THE STATE OF ADOPTING CRM SOFTWARE-SOLUTIONS AS PART OF THE ENTERPRISES' INTERNAL PROCESSES INTEGRATION – A CLUSTER ANALYSIS AT THE LEVEL OF THE EU-MEMBER STATES JUST PRIOR TO THE COVID-19 PANDEMIC

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Abstract

The past months marked by the COVID-19 pandemic experiences proved to enterprises how important is their digitization, not only for improving their economic performance or accessing new digital markets but mostly for their future existence. The digitalization proved that it is no longer just an option. Managers, employers and employees, or even simple citizens understood that the digital revolution and digital technologies are already changing the interaction, communication, products and services consuming mode, our work, as a necessity. Anyway, in recent years, under a continuous change of market conditions, many organizations, specifically business, abandoned their traditional way of managing by adopting the new emerging Internet technologies and using information technology-based solutions. One of the first steps in transformation must be the usage of integrated software applications and integrated systems that combine the business management activities with digital technology, and whereby the various business processes (internal or external) are integrated into the computer system to achieve their specific business goals. Based on available data from the Eurostat online database, this paper aims to identify the groups of countries, European member states (excepting the United Kingdom), with similar (close) characteristics regarding the use of software solutions like Customer Relationship Management (CRM) in 2019 by conducting an agglomerative hierarchical cluster analysis. To classify the 27 countries into homogeneous groups in order to identify countries' disparities based on the clustering variables considered, was applied the hierarchical cluster procedure performed with IBM SPSS. In essence, the aim is to identify the relevant clusters, which assume the proximity (similarity) of countries regarding the CRM software-solutions usage by the enterprises as a part of the internal integration processes of their IT systems.

Keywords: *integration of internal processes, enterprise resource planning, customer relationship management, cluster analysis, agglomerative hierarchical method, European Union.*

Classification JEL: *M15, C38*

1. Introduction

In condition imposed by the restrictions generated by the COVID-19 pandemic, the enterprises, whatever their dimension or field of activity, were forced to respond to the needs and requirements of their consumers, not in a traditional way, and at the same time to offer the possibilities to work from home for their employees by using digital ways. At the same time, the citizens, regardless of the place of residence, education, job, or age were forced to be able to satisfy their consumption needs by using digital ways and some of them to prove the specific digital competencies to can work from home. But, all of that is not only about having the best technology and applications, even if they are indispensables.

The digital integration of the internal and external processes is maybe the major stages of the digital transformation process of an enterprise by allows business systematization and

organizational development, focusing on the unification of objectives of the company, employees, and customers or suppliers. One of the main roles in decision-making is played by integrated information systems. Digital transformation of a business is a process that could need some time. Even if digitalization is not only about having the best technology and applications, they are indispensables, and the digital integration of the internal processes is one important stage of the digital transformation process.

The integration of internal processes allows the business systematization and organizational development, being a key to enhancing productivity by focusing on the unification of objectives of the company, employees, and customers. Thus, the integrated information system can have one of the main roles in decision- making. This integration process is refer to connect all individual technology systems of an organization so as to streamline the information flow between them. The integration goal is to establish connections between internal systems, so as tasks can be manage by a smaller number of employees and with a higher degree of speed and accuracy than usually do. However, business management needs efficient IT systems to improve competitiveness.

The integration of all internal management information systems allowed managers, to access organizational marketing, financial accounting, personnel, etc., necessary for coordination, control and decision making in their area of competence. This required the integration of application programs to allow all IT subsystems to be merged into one. The enterprise systems are major elements of the process vision of any organization due to facilitating communication, coordination, easy exchange of data, but easy access to them, too, during the processes. They play a vital role to execute the processes, collect and store processes data, monitor processes output. Enterprise resource planning (ERP) is "a configurable information system packages that integrate information and information-based processes within and across functional areas in an organization" [1].

ERP have been developed as computer systems for applications intended for management and which allow the management and control of all activities at the organization level through a single program application capable of meeting the particular needs of each functional area. ERPs are business management software-systems that comprise a series of specific sub-systems to the functional areas of a company. The software architecture facilitates the integration of all such (sub) systems ensuring constant information flows between all departments within an organization.

