ANALYSIS OF TRADE EFFICIENCY IN SERBIA
BASED ON THE MABAC METHOD

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Abstract: In recent times, as it is well known, various methods of multi-criteria analysis are increasingly used in order to evaluate the efficiency of companies more accurately. One of them is the MABAC method. With this in mind, this paper analyzes trade efficiency in Serbia on the basis of this method. Trade in Serbia was the most efficient in the observed period (2013 - 2020) in 2020. The general conclusion is that recently, under the positive influence of numerous macro and micro factors, trade efficiency in Serbia has increased. The impact of Covid-19 on trade efficiency in Serbia is negligible. It has been largely compensated by increased electronic sales.

Key words: efficiency, determinants, Serbian trade, MABAC method.

INTRODUCTION

Recently, various (new) methods of multicriteria analysis have been developed (Mathew, 2018; Timiryanova, 2020; Okwu, 2020; Singh, 2020; Pachar, 2021; Brezović, 2021; Tsai, 2021) in order to more realistically evaluate the efficiency (and other performance measures) of companies. One of these methods is the MABAC (Multi-Attributive Border Approximation area Comparison) method (Pamučar, 2015; Božanić, 2016; Boyanic, 2019, 2020; Işik, 2020; Nedeljković, 2021). In this paper, as a subject of research, the analysis of trade efficiency in Serbia is performed on the basis of the MABAC method. The goal and purpose of this research is to determine the most realistic situation as a

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basis and precondition for taking appropriate measures in the function of improving trade efficiency in Serbia in the future.

The world is increasingly rich in literature dedicated to the analysis of trade efficiency based on various methods of multi-criteria analysis (Ersoy, 2017). This is also the case with the literature in Serbia (Lukic, 2011a, b, 2018, 2019, b, 2020a, b, c, d, 2021a,b,c,d,e,f). However, in the literature of Serbia, there is, as far as we know, no complete work dedicated to the evaluation of trade efficiency using the MABAC method. This paper fills that gap to some extent. This, among other things, reflects its scientific and professional contribution.

1. MATERIALS AND METHODS

For the purposes of researching the problem treated in this paper, empirical data were obtained from the Agency for Business Registers of the Republic of Serbia in accordance with relevant international standards. There are no restrictions on comparability at all levels.

The research methodology is based on the use of the MABAC method. To a certain extent, statistical analysis was used as a whole for the treatment of the issue.

MABAC (Multi-Attribute Border Approximation area Comparison) is a newer method of multi-criteria decision making developed by Pamucar and Cirovic (2015). The main feature of this method is in defining the distance of the criterion function of each observed alternative from the limit approximate value. The mathematical formulation of the MABAC method consists of the following steps (Pamucar, 2015):

Step 1: Forming the initial decision matrix (X).

In this phase, m alternatives are evaluated according to n criteria. Alternatives are represented by vectors $A_i = (x_{i1}, x_{i2}, ..., x_{in})$, where $x_{ij}$ value of the i-th alternative according to the j-th criterion ($i = 1, 2, ..., m; j = 1, 2, ..., n$).

$$
A_1 = \begin{bmatrix}
C_1 & C_2 & \cdots & C_n \\
x_{11} & x_{12} & \cdots & x_{1n} \\
x_{21} & x_{22} & \cdots & x_{2n} \\
\vdots & \vdots & \ddots & \vdots \\
x_{m1} & x_{m2} & \cdots & x_{mn}
\end{bmatrix}
$$

(1)

where $m$ is the total number of alternatives, $n$ is the total number of criteria.
Step 2: Normalize the elements of the initial matrix \((X)\).

\[
N = A_1 \begin{bmatrix}
C_1 & C_2 & \ldots & C_n \\
\frac{n_{11}}{n_{11}} & \frac{n_{12}}{n_{11}} & \ldots & \frac{n_{1n}}{n_{1n}} \\
\frac{n_{21}}{n_{21}} & \frac{n_{22}}{n_{21}} & \ldots & \frac{n_{2n}}{n_{2n}} \\
\vdots & \vdots & \ddots & \vdots \\
\frac{n_{m1}}{n_{m1}} & \frac{n_{m2}}{n_{m1}} & \ldots & \frac{n_{mn}}{n_{m1}}
\end{bmatrix}
\]  

