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## Multi-Criteria Assessment of the Company's Location Selection: A Dynamic Approach

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### **Abstract:**

**Purpose:** The aim of the study is to present multi-criteria Vector Measure Construction Method (VMCM), which enables the construction of aggregate measures, the creation of rankings, classifications and the investigation of change dynamics.

**Design/Methodology/Approach:** The VMCM is used to build the measure (in dynamic terms) for the purpose of assessing the friendliness of EU countries in the context of supporting investors in the selection of locations for newly established enterprises.

**Findings:** Not all multi-criteria methods give the opportunity to study the dynamics of change. The VMCM allows taking into account objects from outside the sample, which are better than the pattern (the measure is not limited, neither from the bottom nor from the top).

**Practical Implications:** The solution proposed allows to assess the investment friendliness of individual country and compare countries (objects) with each other in different sections of time.

### **Originality/Value:**

The VMCM allows to eliminate the limitations of the other multi-criteria methods in making rankings, classifications of objects and the analysis of the change dynamics.

**Keywords:** Multidimensional Comparative Analysis (MCA); Multi-Criteria Decision Analysis (MCDA); VMCM; company location.

**JEL codes:** C3, C6, D7, R1, R3.

**Paper type :** Study research.

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## **1. Introduction**

New enterprise creation is being the manifestation of entrepreneurship with the subject of interest for many scientific disciplines such as economics, history, management science, sociology, psychology, law, pedagogy and ethics. Although it is the theory of economics that dominates research on entrepreneurship (Perez and Canino, 2009), whereas the interdisciplinary nature of this research problem and its multithreading as well the complexity means that a unified theory of entrepreneurship has not been developed (Alvarez and Barney, 2017). Currently conducted theoretical considerations are concentrated around two complementary theoretical currents (Santarelli and Vivarelli, 2006). The first, referred as the subjective approach focuses on the essence and importance of entrepreneurship from the side of its causality and referring to its sources inherent in the individual characteristics of units (Bianchi and Henrekson, 2005; Caliendo and Kritikos, 2007; Hessels and Zwan, 2013; Simoes *et al.*, 2013). The second, referred as the subject-based approach focuses on its manifestations with understanding of entrepreneurship as a process that results from the entrepreneurial attitude of people and society which concern with new activities. Entrepreneurship thus understood is the result of individual or collective initiatives leading to the creation and operation of various types and sizes of enterprises.

Location theories explain that the company chooses a location in one place not another in the optimization process, which includes maximizing profit or minimizing costs. The final location decision of the company must consist in choosing the best possible place among a given set of choices and restrictions (Legros *et al.*, 2016). Legal regulations and regulations can influence the creation of new companies in two ways. First of all, the policy can have an indirect impact on start-ups. Secondly, the bureaucracy that needs to be overcome to establish a company in a quite obvious and negative way affects the regulations regarding the creation of new companies (Burden *et al.*, 2012). The applicable regulations regarding the registration of a new company, filing tax returns and paying taxes, filing financial statements, and understanding which rules and regulations a company is subject to follow, cause administrative burdens, or "an individual's experience of policy implementation as onerous" (Burden *et al.*, 2012). When creating new businesses, they can be explained as a time spent understanding and meeting the requirements imposed by government or other public authorities.

These burdens can be overwhelming and difficult to bear, may exceed entrepreneur's own capabilities and either discourage potential entrepreneurs or lead to an increase in the actual costs of creating and running businesses (Hoffmann, 2011). The stability and enforcement of regulations also determine the climate favorable to entrepreneurship. If the current rules are subject to rapid and frequent changes, and ownership rights are not well defined or enforced, the risk related to the start-up and running of the business definitely increases. A stable set of rules can therefore have a positive impact on entrepreneurship as a process (Koster and Karlsson, 2009).

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Administrative burdens in individual countries are one of the elements of the World Bank analysis, which in the Doing Business report focuses on business regulations and their practical application. It indicates the economy with the most and least friendly business regulations. This World Bank study, launched in 2001, is carried out annually and the report presents data on individual indicators (currently 41) and 2 aggregated measurements (Weltbank, 2019).