The ERP' (sub) systems can operate independently or interdependently to form an integrated system, covering all types of organization activities. One of the most common such (sub) system that make up an ERP system is Customer Relationship Management (CRM). CRM helps to improve sales performance through a relationship better with customers. The Sales (sub) system can integrated the CRM to stimulate sales opportunities. Thus, all stored customer details are available and in the CRM system. The CRM helps to manage and track information detailed customer information, like communication history, calls, meetings, details about the purchases made by the customer, the duration of the contract, etc. [2]. Even if a company uses a CRM integrated into an ERP information system, a single platform that centralizes all information and provides access to it to all users through specific coordination and communication tools, is not enough for an organization. Nevertheless, it can be the first step in their digital transformation and the benefits are significant. However, the implementation of ERP integrated systems is difficult and expensive [3]. Therefore, many enterprises do not use them, yet, and it is another major obstacle to their rapid digital transformation, so needed to meet the challenges of the new digital economy.

In this context, the aim of this study is to explore the state in which companies in the 27 EU Member States, regardless of their size, had already integrated internal processes and use ERP application packages, in 2019. It also aims to identify the existence of disparities between those countries by grouping them according to similarities.

2. Data and Methodology

The study is based on Eurostat data from the online database [isoc_eb_iip] regarding the integration of internal processes especially using software solutions like CRM for various purposes, at the country level for the 27 EU - member states, (excepting the United Kingdom), for the year 2019. The considered three clustering variables (see Table no. 1), all of them measured in percentage of all enterprises without the financial sector (10 persons employed or more), for each considered country, are:

- Var_1: *Enterprises using software solutions like CRM;*
- Var_2: *Enterprises using CRM to analyse information about clients for marketing purposes;*
- Var_3: *Enterprises using CRM to capture, store, and make available clients information to other business functions.*

Table no. 1 **Integration of internal processes by using software-solutions like CRM, in the EU-Member States (excepting the United Kingdom), for all enterprises, without financial sector (10 persons employed or more), year 2019, (% of all enterprises)**

Country	Var_1	Var_2	Var_3	Country	Var_1	Var_2	Var_3
	Enterprises using software solutions like CRM	*Enterprises using CRM to analyse information about clients for marketing purposes;*	*Enterprises using CRM to capture, store, and make available clients information to other business functions.*		*Enterprises using software solutions like CRM*	*Enterprises using CRM to analyse information about clients for marketing purposes;*	*Enterprises using CRM to capture, store, and make available clients information to other business functions.*
Belgium	46	25	45	Lithuania	36	24	36
Bulgaria	17	11	16	Luxembourg	37	18	36
Czechia	21	15	19	Hungary	12	7	11
Denmark	35	23	33	Malta	32	25	27
Germany	44	20	43	Netherlands	56	26	55
Estonia	22	16	21	Austria	41	22	41
Ireland	32	25	30	Poland	31	21	31
Greece	20	16	18	Portugal	28	17	27
Spain	33	24	32	Romania	20	14	19
France	28	15	27	Slovenia	20	10	20
Croatia	19	10	18	Slovakia	22	15	20
Italy	28	15	26	Finland	42	26	40
Cyprus	33	19	33	Sweden	36	21	35
Latvia	16	12	12	***EU(27)***	***29,89***	***18,22***	***28,56***

Source: Eurostat Database, Integration of internal processes [isoc_eb_iip], Last update of data: 04/03/2020, [4] Extracted by the author on 17.07.2020.

For example, in Netherlands are registered the high percentage of enterprises that using CRM (56%), followed by Belgium, Germany, Finland and Austria, all with high percentage, over than 40% of enterprises. In Hungary, only 12% of enterprises integrate CRM as software solutions. The situation is no different for Latvia (16%) Bulgaria (17%), Croatia (19%), Greece, Slovenia or Romania, (20%). In fact, another 5 countries have percentages under the EU (27) average having in mind Czechia, Estonia, Slovakia, France, Italy, and Portugal.

Regarding the aim of CRMs usage, can note for all countries that the enterprises use them especially to capture, store, and make available clients information to other business functions than marketing, the percentages of enterprises using CRMs with such goals being much higher than the

percentages of enterprises that use CRMs to analyze information about clients for marketing purposes (see Table 1).

The table from the figure below shows the input variables descriptive statistics. The input variables descriptive statistics, shown in the table from the figure below, highlight high differences in using CRM software-solution at the countries level.

