Comparative Analysis of The Digitization of the European Union and Serbia Based on the MEREC and MARCOS Methods

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In recent times, digitization is increasingly becoming a critical factor in business success. Given this, knowing the level of digitization is a key assumption for improvement in the future. Bearing that in mind, this study comparatively analyzes the level of digitization of the member states of the European Union (EU) and Serbia using the MEREC and MARCOS methods. The results indicate which member states of the European Union need to speed up the digitization process to achieve the optimal level of success in realizing the target business. A higher level of digitization means better business success. In the European Union, the highest level of digitization is in the Netherlands. Next: Finland, Sweden, Denmark, Spain and so on. The leading countries of the European Union are positioned: Germany is in eighteenth place, France is in fourteenth place and Italy is in twentieth place. In the European Union, in terms of digitization, Romania took the worst position. Serbia (twenty-eighth place) is therefore in a very bad position among the member states of the European Union and in the surrounding area (Croatia is in thirteenth place, and Slovenia is in sixteenth place). In Serbia, to achieve the desired business success, it is necessary to significantly increase the level of digitization.
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1 Introduction

In recent times, it has been very challenging to investigate the issue of digitization from different angles. Because digitization is a critical factor in business success. Considering that this study comparatively analyzes the level of digitization of the member states of the European Union (EU) and Serbia based on the MEREC and MARCOS methods. The first method is used to determine the weight of the criteria. Another method is used to rank the alternatives. The goal of this research is to determine the most realistic level of digitization in individual EU member states and Serbia to improve it in the future.

There is an increasingly rich literature dedicated to the issue of digitization. This is completely understandable when you consider the fact that digitization is one of the critical factors of business success. Therefore, it is investigated from different angles. It is investigated from the point of view of the impact of digitization on economic growth, sustainable development and, generally speaking, on performance [3], [4[, [5], [22]. [25], [38]. In the literature, significant attention has been paid to digitization in the European Union [6], [21], [23]. In this context, a special digitalization regulation was developed [24]. In the literature, special attention is paid to the effects of digitalization in public administration [32] i.e. by individual sectors [37]. In the literature, which should be highlighted, the effects and consequences of the application of artificial intelligence are specifically investigated as part of digitization [11]. All in all, in the literature, due to its importance, the issue of digitization is investigated from different angles. In this study, the issue of digitization is investigated from the point of view of the ranking of individual EU member states and Serbia according to performance based on multi-criteria decision-making methods, namely: MEREC and MARCOS methods. The application of these methods makes it possible to see the real situation and the need for an accelerated digitization process as a critical factor in business success.

2 Materials and Methods

In this study, the problem treated is, in the methodological sense of the word, investigated using the MEREC and MARCOS methods. These methods give a more realistic picture of the level of digitization because they are based on several criteria whose weights are determined mathematically.

As is known, the weight of criteria in multi-criteria decision-making (MCDM) problems is an important element that significantly affects the results. Accordingly, several methods have been developed for determining the weights of the criteria (AHP, DEMATEL, CRITIC, Entropy, Standard Deviation, and others). Weighting methods can be objective, subjective, and integrated in nature. This paper discusses the method based on the removal effects of criteria (MEREC - MEthod based on the Removal Effects of Criteria) for determining their weights in decision problems with multiple criteria [1], [29], [8], [28], [16]. The MEREC method is in the category of objective criteria weighting methods, which uses the effect of removing each criterion on the performance of the alternatives to determine the weight of the criteria [33]. Higher weights are assigned to criteria that have greater effects on the performance of alternatives. First, in the MEREC method, measures for the performance of the alternatives are defined. In doing so, a simple logarithmic measure is used with equal weights to calculate the performance of the alternative. To identify the effects of removing each criterion, a measure of absolute deviation is used, which reflects the differences between the overall performance of the alternative and its effect in removing the criteria. The following steps are used to calculate the objective weights of the criteria using the MEREC method [9].

Step 1: Constructing the decision matrix.

The decision matrix shows the scores or values of each alternative about each criterion. The elements of this matrix are denoted by x_{ij} and should be greater than zero ($x_{ij} > 0$). If the values are negative, they should be transformed into positive values using the appropriate technique. Suppose there are n alternatives and m criteria, the form of the decision matrix is as follows:

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1j} & \cdots & x_{1m} \\ x_{21} & x_{22} & \cdots & x_{2j} & \cdots & x_{2m} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ x_{i1} & x_{i2} & \cdots & x_{ij} & \cdots & x_{im} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{nj} & \cdots & x_{nm} \end{bmatrix} \quad (1)$$

Step 2: Normalization of the decision matrix (N).

In this step, a simple linear normalization is used to scale the elements of the decision matrix. The elements of the normalized matrix are marked with n_{ij}^{x}. If $\mathcal{B}$it shows a set of useful criteria and $\mathcal{H}$ represents a set of non-useful criteria, the following normalization equation can be used:

$$n_{ij}^{x} = \begin{cases} \dfrac{\min_k x_{kj}}{x_{ij}} & if \quad j \in \mathcal{B} \\ \dfrac{x_{ij}}{\max_k x_{kj}} & if \quad j \in \mathcal{H} \end{cases} \quad (2)$$

It should be noted here that the normalization process is similar to but different from the process in methods such as WASPAS. The difference is in switching between useful and non-useful criteria formulas. Unlike other studies, here all criteria are transformed into normalized criteria types [9].

Step 3: Calculate the total performance of the alternatives (S_i).

In this phase, a logarithmic measure with equal criteria weights is applied to obtain the overall performance of the alternatives. This measure is based on the non-linear function shown in **Figure 1**. According to the normalized value obtained in the previous phase, it can be ensured that smaller values n_{ij}^{x} give higher performance values (S_i). The following equation is used for these calculations:

$$S_i = ln\left(1+\left(\frac{1}{m}\sum_j \left|ln\left(n_{ij}^{x}\right)\right|\right)\right) \quad (3)$$

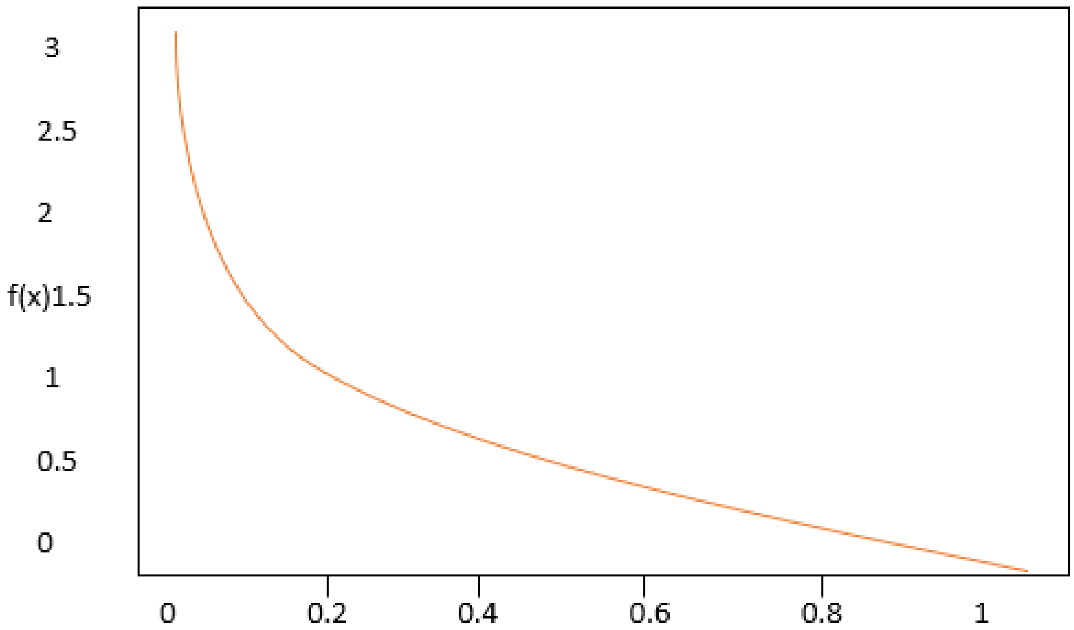

Fig. 1. Weights of comparative analysis

Step 4: Calculate the performance of alternatives with each criterion removed.
In this phase, logarithmic measures are used in the same way as in the previous step. The difference between this step and step 3 is that the performance of the alternatives is determined by removing each criterion separately. Thus, m performance sets are associated with m criteria. Denote by S'_{ij} the total performance of the i -th alternative in connection with the removal of the j -th criterion. In this step, the following equation is used for the calculation:

$$S'_{ij} = ln\left(1+\left(\frac{1}{m}\sum_{k,k\neq j} \left|ln\left(n_{ik}^{x}\right)\right|\right)\right) \quad (4)$$

