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Article

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Determinants of Civil Service in EU Countries: Analysis Using Multivariate Methods

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Abstract

Systems of civil service reflect specific needs, traditions and institutional fundamentals of every state. The paper provides an outline of the European context of civil service, characteristics of basic features of civil service in EU countries, and evaluation of selected determinants of civil service from the perspectives of human resources, finances, and performance. Factor analysis, hierarchical cluster analysis and analysis of variance are applied in the research to evaluate the period 2012-2019 in the 27 EU countries. Factor analysis was used to assign the selected determinants of civil service in the EU countries with the three factors created (performance of civil service, financial dimension of civil service, employees of civil service). The evaluation of the factors of the civil service in the EU countries using hierarchical cluster analysis has resulted in five clusters of countries with similar characteristic features of civil service. The strongest similarity is seen in the clusters of the EU countries in performance of civil service and employees of civil service. The results of the EU countries also indicate similarity of average values of civil service factors. Analysis of civil service determinants has proved that in the majority of countries placed in the same cluster according to the similarity of civil service, a relation exists in terms of the same tradition of the civil service but also in terms of the geographical viewpoint. Despite differences, similar tendencies can be observed related to increased flexibility, performance and modernisation of civil service systems.

Keywords

Civil service, Civil servants, Determinants of civil service, EU countries, Factor analysis, Hierarchical cluster analysis

JEL Classification

H10, H83, C38

Introduction

Economic situation calls for rapid changes in public administration, and effective public management cannot be imagined without efficiently functioning civil service apparatus (Hondeghe and Van Dorpe, 2013; Meyer-Sahling and Mikkelsen, 2020; Černěnko et al., 2021). Many countries in this context respond to contemporary challenges and the trends of open innovation, to upgrade their civil service quality (Meričková et al., 2017; Polyakova, 2020). Strategic human resources management has then positive effects on employee motivation and organisational performance. Systems of civil service reflect specific needs, cultures and traditions of each state, legal and institutional foundations, but also reform pressures and overall employment developments (Knies et al., 2018; Audenaert et al., 2019; Židonis and Raišienė, 2020; Mackie et al., 2021). Civil service is moulded by the same or highly similar principles as the European administrative area and falls under the sovereignty of the individual states (Staroňová, 2017). However, European countries do not have a unified system of civil service, and management of human resources at the level of central government is organised in various manners. Even if the same type of system of civil service is adopted, differences in the individual countries consist mainly in the variety of categories of employees or in functional sectors of employments (European Commission, 2018; European Union, ESF, 2020). Still, individual countries strive to implement systems of civil service with a higher degree of performance, flexibility, transparency, opened systems leaning upon work of specialists, and accentuating qualification and competence (Demmke and Moilanen, 2010, 2012; Van den Steen et al., 2018). These demands

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result mainly from a new system of human resources management that aims for a good quality of public services (Meričková and Halásková, 2014a, 2014b).

Research into human resources and civil service in Europe already carried out dealt with topical questions of civil service, reform and its impact on the development of human resources, changes to legislation, position of civil servants or forms of remuneration (Marcetic, 2015; Stelina, 2019). Other topics researched are broader context of civil service systems, individual models and traditions of civil service and politicisation of the senior civil service (Choi and Whitford, 2011; Nahtigal and Haček, 2013; Kruyen and Van Genugten, 2020). Van de Walle (2007), using data from the World Values Survey, tested the impact of socio-demographic and socio-economic characteristics on citizens' confidence in the civil service by building multivariate regression models for 60 countries and focused on the emergence of cultural and regional patterns. Other research deals with specificities of civil service, changes to human resource management and senior civil servants in the EU countries (Marcetic, 2005; Meyer-Sahling, 2008; Manole, 2009; Knassmuller and Veit, 2016; Druskienė and Šarkiūnaitė, 2018; Mazur et al., 2018 or Aubin and Brans, 2020) or topical questions related to civil service outside the EU (e.g. Zaytseva, 2016; Rahimli, 2020; Sigituly and Guo, 2021).

The aim of the article is to outline civil service in the European context, to characterise the main features of civil service systems in the EU countries, and to evaluate similarities between selected determinants of civil service. The authors provide a deeper analysis of the selected determinants of civil services from the viewpoint of human resources, finances and performance, and evaluation of similarities and differences of civil service indicators (according to created factors) by use of factor analysis, hierarchical cluster analysis and analysis of variance. Two research questions are verified for the sake of the fulfilment of the aim: RQ1: Are career-based systems of civil service more closed compared to position-based systems in European countries? RQ2: Are EU countries similar according to the factors of civil service from the viewpoint of employees, finances, performance and affiliation to the same tradition of civil service?

Literature Review

Basically, public service means acting on the mandate of the citizens, with the funds of the citizens and for the good of the citizens (Ministry of Finance of Finland, 2000, p. 7). Key terms civil service are professionalism, political impartiality, restraint, recruitment and career (Demmke, 2004). Civil service is interpreted as a national service in a narrow sense (employees of ministries as part of the government) and also as employees of other central administrative authorities (Halásková and Halásková, 2021). Status of civil service is regulated by a special law and is a form of employment that provides "job security" with broad social rights (Stelina, 2019; Diplomatic review, 2021). In the European context, countries are affiliated to one of the three types of human resource systems. Currently, three basic systems of civil service are distinguished on the European as well as global scale, namely the career-based system, the position-based system, and the mixed (hybrid) system (Perry, 2015; Staroňová, 2017; European Commission, 2018; Mackie et al., 2021). The civil service systems (the career-based system and the position-based system) differ in the legislature, special requirements for employees, ways of recruiting employees, age limit, salary increase, remuneration or acknowledgement of experience from outside the public sector. Each of these systems has its benefits and drawbacks (Dahlström et al., 2012; Kuperus and Rode, 2016; Choi and Whitford, 2017; Natalia and Irina, 2018; Xifre, 2020). The career-based system only allows hiring employees on entry-level positions, applies special legal requirements for special careers, entails a maximum age, and disregards any work experience from outside the public sector. The employment is associated with a permanent position. The position-based system is applied in recruiting higher positions, and special skills are required for special positions, and no maximum age is applied. Previous work experience also outside the public sector is recognised. There is no guarantee of a permanent employment (Halásková and Halásková, 2021, p. 131). The hybrid system with structural elements is then a combination of the two afore-mentioned systems. Characteristic features and elements of one system civil service are gradually implemented in terms of the second system (Sundell, 2014; Levitats and Vigoda-Gadot, 2020). Apart from the already mentioned systems of civil service, EU countries can also be divided by traditions of civil service. According to Demmke and Moilanen (2010) we can distinguish six traditions of civil service (the Anglo-Saxon, the Continental, the Mediterranean, the Scandinavian tradition, the Eastern-European and the Balkan tradition). These traditions of civil service create pre-conditions for the system of human resource management in the individual countries (Halásková and Halásková, 2021).