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Var_1: Enterprises using software solutions like CRM	27	44	12	56	29,89	10,555
Var_2: Enterprises using CRM to analyse information about clients for marketing purposes	27	19	7	26	18,22	5,563
Var_3: Enterprises using CRM to capture, store and make available clients information to other business functions	27	44	11	55	28,56	10,811
Valid N (listwise)	27					

Figure no. 1 - Descriptive statistics of considered indicators regarding the integration of internal processes, at the level of the 27 countries European Union member states for the year 2019, (% of all enterprises) performed with Descriptive IBM SPSS Procedure

Can be noted high differences in internal integration of processes, between the 27 countries, especially for enterprises using CRM software solution (Var_1) and enterprises using CRM to capture, store, and make available clients information to other business functions (Var_3).

Thus, in respect to classify the 27 EU Member states was performed the cluster analysis with IBM SPSS v.20 based on the three considered variables that describe the stage of internal process integration and CRM software solutions at the level of the year 2019. Cluster analysis was chosen as a research method because it practically aims to simplify the input data. Thus, the analysis is focused on groups of similar countries, rather than analysing each of them, individually, and so it can be identified the linkage between data, patterns of data sets grouped in clusters, that would otherwise be more difficult to notice.

This approach permits to identify patterns within countries and, at the same time, differences between them. Several algorithms can be used in cluster analysis to classify cases (countries in this case) into homogeneous groups called "clusters", including the two classical methods: partitioning methods and hierarchical clustering. Partitional clustering divides objects/cases into clusters such that each object is in exactly one cluster, while the hierarchical clustering returns a set of clusters organized as a hierarchical tree.

The homogeneity of the clusters is about the "similarity/dissimilarity" of the countries regarding the selected indicators. Chen et al. (2009) defined the objects' similarity in term of a distance measure which reflect how "closely" are one to each other [5]. The literature in the topic presents various such measures of similarity, but the most used in practice are Euclidean or Manhattan distances [6, 7]. The clustering methods target to identify groups of similar objects in multivariate data sets, with minimized intra-cluster distances and maximized inter-cluster distances.

In the study, an agglomerative hierarchical clustering with Ward's method was used to identify the number of clusters and potential outliers. For classifying N objects, the agglomerative hierarchical clustering procedures start with N clusters called "singleton clusters", each of them containing a single object (a country in our case). In the first stage, the two most similar singleton clusters, the two similar objects, are merged. Stage by stage, the algorithm searches the most similar two clusters and merges them until a single big cluster agglomerate all the objects. Generally, to compute the distances between two clusters are applied one of several clustering methods such as single linkage clustering, complete linkage clustering, average linkage clustering,

or centroid linkage clustering, but frequently, another agglomerative algorithm called Ward's method is used especially when the clustering variables are interval-scaled).

Because of the considered clustering variables are interval-scaled, an agglomerative algorithm called Ward's method was preferred [8] to clustering the EU Member States to investigate the integration of their enterprises' internal processes regarding CRM. Starting with 27 singletons, (27 clusters contained each of them only a single country), stage by stage, two of them are joined by minimizing the total within-cluster variance, and maximizing the between-clusters variance at the same time. The algorithms are stopped when a single cluster that includes all 27 countries is obtained. For that, the Ward's method is using the squared Euclidean distance as a dissimilarity measure. The number of clusters was determined based on the dendrogram - the tree-based graphical representation of the agglomeration schedule.

The importance of each variable, in the construction of the clustering, was evaluated by measuring the proportion of the variance (of each variable) explained by the group membership. For determining which variables are significantly different between the groups in each cluster solution, was conducted one-way ANOVA (Analyse of variance).

However, because p-values are not enough to indicate each clustering variables size of effect, was applied ANOVA with η^2 (Eta Squared) using a categorical variable generated by the IBM SPSS program as cluster membership. The η^2 statistic is the differentiation ratio. It measures the proportion of the variation in variable dependent Y that is associated with membership of the different groups defined by independent variable X [9]. Eta Squared (η^2) is a specific measure of effect size usually included in SPSS one-way-ANOVA (Analyse of variance). Defined as ratio of effect to total variance [10], η^2 has an intuitive interpretation, similar with R^2. So, Eta squared was used to evaluate the effect size of the three variables considered in cluster analysis to countries' membership of clusters.

3. Results and Discussion

By performing the IBM SPSS Hierarchical Cluster Analysis procedure, some first significant outputs can be obtained. One of them is the Proximity Matrix, practically a "dissimilarity matrix" because of Ward's method usage.