(2)

The elements of the normalized matrix \((N)\) are obtained using the following equations:

a) For beneficial (income) types of criteria (high value of criteria is preferred)

\[
n_{ij} = \frac{x_{ij} - x_i^-}{x_i^+ - x_i^-}  
\]  

(3)

b) For cost types of criteria (lower value of criteria is preferred)

\[
n_{ij} = \frac{x_{ij} - x_i^+}{x_i^- - x_i^+}  
\]  

(4)

where \(x_{ij}\), \(x_i^+\) and \(x_i^-\), and the elements of the initial decision matrix \((X)\), where they are defined as:

\[x_i^+ = \max(x_1, x_2, \ldots, x_m)\] and represent the maximum values of the observed criterion by alternatives.

\[x_i^- = \min(x_1, x_2, \ldots, x_m)\] and represents the minimum values of the observed criterion by alternatives.

Step 3: Calculation of weight matrix elements \((V)\).

The elements of the weight matrix \((V)\) are calculated as follows:

\[
V_{ij} = w_i g(n_{ij} + 1)  
\]  

(5)

where the \(n_{ij}\) elements of the normalized matrix \((N)\) are the \(w_i\) weighting coefficients of the criteria.

Based on the previous equation, the following weight matrix \(V\) is obtained
\[ V = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ v_{m1} & v_{m2} & \cdots & v_{mn} \end{bmatrix} = \begin{bmatrix} w_1 g(n_{11} + 1) & w_2 g(n_{12} + 1) & \cdots & w_n g(n_{1n} + 1) \\ w_1 g(n_{21} + 1) & w_2 g(n_{22} + 1) & \cdots & w_n g(n_{2n} + 1) \\ w_1 g(n_{m1} + 1) & w_2 g(n_{m2} + 1) & \cdots & w_n g(n_{mn} + 1) \end{bmatrix} \] (6)

where \( n \) is the total number of criteria, \( m \) is the total number of alternatives.

**Step 4:** Determining the matrix of boundary approximate areas (\( G \)).

The cut-off approximate range (BAA) for each criterion is determined according to the following expression:

\[ g_i = \left( \prod_{j=1}^{m} v_{ij} \right)^{1/m} \] (7)

where are the \( v_{ij} \) elements of the weight matrix (\( V \)), \( m \) the total number of alternatives.

After calculating the value of \( g_i \) for each criterion, a matrix of boundary approximate areas (\( G \)) of the format \( n + 1 \) is formed (\( n \) represents the total number of criteria according to which the offered alternatives are selected):

\[ G = \begin{bmatrix} C_1 & C_2 & \cdots & C_n \\ g_1 & g_2 & \cdots & g_n \end{bmatrix} \] (8)

**Step 5:** Calculation of the elements of the alternative distance matrix from the boundary approximate domain (\( Q \)).

\[ Q = \begin{bmatrix} q_{11} & q_{12} & \cdots & q_{1n} \\ q_{21} & q_{22} & \cdots & q_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ q_{m1} & q_{m2} & \cdots & q_{mn} \end{bmatrix} \] (9)

The distance of the alternatives from the boundary approximate domain (\( q_{ij} \)) is determined as the difference between the elements of the weight matrix (\( V \)) and the values of the boundary approximate domains (\( G \)).
\[ Q = V - G = \begin{bmatrix} v_{11} & v_{12} & ... & v_{1n} \\ v_{21} & v_{22} & ... & v_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ v_{m1} & v_{m2} & ... & v_{mn} \end{bmatrix} - \begin{bmatrix} q_1 & q_2 & ... & q_n \\ q_1 & q_2 & ... & q_n \\ \vdots & \vdots & \ddots & \vdots \\ q_1 & q_2 & ... & q_n \end{bmatrix} \] (10)

\[ Q = \begin{bmatrix} v_{11} - g_1 & v_{12} - g_2 & ... & v_{1n} - g_n \\ v_{21} - g_1 & v_{22} - g_2 & ... & v_{2n} - g_n \\ \vdots & \vdots & \ddots & \vdots \\ v_{m1} - g_1 & v_{m2} - g_2 & ... & v_{mn} - g_n \end{bmatrix} - \begin{bmatrix} q_{11} & q_{12} & ... & q_{1n} \\ q_{21} & q_{22} & ... & q_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ q_{m1} & q_{m2} & ... & q_{mn} \end{bmatrix} \] (11)

where \( g_i \) the boundary approximate area for criterion \( C_i \), \( v_{ij} \) the elements of the weight matrix \( (V) \), \( n \) is the number of criteria, \( m \) is the number of alternatives.