Changes of civil service called for not only new structures and institutions for public administration but also major changes in public management, including human resources management (European Commission, 2018; European Union, ESF, 2020). Various forms of performance management systems have been introduced and this had an impact on the role and position of senior civil servants (Hondeghem and Van Dorpe, 2013). Many EU countries have introduced top civil service or systems of top public managers (TPM) as "systems of high-ranked positions in the national civil service, albeit with varying features and specificities depending on each country (Meyer-Sahling, 2008; Kuperus and Rode, 2016; Knassmuller and Veit, 2016; Ebinger, Veit and Fromm, 2019). Two employment systems exist in top civil service, i.e. the career-based system, and the position-based system.

According to Kuperus and Rode (2016, pp. 16-17), five typologies of top public managers can be categorised in Europe: 1) Centralised TPM organisation, 2) Formalised TPM status with special conditions, 3) Formalised TPM status without special conditions, 4) Recognised TPM group with special conditions and 5) No special TPM recognition or organisation.

Many older and contemporary authors deal with current employee management questions and civil service, its concept, trends including also evaluation and remuneration of civil servants in the European dimension, innovative management tools in institutions of public administration in European public services or factors, which increase of efficiency and effectiveness of the public sector (Hondeghem and Vandermeulen, 2000; Farnham 2004; Stare and Klun, 2008; Meyer-Sahling and Veen, 2012; Nahtigal and Haček, 2013; Knassmuller and Veit, 2016; Židonis and Raišiene, 2020; Kuba and Stejskal, 2021; Rozskazov, 2021).

Manole (2009) evaluated rewards of civil servants in relation with the results and observed significant differences existing in the career-based system and remuneration system. Xifre (2020) examined civil service career development and modernising of civil servants' careers in the EU reform. Kruyen and Van Genugten (2020) show that competencies of civil servants can be linked to three major governance philosophies: traditional Public Administration, New Public Management, and New Public Governance. Druskienė and Šarkiūnaitė (2018) and Rozskazov et al. (2021) argue that to ensure the implementation of the state's objectives and the efficiency and quality of civil servant activities, adequate state incentives are necessary.

Also broader context of European civil service is analysed. Marcetic (2015) compared the human resource system and the position of civil servants, reforms and systems of remuneration in Anglo-Saxon, Western European and post-socialist European countries. Choi and Whitford (2011) evaluated the civil service laws, their differences in OECD countries and from Central and Eastern Europe with cluster analysis and identified several groups of countries with similar functions of the civil service system. Similarly, other research (Stelina, 2019) dealt with the legal position of civil servants in Europe. *"The author found that the existence of different models of public service in different legal systems does not exclude the definition of some general models of the law of public servants"* (Stelina, 2019, p. 1). Hondeghem and Van Dorpe (2013) looks at the performance management systems that have been introduced for senior civil servants in four European countries and their impact on the managerial public service bargain. Other authors (Meyer-Sahling and Veen, 2012; Nahtigal and Haček, 2013) evaluate the form that is used to politicise the administrative system, and politicisation of civil service and senior civil service in Central and Eastern Europe. The authors also accentuate the issues related to political control.

Civil service in the individual countries is emphasised in several pieces of research (Knassmuller and Veit, 2016; Aubin and Brans, 2020). Marcetic (2005) discusses the role of civil servants throughout history and in the present, as well as the changed role of civil servants in the countries in post-socialist transition and compares the systems of education and training of Hungary, Lithuania and Slovenia. Meyer-Sahling (2008) argues that the politicisation of the Hungarian senior civil service is characterised by high turnover, recruitment of outsiders and heavy reliance on the appointment of officials who come and go with their bloc of political parties. Druskienė and Šarkiūnaitė (2018) showed that the civil servants in Lithuania are mostly motivated by moral and normative incentives, and less often by political and monetary incentives. Mazur et al. (2018) analysed of civil service reform in Poland taking into account the political context and the most important postulated changes of top civil servants. Other authors, Meyer-Sahling and Mikkelsen (2020) focused on broader context of civil service, in particular the effect of anti-corruption tools (ethical and disciplinary codices) on containing corruption in the civil service in Poland, using the example of central government civil servants. Rybář and Podmaník (2020) compare the career backgrounds of top civil servants in the Czech Republic before and after the entry into force of the new Civil Service Act in 2015. Some researchers (e.g. Androniceanu and Nastase, 2009; Ciobanu and Ristea, 2015) presented legal as well as managerial aspects of the Romanian civil service, identified its main strengths and weaknesses and examined performance appraisal and the factors that motivate civil servants to achieve improved results. Other authors (Zaytseva, 2016; Veledar and Gadzo, 2020; Rahimli, 2020; Sagituly and Guo, 2021) deal with civil service also outside the EU countries e.g. case in Bosnia and Herzegovina, Kazakhstan, Azerbaijan or Russia. The authors evaluated the reforms of civil service and their effectiveness, increased transparency of public budgets, accountability of public employees and the practices of professional development in civil service.

Methodology

Data

The article draws from literature on civil service in the context of Europe. Analytical and empirical methods are applied in the analysis of civil service systems and selected indicators. In the empirical part, data from Eurostat are used on: 1) Civil service – remuneration of civil servants – specific indicators; 2) government statistics – general government expenditure by function COFOG; government revenue, expenditure and main aggregates; 3) sustainable development indicators (Eurostat, 2021a, b, c). In addition, data from the European Institute for Gender Equality (EIGE) – Gender Statistics Database, and the World Bank -Worldwide Governance Indicators are used (EIGE, 2021; World Bank, 2021). The available indicators of civil service related to human resources,

finances and performance are used for the purposes of the evaluation. The research was partially limited by the absence of a unified statistical database, therefore indicators have been used from multiple databases (Eurostat, EIGE, World Bank) to provide a reflection of civil service at a European scale.

The selected set is composed of 27 EU countries i.e. 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), Spain (ES), Slovakia (SK), Slovenia (SI), Sweden (SE). The analysis is performed over the period 2012-2019 as average of the years. The trend of the applied indicators did not vary significantly in the given years, nor were observed any significant regular vicissitudes. As a result, moving average is applied on the period 2012-2019, which balanced these random vicissitudes (not only the last known year, 2019). The period has been chosen due to the availability of the used variables in the individual countries. The year 2012 has been selected due to the indicator Corruption Perceptions Index (its methodology changed in 2012), and 2019 is the last year when all the observed variables are available. The list of applied indicators is seen in Table 1.

Table 1. Used indicators.

