

## STRATEGIC CULTURAL VALENCES OF CORRUPTION BEHAVIOR IN ROMANIA. A EUROPEAN APPROACH

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### **Abstract**

*The present research is based on Romanian cultural anthropology and cultural European management in an attempt to investigate the strategic behaviors of corrupt business organizations. We use both statistical and network analysis with the objective being the detection of possible corruption strategies and corruption behaviors in the process of public procurement. Based on cultural parameters and network measurements, and by using strategic intelligence, which can provide us signals about possible small or grand corruption, we detect circular strategies and hyper-cluster strategies of small and respective grand presumptive corruption at the level of quarterly networks (macro-networks), as well as specific strategic behaviors of the bid issuers and bid winners involved in the public procurement process in Romania (meso- and micro-networks). The overall aim of this paper is to explore the relationship between culture and corruption and to establish the cultural context of Romania concerning corruption. Then, by further network analysis, we detect the signals of corruption strategies and behaviors in the public procurement process. The limitations of our study are given by the use of perception indices for statistical measurements and the use of Big Data for the network analysis, as well as by the use of one-year data. Future research should imply the use of regional data for Romania to detect more specific corruption behaviors, as well as the use of public procurement data for individual sectors, to detect specific behaviors.*

### **Keywords**

*Corruption; corruption strategies; public procurement; cultural dimensions; network analysis; Romania.*

### **Introduction**

As corruption has become one of the business issues at the national and international levels, with the corrupt practices growing and wide-spreading, the strategic diagnosis of corruption behaviors becomes highly important for businesses.

This paper aims to explore the relationship between cultural dimensions and business corruption strategies among European Union countries, to establish the context of corruption and culture in Romania. This analysis is then expanded in the process of public procurement. By using network analysis, we intend to detect possible corruption behavior signals in the process of public procurement.

The relationship between culture and corruption is tested using Pearson correlation and multilinear regression, the variables being GLOBE cultural values and practices, and the

Corruption Perception Index (CPI). For the network analysis a large quantity of public data, which includes the contracts signed during 2019, is used. The data includes the public institution which opens the bid (bid issuer) and the big winner as the private business. The data is then analyzed using Gephi Software and both network and nodes level measures are calculated.

As in our study, the relationship between culture and business corruption strategies is tested through statistical measurements and network analysis, the premise of our study is that by using different measurements of corruption and corruption behaviors and perceptions, an in-depth diagnosis of specific business corruption behaviors in the process of public procurement can be conducted. With this, the study objective becomes the detection of corruption signals in public procurement networks in Romania, during the year of 2019.

The results provide an in-depth understanding of the influence of cultural dimensions on corruption as well as empirical support for a strategic diagnosis of business corruption in the context of the public procurement process, with practical implications for international and national policymakers as well as for business organizations.

## **Literature review**

The theoretical background of this research relies on corruption definitions and perceptions, cultural dimensions, and public procurement networks. Corruption can be considered the misuse of public power for personal gain (Rose – Ackerman, 2013). Corruption is often defined as the use of public power for a personal gain, including both a demand side, as being the public official, and a supply side, as being the business organization or the private individual (Rose – Ackerman, 2013). Cultural dimensions are a set of values and beliefs about what is desirable or not in a community, and a set of practices (formal or informal) to support these values (Javidan & House, 2001).

There is an agreement among literature review in considering the distinctive societal cultures as influencing various social phenomena (Hofstede, 1984; House, Javidan, Hanges, & Dorfman, 2002), as well as organizational studies, indicate a strong relationship between culture and personal behaviors (Rokeach, 1972; Hofstede, 2001). Cultural dimensions are influencing the individual's perception of some ethical situations (Scott, Saviour, & James, 1993); thus, national cultural dimensions may influence corruption practices and strategies.

Previous studies correlate national culture as an influencing factor that has some potential on explaining corruption (Husted, 1999; Park, 2003) as well as on investigating the relationship between cultural dimensions and corruption (Bontis, Bart, & Seleim, 2009). The studies in the area of culture are using Hofstede's cultural dataset on explaining different social phenomena. These studies assume that cultural values and practices are stable and generally applicable to any present-day situations (Husted, 1999; Davis & Ruhe, 2003; Myers & Tan, 2002). Bontis et al. (2009) investigate the relationship between culture and corruption using the GLOBE framework, providing empirical support in building a general theory of the culture perspective on corruption perception.