Step 5: Calculate the sum of the absolute deviations.
The jth criterion is calculated based on the values obtained in steps 3 and 4. Let's denote by E_j the effect of removing the jth criterion. The calculation of the value of E_j is performed using the following equation:

$$E_j = \sum_i \left|S'_{ij} - S_i\right| \quad (5)$$

Step 6: Determining the final criteria weight.
In this step, the actual weight of the criterion is calculated using the removal effect (E_j) in step 5. Let us denote w_j the weight of the jth criterion. The following equation is used to calculate w_j:

$$W_j = \frac{E_j}{\sum_k E_k} \quad (6)$$

The **MARCOS** method is based on defining the relationship between alternatives and reference values (ideal and anti-ideal alternatives) [7], [10], [26], [27], [30], [36], [34], [40], [12], [13], [14], [15], [16], [17], [18], [19]. Based on the defined relationships, the utility functions of the alternatives are determined and a compromise ranking is made about ideal and anti-ideal solutions. Decision preferences are defined based on a utility function. Utility functions represent the position of alternatives about ideal and anti-ideal solutions. The best alternative is the one that is closest to the ideal and at the same time furthest from the anti-deal reference point.

The MARCOS method proceeds through the following steps [35], [36]:

Step 1: Formation of the initial decision-making matrix. A multi-criteria model involves defining a set of *n* criteria and *m* alternatives. In the case of group decision-making, a group of r experts is formed who evaluate the alternatives to the criteria. In that case, the expert evaluation matrices are aggregated into the initial group decision matrices.

Step 2: Forming the expanded initial matrix. In this step, the expansion initial matrix is defined with ideal (AI) and anti-ideal (AAI) solutions.

$$X = \begin{matrix} & C_1 & C_2 & \cdots & C_n \\ AAI & x_{aa1} & x_{aa2} & \cdots & x_{aan} \\ A_1 & x_{11} & x_{12} & \cdots & x_{1n} \\ A_2 & x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ A_m & x_{m1} & x_{m2} & \cdots & x_{mn} \\ AI & x_{ai1} & x_{ai2} & \cdots & x_{ain} \end{matrix} \quad (7)$$

The anti-ideal solution (AAI) is the worst alternative. The ideal solution (AI) is, on the contrary, the alternative with the best characteristics. Depending on the nature of the criteria, AAI and AI are defined using the following equations:

$$AAI = \min_i x_{ij} \ if \ j \in B \ and \ \max_i x_{ij} \ if \ j \in C \quad (8)$$

$$AI = \max_i x_{ij} \ if \ j \in B \ and \ \min_i x_{ij} \ if \ j \in C \quad (9)$$

where B represents the benefit and C the cost group of criteria.

Step 3: Normalization of the extended initial matrix (X). The elements of the normalized matrix $N = \left[n_{ij}\right]_{mxn}$ are obtained by applying the following equations:

$$n_{ij} = \frac{x_{ai}}{x_{ij}} \ if \ j \in C \quad (10)$$

$$n_{ij} = \frac{x_{ij}}{x_{ai}} \ if \ j \in B \quad (11)$$

where the elements x_{ij} and x_{ai} represent the elements of the matrix X.

Step 4: Defining the weighting matrix $V = \left[v_{ij}\right]_{mxn}$.The weighting matrix V is obtained by multiplying the normalized matrix N with the weighting coefficients of the criteria w_j using the following equation:

$$v_{ij} = n_{ij} x v_j \quad (12)$$

Step 5: Determining the degree of usefulness of alternatives K_{and}. The degree of usefulness of alternatives to anti-ideal and ideal solutions is determined using the following equations:

$$K_i^- = \frac{S_i}{S_{aai}} \quad (13)$$

$$K_i^+ = \frac{S_i}{S_{ai}} \quad (14)$$

where S_i ($i=1,2,..,m$) represents the sum of the elements of the weight matrix V, shown in the following equation:

$$S_i = \sum_{i=1}^{n} v_{ij} \quad (15)$$

Step 6: Determining the utility function of alternatives *f(K i)*. The utility function is the compromise of the observed alternative about ideal and anti-ideal solutions. The utility function of alternatives is defined by the following equation:

$$f(K_i) = \frac{K_i^+ + K_i^-}{1 + \frac{1 - f(K_i^+)}{f(K_i^+)} + \frac{1 - f(K_i^-)}{f(K_i^-)}}; \qquad (16)$$

where $f(K_i^-)$represents the utility function of the anti-ideal solution and $f(K_i^+)$represents the utility function of the ideal solution. Utility functions about ideal and anti-ideal solutions are determined using the following equations:

$$f(K_i^-) = \frac{K_i^+}{K_i^+ + K_i^-} \qquad (17)$$

$$f(K_i^+) = \frac{K_i^-}{K_i^+ + K_i^-} \qquad (18)$$

Step 7: Ranking of alternatives. The ranking of alternatives is based on the final value of the utility function. The alternative that has the highest possible value of the utility function is preferred.

3 Results and discussion

The research of the treated problem in this study is carried out using the MEREC and MARCOS methods based on twelve relevant criteria, namely:

C1 - Individuals' level of digital skills (Percentage of individuals)

C2 - Employed ICT specialists - total (Percentage of total employment)

C3 - Digital Intensity by size class of enterprise (enterprises with very high digital intensity index) (and Percentage of enterprises)

C4 - Cloud computing services by size class of enterprise (10 persons employed or more) (Percentage of enterprises)

C5 - Artificial intelligence by size class of enterprise (10 persons employed or more) (Percentage of enterprises)

C6 - E-government activities of individuals via websites (Percentage of individuals who used the internet within the last year)

C7 - Individuals - internet activities Internet use: Internet banking (Percentage of individuals who used the Internet in the last 3 months)

C8 - Internet purchases by individuals (2020 onwards) (Percentage of individuals who used the Internet within the last year)

C9 - Internet purchases - goods or services (2020 onwards) (Online purchases (3 months): clothes (including sports clothing (, or shoes or accessories), (Percentage of individuals who purchased online in the last 3 months)

C10 - Internet purchases - problems encountered (2021 onwards) (Problem encountered by individuals when buying via a website or an app (3 months): Foreign retailer did not sell in my country) (Percentage of individuals who purchased online in the last 3 months)

C11 - Social media use by type, internet advertising, and size class of enterprise (250 persons employed or more) (Percentage of enterprises)

C12 - E-commerce sales of enterprises by size class of enterprise (250 persons employed or more) (Percentage of enterprises)

Alternatives are certain member states of the European Union (A1-A27) and Serbia (A28). Table 1 shows the initial data for 2023.