Individual indicators refer to 10 areas of regulations relevant to the entire life cycle of small and medium-sized enterprises:

- Starting a business – Procedures, time, cost, and minimum capital to open a new business;
- Dealing with construction permits – Procedures, time, and cost to build a warehouse;
- Getting electricity – procedures, time, and cost required for a business to obtain a permanent electricity connection for a newly constructed warehouse;
- Registering property – Procedures, time, and cost to register commercial real estate;
- Getting credit – Strength of legal rights index, depth of credit information index;
- Protecting investors – Indices on the extent of disclosure, extent of director liability, and ease of shareholder suits;
- Paying taxes – Number of taxes paid, hours per year spent preparing tax returns, and total tax payable as share of gross profit;
- Trading across borders – Number of documents, cost, and time necessary to export and import;
- Enforcing contracts – Procedures, time, and cost to enforce a debt contract;
- Resolving insolvency – The time, cost, and recovery rate (%) under bankruptcy proceeding.

Aggregated measurements are:

- the ease of doing business score (formerly called the distance to frontier score) - benchmarks economies with respect to regulatory best practice, showing the absolute distance to the best regulatory performance on each Doing Business indicator; this measurement was normalized in the range from 0 to 100, where the number 100 means the limit value of the best practices;
- the ease of doing business ranking - is based on the ease of doing business score and compares economies with one another.

The indicator regarding the operating conditions in a given country and the report itself are based on the collection and comprehensive analysis of comparable quantitative data provided by the business environment (representatives of state authorities, lawyers, consultants, accountants and other professionals). The rankings created on their basis allow for comparing economies from different regions and

time comparisons. Doing Business encourages economies to compete towards more effective regulation offers measurable benchmarks for reform and serves as a source of information for researchers, journalists, the private sector and other interested in the economic situation of any economy.

The aim of the article is to present the methodological, foundations and practical use of the multi-criteria VMCM (Vector Measure Construction Method) in the context of investor support in the selection of locations for newly established enterprises (in EU countries).

## **2. Methodology**

The research concerns the issues of the EU countries' assessment in terms of choosing the location for newly established enterprises. The data from 2010-2019 were used for this study. This is the period from the end of the global financial crisis (2008-2009) to the current year (2019). The data was obtained from the *Doing Business* database (Doing Business, 2019). Two scenarios were developed for this study. In the first scenario (based on the adopted diagnostic variables), the ranking of EU countries according to the so-called artificial pattern was made. A pattern and anti-pattern were constructed on the basis of data from 2010. The ranking was created in order to obtain information on the stability of investment conditions of individual countries with reference to the adopted base year (2010). In the second scenario two real objects were selected: a pattern and anti-pattern. In our case, the best and most stable country in the EU countries ranking within the first class for 2019 (in the context of investment friendliness) became the pattern. The anti-pattern was the last country in the ranking. The purpose of this scenario was to enable the general ranking of the countries and to give the possibility of making comparison with respect to the selected real object (country), which was the pattern.

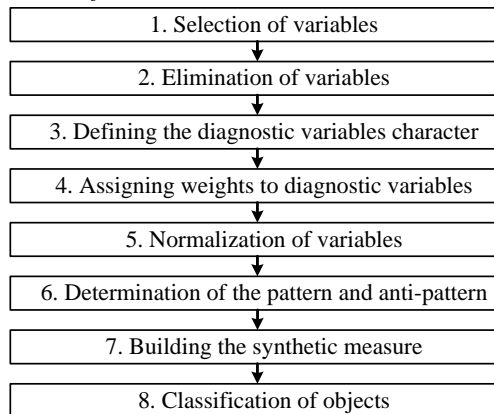
The following objects were analysed (28 countries of EU): Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czechia (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), United Kingdom (UK).

The following nine indicators were used for the research (data for 2010-2019 obtained from *Doing Business*):  $x_1$  – Starting a business;  $x_2$  – Getting credit;  $x_3$  – Paying taxes;  $x_4$  – Enforcing contract;  $x_5$  – Dealing with construction permits;  $x_6$  – Registering property;  $x_7$  – Protecting minority investors;  $x_8$  – Trading across borders;  $x_9$  – Resolving insolvency.

