

Factors Influencing the Perception of Corruption in the Countries of the European Union

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Abstract

Objectives: The European Union regularly publishes reports on corruption as part of its Eurobarometer surveys. These report on the opinions of European citizens regarding corruption and the presence of corruption they perceive. Based on survey data from 2008-2022, this study examines the perception of corruption in EU member states. **Methods:** As a method, the authors use statistical tests. They examine the differences between geographical regions and created country clusters to examine the effect of geographical location on the perception of corruption. They managed to show a difference between north and south. **Findings:** Based on the results, the role of the cultural and historical background is the most significant in the perception of corruption. Other influences, such as democratization, play a role in shaping opinions. However, the impact of the anti-corruption fight is evaluated independently of the region. It is also a common opinion that corruption cannot be eradicated. **Novelty:** This study provides a structured approach to analysing corruption perception across regions, emphasizing statistical validation. The findings contribute to understanding the persistence of corruption perception and highlight key influencing factors.

Keywords:

Corruption; European Union;
Public Opinion; Institutions;
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1- Introduction

Perceptions of corruption vary considerably across European Union (EU) Member States and change over time. Many previous studies have analyzed corruption using the Corruption Perceptions Index (CPI) [1] and Eurobarometer corruption perceptions surveys [2]. These studies generally do not capture the regional differences and historical influences that shape perceptions of corruption over time.

This research differs from most of the studies in the literature in two respects. On the one hand, it does not use the globally recognized but increasingly criticized independent Transparency International CPI index, but the Eurobarometer survey reflecting the opinions of European citizens. The other novelty is that it examines not only the factors determining the perception of corruption, but also their temporal dynamics. It examines this issue with the temporal dynamics of the fundamentally static cluster analysis, using the time series-based clustering method, which is a methodological novelty.

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This research aims to fill this gap by statistically processing Eurobarometer data from 2008 to 2022. It does not rank, as previous studies have done, but rather explores, through regional clustering and time-series comparison of long-term trends, what historical, cultural and democratization factors influence perceptions of corruption. Our analysis includes several factors in order to assess long-term trends.

The study first reviews the theoretical background, definition and measurement methodology of corruption, and then presents a case study of corruption in Hungary. This is followed by a description of the data and methods, a presentation of the results and a comparison with previous literature. The study concludes with a discussion of the most important findings and their implications for anti-corruption policies.

2- The Concept and Measurement of Corruption

2-1- Concept and Importance of Corruption

In recent political news, instances of corruption involving political actors are increasingly exposed, steadily eroding public confidence in democratic systems. This decline in trust becomes even more severe when international institutions — expected to uphold integrity — are implicated. While corruption remains a serious issue, it is often perceived by many as an inevitable part of daily life. However, its harmful effects on society are undeniable and require constant efforts to prevent and reduce it.

The word *corruption* originates from the Latin term *corruptio*, meaning decay or deterioration [3]. One of the most widely accepted definitions is provided by Transparency International (TI), which describes corruption as the misuse of public power, trust, or an entrusted position for personal benefit [4]. Corruption is a complex, multidisciplinary issue encompassing moral, cultural, social, legal, and political dimensions [5]. It is considered a criminal act that can involve politicians, high-ranking public or private officials, or even lower-level employees [6]. Typically, it involves individuals in positions of authority exploiting their institutional power to serve the interests of a select group [7, 8]. The most severe cases — such as bribery, influence peddling, or failing to report such acts — are punishable under the criminal laws of most countries [9]. However, these represent only the most visible forms of corruption. A broader range of corrupt behaviors exists, often falling outside the scope of criminal law, yet still causing significant moral and political harm as part of social corruption.

Engels [10] in his book illustrates that from the early modern era until the mid-20th century, the rise of political corruption closely followed the development of the modern state. Even today, the link between politics and corruption remains evident, as exemplified by the 2022 Qatargate scandal involving several members of the European Parliament [11]. Corruption, along with efforts to combat it, dates back to ancient times — classical authors like Herodotus, Thucydides, Xenophon, and Polybius documented instances where political power was obtained through money or gifts. Detecting corruption is challenging because it often operates beneath official institutional structures. For example, the fact that EU leaders and pharmaceutical companies negotiated Covid vaccine deals via text messages remained hidden from the public for a long time [12].

The concept of micropolitics captures this covert and institutionalized aspect of corruption, involving personal networks, exchanges of favors or resources, and ambitions for social mobility [13]. Historian Koselleck [14] links this phenomenon to the "Sattelzeit" or "saddle period" (1750–1850), during which key political ideas like homeland, freedom, and citizenship emerged — alongside the modern notion of corruption. By the late 19th century, criticism of corruption intensified, yet it did not lead to greater transparency; instead, it mainly resulted in changes in political style. Today, personal networks remain a fundamental part of political life and success [10].

The complexity and hidden nature of corruption contribute to the absence of a universally accepted definition of the term. This was demonstrated by a Hungarian study [15], where nearly two hundred participants were asked to assess thirty different scenarios and determine whether they involved corruption or the risk of it. Interestingly, none of the cases received unanimous classification from the respondents. Generally, corruption can be categorized into two basic forms based on who initiates the act. If a client offers a reward to the official in charge, it is considered active corruption. Conversely, if the official requests compensation in return for assistance, it is regarded as passive corruption [16]. While this model involves two parties, corruption often unfolds in a more complicated manner. The three-actor model of corruption [17] illustrates this complexity, introducing a third party who becomes disadvantaged or excluded as a result of the corrupt act.