Indicator	Description	Unit	Source
Number of national civil servants in central public administration (NCS)	National civil servants are categorised into "administrator-equivalents" and "assistant-equivalents" and "secretary/clerk equivalents".	Number of persons, headcount	Eurostat
Remuneration of national civil servants in central public administration (RCS)	The country specific indicator measures the annual evolution in the remuneration of national civil servants working in central public administration.	index	Eurostat
National administration: Senior administrators- top two tiers of administrators by function of government (NASA)	The indicator expresses of women and men in the position of Senior Administrators in all positions in the government ministries of each country. Senior administrators include departments of the national government, led by a minister, all administrative (non-political) positions from the head of the ministry, directorate and all positions below the head of directorate.	Number of persons, headcount	EIGE
Central government expenditure on public administration (CGEPA)	Government expenditure on executive and legislative organs, financial and fiscal affairs, external affairs; foreign economic aid; general services; basic research; R&D related to general public services; general public services n.e.c.; public debt transactions, transfers of a general character between different levels of government.	% of GDP	Eurostat
Compensation of employees in central government (CECG)	The total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during an accounting period. Compensation of employees consists of wages and salaries in cash or in kind and employer's actual and imputed social contributions.	% of GDP	Eurostat
Corruption Perceptions Index (CPI)	Corruption Perception Index is a composite index based on a combination of surveys and assessments of corruption from 13 different sources and scores and ranks countries based on how corrupt a country's public sector is perceived to be, with a score of 0 representing a very high level of corruption and a score of 100 representing a very clean country.	Index 1-100	Eurostat
Control of Corruption (CC)	Perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Index 1-100	World Bank
Government Effectiveness (GE)	Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Index 1-100	World Bank

Source: Authors according to Eurostat (2021a, b, c); EIGE (2021); World Bank (2021)

The analysis was created using 8 indicators (CGEPA, NASA, NCS, RCS, CECG, CPI, CC, GE). The indicators have different units and values, so they were all normalised using z-scores. All analyses (consistency, correlation, factor analysis, cluster analysis, analysis of variance) are performed with these normalised indicators. Consistency analysis was performed using Cronbach's alpha. To maximise the consistency value, the indicators

that show a negative consistency with the other variables were inverted (by changing the sign at the z-score). The value of Cronbach's alpha (0.679) shows a relatively high consistency of the data, on the other hand, sufficient differentiation to identify latent factors and define the internal structure. The battery of 8 input indicators is therefore sufficient to perform factor analysis. A correlation matrix was calculated that determines the strength of the dependence between all pairs of variables (Zhou and Skidmore, 2017; Wagner, 2020).

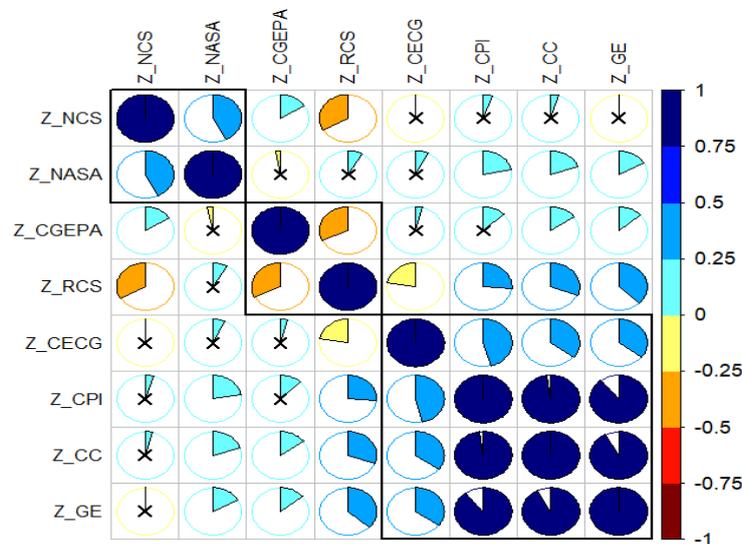


Fig. 1. Correlation matrix of the applied indicators

Note: An empty pie chart = 0, A full pie chart = 1. Crosses = statistically insignificant correlations.

Source: Authors calculations in the R program

The correlation matrix (Figure 1) shows a strong correlation between the three indicators CPI, CC and GE. There are other significant correlations between the other variables, indicating a possible structure of indicators that can be created by factor analysis. The relationships between the indicators can be clearly displayed using a correlation plot, which is created by visualising the correlation matrix. Fig.1 indicates the existence of three significant groups (clusters, factors) of indicators. One group has four members, the other two consist of two variables. This fact can be verified by exploratory factor analysis (EFA).

Exploratory factor analysis – The outputs of the consistency analysis are also in accordance with the results of the EFA analysis, specifically the KMO measure. The result of the Bartlett test suggests (sig. = 0.000) that the use of factor analysis for the indicated data is appropriate (Costello and Osborne, 2005). The appropriate number of factors can be estimated using Kaiser's rule (number of factors = number of eigenvalues of the correlation matrix greater than 1). According to Kaiser's rule, three factors could arise, which is in line with the previously presented correlation plot. The principal components (PC) method will be used to extract the factors, and orthogonal rotation using the Varimax method will be used to balance the loads between the factors. After rotation, one strong factor is created, which covers about 40% of the variability of the original correlation matrix, and two practically equally strong factors, which represent about 18% of the variability each. In total, the generated factors represent circa 77% of the variability of the correlation matrix, which is a very good result (at least 60% is the recommended value), (Zhou and Skidmore, 2017). Most of the calculations and outputs of the analysis were generated in the IBM SPSS Statistics program. Some special analyzes and graphs (including the correlation plot) were created in the R program.

Methods

Evaluation of the eight selected indicators (determinants) of civil service in EU countries over the period 2012-2019 is performed by means of factor analysis, hierarchical cluster analysis and analysis of variance. Factor analysis is a statistical method which analyses the structure of correlation/covariance matrix to define the key factors (sometimes called latent variables) which have most influence to measured variable. The key factors are created from the other variables and split together based on the relationship between them. Mainly a strong correlation/covariance is used. The advantage of the method is finding the key factors (and splitting the variables to the groups) and eliminating the other factors which do not have a strong relationship to the variable. The disadvantage is that not every data type can be used, so it is not usable for many datasets (not even after normalisation), (Pohlmann, 2004).

Hierarchical cluster analysis is applied to evaluate the similarity of EU countries by three factors of civil service (created from the original set of eight indicators). Cluster analysis is a multivariate statistical analysis method for

the classification of samples based on the principle of “an alike attracts an alike”. Cluster analysis or clustering is the task of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense) to each other than to those in other groups (clusters), (Scitovski et al., 2021). Hierarchical cluster analysis was used to create clusters of statistical units (countries EU) - instead of the often-used K-means method – due to the relatively small number of units, which allows to construct a dendrogram as a graph of successive clustering and to identify a suitable number of clusters. Ward's method, based on the least squares, was used for clustering, which tends to form compact clusters of roughly the same size. The square of the Euclidean distance between the centroids of the clusters is used to measure the distance between the clusters (Murtagh and Contrera, 2017).