VMCM is included in the group of multidimensional comparative analysis (MCA) methods. These methods utilize the vector calculus properties in order to build a

vector aggregate measure value based on a pattern and anti-pattern. This group includes also other methods, for example: TOPSIS (Hwang and Yoon, 1981; Jahanshahloo *et al.*, 2009; 2006), VIKOR (Opricovic, 1998; Opricovic and Tzeng, 2004; Piwowarski *et al.*, 2018a), HELLWIG (Kasztelan, 2017), PVM (Nermend, 2017). VMCM allows for making rankings, classifications of objects and the analysis of the change dynamics. It is dedicated to the study of complex economic processes described by many factors over time (Nermend, 2017; Piwowarski *et al.*, 2018b). The procedure of VMCM consists of 8 steps (Figure 1).

**Figure 1.** The procedure of VMCM



*Source:* Author's elaboration

In the first step of the VMCM procedure (the selection of diagnostic variables) expert judgment method is used. The second step is to eliminate variables using the significance coefficient of features. Variables, for which significance coefficient values are within the range  $< 0; 0,1 >$  are quasi-constant and such variables should be eliminated from the set of variables under consideration (Nermend, 2007). The third step of the procedure is to define the diagnostic variables character (stimulants, destimulants, nominants). Stimulants are such variables, which greater values mean the higher level of development of studied phenomena, e.g. considering the quality of life there will be: number of GPs, cars, residential area per person, etc. Destimulants are such variables, which smaller values mean the higher level of development, for instance considering the standard of living there will be: inflation, unemployment, etc. Nominants are such variables, which desired values are within a specific range (e.g. natural growth, lending rate, etc.). In our study all diagnostic variables were stimulants.

The two next steps of the procedure are: assigning weights to diagnostic variables and normalization of variables. In our study, weights are assigned to diagnostic variables using expert judgment method. They are so-called substantive weights. The aim of the variables normalization is to eliminate units of measurement, but also

to equalize the values of variables. Standardization is the most commonly used normalization technique:

$$x'_{ij} = \frac{a_i}{\sigma_i} \tag{1}$$

where:

$\sigma_i$  – standard deviation of the  $i$ -th variable nominator;  $a_i$  can be defined in any way, e.g.:

$$a_i = x_{ij} - \bar{x}_i \tag{2}$$

where:

$\bar{x}_i$  – mean value of the  $i$ -th variable;  $x'_{ij}$  is normalized value of the  $i$ -th variable for the  $j$ -th object.

The most important stages of the procedure are stages 6, 7, 8 (Figure 1). The pattern and anti-pattern can be selected as real objects. It is also possible to build them as artificial objects, automatically determine the pattern and anti-pattern based on the first and third quartiles, where for stimulants values of the third quartile and for destimulants values of the first quartile are taken as coordinates of the pattern accordingly:

$$x'_{iw} = \begin{cases} x'_{i3} & \text{for stimulants} \\ x'_{i1} & \text{for destimulants} \end{cases} \tag{3}$$

where:

$x'_{iw}$  – the value of the  $i$ -th normalized variable for the pattern,

$x'_{i1}$

$q_1$  – the value of the  $i$ -th normalized variable for the first quartile,

$x'_{i3}$  – the value of the  $i$ -th normalized variable for the third quartile.

In case of anti-pattern the procedure is inversed, values in the first quartile are anti-pattern coordinates for stimulants and values in the third quartile for destimulants:

$$x'_{iaw} = \begin{cases} x'_{i1} & \text{for stimulants} \\ x'_{i3} & \text{for destimulants} \end{cases} \tag{4}$$

where:

$x'_{iaw}$

– means the value of the  $i$ -th normalized variable for anti-pattern.

The values of the variables of the examined objects are described by the coordinates of the vectors. Objects located in the vector space determine the direction. The difference between a pattern and anti-pattern object is also a vector with a specific

direction. The value of the aggregate measure is determined along this direction. In this way, the value of the aggregate measure for each analysed object is appointed. The formula is used to determine the coordinates of objects (Nermend, 2007, 2006):

$$c = \frac{(\vec{A}, \vec{B})}{(\vec{B}, \vec{B})} \tag{5}$$

In turn,  $\vec{A}$  and  $\vec{B}$  based on vectors  $(\vec{A}, \vec{B})$  is calculated according to the formula:

$$(\vec{A}, \vec{B}) = \sum_{k=1}^n a_k b_k \tag{6}$$

where:

$a_k, b_k$  – coordinates of the appropriate vector  $\vec{A}$  and  $\vec{B}$ .