Recent studies further enrich the understanding of corruption from various perspectives. Al-Faryan [18] reviews the intersection of agency theory, corporate governance, and corruption, highlighting the lack of focus on this topic in current literature. Emordi & Ikedinma [19] explore the challenges of democratic governance in Senegal, emphasizing weak institutional checks and public distrust as factors that foster corruption. Johnston [20] reassesses the political consequences of corruption, revealing ongoing debates about its potential benefits and harms. Myrdal [21] underlines corruption's detrimental effects on modernization efforts, arguing that claims of potential advantages are mostly speculative. Sharmeen [22] examines white-collar crime in Pakistan, suggesting that distinct countermeasures are needed

for different types of corruption-related offenses. Lastly, Trabelsi [23] provides nonlinear evidence on corruption's impact on economic growth, finding that both low and high corruption levels harm growth, while an optimal threshold may exist where growth benefits.

2-2-Measuring Corruption

Public discourse on the harm caused by corruption began gaining attention in the 1970s. By then, the deep connection between the Italian state and the mafia could no longer be ignored. Both sides benefited from this relationship: politicians eliminated rivals and secured election victories, while the mafia received lucrative public contracts. It remains unclear which side initiated the cooperation or who ultimately controlled it. According to the Lima model [24], the relationship was balanced, whereas the Ciancimino model [25] suggests that the mafia held the dominant position. Growing public pressure eventually forced the state to take increasingly strict action against organized crime. However, this did not prevent further tragedies. The assassination of General Chiesa in 1982 [26] — later adapted into the film *The Assassination of the General* [27] — sparked significant outrage. A similar reaction followed the murder of anti-mafia judge Giovanni Falcone [28]. These events illustrate that, without adequate oversight, corruption can spread rapidly and uncontrollably, much like weeds [29].

The challenges of measuring corruption are well illustrated by the Italian case. Its hidden nature makes it nearly impossible to capture the full extent of the problem. At the same time, the shocking murders mentioned earlier fueled public outrage, heightening the perception and awareness of corruption. However, perception does not always reflect reality. Some people see corruption in every public procurement process, while others view it as normal practice when a client selects a familiar applicant. Globally recognized organizations such as Freedom House, the Open Society Institute, Transparency International, and the Gallup monitor — along with Hungarian institutions like MÁST and TÁRKI — typically rely on two main methods for measuring corruption. The first focuses on assessing perception, while the second uses approximation. The approximation method estimates the extent of corruption by counting observable instances like bribes, gifts, or paid favors, then generalizing from these cases. The primary distinction lies in subjectivity: perception-based approaches are highly subjective and prone to misinterpretation, leading to possible under- or overestimation. In contrast, the approximation method is more objective and less influenced by external factors like media or politics, but it only captures known cases and thus likely underreports the true frequency [30]. Methodologically, surveys are conducted either through questionnaires (perception) or by analysing criminal statistics (approximation).

Public surveys can be used to gauge internal perceptions of corruption, while external assessments rely on the opinions of outside observers [16]. These two perspectives often differ. In certain countries, such as Slovenia and Sweden, citizens perceive corruption as a more serious issue than external experts do. In contrast, in places like Italy and Greece, external evaluations tend to be harsher than domestic perceptions. By applying suitable transformations, these two perspectives can be combined into a single index measuring corruption perception. Additionally, the general societal attitude toward corruption within a country greatly influences perception levels. According to TÁRKI's 2009 study [16], both the perceived and actual presence of corruption are higher in countries where people display greater tolerance towards such practices. Still, notable differences exist—some countries, like Greece, show perceived corruption levels that exceed societal tolerance, while in others, like Sweden, tolerance levels remain higher. Based on these differences, the report classifies countries into two groups: "partially blind" nations, where actual corruption surpasses perceived levels, and "oversensitive" ones, where perception overestimates the real situation. TÁRKI's report also introduced a corruption culture index developed by Keller and Sik, which combines public attitudes, perceived corruption, and actual corruption indicators.

2-3-Reliability of Corruption Indices

As previously discussed, corruption is inherently challenging to measure and quantify, making it essential to assess the reliability of corruption indices. If an index is poorly designed, it can lead to serious economic consequences and negatively affect a country's international reputation and image. Several factors can undermine the reliability of these measurements [31], including the composition of the surveyed population, the transparency of the methodology, the credibility of data sources, and the political neutrality of the organization conducting the research. These aspects often attract the most criticism.

One of the most widely referenced indices is Transparency International's Corruption Perceptions Index (CPI), which is published regularly. Although it is broadly recognized, concerns have been raised about its reliability. According to TI's 2022 financial report [1], the list of supporters includes entities such as the US, Danish, and Dutch foreign ministries, the European Commission, the Open Society Foundation, and the international NGO FERN, along with other government bodies, foundations, boards, companies, and unnamed individual contributors. The total amount of funding exceeds €20 million. This raises valid concerns about the political and financial independence of Transparency International as a survey organization.

The sources of data used to compile the CPI remain undisclosed, and the identities of the experts interviewed are also unknown. Additionally, the representativeness of the survey sample raises concerns [31]. Although the CPI primarily measures perceptions, reports often present the findings as actual corruption levels—crossing the boundaries of political correctness frequently mentioned. For example, a headline from *Portfolio.hu* [32] states: "*Hungary became the most corrupt country in the EU in a three-way tie according to Transparency International's index.*" Similarly, *Index.hu* references the CPI in its article titled "*We have reached the same level as South Africa in corruption*" [33]. Ensuring the reliability of such indices is crucial, given that the perception of corruption can severely impact both a country's economic prospects and its international reputation.