The matrix lists the squared Euclidean distances were calculated between all countries, one with each other, in the first stage of the clustering procedure. Can be noted the hiegst distance of the squared Euclidian distance, 4233, between Netherlands and Hungary, those two countries being the most dissimilar and the lower value of distance, 1, between France and Italy, the most similar countries (See Figure no.2 in Appendix).

The IBM SPSS clustering procedure, also returns the dendrogram as one of the first outputs. Practically, this is a tree-based graphical representation of the agglomeration schedule (See Figure no.3 in Appendix).

The Figure no. 4 shows the dendrogram, the obtained set of clusters of countries organized like a hierarchical tree. The vertical axis on the dendrogram represents the clusters. The horizontal scale represents the distance or dissimilarity. Each vertical line that joins two horizontal lines represents the merging of two clusters. The horizontal position of the joining, shown by a short bar gives the distance (dissimilarity) between the two clusters.

The visual interpretation of the dendrogram, together with the agglomeration schedule, or the line graph of the agglomeration schedule coefficients (see Figure no. 5) can offer significant suggestions about the number of a good cluster solution. In our case, all indicate three main clusters formed before point 8 on the rescaled distance axis. The added red line in the dendrogram indicate the chosen of stopping location.

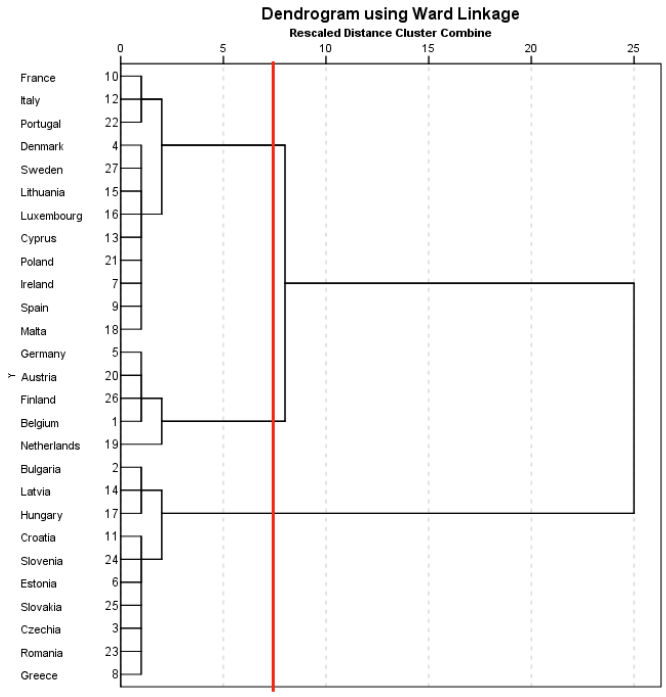

Figure no. 4 – Dendrogram
(IBM SPSS Hierarchical Cluster Analysis procedure Output using Ward's method)

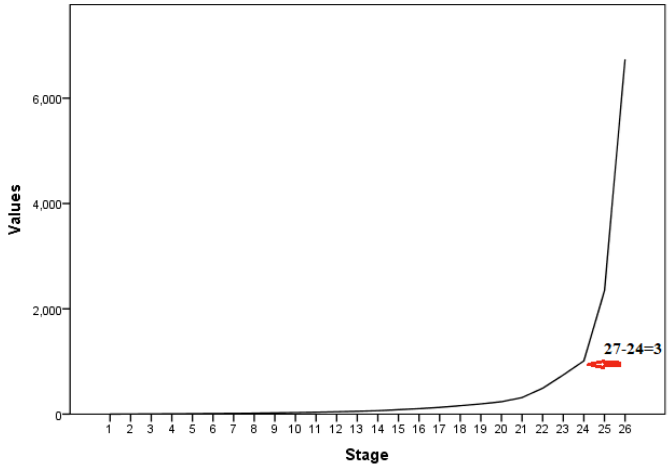

Figure no. 5 – Line of the agglomeration schedule coefficients

Thus, in the table below are presented the content for each of these three clusters. Even Ward's method tends to obtaine equal clusters, can be note cluster 1 with only 5 countries.