Table 1. Initial data

		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
	European Union - 27 countries (from 2020)	55.56	4.8	5.0	45.2	8.0	45.05	69.85	75.35	69.70	6.89	86.0	45.9
A1	Belgium	59.39	5.4	9.7	51.7	13.8	52.24	84.12	79.00	68.79	7.40	95.5	59.0
A2	Bulgaria	35.52	4.3	1.6	17.5	3.6	11.08	29.15	53.82	78.10	7.37	61.7	27.3
A3	Czechia	69.11	4.3	4.8	47.2	5.9	59.27	86.74	83.74	62.07	6.09	87.4	51.6
A4	Denmark	69.62	5.9	6.6	69.5	15.2	73.02	97.39	89.92	71.94	10.05	95.8	62.3
A5	Germany	52.22	4.9	5.6	47.0	11.6	35.99	61.88	82.93	73.70	2.21	87.7	43.1
A6	Estonia	62.61	6.7	4.3	58.6	5.2	66.57	91.09	78.05	57.19	3.87	85.5	52.1
A7	Ireland	72.91	6.2	6.9	63.1	8.0	59.82	89.81	93.20	70.82	7.15	88.2	49.4
A8	Greece	52.40	2.4	2.8	23.6	4.0	45.40	61.18	66.72	73.55	2.51	66.4	32.6
A9	Spain	66.18	4.4	6.8	30.0	9.2	47.61	74.86	71.78	70.76	16.47	92.6	56.7
A10	France	59.67	4.7	0.0	26.8	5.9	53.27	78.00	82.03	65.91	6.32	90.0	43.0
A11	Croatia	58.95	4.3	5.1	45.1	7.9	44.82	74.20	70.11	72.01	5.76	76.0	47.4
A12	Italy	45.75	4.1	3.2	61.4	5.0	36.18	59.31	58.27	63.82	4.10	81.4	47.7
A13	Cyprus	49.46	5.4	4.8	52.9	4.7	54.85	77.68	62.20	82.28	0.40	95.0	52.9
A14	Latvia	45.34	4.4	4.5	35.8	4.5	52.94	90.70	66.95	56.17	1.32	94.2	42.0
A15	Lithuania	52.91	4.9	4.2	38.4	4.9	44.65	85.57	68.44	64.83	4.95	88.5	58.9
A16	Luxembourg	60.14	8.0	4.1	37.0	14.4	58.49	71.61	80.27	60.23	6.80	94.1	30.4
A17	Hungary	58.89	4.2	3.9	44.9	3.7	55.30	71.64	75.89	60.10	6.22	83.2	49.2
A18	Malta	63.02	4.7	11.4	66.7	13.2	57.34	73.18	73.22	64.01	10.34	96.4	41.0
A19	Netherlands	82.70	6.9	11.0	61.2	13.4	66.51	95.95	93.09	73.53	16.31	90.6	40.2
A20	Austria	64.68	5.3	5.5	46.5	10.8	46.29	80.95	75.40	64.42	4.59	91.1	52.8
A21	Poland	44.30	4.3	4.0	55.7	3.7	37.27	68.38	73.00	75.14	3.76	81.1	43.5
A22	Portugal	55.97	4.5	4.5	37.5	7.9	48.84	68.64	63.39	67.58	1.34	85.0	43.0
A23	Romania	27.73	2.6	1.3	18.4	1.5	12.47	24.54	54.93	79.62	7.78	61.2	25.0
A24	Slovenia	46.70	3.8	4.7	40.2	11.4	51.23	67.15	72.54	65.85	2.43	91.9	63.4
A25	Slovakia	51.31	4.2	3.2	34.4	7.0	54.88	66.18	86.22	71.83	3.76	71.3	38.6
A26	Finland	81.99	7.6	13.0	78.3	15.1	82.75	96.71	80.90	58.39	12.03	98.7	55.4
A27	Sweden	55.56	4.8	7.9	71.6	10.4	71.15	86.58	90.50	69.42	14.86	94.1	64.9
A28	Serbia	33.61	4.3	3.0	37.0	1.8	22.61	37.28	64.18	69.66	0.22	70.5	35.8
	Statistics												
	Mean	56.3800	4.9107	5.4963	46.3571	7.9893	50.1014	73.2311	74.6675	68.2757	6.3004	85.5393	46.7571
	Median	57.4300	4.6000	4.7000	45.8000	7.4500	52.5900	74.5300	74.3100	69.1050	5.9250	88.3500	47.5500
	Std. Deviation	13.08452	1.28246	2.91039	16.14603	4.23857	16.47278	18.75576	11.04294	6.73148	4.47885	10.69272	10.74390
	The minimum	27.73	2.40	1.30	17.50	1.50	11.08	24.54	53.82	56.17	.22	61.20	25.00
	Maximum	82.70	8.00	13.00	78.30	15.20	82.75	97.39	93.20	82.28	16.47	98.70	64.90

Note: Author's statistics
Source: Eurostat

In the European Union, according to the data presented, the largest application of artificial intelligence is in Denmark, and the smallest is in Romania. Within the leading countries of the European Union, the largest application of artificial intelligence is in Germany, followed by France and, finally, Italy. In Slovenia, artificial intelligence is used more than in Croatia. In Serbia, the application of artificial intelligence is smaller compared to Croatia and Slovenia. The unequal application of Visht's intelligence in individual countries of the European Union, and Serbia, is reflected in its way on their business success. Artificial intelligence is increasingly considered a critical factor in business success. It is applied in all spheres of business and private life.
Table 2 shows the process of determining the weighting coefficients of the criteria using the MEREC method.

Table 2. The process of determining weight coefficients of criteria using the MEREC method

Initial Matrix												
kind of criteria	1	1	1	1	1	1	1	1	1	1	1	1
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
A1	59.39	5.4	9.7	51.7	13.8	52.24	84.12	79	68.79	7.4	95.5	59
A2	35.52	4.3	1.6	17.5	3.6	11.08	29.15	53.82	78.1	7.37	61.7	27.3
A3	69.11	4.3	4.8	47.2	5.9	59.27	86.74	83.74	62.07	6.09	87.4	51.6
A4	69.62	5.9	6.6	69.5	15.2	73.02	97.39	89.92	71.94	10.05	95.8	62.3
A5	52.22	4.9	5.6	47	11.6	35.99	61.88	82.93	73.7	2.21	87.7	43.1
A6	62.61	6.7	4.3	58.6	5.2	66.57	91.09	78.05	57.19	3.87	85.5	52.1
A7	72.91	6.2	6.9	63.1	8	59.82	89.81	93.2	70.82	7.15	88.2	49.4
A8	52.4	2.4	2.8	23.6	4	45.4	61.18	66.72	73.55	2.51	66.4	32.6
A9	66.18	4.4	6.8	30	9.2	47.61	74.86	71.78	70.76	16.47	92.6	56.7
A10	59.67	4.7	0	26.8	5.9	53.27	78	82.03	65.91	6.32	90	43
A11	58.95	4.3	5.1	45.1	7.9	44.82	74.2	70.11	72.01	5.76	76	47.4
A12	45.75	4.1	3.2	61.4	5	36.18	59.31	58.27	63.82	4.1	81.4	47.7
A13	49.46	5.4	4.8	52.9	4.7	54.85	77.68	62.2	82.28	0.4	95	52.9
A14	45.34	4.4	4.5	35.8	4.5	52.94	90.7	66.95	56.17	1.32	94.2	42
A15	52.91	4.9	4.2	38.4	4.9	44.65	85.57	68.44	64.83	4.95	88.5	58.9
A16	60.14	8	4.1	37	14.4	58.49	71.61	80.27	60.23	6.8	94.1	30.4
A17	58.89	4.2	3.9	44.9	3.7	55.3	71.64	75.89	60.1	6.22	83.2	49.2
A18	63.02	4.7	11.4	66.7	13.2	57.34	73.18	73.22	64.01	10.34	96.4	41
A19	82.7	6.9	11	61.2	13.4	66.51	95.95	93.09	73.53	16.31	90.6	40.2
A20	64.68	5.3	5.5	46.5	10.8	46.29	80.95	75.4	64.42	4.59	91.1	52.8
A21	44.3	4.3	4	55.7	3.7	37.27	68.38	73	75.14	3.76	81.1	43.5
A22	55.97	4.5	4.5	37.5	7.9	48.84	68.64	63.39	67.58	1.34	85	43
A23	27.73	2.6	1.3	18.4	1.5	12.47	24.54	54.93	79.62	7.78	61.2	25
A24	46.7	3.8	4.7	40.2	11.4	51.23	67.15	72.54	65.85	2.43	91.9	63.4
A25	51.31	4.2	3.2	34.4	7	54.88	66.18	86.22	71.83	3.76	71.3	38.6
A26	81.99	7.6	13	78.3	15.1	82.75	96.71	80.9	58.39	12.03	98.7	55.4
A27	55.56	4.8	7.9	71.6	10.4	71.15	86.58	90.5	69.42	14.86	94.1	64.9
A28	33.61	4.3	3	37	1.8	22.61	37.28	64.18	69.66	0.22	70.5	35.8
MAX	82.7	8	13	78.3	15.2	82.75	97.39	93.2	82.28	16.47	98.7	64.9
MIN	27.73	2.4	0	17.5	1.5	11.08	24.54	53.82	56.17	0.22	61.2	25