Vector  $\vec{B}$  is the difference between the pattern and anti-pattern. Including in the formula (5) coordinates pattern, anti-pattern and object we obtain a formula for determining the aggregate measure (Nermend, 2009):

$$m_{a_j} = \frac{\sum_{i=1}^m \left( x'_i - x'_i \right)_j \left( x'_i - x'_i \right)_{aw}}{\sum_{i=1}^m \left( x'_i - x'_i \right)_{aw}^2} \tag{7}$$

The pattern will have the value equal to 1 and the anti-pattern equal to 0. The objects better than the anti-pattern take values between 0 and 1, just like objects worse than pattern. If the objects that are better than the pattern are taken into account, the aggregate measure value will be greater than 1. For objects worse than the anti-pattern, the value of the measure will be smaller, and having a negative value of measure.

The values of the aggregate measure allow for ranking objects, thus it is possible to determine which of them are "better" and which are "worse". They also allow determining which are similar to each other in terms of adopted criteria. In the simplest case objects can be classified based on mean value  $\bar{m}_{m_{s_0}}$  and standard deviation of the synthetic measure  $\sigma_{m_{s_0}}$ . Objects are classified into four classes (Nermend, 2009):

$$\left\{ \begin{array}{l} 1 \text{ for } m_{a,j} \in (\bar{m}_{m_{a0}} + \sigma_{m_{a0}}; \infty), \\ 2 \text{ for } m_{a,j} \in (\bar{m}_{m_{a0}}; \bar{m}_{m_{a0}} + \sigma_{m_{a0}}), \\ 3 \text{ for } m_{a,j} \in (\bar{m}_{m_{a0}} - \sigma_{m_{a0}}; \bar{m}_{m_{a0}}), \\ 4 \text{ for } m_{a,j} \in (-\infty; \bar{m}_{m_{a0}} - \sigma_{m_{a0}}). \end{array} \right. \quad (7)$$

### 3. Research Results and Discussion

The analysis of data for 28 EU countries was supposed to answer the question which countries create the best conditions for investors (location for start-ups). Inclusion of data from the last 10 years (2010-2019), coming from a reliable institution (The World Bank Group) allowed to assess the stability of investment conditions in individual European countries. The variability of these conditions over time was studied. The designated ranking of EU countries (2010-2019) in terms of investment friendliness is presented in table 1. Data from 2010 were used to build an artificial pattern (base year).

**Table 1.** Ranking of the European countries for 2010-2019 made with the use of VMCM artificial pattern - 2010) in terms of assessing the friendliness of EU countries for newly established enterprises

Name of country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria (AT)	10	9	12	9	11	8	8	8	8	8
Belgium (BE)	9	10	11	11	14	16	17	17	17	15
Bulgaria (BG)	19	20	20	21	20	18	20	21	20	22
Croatia (HR)	27	27	27	28	28	22	24	25	24	25
Cyprus (CY)	15	15	16	17	23	27	26	26	26	26
Czechia (CZ)	25	21	21	19	18	19	19	19	19	20
Denmark (DK)	2	2	1	2	1	1	1	1	1	1
Estonia (EE)	6	6	6	7	6	3	2	2	2	2
Finland (FI)	4	5	4	4	3	6	7	7	7	7
France (FR)	13	13	14	14	13	13	9	12	13	10
Germany (DE)	7	7	8	10	10	17	16	16	16	16
Greece (EL)	26	28	28	27	26	26	27	27	27	27
Hungary (HU)	20	18	18	22	22	20	21	20	25	19
Ireland (IE)	1	1	2	1	2	10	11	10	11	13
Italy (IT)	22	23	22	24	24	24	25	24	23	24
Latvia (LV)	12	12	7	8	7	7	6	6	6	6
Lithuania (LT)	11	11	10	12	9	5	5	5	3	3
Luxembourg	16	16	17	18	17	21	22	23	22	23