3- The Relationship Between Financial Culture and Corruption

Early studies examined how corruption is linked to economic growth [34, 35], leading to two main schools of thought among researchers. One group argues that corruption hinders economic development through various negative channels [36-38]. In contrast, others suggest that under certain conditions, a lower level of corruption might actually support economic growth [39], often pointing to formerly corrupt Asian countries that have since experienced rapid economic expansion. Nevertheless, the general consensus in the academic literature views corruption as harmful, with its prevalence typically decreasing as financial development progresses [40].

Lederman et al. [41] and Serra [42] argue that developed countries have greater resources to allocate toward detecting and preventing corruption, which helps reduce its occurrence. Economic growth also enhances education systems and educational quality, which increases the chances of uncovering and penalizing corrupt practices. Thornton [43] found that financial development contributes to lowering corruption levels, even before modern financial services become widespread. Recent studies frequently explore the connection between corruption and financial development. For example, Setor et al. [8] demonstrated that the expansion of digital payment systems reduces corruption opportunities. Similarly, Jungo et al. [44] emphasize that broader access to financial services and education plays a crucial role in curbing corruption [45], particularly in developing and emerging economies, but this impact is also evident on a global scale [46].

4- The Corruption in Hungary (2022/23)

While most online searches regarding global corruption rely heavily on Transparency International's (TI) index, alternative surveys and reports also exist. One such example is the Swiss-based Global Risk Global Corruption Index (GCI), compiled and published by Profile. This index is built on data-driven metrics, drawing primarily from reputable expert organizations like the World Bank, the World Economic Forum, the United Nations, and the OECD, although it does reference TI's CPI as well [47]. In the 2022 GCI ranking, Hungary was placed 71st globally. Scoring 40.89 points, the country fell into the "medium" corruption category and ranked 30th out of the 41 European countries assessed.

The World Justice Project's Rule of Law Index [48] evaluates countries based on multiple criteria, including corruption, government transparency, justice, fundamental rights, and public order and security. Although corruption is only one element of this complex index, several related sub-indices also influence the overall score. In the 2015 WJP ranking, Hungary placed 45th out of 102 countries, performing best in the categories of order and security, as well as the protection of fundamental rights. By 2022, Hungary's position in order and security had improved significantly, achieving 10th place alongside countries like Finland and Canada.

Additionally, the European Commission (EC) commissioned Kantar to survey public perceptions and tolerance of corruption across the European Union in 2022 [2]. The results revealed that in Hungary, 4% of respondents openly accepted corruption, 57% tolerated it, and 39% completely rejected it. The 4% acceptance rate reflects relatively well on Hungary, being lower than Greece's 10% and the EU-27 average of 5%, and even better than countries like the Netherlands (6%) and Austria (8%). However, the overall assessment is less favorable due to the high tolerance level—57% of Hungarian respondents acknowledged the existence of corruption but indicated they would not act against it.

In 2023, the European Commission (EC) released updated survey results [2]. Hungary's position showed slight improvement, with the share of respondents who find corruption unacceptable rising by 4 percentage points to 43%. Additionally, the percentage of those who tolerate corruption dropped by 6%, decreasing from 57% to 51% compared to 2022. This study utilizes the Eurobarometer survey time series data to explore these trends and focuses on answering three key research questions:

Q1 Do the European Union member states' perception of corruption and their opinions on corruption show regional characteristics?

Q2 If we arrange the EU countries into clusters based on the perception of corruption, do the resulting clusters correspond to the geographical regions?

Q3 Has the opinion of each country changed in the assessment of corruption during the 15 years under review?

5- Research methodology

5-1- The Used Dataset

The study is based on data from the already mentioned Eurobarometer surveys. The examined period is 15 years between 2008-2022. In this interval, European citizens were not contacted every year or with regular frequency (2008, 2009, 2011, 2012, 2014, 2017, 2020, 2022), therefore there are missing data in the samples. We encounter missing data in almost every database. These must be dealt with in some way. Leaving them out of the sample will bias the population parameter estimates, unless the missing data is completely random. The handling of missing data is necessary precisely to avoid this distortion. The goal can be achieved with different methods, for which it is necessary to identify and model the characteristics of the lack of data [49, 50]. The authors performed the missing data using the imputation algorithm of the free WEKA software with the DMI filter setting [51, 52].

The authors divided the countries included in the Eurobarometer surveys into regional groups. With this, they wanted to increase the aspects and possibilities of comparison. Table 1 summarizes the individual regions and their respective countries.

Table 1. Regions and countries

Name of region	Region countries
EU28/27 (EUFULL)	All EU member states
West Europe Western Europe (WE)	Belgium (BE), former West Germany (DW), Germany (DE), former German Democratic Republic (DE), France (FR), Ireland (IE), Luxembourg (LU), Netherlands (NL), Austria (AT), United Kingdom (UK)
South -East Europe South Eastern Europe (SE)	Bulgaria (BG), Croatia (HR), Romania (RO), Slovenia (SI), Greece (EL) – i.e. the Balkan states
Central Europe Central Europe (CE)	Hungary (HU), Poland (PL), Slovakia (SK), Czech Republic (CZ) - i.e. the "Visegrad Four" (V4)
Northern Europe Northern Europe (NE)	Finland (FI), Sweden (SE), Denmark (DK)
Baltic states Baltic States (BT)	Latvia (LV), Lithuania (LT), Estonia (EE) - i.e. the Baltic States
South - West Europe Southwestern Europe (SW)	Spain (ES), Italy (IT), Malta (MT), Portugal (PT)