Normalized Matrix												
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
A1	0.467	0.444	0.000	0.338	0.109	0.212	0.292	0.681	0.817	0.030	0.641	0.424
A2	0.781	0.558	0.000	1,000	0.417	1,000	0.842	1,000	0.719	0.030	0.992	0.916
A3	0.401	0.558	0.000	0.371	0.254	0.187	0.283	0.643	0.905	0.036	0.700	0.484
A4	0.398	0.407	0.000	0.252	0.099	0.152	0.252	0.599	0.781	0.022	0.639	0.401
A5	0.531	0.490	0.000	0.372	0.129	0.308	0.397	0.649	0.762	0.100	0.698	0.580
A6	0.443	0.358	0.000	0.299	0.288	0.166	0.269	0.690	0.982	0.057	0.716	0.480
A7	0.380	0.387	0.000	0.277	0.188	0.185	0.273	0.577	0.793	0.031	0.694	0.506
A8	0.529	1,000	0.000	0.742	0.375	0.244	0.401	0.807	0.764	0.088	0.922	0.767
A9	0.419	0.545	0.000	0.583	0.163	0.233	0.328	0.750	0.794	0.013	0.661	0.441

A10	0.465	0.511	0.000	0.653	0.254	0.208	0.315	0.656	0.852	0.035	0.680	0.581
A11	0.470	0.558	0.000	0.388	0.190	0.247	0.331	0.768	0.780	0.038	0.805	0.527
A12	0.606	0.585	0.000	0.285	0.300	0.306	0.414	0.924	0.880	0.054	0.752	0.524
A13	0.561	0.444	0.000	0.331	0.319	0.202	0.316	0.865	0.683	0.550	0.644	0.473
A14	0.612	0.545	0.000	0.489	0.333	0.209	0.271	0.804	1,000	0.167	0.650	0.595
A15	0.524	0.490	0.000	0.456	0.306	0.248	0.287	0.786	0.866	0.044	0.692	0.424
A16	0.461	0.300	0.000	0.473	0.104	0.189	0.343	0.670	0.933	0.032	0.650	0.822
A17	0.471	0.571	0.000	0.390	0.405	0.200	0.343	0.709	0.935	0.035	0.736	0.508
A18	0.440	0.511	0.000	0.262	0.114	0.193	0.335	0.735	0.878	0.021	0.635	0.610
A19	0.335	0.348	0.000	0.286	0.112	0.167	0.256	0.578	0.764	0.013	0.675	0.622
A20	0.429	0.453	0.000	0.376	0.139	0.239	0.303	0.714	0.872	0.048	0.672	0.473
A21	0.626	0.558	0.000	0.314	0.405	0.297	0.359	0.737	0.748	0.059	0.755	0.575
A22	0.495	0.533	0.000	0.467	0.190	0.227	0.358	0.849	0.831	0.164	0.720	0.581
A23	1,000	0.923	0.000	0.951	1,000	0.889	1,000	0.980	0.705	0.028	1,000	1,000
A24	0.594	0.632	0.000	0.435	0.132	0.216	0.365	0.742	0.853	0.091	0.666	0.394
A25	0.540	0.571	0.000	0.509	0.214	0.202	0.371	0.624	0.782	0.059	0.858	0.648
A26	0.338	0.316	0.000	0.223	0.099	0.134	0.254	0.665	0.962	0.018	0.620	0.451
A27	0.499	0.500	0.000	0.244	0.144	0.156	0.283	0.595	0.809	0.015	0.650	0.385
A28	0.825	0.558	0.000	0.473	0.833	0.490	0.658	0.839	0.806	1,000	0.868	0.698

Ln(x)													
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**	**Sum**	**Si**
A1	0.762	0.811	0.000	1.083	2.219	1.551	1.232	0.384	0.203	3,516	0.445	0.859	13.063	0.737
A2	0.248	0.583	0.000	0.000	0.875	0.000	0.172	0.000	0.330	3,512	0.008	0.088	5,816	0.395
A3	0.913	0.583	0.000	0.992	1.369	1,677	1.263	0.442	0.100	3.321	0.356	0.725	11,741	0.682
A4	0.921	0.899	0.000	1.379	2.316	1.886	1,378	0.513	0.247	3,822	0.448	0.913	14,723	0.801
A5	0.633	0.714	0.000	0.988	2,046	1.178	0.925	0.432	0.272	2.307	0.360	0.545	10,399	0.624
A6	0.814	1.027	0.000	1.209	1.243	1,793	1.312	0.372	0.018	2,867	0.334	0.734	11,723	0.682
A7	0.967	0.949	0.000	1.283	1,674	1.686	1,297	0.549	0.232	3,481	0.365	0.681	13.165	0.741
A8	0.636	0.000	0.000	0.299	0.981	1,410	0.914	0.215	0.270	2,434	0.082	0.265	7,506	0.486
A9	0.870	0.606	0.000	0.539	1.814	1,458	1.115	0.288	0.231	4,316	0.414	0.819	12,470	0.713
A10	0.766	0.672	0.000	0.426	1.369	1,570	1.156	0.421	0.160	3,358	0.386	0.542	10,828	0.643
A11	0.754	0.583	0.000	0.947	1.661	1,398	1.106	0.264	0.248	3,265	0.217	0.640	11,084	0.654
A12	0.501	0.536	0.000	1,255	1.204	1.183	0.882	0.079	0.128	2,925	0.285	0.646	9,625	0.589
A13	0.579	0.811	0.000	1.106	1.142	1,599	1.152	0.145	0.382	0.598	0.440	0.750	8,703	0.545
A14	0.492	0.606	0.000	0.716	1,099	1,564	1.307	0.218	0.000	1.792	0.431	0.519	8,744	0.547
A15	0.646	0.714	0.000	0.786	1.184	1,394	1,249	0.240	0.143	3.114	0.369	0.857	10,695	0.637
A16	0.774	1.204	0.000	0.749	2.262	1,664	1.071	0.400	0.070	3.431	0.430	0.196	12,250	0.703
A17	0.753	0.560	0.000	0.942	0.903	1.608	1.071	0.344	0.068	3.342	0.307	0.677	10,574	0.632
A18	0.821	0.672	0.000	1.338	2,175	1,644	1.093	0.308	0.131	3,850	0.454	0.495	12,980	0.733
A19	1.093	1.056	0.000	1.252	2,190	1.792	1,364	0.548	0.269	4.306	0.392	0.475	14,737	0.801
A20	0.847	0.792	0.000	0.977	1.974	1,430	1.194	0.337	0.137	3,038	0.398	0.748	11,871	0.688
A21	0.468	0.583	0.000	1.158	0.903	1.213	1,025	0.305	0.291	2,839	0.282	0.554	9,620	0.589
A22	0.702	0.629	0.000	0.762	1.661	1,483	1.029	0.164	0.185	1.807	0.329	0.542	9,293	0.573
A23	0.000	0.080	0.000	0.050	0.000	0.118	0.000	0.020	0.349	3,566	0.000	0.000	4.183	0.299
A24	0.521	0.460	0.000	0.832	2,028	1.531	1.007	0.298	0.159	2.402	0.407	0.931	10,575	0.632
A25	0.615	0.560	0.000	0.676	1,540	1,600	0.992	0.471	0.246	2,839	0.153	0.434	10.126	0.612
A26	1.084	1.153	0.000	1,498	2.309	2.011	1.371	0.408	0.039	4.002	0.478	0.796	15.148	0.816