The analysis of variance (ANOVA) is applied to verify the comparability of average values of factors of civil service between clusters of EU countries. Analysis of variance is a statistical method used to analyse the difference between means, it is used in the analysis of comparative experiments in which only the difference in outcomes is of interest. The method is based on the law of total variance, where the observed variance in a particular variable is partitioned into components attributable to different sources of variation. ANOVA can be used for a single factor or for multiple factors and provides a statistical test of whether two or more variables/population means are equal, and therefore generalises the t-test beyond two means (Cuesta-Albertos and Febrero-Bande, 2010; Rouder et al., 2016).

Results

In the following section, the main features of civil service are summarised and the selected determinants of civil service (performance, finances, human resources) are evaluated, including the similarity between EU countries according to the created factors of civil service over the period 2012-2019 by use of factor analysis, cluster analysis and analysis of variance.

Characteristic Features of Civil Service in EU Countries

Comparison of civil service systems in EU countries, and other characteristic features, such as openness of the public service, coherence of human resource management across different levels of government, differences between public employees and civil servants, turnover rate of civil servants, or compensation level compared to the private sector is documented in Table 2.

As shown in Table 2, EU countries have different characteristic features of civil service. Countries with career-based systems have the highest representation by the type of human resources (12), followed by position-based systems (7) or with predominant number of position features (2). The remaining six countries apply the hybrid system, i.e. the combination of the previous two (Mackie et al., 2021). As regards openness of the public service system, the prevalent one in the EU are the closed and hybrid systems. Conversely, only six countries use the open system. When evaluating the coherence of human resources management across different levels of government, it can be said that high coherence is observed in eight countries, medium coherence in 11 countries, and low coherence is typical of eight countries. Differences between public employees and civil servants are low in about half of the EU countries, medium in nine countries, and high in four countries. The indicator that combines information about stability and attractiveness of the public sector, but also a specific system of public service is the turnover rate of civil servants. The majority of EU countries can be characterised by a low turnover rate of civil servants, a medium turnover rate of civil servants is seen in five countries, and a high turnover rate of civil servants is characteristic of five EU countries. Rewards related to the performance are fairly commonplace in the EU member states, although not all countries have introduced the system of rewards. Overall, the rate of payments is lower in the public sector compared to the private sector in the majority of EU member state, in particular in top civil servants (see Table 2). The main motivation behind the introduction of rewards related to performance in civil service is to increase competitiveness of the public sector with respect to employment rate in the private sector (European Commission, 2018).

Table 2. Comparison of the Main Features of Civil Service in EU Countries.

Type of human resources system	Career based		Hybrid	Position based
		AT, BE, CY, DE, EL, ES, FR, HR, IT, LT, LU, PT		BG, CZ, IE, MT, PL, RO
Openness of the public service system (No data for LT)	Open		Hybrid	Closed
	DK, EE, FI, LV, SE, SI		BG, BE, IE, MT, CY, CZ, HU, PL, SK, NL	AT, DE, EL, ES, FR, HR, IT, RO, LU, PT
Coherence of human resources management across different levels of government	High		Medium	Low
	AT, ES, FR, DK, LT, LU, MT, SI		BG, CY, DE, FI, HR, IE, IT, RO, SE, NL, PT	BE, CZ, EE, EL, HU, LV, PL, SK
Differences between public employees and civil servants	High		Medium	Low
	BG, EL, HR, IT		BE, CZ, FR, MT, HU, PL, SI, LT, PT	AT, CY, DE, DK, ES, SE, FI, EE, RO, IE, LU, LV, NL, SK
Turnover rate of civil servants (No data is available for CZ)	High		Medium	Low**
	BG, HU, RO, SE, SK		EE, DK, FR**, LV SI	AT, BE, CY, MT, IE, EL, ES, DE, FI, LU, NT, NL, PT, FR**, HR, IT, PL
Compensation level compared to the private sector	Higher	Same	Lower	Higher for low levels and lower for high levels
	LU, PL, RO	BE, CZ***, LT	AT, BG, FR, LV, DE, DK, FI, SE, HU, MT, NL, SK****, PT	CY, EE, EL*****, ES, HR, IE, IT, SI

Note: * With some career – based elements; ** Low for civil servants, medium for public employees; *** Slightly higher for central government and slightly lower for local governments; **** In practice increments may move the individual salary significantly above private level income; ***** However very differentiated levels of salary in public sector.

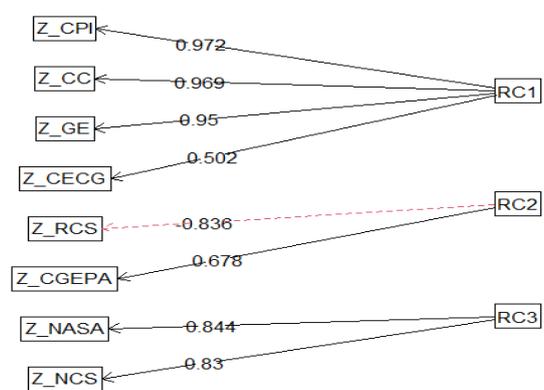
Source: Authors according to European Commission (2018) and Mackie et al. (2021)

Determinants of Civil Service in EU Countries using Factor Analysis

Factor and cluster analyses were used to evaluate the determinants of civil service in EU countries for the average of 2012-2019. Three factors were created from the original eight civil service indicators. The Rotated Component Matrix (Table 3) shows the resulting factors and their relationships to the original variables. The values given in the table show only the correlations between the original indicators and the factors that are (in absolute values higher than 0.5), (see also Figure 2).

Table 3. Rotated Component Matrix*.

	Component		
	1	2	3
CPI (z-score)	0.972		
CC (z-score)	0.969		
GE (z-score)	0.950		
CECG (z-score)	0.501		
RCS (z-score)		-0.836	
CGEPA (z-score)		0.678	
NASA (z-score)			0.844
NCS (z-score)			0.830

Factor Analysis

*Note: Rotation converged in 5 iterations

Source: Authors calculation in the IBM SPSS

Fig. 2. Factors of Civil Service

Source: Authors calculation in the R program

Factor (RC1) – Performance of civil service is formed by 4 indicators i.e. Corruption Perceptions Index (CPI), Control of Corruption (CC), Government Effectiveness (GE) and Compensation of employees in central government (CECG). **Factor (RC2)** – Financial dimension of civil service is formed by 2 indicators - Central government expenditure on public administration (CGEPA) and Remuneration of national civil servants in central public administration (RCS). **Factor (RC3)** – Employees of civil service is created from the two former variables: Number of national civil servants in central public administration (NCS) and National administration – Senior administrators at national level by function governments (NASA). The values of factors RC1, RC2 and RC3 are given as a linear combination of the values of the normalised values of the input indicators (z-scores). The following Table 4 shows the values of all three factors for each EU27 country in the period 2012-2019 as average.