The study is based on data from the already mentioned Eurobarometer surveys. The examined period is the 15 years between the Eurobarometer data, the authors used the percentage of respondents who agreed with the selected statements (read below) compared to all respondents, expressed as a decimal. The answers to the questions appear on an apparently seven-point scale. In fact, the scale is four degrees. In principle, the advantage of such a scale would be that it ensures the possibility of expressing a true opinion for all respondents. Unfortunately, point 5 (not answered, i.e. he did not answer) still gives the opportunity to bypass answering. The apparent point 6 summarizes the values of those who fully and those who agree more, while point 7 contains the summation of the values of those who rather or completely disagree, therefore the authors only used point 6 of the answers to each question when preparing this study. If necessary, the proportion of those who disagree with the given statement can be easily calculated from this value. The following questions from the entire database were included in the research:

- Corruption is a major problem in (OUR COUNTRY);
- There is corruption in local institutions in (OUR COUNTRY);
- There is corruption in regional institutions in (OUR COUNTRY);
- There is corruption in national institutions in (OUR COUNTRY);
- Corruption is perceptible in EU institutions / There is corruption within the institutions of the EU*;
- The large number of successful detections deters people from corrupt behavior / There are enough successful prosecutions in (OUR COUNTRY) to deter people from giving guard receiving bribes;
- Government anti-corruption measures are effective / (NATIONALITY) Government efforts lake combat corruption are effective;
- Judge's sentences in corruption cases are too lenient / Court sentences in corruption cases are too light in (OUR COUNTRY);
- The EU helps in reducing corruption in (OUR COUNTRY);
- Corruption is unavoidable, it has always existed you exist.

From 2014, the last question assessing the inevitability of corruption was replaced by a corruption tolerance index. This included three answer options. The respondent either accepts, rejects, or tolerates corruption. The latter means that although he is aware of the phenomenon, he does nothing about it.

Eurobarometer questionnaire until 2013. In this regard, the authors consider it worthwhile to ask why the EU was not interested in people's opinions about the extent to which the Union itself is corrupt after 2013. After 2013, they were also not asked to what extent EU citizens think EU institutions reduce corruption.

The previously mentioned Qatargate and “von der The case known as Leyen's Pfizer texts” [11, 12] raises a possible answer to the above question. Another methodological task was to solve the fact that the question list of the Eurobarometer's corruption questionnaire also changed during the examined period, in 2013. Some of the questions used in the present research were no longer included in the later questionnaires, but new questions with equivalent content to the previous ones, but differently worded, were included in the questionnaire.

In order to be able to create the time series, the authors searched for which of the questions they selected could be answered in the different versions of the questionnaires. The correspondences used in the case of changed questions are summarized in Table 2. In order to make data processing simpler, the authors used the older version of the questions in the present study to characterize the entire period, except for the three-degree question of corruption tolerance.

Table 2. Old and new Eurobarometer questions

Previous questions	Questions after the change	A year of change
Is corruption a major problem / Corruption is a major problem in (OUR COUNTRY)?	How widespread do you think corruption is in your country / How widespread do you think the problem of corruption is in (OUR COUNTRY)?	2013
Judge's sentences in corruption cases are too lenient / Court sentences in corruption cases are too light in (OUR COUNTRY).	Serious corruption cases are not prosecuted enough / High-level corruption cases are not pursued sufficiently in (OUR COUNTRY).	2013
Corruption is unavoidable, it has always existed you exist	Degree of corruption tolerance (6=acceptable, 7=unacceptable, 5=tolerated/ Corruption tolerance (6= acceptable, 7= unacceptable, 5= tolerated)	2013

Source: EC, 2023; European Commission, 2012

Regarding the management of data, it is now essential to take into account research ethics aspects [53]. The most important of these are voluntary participation and ensuring anonymity. Considering that in this research the authors use international databases created by others and publicly available, research ethics questions did not arise in connection with this research.

5-2-Applied Procedures and Software

To provide a clear overview of the research process, a flowchart summarizing the main steps of the methodology is presented Figure 1. This visual representation helps to better understand the logical sequence of the data collection, processing, and analysis phases applied in the study.

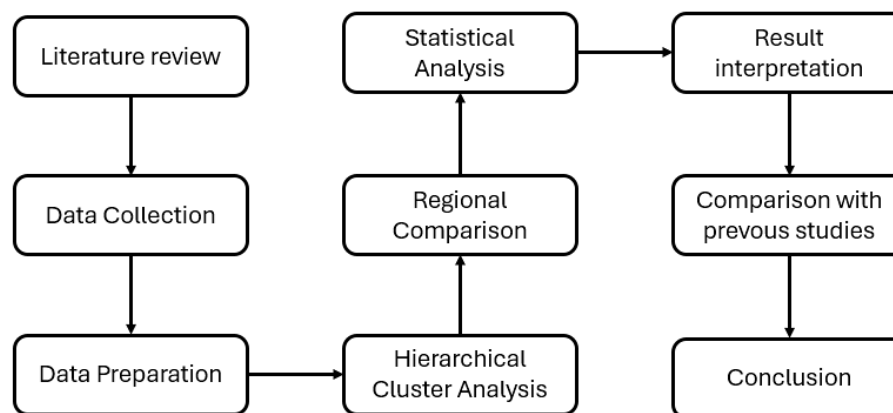


Figure 1. Research Methodology Flowchart

Figure 1 illustrates the main steps of the research process. It begins with the literature review, followed by data collection and preparation. The prepared data undergoes hierarchical cluster analysis and regional comparison. Statistical analysis is then performed, leading to the interpretation of results. Finally, the findings are compared with previous studies, and the research concludes with a summary of key insights.