A27	0.695	0.693	0.000	1.409	1.936	1860	1.261	0.520	0.212	4.213	0.430	0.954	14.182	0.780
A28	0.192	0.583	0.000	0.749	0.182	0.713	0.418	0.176	0.215	0.000	0.141	0.359	3,730	0.271

S'ij												
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
A1	0.706	0.704	0.737	0.692	0.644	0.673	0.686	0.721	0.728	0.585	0.719	0.702
A2	0.381	0.362	0.395	0.395	0.345	0.395	0.385	0.395	0.376	0.176	0.395	0.390
A3	0.643	0.657	0.682	0.640	0.623	0.609	0.628	0.664	0.678	0.532	0.667	0.651
A4	0.766	0.766	0.801	0.748	0.710	0.727	0.748	0.781	0.791	0.646	0.784	0.766
A5	0.595	0.592	0.624	0.579	0.528	0.570	0.582	0.605	0.612	0.515	0.608	0.599
A6	0.647	0.637	0.682	0.629	0.628	0.603	0.625	0.666	0.681	0.553	0.667	0.650
A7	0.701	0.702	0.741	0.688	0.672	0.671	0.688	0.718	0.731	0.592	0.726	0.713
A8	0.453	0.486	0.486	0.470	0.434	0.411	0.438	0.475	0.472	0.353	0.482	0.472
A9	0.676	0.687	0.713	0.690	0.636	0.651	0.666	0.701	0.703	0.518	0.695	0.678
A10	0.609	0.613	0.000	0.624	0.581	0.572	0.591	0.624	0.636	0.484	0.626	0.619
A11	0.621	0.629	0.654	0.612	0.580	0.592	0.605	0.643	0.643	0.502	0.645	0.626
A12	0.566	0.564	0.589	0.529	0.532	0.533	0.547	0.585	0.583	0.444	0.576	0.559
A13	0.517	0.505	0.545	0.490	0.489	0.465	0.488	0.538	0.527	0.516	0.524	0.509
A14	0.523	0.518	0.547	0.512	0.493	0.469	0.482	0.537	0.547	0.457	0.526	0.522
A15	0.608	0.605	0.637	0.602	0.584	0.574	0.581	0.627	0.631	0.490	0.621	0.599
A16	0.671	0.653	0.703	0.672	0.606	0.632	0.658	0.687	0.701	0.551	0.686	0.695
A17	0.598	0.607	0.632	0.589	0.591	0.558	0.583	0.617	0.629	0.472	0.618	0.601
A18	0.700	0.706	0.733	0.678	0.642	0.665	0.688	0.721	0.728	0.566	0.715	0.713
A19	0.759	0.761	0.801	0.753	0.716	0.732	0.749	0.780	0.791	0.626	0.786	0.783
A20	0.652	0.654	0.688	0.646	0.601	0.626	0.636	0.674	0.682	0.552	0.671	0.656
A21	0.567	0.561	0.589	0.534	0.546	0.531	0.540	0.575	0.575	0.448	0.576	0.563
A22	0.540	0.543	0.573	0.537	0.492	0.501	0.524	0.566	0.565	0.485	0.558	0.548
A23	0.299	0.294	0.299	0.296	0.299	0.292	0.299	0.298	0.277	0.050	0.299	0.299
A24	0.609	0.611	0.632	0.594	0.538	0.562	0.586	0.619	0.625	0.519	0.614	0.590
A25	0.584	0.586	0.612	0.581	0.540	0.537	0.566	0.590	0.601	0.475	0.605	0.592
A26	0.776	0.773	0.816	0.760	0.727	0.739	0.765	0.801	0.815	0.657	0.799	0.787
A27	0.753	0.753	0.780	0.725	0.703	0.706	0.731	0.760	0.772	0.605	0.764	0.743
A28	0.258	0.233	0.271	0.222	0.259	0.224	0.244	0.259	0.257	0.271	0.262	0.248

Hey														
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**		
A1	0.031	0.033	0.000	0.044	0.093	0.064	0.050	0.015	0.008	0.151	0.018	0.035		
A2	0.014	0.033	0.000	0.000	0.050	0.000	0.010	0.000	0.019	0.220	0.000	0.005		
A3	0.039	0.025	0.000	0.043	0.059	0.073	0.055	0.019	0.004	0.151	0.015	0.031		
A4	0.035	0.034	0.000	0.053	0.091	0.073	0.053	0.019	0.009	0.154	0.017	0.035		
A5	0.029	0.032	0.000	0.045	0.096	0.054	0.042	0.019	0.012	0.109	0.016	0.025		
A6	0.035	0.044	0.000	0.052	0.054	0.079	0.057	0.016	0.001	0.129	0.014	0.031		
A7	0.039	0.038	0.000	0.052	0.069	0.069	0.053	0.022	0.009	0.149	0.015	0.027		
A8	0.033	0.000	0.000	0.015	0.052	0.075	0.048	0.011	0.014	0.133	0.004	0.014		
A9	0.036	0.025	0.000	0.022	0.077	0.061	0.047	0.012	0.009	0.194	0.017	0.034		
A10	0.034	0.030	0.000	0.019	0.062	0.071	0.052	0.019	0.007	0.159	0.017	0.024		
A11	0.033	0.026	0.000	0.042	0.075	0.062	0.049	0.012	0.011	0.153	0.009	0.028		

A12	0.023	0.025	0.000	0.060	0.057	0.056	0.042	0.004	0.006	0.145	0.013	0.030		
A13	0.028	0.040	0.000	0.055	0.057	0.080	0.057	0.007	0.019	0.029	0.021	0.037		
A14	0.024	0.030	0.000	0.035	0.054	0.078	0.065	0.011	0.000	0.090	0.021	0.025		
A15	0.029	0.032	0.000	0.035	0.054	0.063	0.057	0.011	0.006	0.148	0.016	0.038		
A16	0.032	0.051	0.000	0.031	0.098	0.071	0.045	0.017	0.003	0.153	0.018	0.008		
A17	0.034	0.025	0.000	0.043	0.041	0.074	0.049	0.015	0.003	0.160	0.014	0.030		
A18	0.033	0.027	0.000	0.055	0.091	0.068	0.045	0.012	0.005	0.167	0.018	0.020		
A19	0.042	0.040	0.000	0.048	0.085	0.069	0.052	0.021	0.010	0.176	0.015	0.018		
A20	0.036	0.034	0.000	0.042	0.086	0.062	0.051	0.014	0.006	0.136	0.017	0.032		
A21	0.022	0.027	0.000	0.055	0.043	0.058	0.049	0.014	0.014	0.141	0.013	0.026		
A22	0.034	0.030	0.000	0.036	0.081	0.072	0.050	0.008	0.009	0.089	0.016	0.026		
A23	0.000	0.005	0.000	0.003	0.000	0.007	0.000	0.001	0.022	0.249	0.000	0.000		
A24	0.023	0.021	0.000	0.038	0.094	0.070	0.046	0.013	0.007	0.112	0.018	0.042		
A25	0.028	0.026	0.000	0.031	0.072	0.075	0.046	0.022	0.011	0.137	0.007	0.020		
A26	0.041	0.043	0.000	0.057	0.089	0.077	0.052	0.015	0.001	0.159	0.018	0.030		
A27	0.027	0.027	0.000	0.055	0.077	0.074	0.049	0.020	0.008	0.175	0.017	0.037		
A28	0.012	0.038	0.000	0.049	0.012	0.046	0.027	0.011	0.014	0.000	0.009	0.023		
SUM	**0.828**	**0.841**	**0.000**	**1.116**	**1.868**	**1,785**	**1.296**	**0.380**	**0.247**	**3,968**	**0.394**	**0.732**	**13,455**	**Total Sum**
Weights	**0.0615**	**0.0625**	**0.0000**	**0.0829**	**0.1388**	**0.1326**	**0.0963**	**0.0282**	**0.0184**	**0.2949**	**0.0293**	**0.0544**	**1,000**	

Of the twelve analyzed digitization criteria in this particular case, the most significant criterion is C5 - Artificial intelligence by size class of enterprise (10 persons employed or more) (Percentage of enterprises). Applying artificial intelligence as a critical factor can significantly influence the achievement of the desired business success. Effective control of the other analyzed digitization criteria certainly contributes to this.