Table 4. Determinants of Civil Service by Factors in EU Countries.

Country	RC1		RC2		RC3	
	Performance of civil service		Financial dimension of civil service		Civil service employees	
	Factor Score	Rank	Factor Score	Rank	Factor Score	Rank
Austria	0.765	7	0.114	10	-0.848	23
Belgium	0.755	8	-0.944	24	0.810	7
Bulgaria	-1.558	26	0.095	12	0.040	15
Croatia	-1.031	24	-0.663	22	0.700	9
Cyprus	-0.306	16	-1.564	26	1.360	1
Czechia	-0.399	18	1.943	2	-0.527	22
Denmark	1.297	5	-0.401	20	0.952	4
Estonia	0.036	12	1.309	4	0.779	9
Finland	1.569	1	0.391	8	-0.189	18
France	0.697	9	0.112	11	-2.626	27
Germany	1.307	4	0.984	5	0.524	11
Greece	-1.516	25	-2.267	27	-1.224	24
Hungary	-1.030	23	-0.241	18	0.903	5
Ireland	0.630	10	-0.121	15	0.691	10
Italy	-0.780	21	-0.754	23	-1.839	26
Latvia	-0.431	19	0.730	6	1.071	3
Lithuania	-0.381	17	0.037	13	0.878	6
Luxembourg	1.008	6	-0.142	16	1.270	2
Malta	-0.557	20	-0.334	19	0.175	13
Netherlands	1.447	3	0.127	9	-1.708	25
Poland	-0.176	15	0.496	7	-0.370	19
Portugal	-0.002	13	-1.519	25	-0.430	20
Romania	-1.917	27	2.038	1	-0.094	16
Slovakia	-0.881	22	1.361	3	-0.485	21
Slovenia	-0.077	14	-0.188	17	0.088	14
Spain	0.062	11	-0.600	21	0.225	12
Sweden	1.468	2	0.001	14	-0.126	17

Source: Authors calculation in the IBM SPSS Statistics program

Table 4 clearly shows different positions of countries in terms of the three dimensions of civil service (factors RC1, RC2, RC3). RC1 – Performance of civil service – plays a significant role, documenting a wider context of civil service in relation to corruption, government effectiveness and compensation of employees (wages and salaries). Finland, Sweden and the Netherlands have the best position in of Performance of civil service (RC1) according to the factor score. By contrast, Romania, Bulgaria and Greece have the worst position according to the factor score. Factors RC2 and RC3 focus on a specific part of civil service and characterise its financial and human resource dimension. The factors have a weaker position than RC1 also because of the number of indicators from which they were created. The financial dimension of civil service (RC2) includes government expenditure on executive

and legislative bodies and remuneration of civil servants working in central public administration. The human resource component of civil service (RC3) consists of national civil servants and senior administrators from all government functions.

Evaluation of the Similarities of EU Countries according to Civil Service Factors using Hierarchical Cluster Analysis

This section provides the evaluation of the similarity of EU countries according to the three created factors of civil service for the period 2012-2019. Hierarchical cluster analysis was used to create clusters of EU countries. The created factors RC1- Performance of civil service, RC2- Financial dimension of civil service and RC3- Civil service employees were used as inputs for a hierarchical cluster analysis that divided the 27 EU states into groups with similar civil service determinants behavior. The result of the hierarchical clustering process is displayed using a dendrogram. The dendrogram shows the possible division of states into 5 clusters. Each cluster represents the group of states with similar behaviour according to determinants (factors) of civil service (see Figure 3).

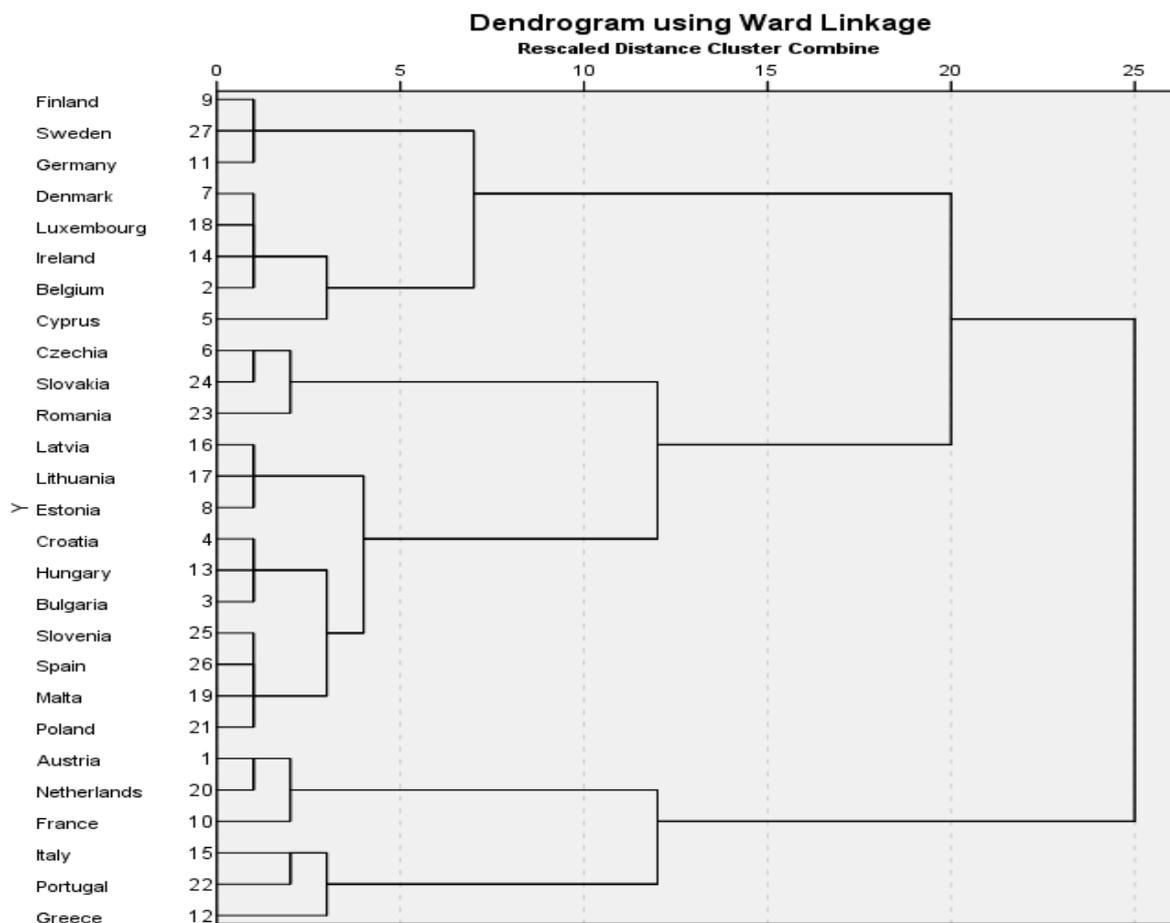


Fig. 3. Dendrogram of Similarities of Civil Service Factors in EU Countries.