Table no. 2 **Clusters' membership**

Cluster' number	Cluster' size	Cluster' membership
Cluster 1	N = 5	Netherlands, Germany, Austria, Finland, Belgium.
Cluster 2	N = 10	Croatia, Slovenia, Estonia, Slovakia, Czechia, Romania, Greece, Bulgaria, Latvia, Hungary.
Cluster 3	N = 12	Denmark, Sweden, Lithuania, Luxembourg, Cyprus, Poland, Ireland, Spain, Malta, France, Italy, Portugal.

The table from figure no. 6 shows the clustering solution described with respect to the clusters' dimension, their membership, and other descriptive statistics. Note that the countries in

cluster 1 record the best performance for all three variables considered, with the highest std. deviation of clustering variables Var_1 and Var_3, and the lowest std. deviation for clustering variable Var_2, just as the countries in cluster 2 register the lowest performances, for all the variables considered. The countries in cluster 3 have much higher than average performances, closer to those of cluster 1, especially for Var_2 – *Enterprises using CRM to analyse information about clients for marketing purposes.*

Report

Ward Method		Var_1: Enterprises using software solutions like CRM	Var_2: Enterprises using CRM to analyse information about clients for marketing purposes	Var_3: Enterprises using CRM to capture, store and make available clients information to other business functions
Cluster 1:	Mean	45,80	23,80	44,80
	N	5	5	5
	Std. Deviation	6,017	2,683	6,017
Cluster 2:	Mean	18,90	12,60	17,40
	N	10	10	10
	Std. Deviation	3,107	3,062	3,406
Cluster 3:	Mean	32,42	20,58	31,08
	N	12	12	12
	Std. Deviation	3,232	3,728	3,679
Total	Mean	29,89	18,22	28,56
	N	27	27	27
	Std. Deviation	10,555	5,563	10,811

Figure no. 6 - Clusters' Descriptive statistics Report - IBM SPSS output

To explore extent the groups are far from each other were used the variables' mean plots shown in the figure below.

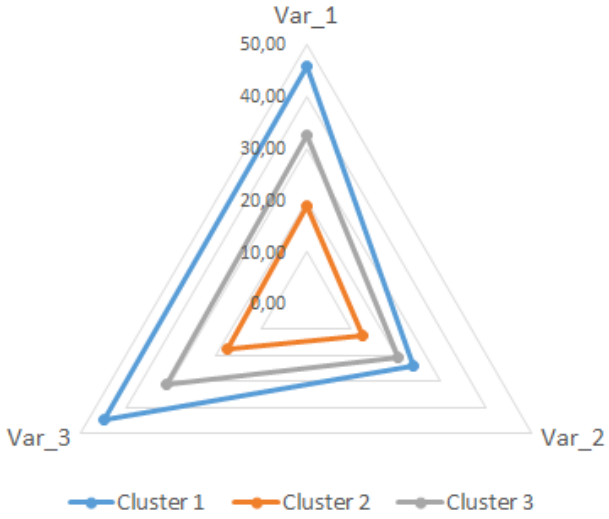

Figure no. 7 Compared clusters variables' means

(Var_1: Enterprises using software solutions like CRM; Var_2: Enterprises using CRM to analyse information about clients for marketing purposes; Var_3: Enterprises using CRM to capture, store, and make available clients information to other business functions.)

In order to identify what are the variables that share countries belonging to the same cluster and differentiate them belonging to distinct group, was conducted a one-way analysis of variance with Eta squared. In the ANOVA table in figure no. 3, F values specify which variables from the three considered separate the clusters best. With large F values are Var_1: *Enterprises using software solutions like CRM* with F=88,284, followed by Enterprises using CRM to capture, store,

and make available clients information to other business functions with F=79,591. However, statistically significant too is Var_2: *Enterprises using CRM to capture, store, and make available clients information to other business functions*.

For all clustering variables, the contributively to clusters separate are statistically significant (p=0.000) producing significant variation between groups. (See table from Figure no. 8)

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Var_1: Enterprises using software solutions like CRM * Ward Method	Between Groups	(Combined)	2550,050	2	1275,025	88,284	,000
	Within Groups		346,617	24	14,442		
	Total		2896,667	26			
Var_2: Enterprises using CRM to analyse information about clients for marketing purposes * Ward Method	Between Groups	(Combined)	538,550	2	269,275	24,285	,000
	Within Groups		266,117	24	11,088		
	Total		804,667	26			
Var_3: Enterprises using CRM to capture, store and make available clients information to other business functions * Ward Method	Between Groups	(Combined)	2640,550	2	1320,275	79,591	,000
	Within Groups		398,117	24	16,588		
	Total		3038,667	26			

Figure no. 8 ANOVA Table - IMB SPSS output

As can note in the table from figure 9, with values higher than 0.5, Eta squared confirms the high influential variables as size effect in clusters' membership for all of them, but especially Var_1: *Enterprises using software solutions like CRM* (η^2 =0.880) and Var_3: *Enterprises using CRM to capture, store, and make available clients information to other business functions* (η^2=0.869).