5-2-1- Software and Descriptive Statistics

The authors used the results of the statistical analysis of the sample to select the tests used for the research. MS-Excel v.17.75.2 and Jamovi v.2.3.21.0 software were used to perform the tests. The results of the descriptive statistics are described in detail at the beginning of chapter 6. Based on the results obtained, the authors chose parametric tests for further research. Although non-parametric tests do not require the normality of the sample, a researcher is rarely interested in the significance test. Rather, you want to say something about the population from which the samples were drawn, and this is best done by estimating parameters and confidence intervals. In addition, parametric tests usually have higher statistical power. This means that significant differences, if they do exist, are more likely to be detected.

5-2-2- Comparison of Regions

The next step of the study was to compare the regions. For this purpose, the authors first examined the homoscedasticity of the variables using Levene's test. According to the null hypothesis, the homogeneity of standard deviations is characteristic of each group. Based on the results of the test, the authors used the Welch test to compare the regions. Since this assumes a lack of equality between the variables, the exact reason for the differences can be found with the Games-Howell post-hoc test. This test was performed by the authors separately for each question.

5-2-3- Country Groups

The authors checked the hypothesis H2 using the method of hierarchical cluster analysis, Ward.D2 procedure, using Euclidean distance. Cluster analysis itself does not mean a certain procedure, but the grouping of blocks of data [54]. The goal is twofold. On the one hand, finding groups that are characterized by internal homogeneity (that is, the elements belonging to a group differ as little as possible from the point of view of the group-forming criterion). On the other hand, there should be as much detectable difference between the individual groups as possible. Hierarchical procedures can be used when we have a lot of data, and the results obtained are less dependent on outliers and the selected distance measure. Its advantage is that it enables the graphical display of clusters in the form of a dendrogram, which provides significant help in choosing the number of clusters and interpreting the results [55]. The authors examined the clusters in the first and last year included in the research, i.e. in 2008 and 2022. The results of the two studies were compared to find an answer to hypothesis H3.

Welch's test is robust for handling unequal variances, making it preferable to ANOVA. Games-Howell post-hoc test is recommended when variances are not equal. Hierarchical clustering is suitable for analyzing corruption perception trends over time due to its ability to visualize relationships in a dendrogram.

6- Results

6-1- Descriptive Statistics of the Sample

The authors begin the description of the results with descriptive statistics (Table 3), the role of which is not only to review the sample, but also to help determine the type of tests to be performed.

Table 3. Descriptive statistics of the sample

Year	N	Missing	Average	Median	Scatter	Minimum	Maximum
2008	30	0	1833	1003	4707	500	26730
2009	30	0	1829	1007	4695	500	26663
2010	30	0	1694	950	4357	407	24737
2011	30	0	1829	1007	4695	500	26663
2012	30	0	1843	1015	4729	500	26856
2013	30	0	1836	1013	4714	500	26768
2014	31	0	1810	1012	4640	500	26786
2015	31	0	2104	1020	4926	526	27211
2016	31	0	1925	1017	4759	523	27359
2017	31	0	1862	1022	4871	502	28080
2018	31	0	1870	1015	4793	519	27646
2019	31	0	1852	1016	4810	509	27741
2020	31	0	1823	1017	4769	500	27498
2021	31	0	1811	1016	4726	439	27249
2022	30	0	1818	1011	4669	298	26509

The number of countries is initially 30 (N=30), then increases to 31, and finally in 2022 we find 30 countries again. The 30 countries include the 27 member states and the EU together, and the database also includes the former West Germany (DW) and the former East Germany (DE) separately. Croatia joined them from 2014 (N=31). With the conclusion of Brexit, the number of countries decreased again to 30. After 2014, questions about the prevalence of corruption in EU institutions and the EU's anti-corruption activities were no longer included in the Eurobarometer questionnaire.

The number of respondents in the entire EU was at least 26,000 people every year (Maximum column). Examining the countries, at least three hundred people answered each year (Minimum column value 298). Based on the results, the authors assumed the normality of the sample using the theorem of the central limit distribution [56]. Therefore, on the one hand, there was no need to perform a normality test (Kolmogorov-Smirnov, Shapiro-Wilk test). On the other hand, based on this, after reviewing the histograms and QQ plots for each question, the authors decided to perform parametric tests.

6-2-Regional Differences

In order to examine regional differences, several groups must be compared. Based on the examination of homogeneity of variance (Table 4), the Levene test became significant ($p < 0.001$), so homoscedasticity cannot be verified. Therefore, the authors performed the comparison with the Welch test. Table 5 contains the results of the Welch's test.

Table 4. Test results of variance homogeneity

	Statistics	df	df2	p
Levene (per question)	1.8-17.06	6	451	< .001

Table 5. Comparison of regions (Welch test)

	F	df1	df2	p
Major Problem	229.731	6	121	< .001
Corr Local	92.93	6	119	< .001
Corr Regional	92.712	6	120	< .001
Cor National	87.753	6	120	< .001
Cor. EU	0.514	6	111	0.796
Prosecutions	4.282	6	120	< .001
Government	46.668	6	116	< .001
Court	30.596	6	116	< .001
EU Help	1.636	6	110	0.144
Corr Accept	0.204	6	111	0.975
Corr Inaccept	6.495	6	116	< .001
Cor Toler	4.691	6	115	< .001

There are significant differences in perceptions of corruption across regions.