Source: Authors in the IBM SPSS Statistics program

Cluster 1 comprises eight countries similar in the factors of civil service (Finland, Sweden, Germany, Denmark, Luxembourg, Ireland, Belgium, Cyprus). These countries represent North, Central, South as well as West Europe and different traditions of civil service (three states with the Scandinavian tradition, three states with the continental tradition, and two states with the Anglo-Saxon tradition). The strongest similarity can be observed between Finland, Sweden, Germany and between Denmark, Luxembourg, Ireland, Belgium. Similarity in the factors RC1, RC2 and RC3 was observed in particular between Finland and Sweden in the case of Performance of civil service (RC1). As regards the financial dimension of civil service (RC2), Luxembourg and Ireland are similar. Luxembourg and Cyprus are similar in Civil service employees (RC3). **Cluster 2** consists of three similar countries (Czechia, Slovakia, Romania) in civil service. Czechia and Slovakia represent Central Europe with an Eastern European tradition of civil service, and Romania represents South-Eastern European tradition and the Balkan tradition of civil service. The strongest similarity is observed between Czechia and Slovakia, which can be partially explained by their common history as a single country. These countries can be characterised mainly by their similarity in the human resource dimension of civil service (RC3). Conversely, from the perspective of the financial dimension of civil service (RC2), the strongest similarity is seen between Czechia and Romania. **Cluster 3** comprises 10 countries with similar characteristics of civil service (Latvia, Lithuania, Estonia, Croatia, Hungary, Bulgaria, Slovenia, Spain, Malta, Poland). These countries are located in Central, North, South and South-Eastern

Europe and they represent various traditions of civil service and human resource management. The most represented countries in the third cluster are those following the Eastern European tradition of civil service (Hungary, Poland, Croatia, Latvia, Lithuania). When considering factors of civil service, the most similar are the three Baltic states (LT, LV, EE), then Croatia, Hungary, Bulgaria, and Slovenia, Spain, Malta and Poland. As regards the performance of civil service (RC1), the strongest similarity is observed between HR and HU. When considering the financial dimension of civil service (RC2), Croatia and Spain demonstrate significant similarity. As regards the personal dimension of civil service (RC3), Lithuania and Croatia are the most similar.

Table 5. Clusters of EU Countries by Similarities of Civil Service Factors.

	Country	RC1	RC2	RC3
Cluster 1	FI	1.569	0.391	-0.189
	SE	1.468	0.001	-0.126
	DE	1.307	0.984	0.524
	DK	1.297	-0.401	0.952
	LU	1.008	-0.142	1.270
	IE	0.630	-0.121	0.691
	BE	0.755	-0.944	0.810
	CY	-0.306	-1.564	1.360
Cluster 2	CZ	-0.399	1.943	-0.527
	SK	-0.881	1.361	-0.485
	RO	-1.917	2.038	-0.094
Cluster 3	LV	-0.431	0.730	1.071
	LT	-0.381	0.037	0.878
	EE	0.036	1.309	0.779
	HR	-1.031	-0.663	0.700
	HU	-1.030	-0.241	0.903
	BG	-1.558	0.095	0.040
	SI	-0.077	-0.188	0.088
	ES	0.062	-0.600	0.225
	MT	-0.557	-0.334	0.175
	PL	-0.176	0.496	-0.370
Cluster 4	AT	0.765	0.114	-0.848
	NL	1.447	0.127	-1.708
	FR	0.697	0.112	-2.626
Cluster 5	IT	-0.780	-0.754	-1.839
	PT	-0.002	-1.519	-0.430
	EL	-1.516	-2.267	-1.224

Source: Authors calculation in the IBM SPSS Statistics program

Cluster 4 is characterised by three similar states in terms of civil service (Austria represents Central Europe, and the Netherlands and France represent Western Europe). All countries in the fourth cluster follow the continental tradition of civil service. In terms of the observed factors of civil service, the strongest similarity is observed between Austria and Netherlands. From the perspective of the individual areas of civil service, it can be said that Austria and France reach the strongest similarity in the financial dimension of civil service (RC2). Somewhat weaker was the similarity the Performance of civil service (RC1) in these countries. **Cluster 5** is composed of three similar states (Italy, Portugal, Greece). These are South-European countries that follow the Mediterranean tradition of civil service. All countries demonstrate a weaker similarity in the individual parts of civil service. The similarities are provided in Figure 3 and Table 5. Table 5 provides information about the division of EU countries and similarity between clusters of countries by factors of civil service, including values of factor score over the

period 2012-2019.

The summary average values of individual factors RC1 to RC3 for individual clusters are shown in the following table 6.

Table 6. Average Values of Individual Factors by Clusters of EU Countries.

		Factor RC1	Factor RC2	Factor RC3
		Mean	Mean	Mean
Cluster	cluster 1	0.966	-0.224	0.661
	cluster 2	-1.066	1.780	-0.369
	cluster 3	-0.514	0.064	0.449
	cluster 4	0.969	0.117	-1.727
	cluster 5	-0.766	-1.514	-1.164

Source: Authors calculation in the IBM SPSS Statistics program

As Table 6 shows, the average values of factors RC1, RC2 and RC3 vary in the clusters of EU countries. The strongest similarity of average values according to Performance of civil service (RC1) is seen between the first and fourth clusters. Similarity is also seen between the third and the fourth clusters in terms of Financial dimension of civil service (RC2). To some extent, similarity of average values was also observed between the first and third clusters regarding Civil service employees (RC3). More detailed comparison is provided in the following section.

Evaluation of Similarities of Civil Service Factors in EU Countries using Analysis of Variance

In this section, factors of civil service and their statistical similarity by clusters of EU countries are evaluated. The average values of the generated factors Performance of civil service (RC1), Financial dimension of civil service (RC2) and Civil service employees (RC3) between the individual clusters 1 to 5 were compared using analysis of variance (ANOVA), which tests whether the average values of the factors of civil service between the clusters can be considered comparable. The results of the analysis of variance, i.e. significance values of less than 0.05, show that the values of the individual factors RC1 to RC3 differ significantly between clusters. The following post-hoc analysis shows for which clusters the average values of factors RC1 to RC3 are comparable, i.e. which clusters behave similarly according to individual factors and which differently. Groups of clusters with similar behaviour form so-called homogeneous groups. Because the sizes of the individual clusters are significantly different, Tukey's HSD method was used. All tests are performed at the level of 0.05. Table 7 shows that statistical similarity of average values of civil service factors (RC1, RC2, RC3) can be found by clusters of countries.