Table 3 shows the application process and results of the MARCOS method.

Table 3. Application process and results of the MARCOS method

Initial Matrix												
weights of criteria	**0.0615**	**0.0625**	**0**	**0.0829**	**0.1388**	**0.1326**	**0.0963**	**0.0282**	**0.0184**	**0.2949**	**0.0293**	**0.0544**
kind of criteria	1	1	1	1	1	1	1	1	1	1	1	1
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
A1	59.39	5.4	9.7	51.7	13.8	52.24	84.12	79	68.79	7.4	95.5	59
A2	35.52	4.3	1.6	17.5	3.6	11.08	29.15	53.82	78.1	7.37	61.7	27.3
A3	69.11	4.3	4.8	47.2	5.9	59.27	86.74	83.74	62.07	6.09	87.4	51.6
A4	69.62	5.9	6.6	69.5	15.2	73.02	97.39	89.92	71.94	10.05	95.8	62.3
A5	52.22	4.9	5.6	47	11.6	35.99	61.88	82.93	73.7	2.21	87.7	43.1
A6	62.61	6.7	4.3	58.6	5.2	66.57	91.09	78.05	57.19	3.87	85.5	52.1
A7	72.91	6.2	6.9	63.1	8	59.82	89.81	93.2	70.82	7.15	88.2	49.4
A8	52.4	2.4	2.8	23.6	4	45.4	61.18	66.72	73.55	2.51	66.4	32.6
A9	66.18	4.4	6.8	30	9.2	47.61	74.86	71.78	70.76	16.47	92.6	56.7
A10	59.67	4.7	0	26.8	5.9	53.27	78	82.03	65.91	6.32	90	43
A11	58.95	4.3	5.1	45.1	7.9	44.82	74.2	70.11	72.01	5.76	76	47.4
A12	45.75	4.1	3.2	61.4	5	36.18	59.31	58.27	63.82	4.1	81.4	47.7
A13	49.46	5.4	4.8	52.9	4.7	54.85	77.68	62.2	82.28	0.4	95	52.9

A14	45.34	4.4	4.5	35.8	4.5	52.94	90.7	66.95	56.17	1.32	94.2	42
A15	52.91	4.9	4.2	38.4	4.9	44.65	85.57	68.44	64.83	4.95	88.5	58.9
A16	60.14	8	4.1	37	14.4	58.49	71.61	80.27	60.23	6.8	94.1	30.4
A17	58.89	4.2	3.9	44.9	3.7	55.3	71.64	75.89	60.1	6.22	83.2	49.2
A18	63.02	4.7	11.4	66.7	13.2	57.34	73.18	73.22	64.01	10.34	96.4	41
A19	82.7	6.9	11	61.2	13.4	66.51	95.95	93.09	73.53	16.31	90.6	40.2
A20	64.68	5.3	5.5	46.5	10.8	46.29	80.95	75.4	64.42	4.59	91.1	52.8
A21	44.3	4.3	4	55.7	3.7	37.27	68.38	73	75.14	3.76	81.1	43.5
A22	55.97	4.5	4.5	37.5	7.9	48.84	68.64	63.39	67.58	1.34	85	43
A23	27.73	2.6	1.3	18.4	1.5	12.47	24.54	54.93	79.62	7.78	61.2	25
A24	46.7	3.8	4.7	40.2	11.4	51.23	67.15	72.54	65.85	2.43	91.9	63.4
A25	51.31	4.2	3.2	34.4	7	54.88	66.18	86.22	71.83	3.76	71.3	38.6
A26	81.99	7.6	13	78.3	15.1	82.75	96.71	80.9	58.39	12.03	98.7	55.4
A27	55.56	4.8	7.9	71.6	10.4	71.15	86.58	90.5	69.42	14.86	94.1	64.9
A28	33.61	4.3	3	37	1.8	22.61	37.28	64.18	69.66	0.22	70.5	35.8
MAX	82.7	8	13	78.3	15.2	82.75	97.39	93.2	82.28	16.47	98.7	64.9
MIN	27.73	2.4	0	17.5	1.5	11.08	24.54	53.82	56.17	0.22	61.2	25

Extended Initial Matrix												
weights of criteria	**0.0615**	**0.0625**	**0**	**0.0829**	**0.1388**	**0.1326**	**0.0963**	**0.0282**	**0.0184**	**0.2949**	**0.0293**	**0.0544**
kind of criteria	1	1	1	1	1	1	1	1	1	1	1	1
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
AAA	27.73	2.4	0	17.5	1.5	11.08	24.54	53.82	56.17	0.22	61.2	25
A1	59.39	5.4	9.7	51.7	13.8	52.24	84.12	79	68.79	7.4	95.5	59
A2	35.52	4.3	1.6	17.5	3.6	11.08	29.15	53.82	78.1	7.37	61.7	27.3
A3	69.11	4.3	4.8	47.2	5.9	59.27	86.74	83.74	62.07	6.09	87.4	51.6
A4	69.62	5.9	6.6	69.5	15.2	73.02	97.39	89.92	71.94	10.05	95.8	62.3
A5	52.22	4.9	5.6	47	11.6	35.99	61.88	82.93	73.7	2.21	87.7	43.1
A6	62.61	6.7	4.3	58.6	5.2	66.57	91.09	78.05	57.19	3.87	85.5	52.1
A7	72.91	6.2	6.9	63.1	8	59.82	89.81	93.2	70.82	7.15	88.2	49.4
A8	52.4	2.4	2.8	23.6	4	45.4	61.18	66.72	73.55	2.51	66.4	32.6
A9	66.18	4.4	6.8	30	9.2	47.61	74.86	71.78	70.76	16.47	92.6	56.7
A10	59.67	4.7	0	26.8	5.9	53.27	78	82.03	65.91	6.32	90	43
A11	58.95	4.3	5.1	45.1	7.9	44.82	74.2	70.11	72.01	5.76	76	47.4
A12	45.75	4.1	3.2	61.4	5	36.18	59.31	58.27	63.82	4.1	81.4	47.7
A13	49.46	5.4	4.8	52.9	4.7	54.85	77.68	62.2	82.28	0.4	95	52.9
A14	45.34	4.4	4.5	35.8	4.5	52.94	90.7	66.95	56.17	1.32	94.2	42
A15	52.91	4.9	4.2	38.4	4.9	44.65	85.57	68.44	64.83	4.95	88.5	58.9
A16	60.14	8	4.1	37	14.4	58.49	71.61	80.27	60.23	6.8	94.1	30.4
A17	58.89	4.2	3.9	44.9	3.7	55.3	71.64	75.89	60.1	6.22	83.2	49.2
A18	63.02	4.7	11.4	66.7	13.2	57.34	73.18	73.22	64.01	10.34	96.4	41
A19	82.7	6.9	11	61.2	13.4	66.51	95.95	93.09	73.53	16.31	90.6	40.2
A20	64.68	5.3	5.5	46.5	10.8	46.29	80.95	75.4	64.42	4.59	91.1	52.8