Measures of Association

	Eta Squared
Var_1: Enterprises using software solutions like Customer Relationship Management (CRM) * Ward Method	,880
Var_2: Enterprises using CRM to analyse information about clients for marketing purposes * Ward Method	,669
Var_3: Enterprises using CRM to capture, store and make available clients information to other business functions * Ward Method	,869

Figure no. 9 Measures of association, Eta squared – IBM SPSS output

3. Conclusions

Due to the possibility to get better satisfaction with costumers, and at the same time, better communication within the company, the CRM software systems are useful to all types of commercial enterprises, with small, medium, or large-size. However, even with all of such benefits, not all enterprises consider CRM solutions as imperative. A significant share of enterprises, from all countries, in the European Union, do not use such systems, yet. Their share is even higher as the countries in which they operate have taken smaller steps in digitizing their economies and have a population with modest digital skills in accordance with DESI Reports [11].

This research has utilized cluster analysis and has identified three main, homogeneous groups of countries regarding the usage of CRM software solutions by their enterprises. All three considered clustering variables confirm high influential as size effect in clusters' membership.

Cluster 1, including 5 north countries like Netherlands, Germany, Austria, Finland, and Belgium presents the best performances. It is important to remark that even if few of these countries have almost 50% of their enterprises using CRM, their usage regard especially to capture,

store, and make available clients information to business functions, other than marketing and less for analyse information about their clients for marketing purposes. The best performance registered Netherlands ad Finland (26%) followed by Belgium (25%), percentages over the cluster mean, only 23.88 % of enterprises. Cluster 3, the largest one, including 12 countries, Denmark, Sweden, Lithuania, Luxembourg, Cyprus, Poland, Ireland, Spain, Malta, France, Italy, and Portugal, is rather much dissimilar than cluster 2 than cluster 1.

Cluster 2, which includes 10 countries from 27 EU – member states, like Croatia, Slovenia, Estonia, Slovakia, Czechia, Romania, Greece, Bulgaria, Latvia, and Hungary, is the cluster with the lower performances in using CRM software-solutions in enterprises. So, is expected that the effects of the pandemic crisis will be much evident, with a negative impact on the financial results of companies in these countries, because of will be more difficult to control their information and communication with their customers, under the restrictions imposed by the pandemic. The governments must have strategies to leverage the European Union funds to support the post-COVID-19 relaunching of their economies, especially focusing on programs to support enterprises in the process of digital transformation.

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ACKNOWLEDGMENT: This work is partially based on the paper "The use of the Customer Relationship Management software-solutions in the enterprises of the European Union - Member States" presented by the authors in the International Scientific conference "Information Society and Sustainable Development" ISSD2020, VIIth Edition, September 11-12, 2020, Targu-Jiu, Gorj County, Romania.

APPENDIX:

Proximity Matrix

Case	Squared Euclidean Distance																									
	1:Belgium	2:Bulgaria	3:Czechia	4:Denmark	5:Germany	6:Estonia	7:Ireland	8:Greece	9:Spain	10:France	11:Croatia	12:Italy	13:Cyprus	14:Latvia	15:Lithuania	16: Luxembourg	17:Hungary	18:Malta	19: Netherlands	20:Austria	21:Poland	22:Portugal	23:Romania	24:Slovenia	25:Slovakia	26:Finland	27:Sweden
1:Belgium	,000	1878,000	1401,000	269,000	33,000	1233,000	421,000	1486,000	339,000	748,000	1683,000	785,000	349,000	2158,000	182,000	211,000	2636,000	520,000	201,000	50,000	437,000	712,000	1473,000	1526,000	1301,000	42,000	216,000
2:Bulgaria	1878,000	,000	41,000	757,000	1539,000	75,000	617,000	38,000	681,000	258,000	9,000	237,000	609,000	18,000	930,000	849,000	66,000	542,000	3267,000	1322,000	521,000	278,000	27,000	26,000	57,000	1426,000	822,000
3:Czechia	1401,000	41,000	,000	456,000	1130,000	6,000	342,000	3,000	394,000	113,000	30,000	98,000	356,000	83,000	595,000	554,000	209,000	285,000	2642,000	933,000	280,000	117,000	2,000	27,000	2,000	1003,000	517,000
4:Denmark	269,000	757,000	456,000	,000	190,000	362,000	22,000	499,000	6,000	149,000	650,000	162,000	20,000	923,000	11,000	38,000	1269,000	49,000	934,000	101,000	24,000	121,000	502,000	563,000	402,000	107,000	9,000
5:Germany	33,000	1539,000	1130,000	190,000	,000	984,000	338,000	1217,000	258,000	537,000	1350,000	570,000	222,000	1809,000	129,000	102,000	2217,000	425,000	324,000	17,000	314,000	521,000	1188,000	1205,000	1038,000	49,000	129,000
6:Estonia	1233,000	75,000	6,000	362,000	984,000	,000	262,000	13,000	306,000	73,000	54,000	62,000	274,000	133,000	485,000	454,000	281,000	217,000	2412,000	797,000	206,000	73,000	12,000	41,000	2,000	861,000	417,000
7:Ireland	421,000	617,000	342,000	22,000	338,000	262,000	,000	369,000	6,000	125,000	538,000	132,000	46,000	749,000	53,000	110,000	1085,000	9,000	1202,000	211,000	18,000	89,000	386,000	469,000	300,000	201,000	57,000
8:Greece	1486,000	38,000	3,000	499,000	1217,000	13,000	369,000	,000	429,000	146,000	37,000	129,000	403,000	68,000	644,000	617,000	194,000	306,000	2765,000	1006,000	315,000	146,000	5,000	40,000	9,000	1068,000	570,000
9:Spain	339,000	681,000	394,000	6,000	258,000	306,000	6,000	429,000	,000	131,000	588,000	142,000	26,000	833,000	25,000	68,000	1171,000	27,000	1062,000	149,000	14,000	99,000	438,000	509,000	346,000	149,000	27,000
10:France	748,000	258,000	113,000	149,000	537,000	73,000	125,000	146,000	131,000	,000	187,000	1,000	77,000	378,000	226,000	171,000	576,000	116,000	1689,000	414,000	61,000	4,000	129,000	138,000	85,000	486,000	164,000
11:Croatia	1683,000	9,000	30,000	650,000	1350,000	54,000	538,000	37,000	588,000	187,000	,000	170,000	502,000	49,000	809,000	712,000	107,000	475,000	2994,000	1157,000	434,000	211,000	18,000	5,000	38,000	1269,000	699,000
12:Italy	785,000	237,000	98,000	162,000	570,000	62,000	132,000	129,000	142,000	1,000	170,000	,000	90,000	349,000	245,000	190,000	545,000	117,000	1746,000	443,000	70,000	5,000	114,000	125,000	72,000	513,000	181,000
13:Cyprus	349,000	609,000	356,000	20,000	222,000	274,000	46,000	403,000	26,000	77,000	502,000	90,000	,000	779,000	43,000	26,000	1069,000	73,000	1062,000	137,000	12,000	65,000	390,000	419,000	306,000	179,000	17,000
14:Latvia	2158,000	18,000	83,000	923,000	1809,000	133,000	749,000	68,000	833,000	378,000	49,000	349,000	779,000	,000	1120,000	1053,000	42,000	650,000	3645,000	1566,000	667,000	394,000	69,000	84,000	109,000	1656,000	1010,000
15:Lithuania	182,000	930,000	595,000	11,000	129,000	485,000	53,000	644,000	25,000	226,000	809,000	245,000	43,000	1120,000	,000	37,000	1490,000	98,000	765,000	54,000	59,000	194,000	645,000	708,000	533,000	56,000	10,000
16:Luxembourg	211,000	849,000	554,000	38,000	102,000	454,000	110,000	617,000	68,000	171,000	712,000	190,000	26,000	1053,000	37,000	,000	1371,000	155,000	786,000	57,000	70,000	163,000	594,000	609,000	490,000	105,000	11,000
17:Hungary	2636,000	66,000	209,000	1269,000	2217,000	281,000	1085,000	194,000	1171,000	576,000	107,000	545,000	1069,000	42,000	1490,000	1371,000	,000	980,000	4233,000	1966,000	957,000	612,000	177,000	154,000	245,000	2102,000	1348,000
18:Malta	520,000	542,000	285,000	49,000	425,000	217,000	9,000	306,000	27,000	116,000	475,000	117,000	73,000	650,000	98,000	155,000	980,000	,000	1361,000	286,000	33,000	80,000	329,000	418,000	249,000	270,000	96,000
19:Netherlands	201,000	3267,000	2642,000	934,000	324,000	2412,000	1202,000	2765,000	1062,000	1689,000	2994,000	1746,000	1062,000	3645,000	765,000	786,000	4233,000	1361,000	,000	437,000	1226,000	1649,000	2736,000	2777,000	2502,000	421,000	825,000
20:Austria	50,000	1322,000	933,000	101,000	17,000	797,000	211,000	1006,000	149,000	414,000	1157,000	443,000	137,000	1566,000	54,000	57,000	1966,000	286,000	437,000	,000	201,000	390,000	989,000	1026,000	851,000	18,000	62,000
21:Poland	437,000	521,000	280,000	24,000	314,000	206,000	18,000	315,000	14,000	61,000	434,000	70,000	12,000	667,000	59,000	70,000	957,000	33,000	1226,000	201,000	,000	41,000	314,000	363,000	238,000	227,000	41,000
22:Portugal	712,000	278,000	117,000	121,000	521,000	73,000	89,000	146,000	99,000	4,000	211,000	5,000	65,000	394,000	194,000	163,000	612,000	80,000	1649,000	390,000	41,000	,000	137,000	162,000	89,000	446,000	144,000
23:Romania	1473,000	27,000	2,000	502,000	1188,000	12,000	386,000	5,000	438,000	129,000	18,000	114,000	390,000	69,000	645,000	594,000	177,000	329,000	2736,000	989,000	314,000	137,000	,000	17,000	6,000	1069,000	561,000
24:Slovenia	1526,000	26,000	27,000	563,000	1205,000	41,000	469,000	40,000	509,000	138,000	5,000	125,000	419,000	84,000	708,000	609,000	154,000	418,000	2777,000	1026,000	363,000	162,000	17,000	,000	29,000	1140,000	602,000
25:Slovakia	1301,000	57,000	2,000	402,000	1038,000	2,000	300,000	9,000	346,000	85,000	38,000	72,000	306,000	109,000	533,000	490,000	245,000	249,000	2502,000	851,000	238,000	89,000	6,000	29,000	,000	921,000	457,000
26:Finland	42,000	1426,000	1003,000	107,000	49,000	861,000	201,000	1068,000	149,000	486,000	1269,000	513,000	179,000	1656,000	56,000	105,000	2102,000	270,000	421,000	18,000	227,000	446,000	1069,000	1140,000	921,000	,000	86,000
27:Sweden	216,000	822,000	517,000	9,000	129,000	417,000	57,000	570,000	27,000	164,000	699,000	181,000	17,000	1010,000	10,000	11,000	1348,000	96,000	825,000	62,000	41,000	144,000	561,000	602,000	457,000	86,000	,000