Alternative \( A_i \) may belong to the boundary approximate region \( (G) \), the upper approximate region \( (G^+) \) or the lower approximate region \( (G^-) \), i.e. \( A_i \in \{ G \lor G^+ \lor G^- \} \). The upper approximate region \( (G^+) \) is the region in which the ideal alternative \( (A^+) \) is located and the lower approximate region is the region in which the anti-ideal alternative \( (A^-) \) is located (Figure 1).

**Figure 1.** Representation of the upper \( (G^+) \), lower \( (G^-) \) and approximate areas

Source: Pamučar, 2015
The affiliation of alternative $A_i$ approximate domain ($G$, $G^+$ or $G^-$) is determined on the basis of the following equation:

$$A_i \in \begin{cases} 
G^+ & \text{if } q_{ij} > 0 \\
G & \text{if } q_{ij} = 0 \\
G^- & \text{if } q_{ij} < 0
\end{cases} \quad (12)$$

In order for alternative $A_i$ to be chosen as the best from the set, it is necessary that it belongs to the upper approximate area ($G^+$) according to as many criteria as possible. If, for example, alternatives $A_i$ as per 5 criteria (out of the 6 criteria) is from above the approximate area, and one criterion as belonging to the approximate area of ($G$), it indicates, in other words that after the 5 criteria alternative close to or equal to an ideal alternative to, while by one criterion it is close to or equal to the anti-ideal alternative. If the value of $q_{ij} > 0$, i.e. $q_{ij} \in G^+$, then alternative $A_i$ is close to or equal to the ideal alternative. However, if $q_{ij} < 0$, i.e. $q_{ij} \in G^-$, then alternative $A_i$ is close to or equal to the anti-ideal alternative (Pamučar, 2015).

**Step 6**: Ranking the alternatives.

The calculation of the values of the criterion functions by alternatives (13) was obtained as the sum of the distances of the alternatives from the boundary approximate areas ($q$). By summing the elements of the matrix $Q$ by rows, the final values of the criterion functions of the alternatives are obtained:

$$S_i = \sum_{j=1}^{n} q_{ij} \quad j = 1, 2, ..., n \quad i = 1, 2, ..., m \quad (13)$$

where $n$ is the number of criteria, $m$ is the number of alternatives.

In this paper, for the purposes of applying the MABAC method in the evaluation of the efficiency of agricultural enterprises in Serbia, the weighting coefficients are determined on the basis of the AHP (Analytical Hierarchical Process) method. With this in mind, we will briefly review the theoretical characteristics of the AHP method. The Analytical Hierarchical Process (AHP) method includes the following steps (Saaty, 2008):
Analysis of trade efficiency in Serbia based on the MABAC method

**Step 1**: Forming a pair-wise comparison matrix

\[ A = [a_{ij}] = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ 1/a_{12} & 1 & \cdots & a_{2n} \\ \vdots & \cdots & \ddots & \vdots \\ 1/a_{1n} & 1/a_{2n} & \cdots & 1 \end{bmatrix} \quad (14) \]

**Step 2**: Normalizing the pair-wise comparison matrix

\[ a^*_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}}, i, j = 1, ..., n \quad (15) \]

**Step 3**: Determining the relative importance, i.e. the weight vector

\[ w_i = \frac{\sum_{j=1}^{n} a^*_{ij}}{n}, i, j = 1, ..., n \quad (16) \]

Consistency index - CI (consistency index) is a measure of deviation \( n \) from \( \lambda_{\text{max}} \) and can be represented by the following formula:

\[ CI = \frac{\lambda_{\text{max}} - n}{n} \quad (17) \]

If \( CI < 0.1 \), the estimated values of the coefficients \( a_{ij} \) are consistent, and the deviation \( \lambda_{\text{max}} \) from \( n \) is negligible. This means, in other words, that the AHP method accepts an inconsistency of less than 10%.