A21	44.3	4.3	4	55.7	3.7	37.27	68.38	73	75.14	3.76	81.1	43.5
A22	55.97	4.5	4.5	37.5	7.9	48.84	68.64	63.39	67.58	1.34	85	43
A23	27.73	2.6	1.3	18.4	1.5	12.47	24.54	54.93	79.62	7.78	61.2	25
A24	46.7	3.8	4.7	40.2	11.4	51.23	67.15	72.54	65.85	2.43	91.9	63.4
A25	51.31	4.2	3.2	34.4	7	54.88	66.18	86.22	71.83	3.76	71.3	38.6
A26	81.99	7.6	13	78.3	15.1	82.75	96.71	80.9	58.39	12.03	98.7	55.4
A27	55.56	4.8	7.9	71.6	10.4	71.15	86.58	90.5	69.42	14.86	94.1	64.9
A28	33.61	4.3	3	37	1.8	22.61	37.28	64.18	69.66	0.22	70.5	35.8
AI	82.7	8	13	78.3	15.2	82.75	97.39	93.2	82.28	16.47	98.7	64.9

Normalized Matrix												
weights of criteria	0.0615	0.0625	0	0.0829	0.1388	0.1326	0.0963	0.0282	0.0184	0.2949	0.0293	0.0544
kind of criteria	1	1	1	1	1	1	1	1	1	1	1	1
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
AAA	0.335308	0.3	0	0.223499	0.098684	0.133897	0.251977	0.577468	0.682669	0.013358	0.620061	0.385208
A1	0.7181	0.6750	0.7462	0.6603	0.9079	0.6313	0.8637	0.8476	0.8360	0.4493	0.9676	0.9091
A2	0.4295	0.5375	0.1231	0.2235	0.2368	0.1339	0.2993	0.5775	0.9492	0.4475	0.6251	0.4206
A3	0.8357	0.5375	0.3692	0.6028	0.3882	0.7163	0.8906	0.8985	0.7544	0.3698	0.8855	0.7951
A4	0.8418	0.7375	0.5077	0.8876	1.0000	0.8824	1.0000	0.9648	0.8743	0.6102	0.9706	0.9599
A5	0.6314	0.6125	0.4308	0.6003	0.7632	0.4349	0.6354	0.8898	0.8957	0.1342	0.8886	0.6641
A6	0.7571	0.8375	0.3308	0.7484	0.3421	0.8045	0.9353	0.8374	0.6951	0.2350	0.8663	0.8028
A7	0.8816	0.7750	0.5308	0.8059	0.5263	0.7229	0.9222	1.0000	0.8607	0.4341	0.8936	0.7612
A8	0.6336	0.3000	0.2154	0.3014	0.2632	0.5486	0.6282	0.7159	0.8939	0.1524	0.6727	0.5023
A9	0.8002	0.5500	0.5231	0.3831	0.6053	0.5753	0.7687	0.7702	0.8600	1.0000	0.9382	0.8737
A10	0.7215	0.5875	0.0000	0.3423	0.3882	0.6437	0.8009	0.8802	0.8010	0.3837	0.9119	0.6626
A11	0.7128	0.5375	0.3923	0.5760	0.5197	0.5416	0.7619	0.7523	0.8752	0.3497	0.7700	0.7304
A12	0.5532	0.5125	0.2462	0.7842	0.3289	0.4372	0.6090	0.6252	0.7756	0.2489	0.8247	0.7350
A13	0.5981	0.6750	0.3692	0.6756	0.3092	0.6628	0.7976	0.6674	1.0000	0.0243	0.9625	0.8151
A14	0.5482	0.5500	0.3462	0.4572	0.2961	0.6398	0.9313	0.7183	0.6827	0.0801	0.9544	0.6471
A15	0.6398	0.6125	0.3231	0.4904	0.3224	0.5396	0.8786	0.7343	0.7879	0.3005	0.8967	0.9076

A16	0.7272	1.0000	0.3154	0.4725	0.9474	0.7068	0.7353	0.8613	0.7320	0.4129	0.9534	0.4684
A17	0.7121	0.5250	0.3000	0.5734	0.2434	0.6683	0.7356	0.8143	0.7304	0.3777	0.8430	0.7581
A18	0.7620	0.5875	0.8769	0.8519	0.8684	0.6929	0.7514	0.7856	0.7780	0.6278	0.9767	0.6317
A19	1.0000	0.8625	0.8462	0.7816	0.8816	0.8037	0.9852	0.9988	0.8937	0.9903	0.9179	0.6194
A20	0.7821	0.6625	0.4231	0.5939	0.7105	0.5594	0.8312	0.8090	0.7829	0.2787	0.9230	0.8136
A21	0.5357	0.5375	0.3077	0.7114	0.2434	0.4504	0.7021	0.7833	0.9132	0.2283	0.8217	0.6703
A22	0.6768	0.5625	0.3462	0.4789	0.5197	0.5902	0.7048	0.6802	0.8213	0.0814	0.8612	0.6626
A23	0.3353	0.3250	0.1000	0.2350	0.0987	0.1507	0.2520	0.5894	0.9677	0.4724	0.6201	0.3852
A24	0.5647	0.4750	0.3615	0.5134	0.7500	0.6191	0.6895	0.7783	0.8003	0.1475	0.9311	0.9769
A25	0.6204	0.5250	0.2462	0.4393	0.4605	0.6632	0.6795	0.9251	0.8730	0.2283	0.7224	0.5948
A26	0.9914	0.9500	1.0000	1.0000	0.9934	1.0000	0.9930	0.8680	0.7096	0.7304	1.0000	0.8536
A27	0.6718	0.6000	0.6077	0.9144	0.6842	0.8598	0.8890	0.9710	0.8437	0.9022	0.9534	1.0000
A28	0.4064	0.5375	0.2308	0.4725	0.1184	0.2732	0.3828	0.6886	0.8466	0.0134	0.7143	0.5516
AI	1	1	1	1	1	1	1	1	1	1	1	1

Weighted Normalized Matrix												
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**C12**
AAA	0.020621	0.01875	0	0.018528	0.013697	0.017755	0.024265	0.016285	0.012561	0.003939	0.018168	0.020955
A1	0.0442	0.0422	0.0000	0.0547	0.1260	0.0837	0.0832	0.0239	0.0154	0.1325	0.0284	0.0495
A2	0.0264	0.0336	0.0000	0.0185	0.0329	0.0178	0.0288	0.0163	0.0175	0.1320	0.0183	0.0229
A3	0.0514	0.0336	0.0000	0.0500	0.0539	0.0950	0.0858	0.0253	0.0139	0.1090	0.0259	0.0433
A4	0.0518	0.0461	0.0000	0.0736	0.1388	0.1170	0.0963	0.0272	0.0161	0.1799	0.0284	0.0522
A5	0.0388	0.0383	0.0000	0.0498	0.1059	0.0577	0.0612	0.0251	0.0165	0.0396	0.0260	0.0361
A6	0.0466	0.0523	0.0000	0.0620	0.0475	0.1067	0.0901	0.0236	0.0128	0.0693	0.0254	0.0437
A7	0.0542	0.0484	0.0000	0.0668	0.0731	0.0959	0.0888	0.0282	0.0158	0.1280	0.0262	0.0414