While measuring cultural dimensions the classification system introduced by Hofstede is proven to be valuable in understanding national culture, the present study uses the GLOBE framework on cultural dimensions (House, Hanges, Javidan, Dorfman and Gupta, 2004), as this framework focuses on both cultural practices and cultural values of nations, so is considered a more in-depth analysis of national culture. The GLOBE framework encompasses 9 dimensions, as being uncertainty avoidance, future orientation, power distance, institutional collectivism, human orientation, performance orientation, in-group collectivism, gender egalitarianism, and assertiveness.

According to House et al. (2002), beliefs are people's perceptions of how things *are done* in their countries and they become the reported practices. The same authors define values as people's aspirations about the way things *should be done*, these being the preferred practices. GLOBE cultural dimensions' measures for both, practices and values.

*Uncertainty avoidance* is the cultural dimension that describes how individuals in society respond to uncertain situations, being the extent to which society relies on norms and specific procedures to cover aspects of their life (House et al., 2002). *Future orientation* shows the degree to which a society encourages and rewards future-orientated behaviors (House et al., 2002). *Power distance* is the degree to which a society and its members react to the existence of authority and higher status in society. *Institutional collectivism* refers to the level in which individuals are encouraged to be part of the groups within organizations and societies (House et al., 2002). *Human orientation* indicates aspects as friendly, tolerant, harmonic, and sensitive societies (House et al., 2002). *Performance orientation* shows the degree to which a community encourages high standards, innovation, and overall performance (House et al., 2002). *Individual collectivism* refers to the overall gathering in small groups such as families and close friends in favor of large groups. *Gender egalitarianism* refers to those societies that pursue the minimization between females and males' roles in any aspect of life (House et al., 2004). *Assertiveness* indicates the extent to which a society encourages individuals to be assertive, measuring the degree to which societies are competitive versus modest and tender (Javidan & House, 2001).

As for the effect of these cultural dimensions and corruption, scholars argue that in high uncertainty avoidance cultures, a high bureaucracy level is present, and with this corruption may rise (Getz & Volkema, 2001). In cultures with a low score on future orientation, people are more focused on immediate decisions, corrupt practices being more likely to appear in these countries (Ashkanasy, Gupta, & Mayfield, 2004). Getz and Volkema (2001) imply that public officials may tend to believe that their social status brings personal privileges, therefore, corruption may be higher in societies with high scores on power distance. Nations with high scores on institutional collectivism encourage group interests over the individual's interests and desires, scholars evidence considering these nations as being less corrupt (House et al., 2002). Societies with a low score on human orientation are considered to be less corrupt, given the aspect that, human-oriented societies rely on personal relations and overall caring and compassion (Bontis et al., 2009). High-performance-oriented nations value those individuals and groups that achieve more results (Javidan, 2004), hence, higher scores on this dimension are supposed to promote lower levels of corruption (Bontis et al., 2009). In societies with high scores on individual collectivism, it is common to favor a family member or a close friend, therefore corruption may be encouraged to protect family or group

interests (Bontis et al., 2009). A few studies show that women tend to be less involved in bribery activities and corruption levels tend to decrease in countries where more women are involved in high political activities (Swamy, Knack, Lee, & Azfar, 2001; Dollar, Fisman, & Gatti, 2001), hence, countries with lower scores on gender egalitarianism could have a lower level of corruption. Societies with higher scores on assertiveness prefer a direct style of communication, they tend to value dominant behavior, characteristics which will encourage individuals to be against corrupt practices (Bontis et al., 2009).

Corruption is rarely singular, where it exists as a problem, it tends to capture large parts of the state administration (Søreide, 2002). When it comes to public procurement, Søreide (2002) argues on the need for further analysis of the involvement of the providers of goods and services in the propagation of corruption in public procurement contracts. The author's argument is also based on the already established hypothesis that, when a country has a higher level of corruption, its public procurement procedures may contribute to the corruption phenomenon (Søreide, 2002).

Previous research in the area of public-private partnerships and the public procurement process investigate various forms of state capture and business-government relationships using network analysis (Siemiatycki, 2011), state-business corruption relationships (Revees – Latour & Morselli, 2017) and also the use of network analysis in the cartels of public bids analysis (Gabardo & Lopes, 2014).