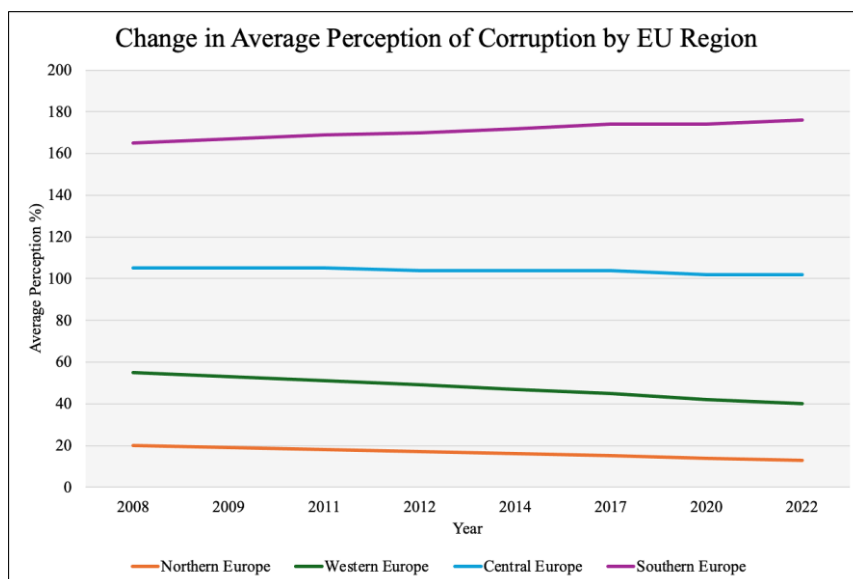


Figure 2. Average Corruption Perception in geographical regions of EU

The most significant difference is observed between southern and northern countries. In northern countries (e.g. Sweden, Denmark, Finland) the perception of corruption is consistently low, while in southern European countries (e.g. Italy, Greece, Spain) it is much higher (Figure 2).

6-3- Clusters of Self-Study

With the cluster analysis, the authors identified 4 clusters each in both examined years, these are shown in Figure 3. Croatia did not take part in the survey in 2008, and by 2022 Brexit was completed and the United Kingdom was no longer an EU member.

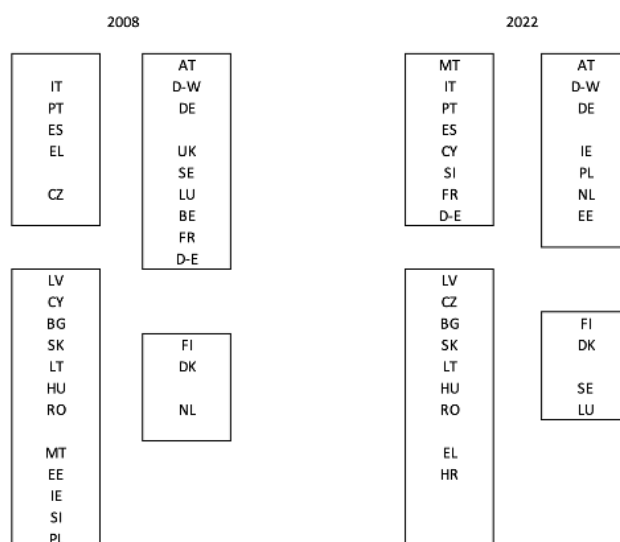


Figure 3. The results of the cluster analysis in 2008 and 2022

Based on the cluster analysis, the former socialist countries formed a distinct cluster in both 2008 and 2022, indicating that the state socialist past continues to shape attitudes towards corruption. Interestingly, the opinions of Estonian and Polish respondents have converged with those of Western European countries by 2022, which can be attributed to the strengthening of democratic institutions and transparency reforms.

In addition, there are significant differences between Western and Central European countries. While the population of former socialist countries is generally more tolerant of corruption, rejection is stronger in Western European countries. This supports previous research by Keller & Sík [16] that suggests that tolerance of corruption is strongly related to political culture and historical experience.

Regarding regional differences, the authors mention that the results of some countries differ significantly from the value typical of the country's region:

- Estonia (2022) shifted towards the Western European cluster, likely due to digital governance reforms.
- Poland (2022) moved closer to Western Europe in corruption perception.
- Former East Germany (2022) aligned with Southern European opinions, possibly due to economic dissatisfaction post-reunification.

In the case of Estonia, a possible explanation is the significant digitalization of public administration (e-Estonia program). This could mean more transparent public administration, reduced corruption and therefore a more favorable perception of corruption. Poland's result can be explained by the political division that has polarized society. Supporters of the ruling parties and the opposition have different views on, among other things, the rule of law and the presence of corruption. This bipolarity may distort the actual level of perception. The eastern half of Germany looked to the future with great expectations after German reunification, but the catch-up has not happened to this day. This may result in disillusionment and increasing pessimism among the residents of the eastern part of the country, which significantly affects the country's corruption perception performance.

7- Discussion

One of the most important findings of the research is that regional differences in perceptions of corruption are not only due to economic factors, but also to strong cultural and historical influences. Northern European countries have more stable democratic institutions, higher levels of transparency, and stronger public trust, while perceptions of

corruption have remained systematically higher in Southern Europe. This is consistent with the findings of Serra [42] and Tanzi & Davoodi [37], who found an inverse relationship between institutional strength and levels of corruption.

The research confirms that former socialist countries still form a distinct cluster in perceptions of corruption, suggesting that institutional heritage and political culture continue to influence perceptions over the long term. However, the shift in Estonia and Poland towards the Western European pattern shows that democratization and transparency reforms can effectively reduce negative perceptions of corruption.