A8	0.0390	0.0188	0.0000	0.0250	0.0365	0.0727	0.0605	0.0202	0.0164	0.0449	0.0197	0.0273
A9	0.0492	0.0344	0.0000	0.0318	0.0840	0.0763	0.0740	0.0217	0.0158	0.2949	0.0275	0.0475
A10	0.0444	0.0367	0.0000	0.0284	0.0539	0.0854	0.0771	0.0248	0.0147	0.1132	0.0267	0.0360
A11	0.0438	0.0336	0.0000	0.0477	0.0721	0.0718	0.0734	0.0212	0.0161	0.1031	0.0226	0.0397
A12	0.0340	0.0320	0.0000	0.0650	0.0457	0.0580	0.0586	0.0176	0.0143	0.0734	0.0242	0.0400
A13	0.0368	0.0422	0.0000	0.0560	0.0429	0.0879	0.0768	0.0188	0.0184	0.0072	0.0282	0.0443
A14	0.0337	0.0344	0.0000	0.0379	0.0411	0.0848	0.0897	0.0203	0.0126	0.0236	0.0280	0.0352
A15	0.0393	0.0383	0.0000	0.0407	0.0447	0.0715	0.0846	0.0207	0.0145	0.0886	0.0263	0.0494
A16	0.0447	0.0625	0.0000	0.0392	0.1315	0.0937	0.0708	0.0243	0.0135	0.1218	0.0279	0.0255
A17	0.0438	0.0328	0.0000	0.0475	0.0338	0.0886	0.0708	0.0230	0.0134	0.1114	0.0247	0.0412
A18	0.0469	0.0367	0.0000	0.0706	0.1205	0.0919	0.0724	0.0222	0.0143	0.1851	0.0286	0.0344
A19	0.0615	0.0539	0.0000	0.0648	0.1224	0.1066	0.0949	0.0282	0.0164	0.2920	0.0269	0.0337
A20	0.0481	0.0414	0.0000	0.0492	0.0986	0.0742	0.0800	0.0228	0.0144	0.0822	0.0270	0.0443
A21	0.0329	0.0336	0.0000	0.0590	0.0338	0.0597	0.0676	0.0221	0.0168	0.0673	0.0241	0.0365
A22	0.0416	0.0352	0.0000	0.0397	0.0721	0.0783	0.0679	0.0192	0.0151	0.0240	0.0252	0.0360
A23	0.0206	0.0203	0.0000	0.0195	0.0137	0.0200	0.0243	0.0166	0.0178	0.1393	0.0182	0.0210
A24	0.0347	0.0297	0.0000	0.0426	0.1041	0.0821	0.0664	0.0219	0.0147	0.0435	0.0273	0.0531
A25	0.0382	0.0328	0.0000	0.0364	0.0639	0.0879	0.0654	0.0261	0.0161	0.0673	0.0212	0.0324
A26	0.0610	0.0594	0.0000	0.0829	0.1379	0.1326	0.0956	0.0245	0.0131	0.2154	0.0293	0.0464
A27	0.0413	0.0375	0.0000	0.0758	0.0950	0.1140	0.0856	0.0274	0.0155	0.2661	0.0279	0.0544
A28	0.0250	0.0336	0.0000	0.0392	0.0164	0.0362	0.0369	0.0194	0.0156	0.0039	0.0209	0.0300
AI	0.0615	0.0625	0	0.0829	0.1388	0.1326	0.0963	0.0282	0.0184	0.2949	0.0293	0.0544

	Results of the MARCOS Method							
		Si	**Ki-**	**Ki+**	**f(K-)**	**f(K+)**	**f(K)**	**Ranking**

	AAA	0.1855							
Belgium	**A1**	0.6836	3.6846	0.6837	0.1565	0.8435	0.6644	0.6644	**7**
Bulgaria	**A2**	0.3649	1.9668	0.3650	0.1565	0.8435	0.3547	0.3547	**26**
Czechia	**A3**	0.5870	3.1642	0.5872	0.1565	0.8435	0.5706	0.5706	**10**
Denmark	**A4**	0.8275	4.4601	0.8276	0.1565	0.8435	0.8043	0.8043	**4**
Germany	**A5**	0.4950	2.6679	0.4951	0.1565	0.8435	0.4811	0.4811	**18**
Estonia	**A6**	0.5799	3.1259	0.5800	0.1565	0.8435	0.5637	0.5637	**12**
Ireland	**A7**	0.6668	3.5943	0.6670	0.1565	0.8435	0.6481	0.6481	**8**
Greece	**A8**	0.3811	2.0541	0.3812	0.1565	0.8435	0.3704	0.3704	**25**
Spain	**A9**	0.7571	4.0810	0.7573	0.1565	0.8435	0.7359	0.7359	**5**
France	**A10**	0.5413	2.9177	0.5414	0.1565	0.8435	0.5261	0.5261	**14**
Croatia	**A11**	0.5453	2.9390	0.5454	0.1565	0.8435	0.5300	0.5300	**13**
Italy	**A12**	0.4628	2.4946	0.4629	0.1565	0.8435	0.4498	0.4498	**20**
Cyprus	**A13**	0.4595	2.4769	0.4596	0.1565	0.8435	0.4466	0.4466	**21**
Latvia	**A14**	0.4412	2.3783	0.4413	0.1565	0.8435	0.4289	0.4289	**24**
Lithuania	**A15**	0.5187	2.7957	0.5188	0.1565	0.8435	0.5041	0.5041	**17**
Luxembourg	**A16**	0.6554	3.5324	0.6555	0.1565	0.8435	0.6370	0.6370	**9**
Hungary	**A17**	0.5311	2.8627	0.5312	0.1565	0.8435	0.5162	0.5162	**15**
Malta	**A18**	0.7236	3.9002	0.7237	0.1565	0.8435	0.7033	0.7033	**6**
Netherlands	**A19**	0.9013	4.8579	0.9014	0.1565	0.8435	0.8760	0.8760	**1**
Austria	**A20**	0.5823	3.1386	0.5824	0.1565	0.8435	0.5660	0.5660	**11**
Poland	**A21**	0.4534	2.4438	0.4535	0.1565	0.8435	0.4407	0.4407	**23**
Portugal	**A22**	0.4543	2.4488	0.4544	0.1565	0.8435	0.4416	0.4416	**22**
Romania	**A23**	0.3312	1.7853	0.3313	0.1565	0.8435	0.3219	0.3219	**27**
Slovenia	**A24**	0.5202	2.8038	0.5203	0.1565	0.8435	0.5056	0.5056	**16**
Slovakia	**A25**	0.4877	2.6287	0.4878	0.1565	0.8435	0.4740	0.4740	**19**
Finland	**A26**	0.8980	4.8405	0.8982	0.1565	0.8435	0.8729	0.8729	**2**
Sweden	**A27**	0.8405	4.5305	0.8407	0.1565	0.8435	0.8170	0.8170	**3**
Serbia	**A28**	0.2772	1.4939	0.2772	0.1565	0.8435	0.2694	0.2694	**28**
	AI	0.9998							

In the European Union, the highest level of digitization is in the Netherlands. Next: Finland, Sweden, Denmark, Spain and so on. The leading countries of the European Union are positioned: Germany is in eighteenth place, France is in fourteenth place and Italy is in twentieth place. In the European Union, in terms of digitization, Romania took the worst position.

In terms of digitization, Serbia is positioned in twenty-eighth place. Croatia is positioned in thirteenth place, and Slovenia is in sixteenth place. Serbia is therefore in a very bad position among the member countries of the European Union and in the surrounding area. All in all, it is necessary to significantly increase the level of digitization in Serbia to achieve the desired business success.

The application of multi-criteria decision-making methods in the analysis of digitalization positioning gives more accurate results, which is confirmed by the research conducted in this study, on the example of EU member states and Serbia, based on the MEREC and MARCOS methods. That is why their application is recommended.

4 Conclusion

Recently, more and more attention has been paid to the issue of digitization. Digitization is a critical factor in business success. As part of digitalization, significant attention is paid to artificial intelligence. The effects and

consequences of the application of artificial intelligence are investigated. A special law on artificial intelligence was created.
The level of digitization is different for individual countries. This is indicated by the results of this study. As far as the positioning of Serbia in terms of the level of digitization is concerned, it is at a very low level. It is therefore necessary to speed up the digitization process to achieve the target business success.

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