## **Research methodology**

The present study relies on both statistical and network analysis measurements to achieve the study objective. In the analysis of the public procurement mechanism, we use public data. This data encompasses the signed contracts between businesses and public institutions in the process of public tenders. The nodes of the networks are issuers of public procurement tenders and winners of those tenders, the links between these nodes being the public procurement contracts. The networks are analyzed for the year 2019 and separated for each quarter.

The quarterly networks (macro-networks) are then further analyzed by detecting the strongest connected networks and by using deep analysis and community detection algorithms we extract these nodes in new networks (meso and micro-networks). These new networks encompass the strongest communities in the quarterly networks, providing us with an extensive view and knowledge over the study phenomena, by the use of strategic intelligence. For this, we first eliminate the weakly connected components from each macro network, resulting in a meso-network. Then, by further deep analysis of the meso-network, we extract the micro-networks, which are the networks formed from the highest connected communities in the meso-networks.

Network analysis uses graph theory to construct networks, one important advantage of the usage of network analysis being given by the topological properties, which are universal (Barabási & Bonabeau, 2003). Networks analysis encompasses various measurements, both for the network overall and the nodes of the network. The measurements used in this study are connected components, average degree, average weighted degree, modularity, average path length, and network diameter.

*Connected components* indicator measures the total number of sub-groups in the network, the value of this measurement screening the number of isolated groups in a network whose nodes are only connected to other nodes in the same group, hence, a high number of a connected component leads to a more dispersed network (Bastian, Heyman, & Jacomy, 2009).

*Modularity* extracts the community structure of large networks, measuring the strength of the division of a specific network into communities or clusters (Blondel, Guillaume, Lambiotte, & Lefebvre, 2008). A high modularity class is an indicator of dense connections between nodes within communities and sparse connections between nodes in different communities, while a low modularity class means sparse connections between nodes within communities and dense connections between nodes in different communities. In other words, the higher the modularity class, the stronger the relations inside communities. This indicator has values between [0,1] (Albert & Barabási, 2002).

*Average path-length* measures the average number of steps needed for all the nodes in the network to reach each other's (Albert & Barabási, 2002). As higher the average path, as disperse the network is. *Degree* counts the number of the nodes that an actor is connected to, being the sum of the ties number in the network. *The average degree* measures the average of the degrees, in other words, it calculates the average connections of a node. *Network diameter* calculates the shortest distance between the furthestmost nodes (Albert & Barabási, 2002).

For the statistical analysis of the GLOBE dimensions, both values and practices were tested as the independent variable and the Corruption Perception Index (Transparency International, 2019) as the dependent variable, to test the relationship between cultural dimensions and corruption with a multiple linear regression and Pearson correlation. The EU analysis offers a better understanding of the regional context of the corruption presumptive behaviors.

GLOBE framework encompasses 9 dimensions, for societal values and practices. While the GLOBE framework uses a large amount of data and for most of the countries, at the EU level the dimensions are calculated in 17 countries. The list of countries can be seen in APPENDIX 1. For Germany, the GLOBE framework measures separately East Germany and West Germany. In this research, we calculate the average measurements between East and West Germany, and we use these values for Germany. Given the existence of GLOBE dimensions for the 17 countries, the CPI measurements for 2019 are then added to the model. The values for Romania in the GLOBE framework can be consulted in APPENDIX 2.

## Research findings

The GLOBE practices and values were tested alongside the CPI to detect the culture effect on corruption perception at the EU level. Table 1 presents the results in terms of culture and corruption correlations.

**Table 1. Correlation between Culture values and practices and CPI**

Culture values	CPI	Culture practices	CPI
Uncertainty Avoidance Values	-		
	0,804**	Uncertainty Avoidance Practices	0,918**
Future Orientation Values	-		
	0,464**	Future Orientation Practices	0,897**
Power Distance Values	-0,184	Power Distance Practices	-0,464
Institutional Collectivism Values	-	Institutional Collectivism Practices	0,753*
	0,424**		
Human Orientation Values	0,304	Human Orientation Practices	0,341*
Performance Orientation Values		Performance Orientation Practices	0,678**
	0,197		
In-group Collectivism Values	-		
	-0,097	In-group Collectivism Practices	0,615**
Gender Egalitarianism Values	0,266**	Gender Egalitarianism Practices	-0,310
Assertiveness Values	-0,375	Assertiveness Practices	-0,299
$R^2$	0,998	$R^2$	0,997
Adjusted R	0,870	Adjusted R	0,870

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$

Based on the results in Table 1, statistical tests reveal a negative and significant correlation between uncertainty avoidance values ( $p=0.005$ ), future orientation values ( $p=0.001$ ), institutional collectivism values ( $p=0.004$ ), power distance practices ( $p=0.004$ ), in-group collectivism practices ( $p=0.002$ ) and corruption. This means that a high score on these values leads to a lower level of CPI (high corruption).

