETHEE, *Journal of Modelling in Management* 3 (1) p.40-70.

Bartika, W.A., Bertrandb, M., Cullenc,Z., Glaeserd, L.E., Lucac. M., and Stanton, C. (2020). The impact of COVID-19 on small business outcomes, *PNAS,* 17656–17666 Vol. 117 no. 30. https://www.pnas.org/lookup/suppl/

doi:10.1073/pnas.2006991117/-/DCSupplemental.y

Benoit, V., & Rousseaux, P. (2003). Aid for Aggregating the Impacts in Life Cycle Assessment. *The International Journal of Life Cycle Assessment*, 8(2), pp. 7482

Bender , L.(2020). Emergency Education UNICEF New York

Bogdanović, D., Obradović, Lj., Miletić, S. (2014).   Selection the optimum method of rehabilitation the degraded areas around the Bor River downstream from the flotation

tailing dump Bor. *Journal Mining and Metallurgy Engineering Bor,* Vol. 4, pp. 137-156. ISSN 2334-8836.

Bogdanović, D., & Miletić, S. (2014). Personnel evaluation and selection by multicriterion decision making method. Journal of Economic Computation and Economic Cybernetics Studies and Research, Vol. 48(3), pp. 179-196.

Brans, J.P. (1982). *L'ingénièrie de la décision; Elaboration d'instruments d'aide à la décision. La méthode PROMETHEE*. In R. Nadeau and M. Landry, editors, L'aide à la décision: Nature, Instruments et Perspectives d'Avenir, Québec, Canada. Presses de l'Université Laval, pp. 183-213.

Brans J.P., Mareschal B. & Vincke P.H.(1984). PROMETHEE: A new family of outranking methods in multi-criterion analysis, *Operational Research,* North-Holland, Amsterdam, p.477-490.

Brans, J.P., Vincke, P.H., Mareschal, B., (1986). How to select and how to rank projects–the PROMETHEE method. *European Journal of Operational Research* 24, pp. 228 -238.

Brans, J. P. and Vincke, P., (1985). Note—A Preference Ranking Organisation Method: (The PROMETHEE Method for Multiple Criterion Decision-Making). *Management science*, 31(6), pp. 647-656

Brauers, W.K.M., & Zavadskas, E.K., (2010). Project management by MULTIMOORA as an instrument for transition economies. *Technological and Economic Development of Economy*, 16(1), pp. 5-24

Chowdhury., P. Paul, S.K. (2020). Applications of MCDM methods in research on corporate sustainability: a systematic literature review. *Manag Env Qual* 31:385–405. https://doi.org/10.1108/MEQ-12- 2019-0284

Chowdhury, T., Sarkar, A., Paul, K.S., & Moktadir, A., (2020). A case study on strategies to deal with the impacts of COVID-19 pandemic in the food and beverage industry, *Operations Management Research,* https://doi.org/10.1007/s12063-020-00166-9. Springer Science+Business Media, LLC, part of Springer Nature 2020.

Degryse, C. (2016). *Digitalization of the economy and its impact on lab our markets*. Publisher: ETUI aisbl, Brussels.

Donthu, N., and Gustafsson, A., (2020). Effects of COVID-19 on business and research, *Elsevier Journal of Business Research,* Vol. 117, 284-289.

Ginevičius, R., (2011) A new determining method for the criterion weights in multicriterion evaluation. *International Journal of Information Technology & Decision Making*, 10(6), pp. 1067-1095

Grigoroudis, E. and Siskos, Y., (2002) .Preference disaggregation for measuring and analysing customer satisfaction: The MUSA method. *European Journal of Operational Research,* 143(1), pp. 148-170

Ghorabaee, M.K. Zavadskas, E. K. Olfat, L. & Turskis, Z., (2015). Multi-Criterion Inventory Classification Using a New Method of Evaluation Based on Distance from Average Solution (EDAS). *Informatica*, 26(3), 435-451.

Kersuliene, V. Zavadskas, E. K. and Turskis, Z., (2010). Selection of rational dispute resolution method by applying new step-wise weight assessment ratio analysis (SWARA). *Journal of Business Economics and Management*, 11(2), pp. 243-258.

Fedajev, A., Stanujkic, D., Karabašević, D., Brauers, WKM., Zavadskas, EK. (2020). Assessment of progress towards "Europe 2020" strategy targets by using the MULTIMOORA method and the Shannon Entropy Index, *Journal of Cleaner Production* 244, 118895

Hwang, C. L. and Yoon, K., (1981) *Multiple Attribute Decision Making Methods and Applications*. Springer-Verlag, Heidelberg.