Using the consistency index, the consistency ratio \( CR = CI / RI \) can be calculated, where \( RI \) is a random index.

**2. RESULTS AND DISCUSSION**

During the analysis of trade efficiency in Serbia on the basis of the MABAC method, the following criteria were used: C1 - number of employees, C2 - employees' earnings, C3 - assets, C4 - capital, C5 - sales and C6 - net profit. Alternatives were observed in the years: A1 - 2013, A2 - 2014, A3 - 2015, A4 - 2016, A5 - 2017, A6 - 2018, A7 - 2019 and A8 - 2020. The calculation was performed using the software program MABAC Software-Excel, and obtained the results are shown in the tables below, as well as graphically.

Table 1 shows the initial data for the evaluation of trade efficiency in Serbia based on the MABAC method.
Table 1.: Initial data

| Year | Number of employees | Employees’ earnings | Assets | Capital | Sales | Net profit |
|------|---------------------|---------------------|--------|---------|-------|------------|
| 2013 | 193210              | 151978              | 2160474| 746992  | 2891518| 89730      |
| 2014 | 191621              | 154833              | 2157564| 761305  | 2594602| 86955      |
| 2015 | 159621              | 164718              | 2197931| 805009  | 2731999| 95265      |
| 2016 | 206092              | 180367              | 2324843| 859749  | 3009651| 105238     |
| 2017 | 208020              | 194924              | 2375290| 920992  | 3172393| 122727     |
| 2018 | 219373              | 218410              | 2524897| 1007972 | 361094 | 121816     |
| 2019 | 222049              | 238022              | 2682931| 1073056 | 3608329| 139409     |
| 2020 | 227618              | 262322              | 2837599| 1183026 | 3664505| 171010     |

Note: Data is shown in millions if dinar. Number of employees is shown as a whole number.

Source: The Serbian BusinessRegisters Agency (SBRA)

Table 2 shows the statistics of the initial data.

Table 2.: Statistics

| Statistics   | 1 Number of employees | 2 Employees’ earnings | 3 Assets | 4 Capital | 5 Sales | 6 Net profit |
|--------------|-----------------------|-----------------------|----------|-----------|---------|--------------|
| N Valid      | 8                     | 8                     | 8        | 8         | 8       | 8            |
| Missing      | 0                     | 0                     | 0        | 0         | 0       | 0            |
| Mean         | 203450.5000           | 195696.7500           | 2407691.1250| 919762.6250| 3129261.3750| 116518.7500  |
| Std. Error of Mean | 7765.75139      | 14344.42335           | 89632.96460 | 55471.58315 | 139264.95990 | 10115.84043  |
| Median       | 207056.0000           | 187645.5000           | 2350066.5000 | 890370.5000 | 3091022.0000 | 113527.0000  |
| Std. Deviation | 21964.86187          | 40572.15608           | 253520.30840 | 156897.33040 | 393900.79000 | 28611.91747  |
| Skewness     | -1.119                | .565                  | .717     | .576      | .141    | .960         |
| Std. Error of Skewness | .752            | .752                  | .752     | .752      | .752    | .752         |
| Kurtosis     | 1.355                 | -1.028                | -.773    | -.869     | -1.373  | .519         |
| Std. Error of Kurtosis | 1.481           | 1.481                 | 1.481    | 1.481     | 1.481   | 1.481        |
| Minimum      | 159621.00             | 151978.00             | 2157564.00 | 746992.00 | 2594602.00 | 86955.00     |
| Maximum      | 227618.00             | 262322.00             | 2837599.00 | 1183026.00 | 3664505.00 | 171010.00    |

NPar Tests

Friedman Test
Trade performance in Serbia in 2020 was better than the statistical average. The impact of the Chovid-19 corona virus pandemic has been neutralized by increased electronic sales. The null hypothesis is rejected. There is a significant statistical difference between the observed variables (Asymp. Sig. .000 < .05).