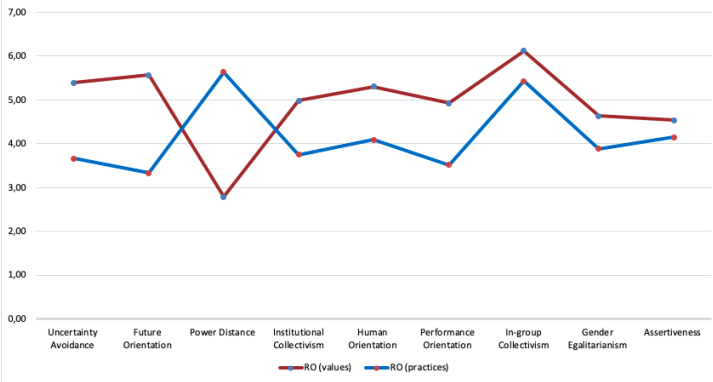
As for the uncertainty avoidance practices ( $p=0.001$ ), future orientation practices ( $p=0.002$ ), institutional collectivism practices ( $p=0.03$ ), human orientation practices ( $p=0.012$ ), performance orientation practices ( $p=0.006$ ), gender egalitarianism values the tests reveal a positive and significant relationship between the parameters which indicates that a high score on these cultural dimensions can be associated with a high score of CPI (low corruption).

Regarding human orientation values ( $p=0.251$ ) and performance orientation values ( $p=0.443$ ) the results reveal a positive and non-significant correlation with the CPI, an indication that possible changes in these cultural dimensions do not affect the corruption index. The results on testing power distance values ( $p=0.570$ ), gender egalitarianism practices ( $p=0.697$ ), assertiveness values ( $p=0.396$ ), and assertiveness practices ( $p=0.462$ ) in correlation to the corruption index are negative and non-significant, these dimensions, as well, having no tested effect on corruption levels. The correlation results are summarized in Table 2.

**Table 2. Correlations results summary**

Culture values and CPI correlation		Culture practices and CPI correlation	
Uncertainty Avoidance	<i>negative, significant</i>	Uncertainty Avoidance	<i>positive, significant</i>
Future Orientation	<i>negative, significant</i>	Future Orientation	<i>positive, significant</i>
Power Distance	<i>negative, non-significant</i>	Power Distance	<i>negative, significant</i>
Institutional Collectivism	<i>negative, significant</i>	Institutional Collectivism	<i>positive, significant</i>
Human Orientation	<i>positive, non-significant</i>	Human Orientation	<i>positive, significant</i>
Performance Orientation	<i>positive, non-significant</i>	Performance Orientation	<i>positive, significant</i>
In-group Collectivism	<i>negative, non-significant</i>	In-group Collectivism	<i>negative, significant</i>
Gender Egalitarianism	<i>positive, significant</i>	Gender Egalitarianism	<i>negative, non-significant</i>
Assertiveness	<i>negative, non-significant</i>	Assertiveness	<i>negative, non-significant</i>

In concern to Romania, in the GLOBE framework scores can be found significant differences between cultural values and practices, as emphasized in Fig. 1. An important difference regards the power distance dimension, where on values the score is high and on practices is low. This indicates that, in Romania, people tend to practice social class differentiation, but at the same time they have societal values that would indicate the opposite. Regarding the rest of the dimensions, the values score is higher than the practice score.



**Figure 1. Cultural values vs. cultural practices in Romania (GLOBE framework data)**

As for the correlation between power distance practices and the CPI, there is a negative and significant correlation, which indicates that the higher the power distance practices, the lower the CPI (higher corruption). These results offer a context diagnosis in terms of cultural dimensions and corruption in the EU and Romania reported at EU results.