Name of country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
(LU)										
Malta (MT)	23	25	25	26	27	28	28	28	28	28
Netherlands (NL)	8	8	9	6	8	9	12	13	10	11
Poland (PL)	24	24	24	16	15	15	15	14	15	14
Portugal (PT)	14	14	13	13	12	12	10	11	12	12
Romania (RO)	18	22	23	23	19	11	14	15	14	17
Slovakia (SK)	21	19	19	20	21	23	18	18	18	18
Slovenia (SI)	28	26	26	25	25	25	23	22	21	21
Spain (ES)	17	17	15	15	16	14	13	9	9	9
Sweden (SE)	5	4	5	5	5	4	4	3	4	4
United Kingdom (UK)	3	3	3	3	4	2	3	4	5	5

*Source: Author's calculations.*

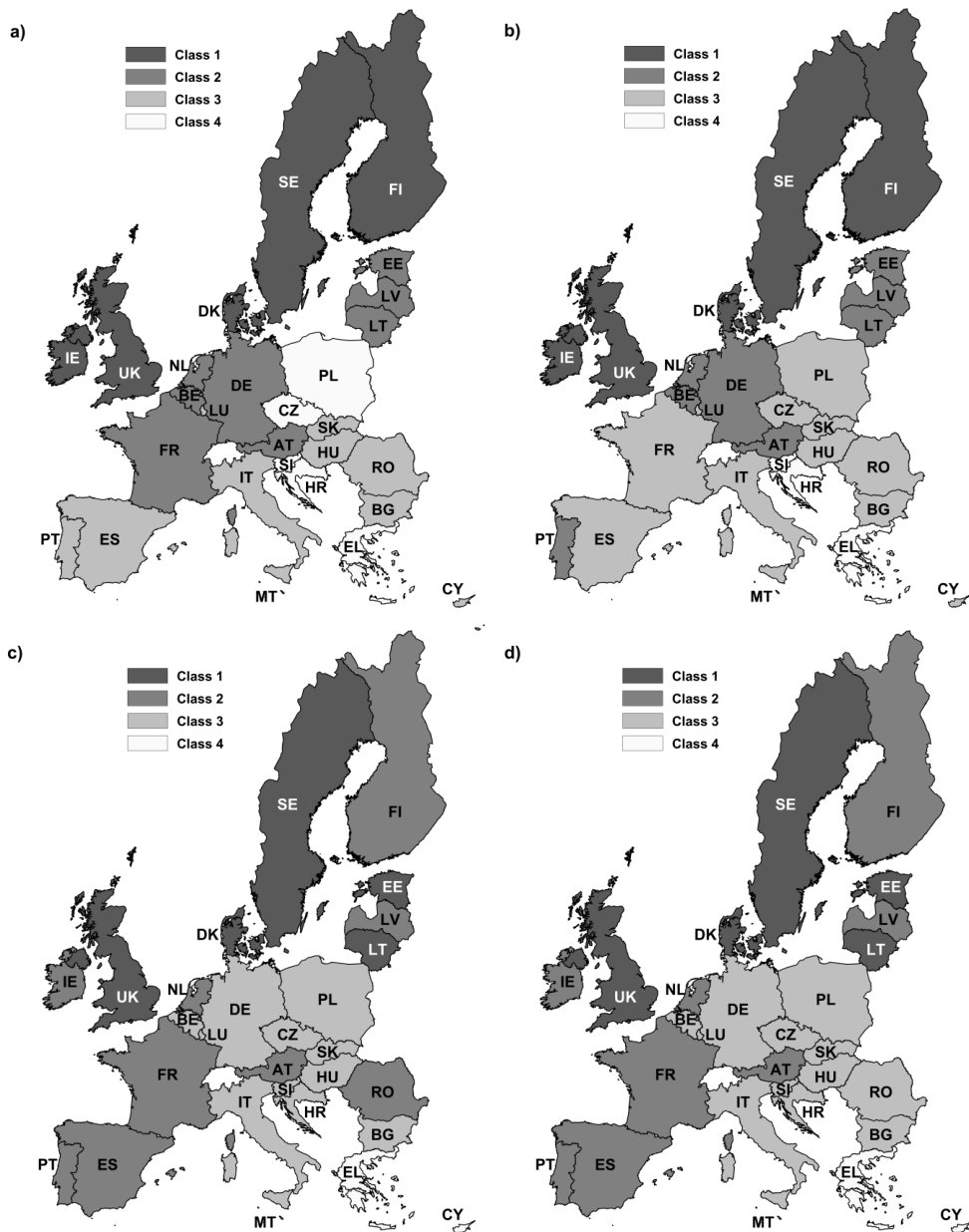
At the head of the EU countries ranking (for the base year 2010) are countries of northern Europe, such as Ireland (1), Denmark (2), United Kingdom (3) and Finland (4). Over the years (until 2019) Denmark has been the most stable position in the ranking (first or second position in each year). An interesting situation is in the case of Ireland, which from the position of the leader in the ranking (2010, 2011, 2013) fell to the 10th position (2015), and currently on the spot 13 (2019). The high position of Ireland (2010-2014) results from a long-term policy aimed at attracting foreign investors (focusing mainly on high technologies).

