



FACTORS INFLUENCING CORRUPTION MEASUREMENT IN LITHUANIA

Ligita Gasparėnienė, Greta Gagytė, Rita Remeikienė

Mykolas Romeris University

Abstract

Corruption is one of the oldest human problems that poses a serious threat to the process of economic growth. Corruption in recent decades has been highlighted in many studies. Some corruption studies were focused on the decline of economic indicators, other studies have shown that corruption can increase economic efficiency. Later studies were performed using statistical analysis. The purpose of this article is to assess the level of corruption in Lithuania, identifying the main factors of the emergence of the shadow economy. Having analysed the level of corruption in Lithuania, it was found that in Lithuania between 1999 and 2016, the corruption perception index reached an average of 4.96 points, therefore, it can be argued that Lithuania faces large corruption problems and is not able to bring down corruption.

KEY WORDS: corruption, corruption perceptions index, Lithuania, Transparency International.

Introduction

Corruption is a phenomenon common to the society from old times, for which contemporary democratic states devote particular attention to efforts to prevent and control corruption. This is what concerns not only the states themselves, but also international organizations such as the World Bank, the United Nations, and others. However, even with these anti-corruption initiatives, this phenomenon remains one of the most pressing problems (Kaušlyaitė, 2009).

According to Buinickienė (2017) the phenomenon of corruption is very widespread in the world and in Lithuania, and its consequences seriously damage the state and its citizens financial, legal, social, moral and other aspects.

In Lithuania, like in many other countries, corruption exists as a problem, and its quantity is difficult to predict. An official, legal proof of the existence of corruption is an official, according to separate articles of the law (including corruption), statistics of recorded and identified crimes, as well as analysis of convictions handed down in courts, following a criminal investigation into such criminal cases (Jagėla, 2005). Corruption undermines good management and the rule of law, which adversely affects the quality and effectiveness of services and jeopardizes the principles of democracy, justice and economy. Parties capable of controlling corruption can make more efficient use of their human and financial resources, attract more foreign and domestic investment and accelerate growth.

Successful anti-corruption efforts are often accompanied by a "related coalition"- politicians and senior government officials, the private sector, citizens, communities and civil society organizations. Increasingly, tackling corruption will require a

coordinated focus on governments and businesses and the use of advanced technologies to collect analyse and exchange information to prevent, detect and sanction corrupt practices. Most of the world's largest corrupt practices could not happen without the wealthy state institutions: private-sector enterprises that provide large bribes, financial institutions that receive money, and lawyers and accountants who facilitate corrupt transactions. Data on international financial flows shows that money is being transferred from the poor to rich countries in such a way as to be detrimental to development. Corruption is a global problem requiring global solutions (The World Bank Anti-Corruption Report, 2017).

The **problem** of this article is: why is it important to assess the main factors of corruption and to anticipate the prospects for their reduction?

The main aim of the article is to evaluate factors influencing corruption measurement in Lithuania.

Tasks:

1. To present the most important corruption theoretical aspects.
2. To prepare corruption assessment methodology.
3. To carry out an assessment of corruption in Lithuania based on the main indicators of corruption assessment.
4. Identify the relationship between components of the offenses of a corruptive nature: (bribery, abuse, subornation, trade impact, fraud and legalization of money or property acquired through criminal activity), based on the model of multiple linear regression.

Research methods:

1. Analysis, systematization and generalization of scientific literature sources.
2. Comparative analysis of statistical data.

3. Traditional methods of research, such as data comparison, grouping, analysis and graphical presentation of information.

4. Statistical methods: graphical representation of data, analysis.

Literature review

The concept of corruption is derived from the Latin word "corruption", which means damage, bribe. International word dictionary (1985) provides the following definition of corruption: corruption is the use of official rights for profit purposes, the bribe of an official or political actor. Another International Words Dictionary (1999) extends the interpretation of corruption and states that corruption is the taking of bribes by an official or political actor of a state institution for the performance of his duties or for violation of the law in order to benefit himself or herself from mutual benefits, bribery.

According to Gavelis (2006), corruption is an extremely difficult social phenomenon. This problem is being addressed by specialists from various fields—lawyers, economists, psychologists, mathematicians and others. Nevertheless, the cause and effect of corruption are unavailable, and the problems raised by it are only rising. This could be explained by the fact that corrupt relations can transform very quickly and gain new forms of expression, which requires time and effort to be determined. Gavelis (2006) also emphasizes that corruption is a symptom that indicates that something has failed in the state management mechanism, and part of civil servants and officials use their official powers to satisfy unwarranted interests and to suppress the functions of competition. This interferes with full manifestation of market elements (such as demand, supply, price, costs and profit). The high rates of corruption cause disruption of demand and supply, which reduces the pace of economic growth and causes stagnation. All of this suggests that research into the impact of corruption on the economy needs to be expanded, since it provides an effective framework for preventing and controlling corruption. Corruption is not just a problem for underdeveloped countries. Its impact on the economy and society is increasing. The devastating impact of corruption on the social and political development of countries is nowhere inevitable; it is equally thriving in both rich and poor countries. The weakest and poorest classes of social society suffer most from corruption. The impact of corruption began to be studied in more detail in the 20th century. Initially, the focus is on the causes of corruption, and then it was aimed at figuring out how corruption affects the economy.