Table 7. Similarity of Average Values of Factors of Civil Service by Clusters of Countries.

RC1 - Performance of civil service				
Cluster	N	1	2	
cluster 2	3	-1.0655384		
cluster 5	3	-0.7658497		
cluster 3	10	-0.5143158		
cluster 1	8		0.9661460	
cluster 4	3		0.9693849	
Sig.		0.686	1.000	
RC2 - Financial dimension of civil service				
Cluster	N	1	2	3
cluster 5	3	-1.5135856		
cluster 1	8	-0.2244611	-0.2244611	
cluster 3	10		0.0642716	
cluster 4	3		0.1174737	
cluster 2	3			1.7804364
Sig.		0.063	0.940	1.000
RC3 - Civil service employees				

Cluster	N	1	2	3
cluster 4	3	-1.7274890		
cluster 5	3	-1.1640623	-1.1640623	
cluster 2	3		-0.3686276	-0.3686276
cluster 3	10			0.4489316
cluster 1	8			0.6614026
Sig.		0.621	0.296	0.105

Source: Authors calculation in the IBM SPSS Statistics program

According to the RC1 factor "Performance of civil service", the clusters were divided into two groups with similar behavior. In the first group there are clusters 2, 3 and 5, in the second group there are clusters 1 and 4. The RC2 factor "Financial dimension of civil service" classified clusters into three homogeneous groups. In the first group there are clusters 1 and 5, in the second group there are clusters 1, 3 and 4, the third group consists of a single cluster 2. It is clear, that cluster 1 was classified simultaneously into two homogeneous groups, the first and the second. The RC3 factor "Civil service employees" also classified clusters into three homogeneous groups. In the first group there are clusters 4 and 5, in the second group there are clusters 2 and 5, the third group consists of three clusters 1, 2 and 3. This means that clusters 2 and 5 were classified simultaneously into two homogeneous groups. Statistical similarity of average values of the individual civil service factors (RC1, RC2, RC3) is provided in Table 7.

Discussion

Two research questions are verified for the sake of the fulfilment of the aim. The Research question (RQ1): *Are career-based systems of civil service more closed compared to position-based systems in European countries?* A comparison of EU countries (Table 2) showed that most countries with career systems are closed, have a low turnover rate (the ratio of employees leaving civil service for reasons other than retirement to the average number of employees) and low and medium differences between public employees and civil servants. On the contrary, it can be stated that position-based civil service systems in EU countries are mostly characterised by an open system, they have little differences between public employees and civil servants, but the turnover rate of civil servants varies significantly in individual countries. The answer to research question (RQ1) is therefore affirmative, YES.

As other research has shown (Kuperus and Rode, 2016; European Commission, 2018; Mackie et al., 2021), top level share the same culture with other employees in the career system, which enables cooperation and better communication of the whole staff, and supports internal mobility. Career systems are linked to job stability. Conversely, in a position-based system, candidates are selected from those with special skills through an open examination and staff are trained in an open cultural approach. Foreign experience shows that in open and position-based civil service systems, there is a higher ratio of employees leaving the civil service for reasons other than retirement to the average number of employees (European Commission, 2018). According to some research, e.g. Demmke and Moilanen (2012), a lower level of remuneration, together with some negative consequences such as reduced salaries and staff numbers, then leads to significant difficulties in attracting talent to the public sector. One of the aspects related to the turnover rate of civil servants is the system of remuneration and motivation. For instance, Druskienė and Šarkiūnaitė (2018) and Rozszakov et al. (2021) found that the extrinsic motivation factors have an impact on civil servants' motivation for higher standards of their work performance. Other authors (Choi and Whitford (2017)) state that employees with merit-based pay are less satisfied with their organisation than are those working in agencies that do not implement the incentive systems.

Research question (RQ2) was also verified: *Are EU countries similar according to the factors of civil service from the viewpoint of employees, finances, performance and affiliation to the same tradition of civil service?* From the results of the hierarchical cluster analysis, we can state that five similar groups of EU countries according to the established factors of civil service can be included in some of the 6 traditions of civil service (Demmke and Moilanen, 2010). If we evaluate the EU countries (according to the internal similarity of civil service factors and civil service traditions), it can be stated from our results that there are similar countries included in one cluster, which are also representatives of the same tradition of civil service. As Table 8 shows, only in the case of cluster 4, all states represent one tradition (Continental European tradition). Similarly, in the case of cluster 5, all states are representatives of one tradition (Mediterranean / South European tradition of civil service). The other countries in the first, second and third clusters are then representatives of the more traditions of civil service. However, there are groups of countries (clusters 1 and 2) belonging to the same civil service tradition (e.g. FI, SE and DK to the Scandinavian tradition, or NL, LU, BE as representatives of the Continental European tradition). In the case of the third cluster, five countries represent the same tradition, i.e. the Eastern European tradition. The results show that in most of the EU countries there is a similarity of civil service factors and belonging to the same civil service

tradition. The answer to research question (RQ2) is therefore affirmative, YES.

Similarly to our research, Demmke (2004) evaluated European civil services, traditions and reforms. His results offer an overview of the advantages and disadvantages of traditional civil service, the attractiveness of civil service, but also a number of reform changes in terms of civil service performance. The same author Demmke (2010) states that for selected areas of civil service in EU countries, with emphasis on civil servants' legal status, organisational changes, recruitment policies, remuneration, there are similarities and differences amongst the different national civil services. Also other research e.g. Choi and Whitford (2011) or Marčetič (2015) on the example of different groups of European countries (Anglo-Saxon, Western or Eastern Europe identified differences in selected determinants of civil service (personnel or legal) but also similar functions of civil service systems. Stelina (2019) then emphasises that, in Western European and other European countries, the existence of different models of public (civil) service does not exclude the definition of certain general models and the legal status of civil servants.

Table 8. EU Countries by Similarities of Civil Service, Tradition and Geographic View.

Clusters of countries by similarities of civil service	Tradition of civil service	Geographic view
1. Cluster: Finland, Sweden, Germany, Ireland, Denmark, Luxembourg, Belgium, Cyprus	FI, SE, DK - Scandinavian tradition	Northern Europe - FI, SE, DK
	NL, LU, BE - Continental European tradition	Western Europe - NL, LU, BE, IE
	IE, CY - Anglo- Saxon tradition	Southern Europe - CY
2. Cluster: Czechia, Slovakia, Romania	CZ, SK - Eastern European tradition	Central Europe - CZ, SK
	RO - Balkan tradition	South-eastern Europe - RO
3. Cluster: Latvia, Lithuania, Estonia, Croatia, Hungary, Bulgaria, Slovenia, Spain, Malta, Poland	LT, LV, HR, HU, PL - Eastern European tradition	Northern Europe - EE, LT, LV
	EE - Scandinavian tradition	Central Europe - SI, PL, HU
	BG - Balkan tradition	Southern Europe - MT, ES
	SI - Continental European tradition	South-eastern Europe - BG, HR
	MT - Anglo-Saxon tradition	
ES - Mediterranean/South European tradition		
4. Cluster: France, Austria, Netherlands	AT, NL, FR - Continental European tradition	Central Europe - AT
		Western Europe - FR, NL
5. Cluster: Italy, Portugal, Greece	IT, PT, EL - Mediterranean/South European tradition	Southern Europe - IT, PT, EL

Source: Authors

The geographic aspect offers another view of the comparison of similar clusters of countries according to the factors of civil service (see Table 8). A geographic view of the clusters of EU countries according to civil service factors is also dealt with in more detail in Figure 4.