7-1-Regional Differences

The results of the regional comparison (Table 5) show that the regions examined in Europe have the same opinion on three issues, these are:

- The level of corruption in EU institutions (Corr EU),
- The effectiveness of EU anti-corruption measures (EU Help) and
- Acceptance of corruption (Corr Accept).

In other questions, there are significant differences between the opinions of the population of each region. People, regardless of where they live, perceive the level of corruption in the EU institutions equally. They also have the same opinion about how effectively the Union acts against corruption. Although these two questions were removed from the questionnaires after 2014 (due to the ongoing scandals - the aforementioned Qatargate and von der Leyen's Pfizer texts - they can serve as a possible explanation), there has been no continuous deviation in the opinions since 2008. The third common opinion is related to the acceptance of corruption. This indicates that even though action is being taken against corruption, people still believe that the phenomenon has always existed and cannot be completely eliminated. In this regard, history repeats itself: the representatives of the currently loud criticism of corruption are once again not trying to create transparency. Therefore, the same thing is happening today, as it was in the 19th century. Regarding the end of the 20th century, Engels [10] described: the political style is changing. The best proof of this is provided by those politicians who, despite their obvious involvement in corruption, do not follow the classic rules of democracy. That is, despite their compromise, they do not resign, and even openly continue their political careers.

The exact reason for the differences between the regional opinions is revealed by the post-hoc analysis. The result tables for this are not included in this study for reasons of scope, however, the most important observations are summarized by the authors. The results of the post-hoc study also confirmed that the EU population surveyed has the same opinion on the above questions. However, they perceive the level of institutional corruption and the spread of corruption differently in their own countries. In these questions, three regional blocks emerge.

The opinions of the inhabitants of Central Europe and the Baltic States do not differ significantly from each other, but they differ from those of Northern Europe and South-Eastern and South-Western Europe, which also share the same opinion. Based on this, it can be said that a North-Central-South trend can be observed in the perception of corruption. As a further observation, it can be mentioned that, interestingly, the opinions of the Central European countries are similar to those of the entire EU population on most issues, which suggests that anonymity eliminates the "political correctness" almost expected from Western European respondents. A question worthy of further investigation may be why this phenomenon does not prevail in the anonymous European elections.

7-2-Cluster of Self-Study

The former socialist countries formed a separate cluster in both years, as already presented. Their opinion on corruption in 2008 was the same as that of the residents of Cyprus, Malta and Ireland. However, in 2022, only the Greeks saw corruption in the same way as the inhabitants of the countries of the former socialist bloc. Figure 3, seen in chapter 6.3, shows the clusters for 2008 and 2022.

- 2008(1) The former socialist countries: Latvia, Lithuania, Estonia (i.e. the Baltic States), Poland, Slovakia, Hungary (from the Visegrad Four), Slovenia, Romania, Bulgaria (from the Balkans).
- 2008(2) Southern European states belonging to the former Western bloc: Italy, Spain, Portugal, Greece.
- 2008(3) The countries of "classic" Western Europe: Germany (former Eastern and former Western parts), Austria, France, Belgium, Luxembourg, United Kingdom.
- 2008(4) The "welfare states" of Northern Europe: Finland, Denmark.

However, there are "outlier" states in every cluster: the Czech Republic was not included in a cluster with the Visegrad four, but with the western countries of Southern Europe, Sweden was not included in the northern European cluster, but in the "classic" western cluster, from which the Netherlands was transferred to the northern states. Cyprus and Ireland became part of the former socialist cluster.

The main results of the test, which was repeated fifteen years later, are as follows:

- In the course of time, the opinion of the residents of Estonia, which has undergone significant digital and administrative development, on corruption approached that of Western Europeans, and was transferred to this cluster, together with the Irish and Dutch who also returned here and the Poles who moved from the former Eastern Block;
- Only the Greeks agree with the former socialist states on the issue of corruption;
- The cluster of northern states (Sweden, Finland, Denmark) became unified, but Luxembourg, which is also considered a welfare state, was also included in a group with them;
- The cluster of Southern European states also unified, regardless of whether they previously belonged to the Eastern or Western bloc. France, which is also geographically connected, joined the Mediterranean areas. The former East Germans also belonged to this cluster in 2022.

Based on the results of the cluster analysis, the authors found that the perception of corruption is significantly influenced by the cultural background and mentality: the states of the Mediterranean and Scandinavia never fell into a cluster. The other significant influence on the perception of corruption and its acceptance or rejection is the historical past spent in democracy or repression: the countries of the former Eastern bloc typically formed an independent cluster in both studies. However, by 2022, the point of view of the residents of these countries has also approached the Western point of view - this is indicated by the fact that this year the Estonians and the Poles have already been placed in a cluster with the residents of Western Europe.

Germany is also worthy of further analysis, as in every Eurobarometer survey, the opinions of the residents of the former western and former eastern regions were published separately in addition to the country as a whole. The position regarding German corruption is primarily determined by the opinion of the residents of the western parts of the country. The reunification of the country in 1990 had an encouraging effect on the former East German population, who hoped that they would soon be able to catch up with the prosperity of their Western compatriots. This enthusiasm continued even in 2008, and at that time even the image related to corruption was the same in the former West and East areas of Germany. However, the slowing down and then almost complete stoppage of catching up had a disappointing effect on the former East Germans. This pessimism is also reflected in the fact that in 2022, they already have the same position as the residents of Southern Europe.

The authors again point out that perceptions of corruption do not necessarily reflect the real situation, but rather the messages conveyed by the media, public trust in the political elite, and the effectiveness of law enforcement. In countries where the press frequently reports on corruption cases and people constantly hear about corruption scandals, it is easy to develop the impression that the situation is more serious than it actually is. Past scandals have a long-term impact on public trust, and if members of the political elite do not enjoy widespread support or credibility, citizens may be inclined to assume that corruption remains unchanged despite strengthening anti-corruption measures.