The second part of the research includes network analysis and public procurement contract data. For each network, the calculated parameters are modularity and average

path length for the detection of dense and sparse networks; and connected components, network diameter, and average degree are calculated as support and control measurements. The measurements for the macro-networks are presented in Table 3.

**Table 3. Macro - Networks measurements**

		Modularity	Average Path Length	Connected components (weakly)	Network Diameter	Average Degree
<b>2019 network</b>		0,651	5,691	408	20	4,127
2019Q1	macro-network	0,773	5,691	583	20	2,304
2019Q2	macro-network	0,771	7,092	608	28	2,615
2019Q3	macro-network	0,770	6,767	602	19	2,782
2019Q4	macro-network	0,730	6,352	582	18	2,992

From the perspective of strategic diagnosis, the strategies detected within these networks are circular strategies of small presumptive corruption on the outside of macro-networks, and hyper-cluster strategies of grand presumptive corruption inside macro-networks. This diagnosis is based on (1) the cultural context of Romania which, following the correlation tests, promotes corruption and (2) the presumption in which, in high corrupt countries the public procurement process tends also to be corrupt. The macro-networks generated are attached in the Appendix 3.

Then, each quarterly network is deep analyzed and strong communities are extracted for an extensive view and analysis of the public procurement networks. This analysis has the purpose of detecting those hyper-cluster strategies as well as to perform a deep analysis of the actors (bid issuers and bid winners) behavior. The meso-networks and micro-networks are included in Appendix 4. For the first three quarters of 2019, we detected one micro-network for each macro-network, and for the fourth quarter, we detect two micro-networks. The measurements for the meso and micro-networks are presented in Table 4.

**Table 4. Meso- and Micro - Networks measurements**

		Modularity	Average Path Length	Connected components (weakly)	Network Diameter	Average Degree
<b>2019Q1 meso-network</b>		0,717	6,638	2	21	2,983
<b>2019Q2 meso-network</b>		0,734	7,006	4	23	3,209
<b>2019Q3 meso-network</b>		0,738	6,716	1	19	3,367
<b>2019Q4 meso-network</b>		0,702	6,300	1	17	3,546
2019Q1 micro-network		0,414	4,232	1	12	5,187
2019Q2 micro-network		0,550	4,440	1	12	5,788
2019Q3 micro-network		0,532	4,555	1	13	6,104
2019Q4 micro-network (1)		0,515	4,544	1	14	6,031
2019Q4 micro-network (2)		0,836	6,139	1	17	2,433

The results are emphasized in the following strategic matrix (Figure 2) in which we use the modularity and average path length networks measurements to classify the



networks, as well as to attempt a strategic diagnosis of the behaviors followed by the actors (issuers and bid winners) involved in public procurement contracts, based on network measurements.

The intervals in the matrix are determined by the above measurements (Table 3 and Table 4) and are classified as low, medium, and high. This matrix allows us to conduct a preliminary diagnosis of actors' behavior in the process of public procurement by detecting how dense or sparse the network is (determined by the modularity) and the average number of steps needed for all the nodes in the network to reach each other's (determined by the average path length).

Higher modularity determines a denser network and a higher value of average path length determines the need for more steps for an actor to reach another actor, usually being a sign of complex networks.