This is a dissimilarity matrix

Figure no. 2 – The proximity - output of the IBM SPSS Hierarchical Cluster Procedure using Ward's method.

Agglomeration Schedule

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	10	12	,500	0	0	6
2	6	25	1,500	0	0	11
3	3	23	2,500	0	0	4
4	3	8	4,833	3	0	11
5	11	24	7,333	0	0	20
6	10	22	10,167	1	0	23
7	7	9	13,167	0	0	14
8	4	27	17,667	0	0	9
9	4	15	23,167	8	0	15
10	13	21	29,167	0	0	18
11	3	6	36,833	4	2	20
12	5	20	45,333	0	0	16
13	2	14	54,333	0	0	19
14	7	18	65,333	7	0	18
15	4	16	84,333	9	0	21
16	5	26	103,833	12	0	17
17	1	5	128,083	0	16	24
18	7	13	160,883	14	10	21
19	2	17	193,883	13	0	22
20	3	11	235,955	11	5	22
21	4	7	314,821	15	18	23
22	2	3	491,950	19	20	26
23	4	10	744,700	21	6	25
24	1	19	1010,850	17	0	25
25	1	4	2343,582	24	23	26
26	1	2	6740,000	25	22	0

Figure no. 3 – The Agglomeration Schedule - output of the IBM SPSS Hierarchical Cluster procedure using Ward's method.