Another important factor is the weakness of law enforcement. A country may have strong anti-corruption laws, but if its citizens perceive that the implementation of these laws is inconsistent, then perceptions of corruption will remain high. If high-profile arrests have no substantive consequences and those suspected of corruption can later continue their activities with impunity, society may tend to view anti-corruption measures as mere appearances rather than effective solutions. This also leads to high perceptions of corruption.

7-3-Additional Factors Related to the Perception of Corruption

The results show that a decrease in the perception of corruption does not necessarily correspond to an actual decline in corruption. In countries where judicial reforms and transparency measures have been strengthened (e.g. Estonia, Poland), people's trust in institutions has increased and corruption is therefore perceived as less of a problem. In contrast, in countries where the media and political discourse strongly thematize the issue of corruption (e.g. Hungary, Bulgaria), the level of perceived corruption remains high, even when objective indicators show improvements [36].

The results of the analysis also suggest that the perception of corruption is also strongly influenced by political narratives and media discourses. Cases such as Qatargate and the Ursula von der Leyen–Pfizer SMS scandal [11, 12] can significantly erode public trust in EU institutions, regardless of how widespread these corruption cases actually are.

7-4-Comparison with Previous Studies

The results of this research are in many respects consistent with previous studies examining the perception of corruption, but in some areas, differences can also be observed.

The CPI index published annually by Transparency International consistently shows that Northern Europe appears to be less corrupt, while Southern and Eastern Europe show higher corruption values [1]. The results of this research confirm this trend line, as the comparison by region also showed North-South differences. However, the difference is

that the CPI is based more on expert opinions, while the present research directly analyses public opinions, so different mechanisms may be behind the differences in perception.

Eurobarometer data show that the population of former socialist countries typically shows a higher perception of corruption, especially in the case of Bulgaria, Romania and Hungary [2]. The results of the present study are similar: based on the hierarchical cluster analysis, the former socialist countries still form a separate group, except for Estonia and Poland, where the perception levels have approached those of Western European countries. The Eurobarometer has not examined the perception of corruption related to EU institutions in recent years (after 2014), while the present research has analyzed this as well and has shown that the population uniformly considers the EU institutions to be corrupt.

According to research by the Hungarian TÁRKI Institute [16], the perception of corruption in Scandinavian countries is low and the population rejects corruption, while in Southern and Eastern Europe the perception of corruption and the tolerance for corruption are higher. The present research confirms this correlation, but gives a more dynamic picture, according to which the rejection of corruption has strengthened in certain parts of the former socialist countries (e.g. Estonia, Poland).

Setor et al. [8] have shown that the rise of digital payments reduces the potential for corruption by leading to more transparent transactions. Taken together with the data from this study, these results suggest that countries where digital financial solutions have spread rapidly (e.g. Estonia, Finland) have lower perceptions of corruption. This is further evidence that technological advances can contribute to reducing perceptions of corruption.

The differences may be explained by the fact that CPI and other surveys are based on expert opinions, while the present survey measures public perceptions. Perceived corruption does not always reflect the actual level of corruption but can often be distorted by political discourse and media influences. In countries where major corruption scandals have come to light in recent years, people's perceptions of corruption may have increased, regardless of whether the objective level of corruption has increased or not. Political narratives play a significant role in shaping perceptions. Countries that have undergone extensive digitalization and transparency reforms (e.g. Estonia, Finland) have reduced perceptions of corruption, even if not necessarily the actual level of corruption.

8- Conclusion

This study examined the perception of corruption in the European Union. We were able to give a partial "yes" answer to question Q1. There are several differences between the individual geographical regions, but the level of institutional corruption in the EU, the effectiveness of the EU's anti-corruption action and the ineradicable nature of corruption are seen by the residents of all countries in the same way. And in the differing opinions, the difference between north and south is a trend. It was possible to demonstrate a significant similarity between the country groups obtained by cluster analysis and the geographical regions, but the geographical and cluster-based groups are not identical. Therefore, the authors could only partially answer the Q2 question with a "yes". The image of corruption is primarily influenced by the cultural background and historical heritage. In addition, however, additional environmental influences, such as democratization, contribute significantly to the change of opinions, so the answer to question Q3 is clearly: "yes". The phenomenon of corruption is still present in everyday life and public life, despite the development of modern statehood, the development of the democratic system and the strengthening of anti-corruption action. Knowing it can help you find solutions that can reduce or eradicate the phenomenon. The present study of the authors intends to contribute to this.

9- Declarations

9-1- Author Contributions

Conceptualization, B.G.K. and E.B.H.; methodology, B.G.K. and A.T.H.; software, B.G.K. and A.T.H.; validation, B.G.K., E.B.H., and Z.Z.; formal analysis, B.G.K.; investigation, B.G.K.; resources, B.G.K.; data curation, B.G.K. and A.T.H.; writing—original draft preparation, B.G.K.; writing—review and editing, A.T.H. and E.B.H.; visualization, A.T.H.; supervision, Zs.J.V. and Z.Z.; project administration, Zs.J.V. and Z.Z.; funding acquisition, Zs.J.V. and Z.Z. All authors have read and agreed to the published version of the manuscript.

9-2- Data Availability Statement

Data sharing is not applicable to this article.

9-3- Funding

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9-4- Institutional Review Board Statement

Not applicable.

9-5- Informed Consent Statement

Not applicable.

9-6- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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