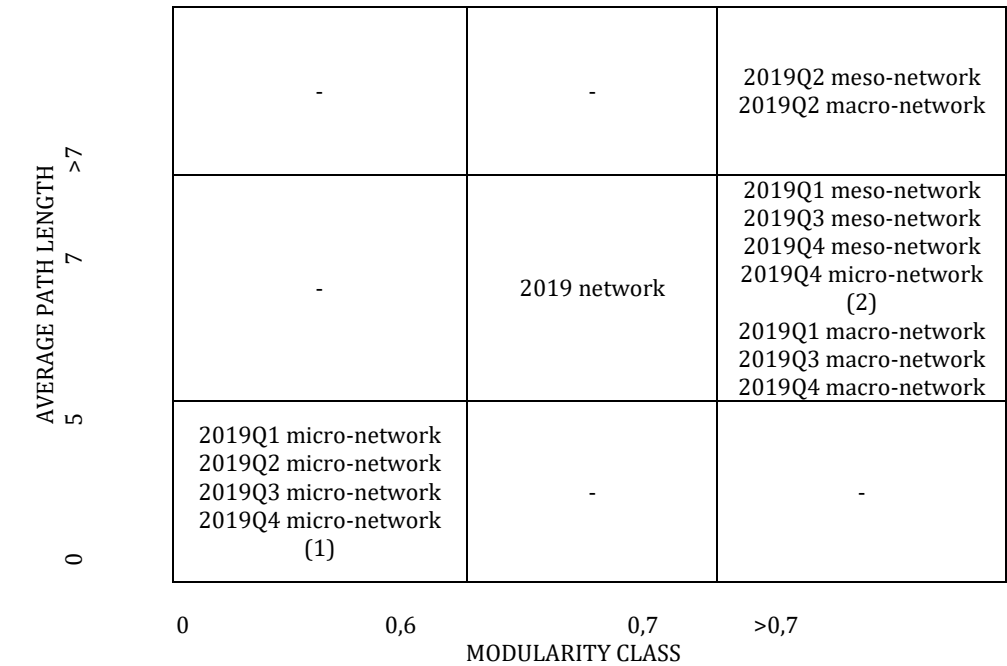


Figure 2. Diagnosis matrix of presumptive corruption strategies

Following the construction of the strategic diagnosis matrix, we can notice a certain behavior of the bid issuers and bid winners. The first category of networks is the ones with low modularity class and low average path length (the micro-networks in Q1, Q2, Q3, and Q4(1)), being sparse networks. In terms of strategic behavior diagnosis, we can see a need of the actors to reach fast for another actor in the network and to keep the network connections within communities rather than inside communities, this being a very weak signal of corruption behavior, as the contracts connections are sparse and bid issuers and bid winners connections are weak.

The second category of networks is the ones in the area of high modularity class and medium average path length (macro-networks: Q1, Q3, Q4; meso-networks: Q1, Q3, Q4;

micro-network Q4(2)). These networks have a high density and a node needs more steps to reach another node in the network. In terms of strategic behavior diagnosis, the actors in these networks have dense connections within their communities, this being a sign of multiple contacts between the same bid issuers and businesses over the period analyzed, being a signal of presumptive corruption behavior.

The third category of networks is the ones with high modularity class and high average path length (Q2 meso-network and Q2 macro-network). The characteristics of these networks show dense networks, but with the actors needing more than 7 steps to reach another node in the network. As for the strategic behavior diagnosis, these networks are formed of actors with high connections within their community, and while reaching another actor needs more steps in the network, the high modularity is still a sign of multiple contracts (connections) between the same bid issuers and businesses.

## Conclusions

The present study uses statistical analysis and network analysis measurements to detect possible signals of corruption strategic behaviors in the process of public procurement. We rely on the cultural context and on the premise that in high corrupt countries the public procurement contracts also tend to be corrupt.

The first part of the research offers an in-depth analysis of the correlation between cultural practices and values in EU countries. Following this analysis, we can observe the context of corruption and culture and we discover that high scores on certain values (uncertainty avoidance, future orientation, institutional collectivism) and practices (power distance, in-group collectivism) lead to higher corruption (among the analyzed EU countries).

Then, in the second part, we analyze the case of public procurement in Romania using network analysis and a strategic diagnosis matrix. We detect three categories of networks. In the first category (micro-networks in Q1, Q2, Q3, Q4(1)) we detect weak signals of corruption. Then, on the second one (macro-networks in Q1, Q3, Q4; meso-networks in Q1, Q3, Q4; micro-network Q4(2)), we detect signals of presumptive corruption behavior between bid issuers and bid winners. In the third category of networks (meso-network Q2 and macro-network Q2) we detect also a weak signal of corruption behavior.

Further research regarding different business sectors and regional data for Romania is needed to determine more specific networks. Regarding the present research, the missing areas in the matrix are explained by the use of data for only one year. Future research should also use more data to overcome research limitations. The distinctiveness of this research consists in involving both statistical and network measurements in the process of strategic diagnosis.