From 2015, such indicators as: 'Enforcing contract' and 'Getting credit' have clearly deteriorated. This had a direct impact on the position of Ireland in the ranking. The opposite pole of the ranking (for 2010) there are countries like Czechia (25), Greece (26), Croatia (27) and Slovenia (28). In case of Czechia, Slovenia and Croatia we can observe a slight tendency to improve investment friendliness. Greece over the years (2010-2019) maintains position at the end of the ranking (26-28). The worst in the ranking is Malta having the lowest ranking -from 2015 until 2019 occupies the last position. Low value of the following indicators mainly have an impact on this situation: 'Registering property', 'Resolving insolvency' and 'Getting credit'. Despite the improvement in the value of the indicator 'Getting credit' in years 2017-2019, Malta's position in the ranking has not changed.

The results of the EU countries classification with the use of VMCM, in terms of investment friendliness, are presented in Figure 2 (for 2010 - base year, 2013, 2016, 2019). Four classes have been created. In class 1 are countries creating the best conditions for investors, while in class 4 the worst. Over the years, some EU countries have not changed their assignment to the class, in the case of other countries this change is visible. The high stability over the years show: United

Kingdom, Sweden and Denmark (class 1) and for instance Greece and Malta (class 4).

**Figure 2.** Classification with the use of VMCM in terms of assessing the friendliness of EU countries for newly established enterprises - artificial pattern (2010) a) for 2010; b) for 2013; c) for 2016; d) for 2019



Source: Author's elaboration.

There are also countries that have improved their classification. For example: Poland and Czechia (year 2010). They moved from the class 4 (Figure 2a) to class 3 (years 2013, 2016, 2019 - Figure 2b-d). Estonia and Lithuania moved from the class 2 (2010, 2013 – Figure 2a-b) to class 1 (2016, 2019, Figure 2c-d). Analysing the classification of EU countries made for the year 2016 (Figure 2c) and 2019 (Figure 2d) we can see on the map that the position of all countries (except Romania) is unchangeable.

On the basis of the conducted research, it can be seen that the leaders, in the context of the investment conditions, are countries such as: Denmark, United Kingdom and Sweden. Among these countries, Denmark is the most stable over the years (2010-2019). In the further part of the study, Denmark was accepted as so-called a real pattern and Malta as an anti-pattern (2019) to which other countries will be compared. Such analysis will allow to assess the level of investment friendliness of countries (for the adopted criteria) in relation to Denmark.

Table 2 presents the EU countries ranking obtained with the use of VMCM, illustrating the positions of EU countries (in the context of investment friendliness) in relation to Denmark (for the reference year 2019).

**Table 2.** *Ranking of the European countries in 2010-2019 made with the use of VMCM (for real pattern – Denmark and anti-pattern – Malta) in terms of assessing the friendliness of EU countries for newly established enterprises*

Name of country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria (AT)	10	9	11	10	12	8	9	10	10	9
Belgium (BE)	13	14	14	15	17	21	20	20	21	18
Bulgaria (BG)	19	20	20	21	21	22	23	23	22	23
Croatia (HR)	27	27	27	27	27	25	26	26	26	25
Cyprus (CY)	18	18	17	17	23	27	25	24	23	24
Czechia (CZ)	24	19	19	18	14	15	17	16	14	16
Denmark (DK)	1	1	1	1	1	1	1	1	1	1
Estonia (EE)	6	6	6	7	6	2	2	2	2	2
Finland (FI)	5	5	3	4	3	5	5	5	5	6
France (FR)	17	15	16	19	19	16	14	15	17	14
Germany (DE)	9	10	10	12	9	17	16	17	15	17
Greece (EL)	26	28	28	28	26	26	27	27	27	27
Hungary (HU)	21	17	18	20	22	20	21	21	25	21
Ireland (IE)	2	3	5	2	2	10	10	9	8	10
Italy (IT)	20	21	21	23	20	19	22	22	20	22
Latvia (LV)	11	11	7	8	7	9	7	6	7	7
Lithuania (LT)	7	7	8	9	10	6	6	7	6	5
Luxembourg	22	23	23	24	25	24	24	25	24	26