Table 3 shows the correlation matrix of the initial data.

Table 3: Correlations

|                  | 1       | 2       | 3       | 4       | 5       | 6       |
|------------------|---------|---------|---------|---------|---------|---------|
| **1 Number of employees** | Pearson Correlation: 1 | .802* | .813* | .793* | .852** | .769* |
|                   | Sig. (2-tailed): .017 | .014 | .019 | .007 | .026 |         |
| **2 Employees' earnings** | Pearson Correlation: .802* | 1   | .997** | .999** | .961** | .975** |
|                   | Sig. (2-tailed): .017 | .000 | .000 | .000 | .000 |         |
| **3 Assets**      | Pearson Correlation: .813* | .997** | 1   | .995** | .963** | .976** |
|                   | Sig. (2-tailed): .014 | .000 | .000 | .000 | .000 |         |
| **4 Capital**     | Pearson Correlation: .793* | .999** | .995** | 1   | .956** | .979** |
|                   | Sig. (2-tailed): .019 | .000 | .000 | .000 | .000 |         |
| **5 Sales**       | Pearson Correlation: .852** | .961** | .963** | .956** | 1   | .933** |
|                   | Sig. (2-tailed): .007 | .000 | .000 | .000 | .001 |         |
| **6 Net profit**  | Pearson Correlation: .769* | .975** | .976** | .979** | .933** | 1       |
|                   | Sig. (2-tailed): .026 | .000 | .000 | .000 | .001 |         |
| **N**             | 8       | 8       | 8       | 8       | 8       | 8       |

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Note: Author's calculation using the SPSS software program
Thus, there is a strong correlation between the observed variables at the level of statistical significance (Sig. (2-tailed < .05).

The weight coefficients of the criteria were determined using the AHP (Analytical Hierarchical Process) method (Saaty, 2008). They are shown in Table 4 and Figure 2.

**Table 4.:** Weight coefficients of the criteria

| Criteria       | Weights of Criteria |
|----------------|---------------------|
| A – Number of employees | 0.2267              |
| B – Employee’s earnings | 0.2020              |
| C – Assets      | 0.1545              |
| D – Capital     | 0.1394              |
| E – Sales       | 0.1426              |
| F – Net profit  | 0.1347              |
| SUM             | 1                   |

Consistency Ratio 0.0762

COMPARE WITH 0.1; IT SHOULD BE LESS THAN 0.1.

*Note: Author’s calculation*

**Figure 2.:** Weight coefficients of the criteria

Of all the observed criteria, the most significant are the number of employees and the salaries of employees. In order to improve trade
efficiency in Serbia in the future, it is necessary to manage human capital as efficiently as possible (training, reward system, flexible employment) (Berman, 2018; Levy, 2019).

Tables 5, 6, 7, 8, 9 and 10 as well as Figure 3 show the obtained results of research on trade efficiency in Serbia using the MABAC method. The calculation was performed using the software program MABAC Software.

### Table 5.: Initial matrix

| weights of criteria | 0.2267 | 0.202 | 0.1545 | 0.1394 | 0.1426 | 0.1347 | 0.9999 |
|---------------------|--------|-------|--------|--------|--------|--------|--------|
| kind of criteria    | -1     | -1    | 1      | 1      | 1      | 1      |        |
| A1                  | 193210 | 151978| 2160474| 746992 | 2891518| 89730  |
| A2                  | 191621 | 154833| 2157564| 761305 | 2594602| 86955  |
| A3                  | 159621 | 164718| 2197931| 805009 | 2731999| 95265  |
| A4                  | 206092 | 180367| 2324843| 859749 | 3009651| 105238 |
| A5                  | 208020 | 194924| 2375290| 920992 | 3172393| 122727 |
| A6                  | 219373 | 218410| 2524897| 1007972| 3361094| 121816 |
| A7                  | 222049 | 238022| 2682931| 1073056| 3608329| 139409 |
| A8                  | 227618 | 262322| 2837599| 1183026| 3664505| 171010 |