Following Table 8 and Figure 4, it can be stated that only the states in the fifth cluster (IT, PT, EL-Southern Europe) fully meet the affiliation to the same geographical area. However, even in the case of other similar countries included in one cluster, we can find a link to the same geographical aspect (e.g. three countries of Northern Europe and four countries of Western Europe in the first cluster). Further affiliation to the same geographical aspect was found in the third cluster (two groups of three countries – Northern and Central Europe and two pairs of countries – Southern and South-Eastern Europe) (see Table 8).

From the results of the similarity of the EU countries according to the factors of civil service, we can state that in addition to the affiliation according to the traditions of civil service, there is also their connection to geography. Other authors, such as Van der Meer et al. (2015), also evaluated the geographical aspect of civil service on the example of Central, Eastern and Western Europe. In this connection, the authors state that civil service systems have been increasingly influenced by a range of internal and external pressures prompted by changes in the institutional context.

The present research and results are based on average annual values over the period 2012-2019. In this very case, the analysis of the development of indicators in the individual years would yield no new qualitative results. The development of the individual indicators in the countries compared is similar in the observed years, with a high rate of mutual correlations, whereas vicissitudes are random and irregular. These vicissitudes can be eliminated by means of moving averages. Evaluation of civil service determinants could be made by use of other methods, such as two-way analysis of variance, with one factor representing the state and one factor the time. Such analysis, including post-hoc analysis, could be carried out for each indicator, whereas the results would be

qualitatively compared to find out about the similarities and differences between the indicators. Another possibility of evaluating determinants of civil services would be the panel data analysis. The present research did not deal with the impact of civil service indicators, but their similarity in link with traditions and geography. The authors believe that expansion of the range of the present indicators of civil service in the EU countries would enable a thorough evaluation in further research into this topic.

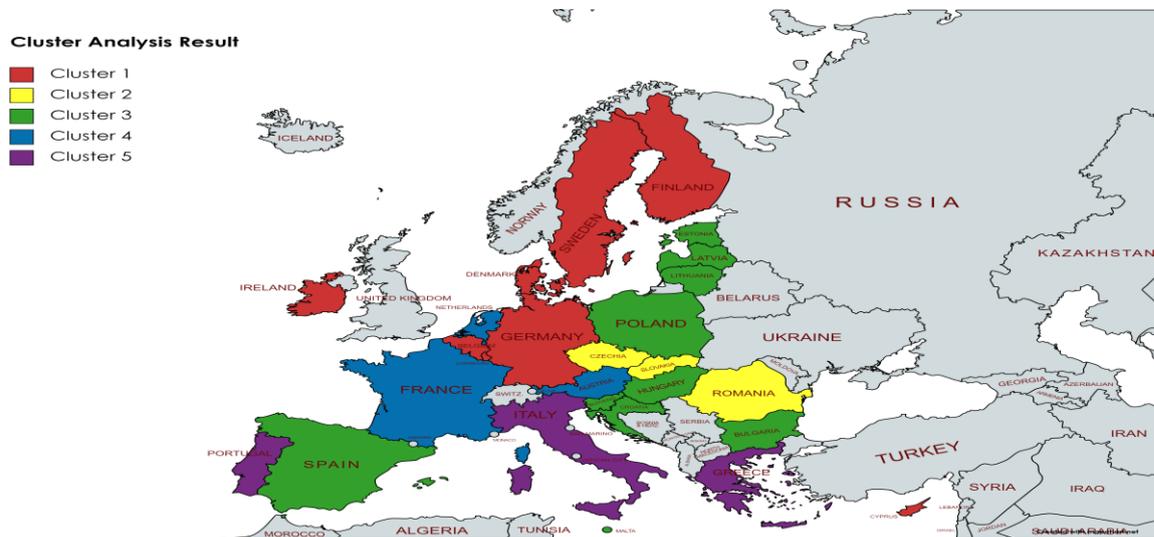


Fig. 4. Geographic View of Clusters of Countries by Similarity of Civil Service Factors
Source: Authors created with use of mapchart.net application

Conclusion

The aim of the paper was to outline the European context of civil service, to characterise the main features of the civil service system in EU countries, and to evaluate selected determinants of civil service. EU countries do not have a unified system of civil service. Systems of civil service demonstrate both similar features as well as differences in types of human resource management, financing, position of civil servants or the system of rewarding employees in numerous countries. Results of factor analysis proved the association of the evaluated determinants of civil service in EU countries to the three created factors (performance of civil service, financial dimension of civil service, employees of civil service). The factor of performance of civil service plays a significant role, whereas the financial dimension of civil service and employees of civil service only have a weaker position. The evaluation of the three factors of civil service in the EU countries by use of hierarchical cluster analysis resulted in the division of the countries into five clusters with similar characteristic features of civil service. The strongest similarity of civil service was found in the first cluster between Finland and Sweden according to the Performance of civil service and Employees of civil service. Czechia and Slovakia demonstrated the strongest similarity according to Employees of civil service. Other similarities were found between Slovenia and Bulgaria, or Hungary, Lithuania and Estonia in the third cluster, according to Employees of civil service. In the fourth cluster, similarity was found mainly between Austria and France according to the Performance of civil service and Financial dimension of civil service. Results by clusters also show similarity of average values of civil service factors. It has been found that based on the performance of civil service, clusters of countries were divided into two groups with similar characteristics. According to factors financial dimension of civil service and civil service employees three homogenous groups of countries have been identified. The trend of human resource management and the type of civil service are closely linked to national traditions, habits, beliefs and the national political interests, which has also been corroborated by our research. The majority of countries placed within the same cluster according to similarity of civil service factors are bound to the same tradition of civil service but also according to same geographic view. All countries in the fourth cluster (Austria, Netherlands, France) are linked to the continental European tradition of civil service, and countries in the fifth cluster (Italy, Portugal, Greece) to the Mediterranean/South European tradition of civil service. All countries found in the fifth cluster represent the same geographic area (South Europe). The results also show that in the case of the first, second and third clusters, groups of similar countries exist that are linked to the same tradition of civil service. Civil service in the European context offers a vast area for the investigation of topical questions, which could be used as a topic for further research.

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