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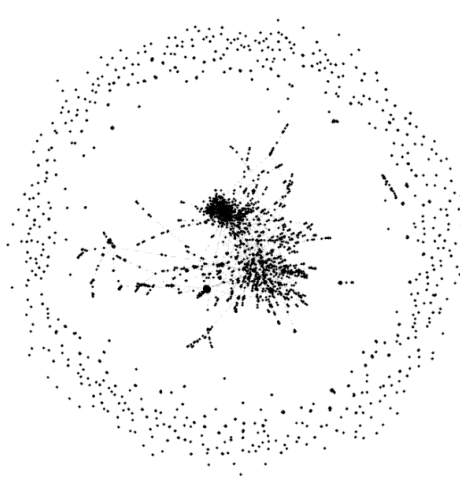
#### APPENDIX 1. Countries list used for culture and corruption correlation

Country	Culture Values	Culture Practices	CPI value
Austria	✓	✓	77
Czech Republic	✓	✓	56
Denmark	✓	✓	87
Finland	✓	✓	86
France	✓	✓	69
Germany	✓	✓	80
Greece	✓	✓	48
Hungary	✓	✓	44
Ireland	✓	✓	74
Italy	✓	✓	53
Netherlands	✓	✓	82
Poland	✓	✓	58
Portugal	✓	✓	62
Romania	✓	✓	44
Slovenia	✓	✓	60
Spain	✓	✓	62
Sweden	✓	✓	84

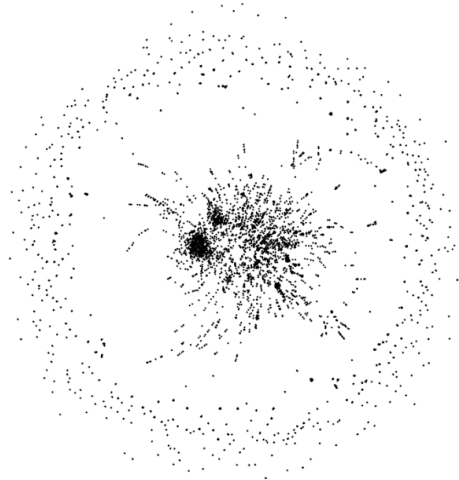
**APPENDIX 2. Romania’s cultural values and practices resulted in the GLOBE framework**

	Cultural values	Cultural practices
Uncertainty Avoidance	5,39	3,66
Future Orientation	5,56	3,33
Power Distance	2,78	5,63
Institutional Collectivism	4,98	3,75
Humane Orientation	5,30	4,09
Performance Orientation	4,93	3,51
In-group Collectivism	6,12	5,43
Gender Egalitarianism	4,63	3,88
Assertiveness	4,53	4,14