Name of country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
(LU)										
Malta (MT)	23	25	25	26	28	28	28	28	28	28
Netherlands (NL)	8	8	9	6	8	7	8	8	9	8
Poland (PL)	25	24	24	14	13	12	13	13	13	13
Portugal (PT)	12	12	12	11	11	11	11	11	11	12
Romania (RO)	16	22	22	22	18	14	18	18	18	20
Slovakia (SK)	14	13	15	16	16	18	15	14	16	15
Slovenia (SI)	28	26	26	25	24	23	19	19	19	19
Spain (ES)	15	16	13	13	15	13	12	12	12	11
Sweden (SE)	3	2	4	5	5	3	3	3	3	3
United Kingdom (UK)	4	4	2	3	4	4	4	4	4	4

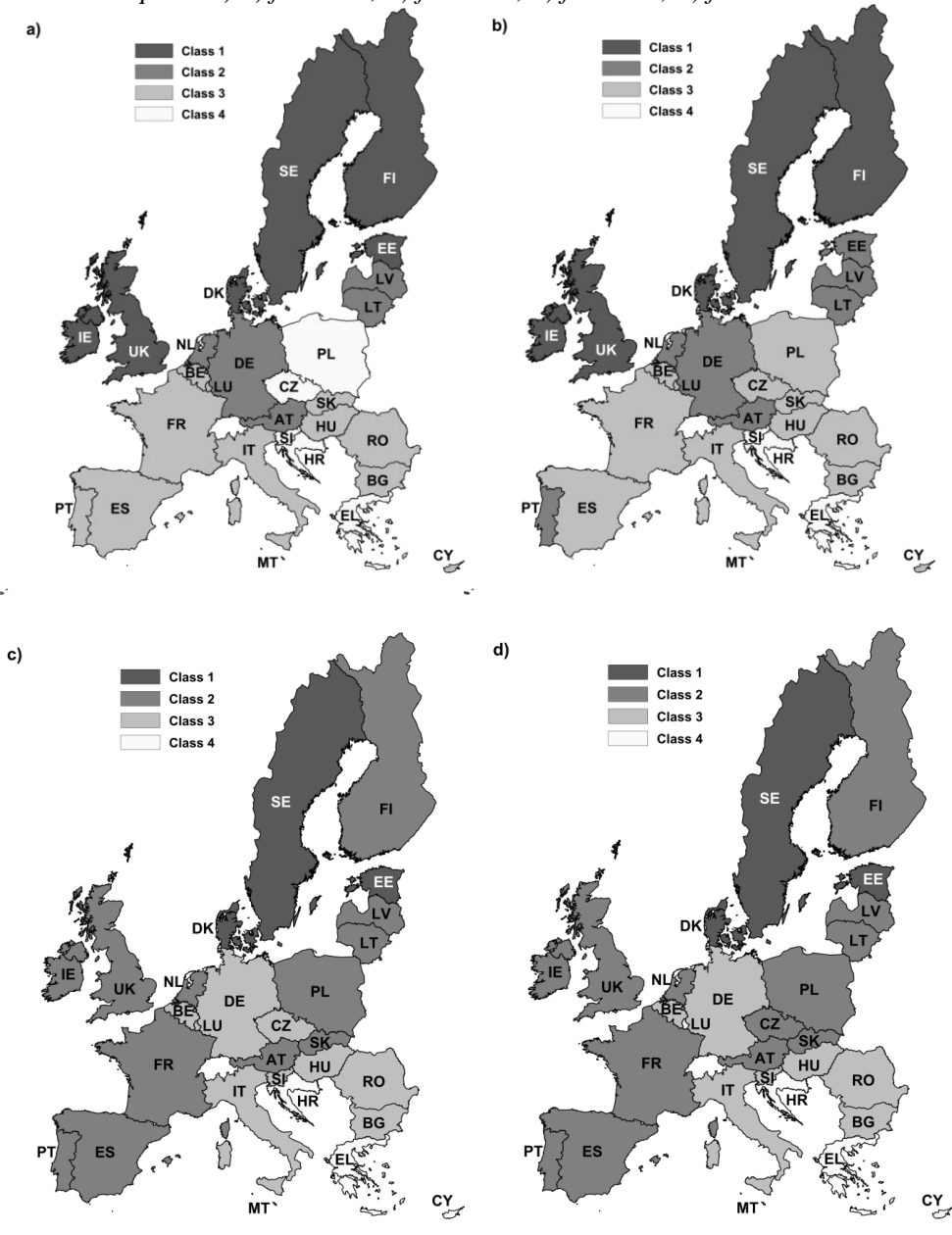
*Source: Author's calculations.*

Table 2 shows, that there are several EU countries that offer similar investment conditions to Denmark (base year 2019). Over the years (2010-2019), Sweden (2-5 position) and United Kingdom (2-4 position) had the most similar and stable conditions. From 2015, however, Estonia is ranked second with indicators 'Enforcing contrac' better than Denmark, 'Getting credit' such as Denmark and 'Registering property' close to Denmark. The worst in this comparison is Malta, which from 2014 has occupied the last position in the ranking. The low value of the following indicators mainly affect this situation: 'Getting credit', 'Registering property' and 'Resolving insolvency'. The situation of Croatia (position 25-27) and Greece (26-28) is not much better. In the case of Greece it results from such indicators as: 'Getting credit', 'Enforcing contract', 'Registering property' and 'Resolving insolvency'.

There are also countries that have deteriorated their investment conditions in 2010-2019 (in relation to Denmark) - e.g. Ireland (fall from 2 to 10 position). There are those that systematically improve their position too, e.g. Latvia (from 11 to 7 position) or Poland (from 25 to 13 position).

The visualization of the EU countries classification in 2010, 2013, 2016, 2019 (Denmark 2019 as a pattern and Malta 2019 as anti-pattern) is presented in Figure 3. In class 1 in 2019, there were only Sweden and Estonia, except Denmark (Figure 3d). The same situation took place in 2016 (Figure 3c). In year 2013 Estonia was in class 2, while in class 1 were United Kingdom, Ireland and Finland (Figure 3b), and in 2010 year Estonia joined to class 1 (Figure 3a). This shows that in the context of friendliness for investors these countries are closer to Denmark (the same class). In class 4 there are invariably Greece, Croatia and Malta (Figure 3a-d).