**MAX**

| weights of criteria | 227618 | 262322 | 2837599 | 1183026 | 3664505 | 171010 |
|---------------------|--------|-------|--------|--------|--------|--------|
| kind of criteria    |        |       |        |        |        |        |
| A1                  |        |       |        |        |        |        |
| A2                  |        |       |        |        |        |        |
| A3                  |        |       |        |        |        |        |
| A4                  |        |       |        |        |        |        |
| A5                  |        |       |        |        |        |        |
| A6                  |        |       |        |        |        |        |
| A7                  |        |       |        |        |        |        |
| A8                  |        |       |        |        |        |        |

**MIN**

| weights of criteria | 159621 | 151978 | 2157564 | 746992 | 2594602 | 86955  |
|---------------------|--------|-------|--------|-------|--------|--------|
| kind of criteria    |        |       |        |       |        |        |
| A1                  |        |       |        |       |        |        |
| A2                  |        |       |        |       |        |        |
| A3                  |        |       |        |       |        |        |
| A4                  |        |       |        |       |        |        |
| A5                  |        |       |        |       |        |        |
| A6                  |        |       |        |       |        |        |
| A7                  |        |       |        |       |        |        |
| A8                  |        |       |        |       |        |        |

**Note:** Author’s calculation

### Table 6.: Normalized matrix

| weights of criteria | 0.2267 | 0.202 | 0.1545 | 0.1394 | 0.1426 | 0.1347 |
|---------------------|--------|-------|--------|--------|--------|--------|
| kind of criteria    | -1     | -1    | 1      | 1      | 1      | 1      |
| C1                  | 0.5060 | 1.0000| 0.0043 | 0.0000 | 0.2775 | 0.0330 |
| C2                  | 0.5294 | 0.9741| 0.0000 | 0.0328 | 0.0000 | 0.0000 |
| C3                  | 1.0000 | 0.8845| 0.0594 | 0.1331 | 0.1284 | 0.0989 |
| C4                  | 0.3166 | 0.7427| 0.2460 | 0.2586 | 0.3879 | 0.2175 |
| C5                  | 0.2882 | 0.6108| 0.3202 | 0.3991 | 0.5400 | 0.4256 |
| C6                  | 0.1213 | 0.3980| 0.5402 | 0.5985 | 0.7164 | 0.4147 |
| A1                  |        |       |        |        |        |        |
| A2                  |        |       |        |        |        |        |
| A3                  |        |       |        |        |        |        |
| A4                  |        |       |        |        |        |        |
| A5                  |        |       |        |        |        |        |
| A6                  |        |       |        |        |        |        |
| A7                  |        |       |        |        |        |        |

**Note:** Author’s calculation
### Table 7.: Normalized Weighted Matrix

| NormalizedWeighted Matrix (V) | C1  | C2  | C3  | C4  | C5  | C6  |
|-------------------------------|-----|-----|-----|-----|-----|-----|
| A1                            | 0.3414 | 0.4040 | 0.1552 | 0.1394 | 0.1822 | 0.1391 |
| A2                            | 0.3467 | 0.3988 | 0.1545 | 0.1440 | 0.1426 | 0.1347 |
| A3                            | 0.4534 | 0.3807 | 0.1637 | 0.1579 | 0.1609 | 0.1480 |
| A4                            | 0.2985 | 0.3520 | 0.1925 | 0.1754 | 0.1979 | 0.1640 |
| A5                            | 0.2920 | 0.3254 | 0.2040 | 0.1950 | 0.2196 | 0.1920 |
| A6                            | 0.2542 | 0.2824 | 0.2380 | 0.2228 | 0.2448 | 0.1906 |
| A7                            | 0.2453 | 0.2465 | 0.2739 | 0.2436 | 0.2777 | 0.2188 |
| A8                            | 0.2267 | 0.2020 | 0.3090 | 0.2788 | 0.2852 | 0.2694 |

*Note: Author’s calculation*

### Table 8.: Border Approximation Area Matrix

| Border Approximation Area Matrix (G) | 0.3003 | 0.3157 | 0.2049 | 0.1892 | 0.2081 | 0.1774 |