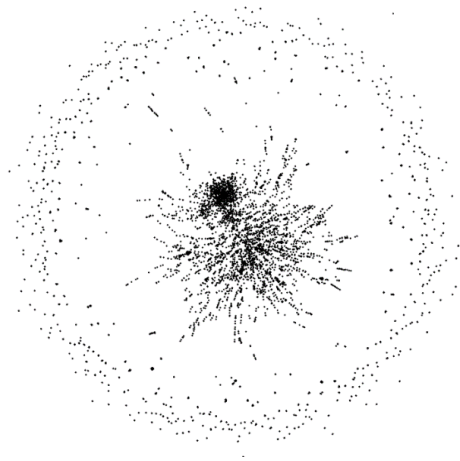
**APPENDIX 3. Macro-networks**



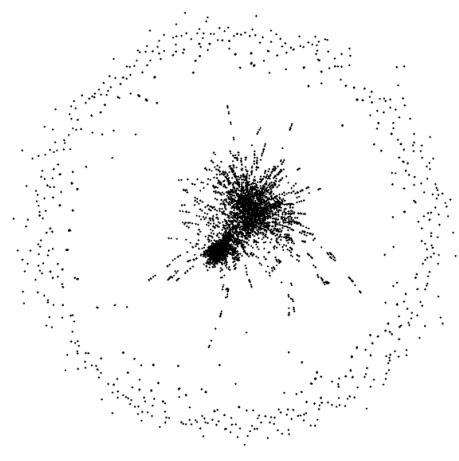
2019Q1 macro-network



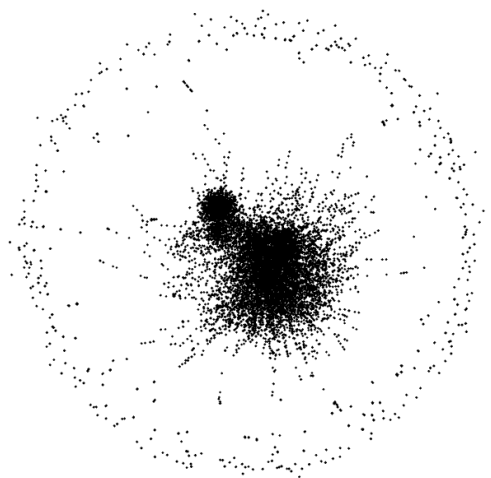
2019Q2 macro-network



2019Q3 macro-network

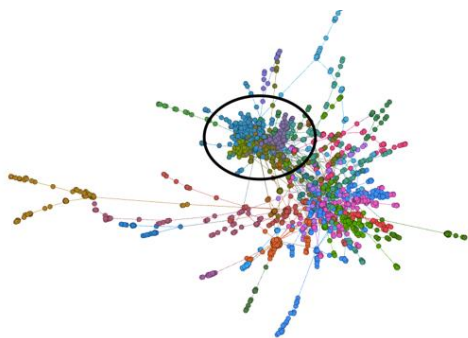


2019Q4 macro-network

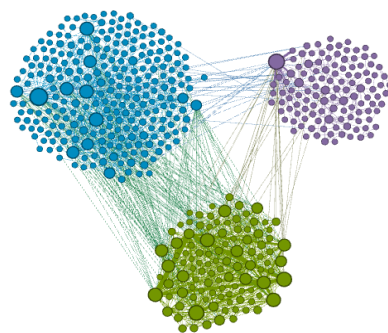


2019 yearly macro-network

#### APPENDIX 4. Meso and micro-networks



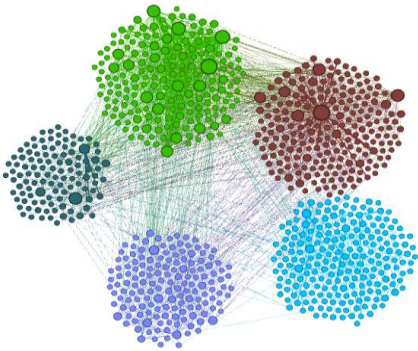
*meso-network Q1*



*micro-network Q1*



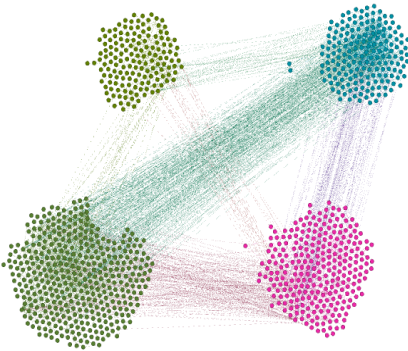
*meso-network Q2*



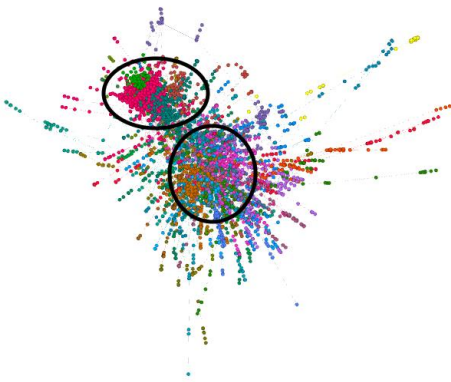
*micro-network Q2*



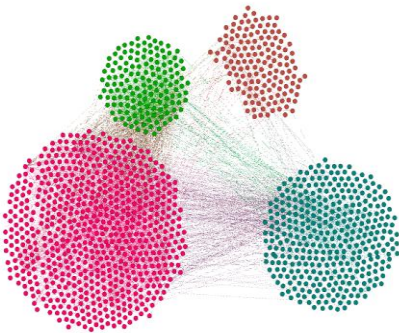
*meso-network Q3*



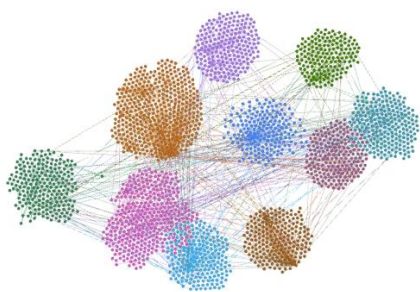
*micro-network Q3*



*meso-network Q4*



*micro-network Q4 (1)*



*micro-network Q4 (2)*