**Figure 3.** Classification with the use of VMCM in terms of assessing the friendliness of EU countries for newly established enterprises (for real pattern – Denmark and Malta as anti-pattern) a) for 2010; b) for 2013; c) for 2016; d) for 2019



Source: Author's elaboration.

Poland and Czechia being in 2010 in class 4 (Figure 3a), in year 2013 have moved to class 3 (Figure 3b). Poland in 2016 was in class 2, Czechia in class 3 (Figure 3c) and

in 2019 both in class 2 (Figure 3d). This means a systematic improvement of investment conditions in these countries in relation to the pattern country (Denmark).

## **1. Conclusions**

The place of investment selection is not limited to one European country, since the border is open for all the European market where each of the EU country offers potential investors different conditions. Evaluation of these conditions is not an easy task. Many indicators should be taken into account with the use of reliable data and the use of a suitable methodological approaches. The solution proposed in the article allows to assess the investment friendliness of individual country. It gives the opportunity to create rankings, classifications as well as analysis of changes in investment conditions over time. It allows you to compare countries (objects) with each other in different sections of time.

Any object can be used as a reference vector in the VMCM. An artificial pattern (automatically determined on the basis of the first and third quartiles) or a real pattern can be accepted. The reference vector (real pattern) need not be the best or the worst object in the sample under consideration. The VMCM also allows taking into account objects from outside the sample, which are better than the pattern (the measure is not limited, neither from the bottom nor from the top).

In such situations, there is also no need to build a new pattern. The VMCM eliminates the limitations of the other methods e.g. TOPSIS, or HELLWIG. The VMCM is dedicated to the study of complex economic processes described by many factors over time. Such an approach allows for making rankings, classifications of objects and the analysis of the change dynamics.

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