*Note: Author’s calculation*

### Table 9. Distance of Alternatives from Border Approximation Areas matrix Matrix (Q)

| Distance of Alternatives from BAA matrix (Q) | C1 | C2 | C3 | C4 | C5 | C6 |
|---------------------------------------------|----|----|----|----|----|----|
| A1                                           | 0.0411 | 0.0883 | -0.0497 | -0.0498 | -0.0260 | -0.0383 |
| A2                                           | 0.0464 | 0.0830 | -0.0504 | -0.0452 | -0.0655 | -0.0427 |
| A3                                           | 0.1531 | 0.0649 | -0.0412 | -0.0313 | -0.0472 | -0.0294 |
| A4                                           | -0.0018 | 0.0363 | -0.0124 | -0.0138 | -0.0102 | -0.0134 |
| A5                                           | -0.0083 | 0.0096 | -0.0009 | 0.0058 | 0.0115 | 0.0146 |
| A6                                           | -0.0461 | -0.0334 | 0.0331 | 0.0336 | 0.0366 | 0.0132 |
| A7                                           | -0.0550 | -0.0693 | 0.0690 | 0.0544 | 0.0696 | 0.0414 |
| A8                                           | -0.0736 | -0.1137 | 0.1041 | 0.0896 | 0.0771 | 0.0920 |

*Note: Author’s calculation*

### Table 10.: Ranking of alternatives

| Alternatives | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|--------------|------|------|------|------|------|------|------|------|
| Q            | -0.0343 | -0.0744 | 0.0690 | -0.0153 | 0.0324 | 0.0371 | 0.1101 | 0.1755 |
| Q            | -0.0343 | -0.0744 | 0.0690 | -0.0153 | 0.0324 | 0.0371 | 0.1101 | 0.1755 |
| Ranking      | 7    | 8    | 3    | 6    | 5    | 4    | 2    | 1    |

*Note: Author’s calculation*
Trade in Serbia was most efficient in 2020, followed by 2019, 2015, 2018, 2017, 2016, 2013 and 2014. Recently, altogether, the efficiency of trade in Serbia has been improving. This was positively influenced by a number of macro and micro factors, such as: improved general economic conditions, low inflation, low bank interest rate, reduced unemployment rate, increased living standards, inflow of foreign direct investment (global retailers with new business models: private label, sales of organic products, multichannel sales - store and electronic sales), application of modern concepts of cost, sales and profit management, application of product category management concepts, application of sustainable development concepts (economic, social and environmental dimension), application of circular economy concepts (waste recycling) and digitalization of the entire business. The impact of Covid-19 on trade efficiency in Serbia is negligible. It is largely compensated by increased electronic sales, which is the case almost all over the world.
CONCLUSION

According to the obtained results of the research on trade efficiency in Serbia using the MABAC method, the following can be concluded:

Of all the observed criteria (number of employees, employees' salaries, assets, capital, sales and net profit), the most significant are the number of employees and employees' earnings. Therefore, in order to improve the efficiency of trade in Serbia in the future, it is necessary to manage human capital as efficiently as possible (training, reward systems, flexible employment).

Trade in Serbia was the most efficient in 2020, followed by 2019, 2015, 2018, 2017, 2016, 2013 and 2014. Recently, the efficiency of trade in Serbia has been improving. This was positively influenced by a number of macro and micro factors, such as improved general economic conditions, low inflation, low bank interest rate, reduced unemployment rate, increased living standards, inflow of foreign direct investment (global retailers with new business models: private label, sales of organic products, multichannel sales - store and electronic sales), application of modern concepts of cost management, sales and profit, application of product category management concepts, application of sustainable development concepts, application of circular economy concepts and digitalization of the entire business. The impact of Covid-19 on trade efficiency in Serbia is negligible. It has been largely compensated by increased electronic sales. This is the case almost all over the world.

The application of the MABAC method in the evaluation of trade efficiency is very simple, as illustrated by the example of Serbia. It provides realistic results of the efficiency evaluation and therewith indicates what appropriate measures should be taken in order to improve the efficiency of trade in the future. A much greater effect is achieved in combination with other methods of multi-criteria decision-making (TOPSIS, AHP, ARAS, VASPAS and others). Also in combination with ratio analysis.
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