Khan, SAR., Sharif, A., Golpîra, H., Kumar., A. (2019). A green ideology in Asian emerging economies: from environmental policy and sustainable development. *Sustain Dev* 27:1063–1075. https://doi.org/10. 1002/sd.1958.

Khan, SAR, Zhang, Y., Kumar, A., Zavadskas, E., Streimikiene, D. (2020). Measuring the impact of renewable energy, public health expenditure, logistics, and environmental performance on sustainable economic growth. *Sustain Dev in press* 28:833–843. https://doi.org/10. 1002/sd.2034

Moktadir, M.A., Dwivedi, A., Rahman, A., Jabbour, C., Paul, S.K., Sultana, R., Madaan, J. (2020). An investigation of key performance indicators for operational excellence towards sustainability in the leather products industry. *Bus Strateg Environ in press.* https://doi. org/10.1002/bse.2575.

Miletić, S., Bogdanović, D., Paunković, J. (2015). Selection the optimal model of integrated sustainable management system in the mining companies. *Journal Mining and Metallurgy Engineering Bor*, Vol. 2, стр. 181-204. ISSN 2334-8836.

Miletić, S., Stanojević, Š.Z., Jovanović, I., Radivojević, M., Conić, V.(2020). AHP analysis of organizational culture in textile companies in Serbia, In: *Industria Textila,* 71, 2, 124–131, http://doi.org/10.35530/IT.071.02.1588

Miletć, S., Stanojević Šimšić, Z. (2020). Analysis of the state of employees due to the covid-19 pandemic: a case study, *Innovation as an initiator of the development "innovations – basis for development"*, 130-148, ISBN 978-86-84531-50-8.

Moktadir, MA., Rahman, T., Rahman, MH., Ali, SM., Paul, SK. (2018). Drivers to sustainable manufacturing practices and circular economy: a perspective of leather industries in Bangladesh. *J Clean Prod* 174:1366–1380. https://doi.org/10.1016/j.jclepro.2017.11.063.

Opricovic, S. (1998) *Multicriterion optimization of civil engineering systems*. Faculty of Civil Engineering, Belgrade.

Paul, SK, Chowdhury, P. (2020). A production recovery plan in manufacturing supply chains for a high-demand item during COVID-19. *Int J Phys Distrib Logist Manag* 1-22. https://doi.org/ 10.1108/IJPDLM-04-2020-0127.

Paul A, Moktadir MA., & Paul SK (2019). An innovative decision-making framework for evaluating transportation service providers based on Chowdhury T. et al. sustainable criterion. *Int J prod res* 1–19. https://doi.org/10.1080/ 00207543.2019.1652779.

Roy, B., (1968). Classement et choix en présence de points de vue multiples. Revue française d'automatique, d'informatique et de recherche opérationnelle. *Recherche opérationnelle*, 2(1), pp. 57-75.

Saaty, T. L., (1977). A scaling method for priorities in hierarchical structures. *Journal of mathematical psychology,* 15(3), pp. 234-281

Saaty, T. L. (1980). *The Analytic Hierarchy Process*. McGraw Hill Company, New York.

Segal, S., Gerstel, D. (2020). The Global Economic Impacts of COVID-19. https://www.csis.org/analysis/global-economicimpacts-covid-19.

Suhi, SA., Enayet, R., Haque, T., Ali, SM., Moktadir, MA., Paul, SK. (2019). Environmental sustainability assessment in supply chain: an emerging economy context. *Environ Impact Assess Rev* 79:106306. https://doi.org/10.1016/j.eiar.2019.106306.

Tihinen, M., Iivari, M., Ailisto, H., Komi, M., Kääriäinen, J., & Peltomaa, I. (2016). An Exploratory Method to Clarify Business Potential in the Context of Industrial Internet – A Case Study. In: Afsarmanesh H., Camarinha-Matos L., Lucas Soares A. (eds) Collaboration in a Hyperconnected World. PRO-VE 2016. IFIP Advances in Information

and Communication Technology, vol 480. Springer, Cham, 469-478. https://doi-org-443.webvpn.jnu.edu.cn/10.1007/978-3-319-45390-3_40

Yalçın, N., & Yapıcı Pehlivan N., (2019). The WS PLP Approach Application of the Fuzzy CODAS Method Based on Fuzzy Envelopes for Hesitant Fuzzy Linguistic Term Sets: A Case Study on a Personnel. Selection Problem. Journal SymmetrySymmetry, 11, 493; doi:10.3390/sym11040493. www.mdpi.com/ journal/symmetry