According to Special Investigation Service of the Republic of Lithuania the definition of corruption is indicated as corruption, direct or indirect aspiration, demand or acceptance of property or other personal benefits (gifts, services, promises, privileges) by a public servant or equivalent person to himself or another person for performance or failure to act in accordance with current duties, as well as acts or failures of a public servant or equivalent, in order to require the property or

other personal gain for the benefit of himself or another person, or the direct or indirect offering or award of a civil servant, or other personal benefits (gifts, services, promises, privileges) for performance or non-performance of acts in the capacity of a civil servant or equivalent person, as well as mediation in the conduct referred to in this paragraph.

In 2012 Special Investigation Service of the Republic of Lithuania in The activity report distinguishes the following offenses of a corruptive nature:

1. Bribery;
2. Trade impact;
3. Subornation;
4. Other criminal offenses if committed in the public administration or in the provision of public services for the benefit of themselves or others:
 - 4.1. Abuse of official position;
 - 4.2. Excessive powers;
 - 4.3. Misuse of official authority;
 - 4.4. Falsification of documents or instruments;
 - 4.5. Fraud;
 - 4.6. Asset misappropriation or Wasting;
 - 4.7. Disclosure of professional secrecy;
 - 4.8. Providing Incorrect Income, Profit, or Property Data;
 - 4.9. Legalization of money or property acquired through criminal activity;
 - 4.10. Interference with the activities of a public servant or a person performing public administration functions or other criminal acts, when such acts are committed or demanded for bribery, or to conceal or disguise bribery. The public opinion and market research centre "Vilmorus" conducted a sociological survey "The Lithuanian Corruption Map 2016", initiated by the Special Investigation Service of the Republic of Lithuania in 2016, which identified highly corrupt institutions in Lithuania, such as: Lithuania's „Seimas“, parties, courts, government, city and district municipalities, police, ministries. For all these corruptive acts listed below, the responsibility of the Criminal Code of the Republic of Lithuania is at risk.

Regarding the links between corruption and the shadow economy, in theory, corruption and the shadow economy can complement each other or even be a substitute for each other. Choi and Thum (2005) provide an example where corrupt government officials need to reduce the need for bribes if companies manage to operate in a shadow economy rather than in the formal marketplace. Dreher et al. (2009) has expanded the model to a clear institutional quality specification. This model shows that corruption and the shadow economy are substitutes because the existence of a shadow economy reduces the tendency of officials to demand bribes. Johnson et al. (1998) on the contrary other authors, have added a pattern of corruption and a shadow economy. In their full employment model, the workforce can be used in the official sector or in the shadow business. And this means that shadow economy growth always diminishes the size of the official market. Under this model, corruption increases the shadow economy, since corruption can be seen as one particular form of taxation and regulation. According to Hibbs and Piculescu (2005) corrupt bureaucrats can ignore informal production in

exchange for bribes, and corruption increases the size of the illegal activity sector. Hindriks et al. (1999) also argues that the shadow economy is complementary to corruption. This is because, in this case, the taxpayer cooperates with tax inspectors secretly, so the inspector does not take tax payers into account in exchange for a bribe. According to Kiyak et.al. (2013) in countries where the shadow economy holds a large share of the market, there is an additional impact of corruption, which can be partly attributed to the inherent features of the political-economic system and the mentality of society.

Regarding the prevalence of corruption in the world, it is distributed in almost all countries of the world, but some countries in the world are more corrupt than others. Corruption and economic disturbance often take place in parallel. In many countries of the world, corruption plays an important role in promoting escalating poverty and weak economic systems. Often this phenomenon is the ability of the people to function.

In theory, the relationship between corruption and the shadow economy is unresolved. However, there are reasons to believe that the ratio may differ between high and low income countries. In countries with high incomes, the official sector provides residents with public services that are a state under the rule of law, as well as contract enforcement and police protection. Typically, only certain employees or very small businesses choose to operate illegally. In this case, the shadow economy is hiding from tax inspectors and other officials. In other words, bribes are not necessary for the benefit of the official sector. High-income countries - usually showing a relatively low level of corruption - individuals who are confronted with corrupt state officials have the right to go to court. In addition, in high-income countries, the bribery of officials seeking to obtain large and profitable public projects (such as the construction sector) that are considered official and generates millions of dollars in profits. In other words, corruption in high-income countries can be a means of reaching certain beneficial agreements or projects that make work easier in the formal economy, for example, an enterprise obtains a permit for large construction projects by winning a public project, avoiding operating taxes. Schneider and Enste (2000) point out that even two thirds of the revenue earned by the shadow economy is spent in the official sector.

Meanwhile, in the low-income countries, the situation is the opposite, when there is anticipated the dominance of different mechanisms. Instead of working in the official sector and offering additional metropolitan services in high-income countries, companies are fully engaged in shadow activities. For example, most illegally operating businesses are restaurants, bars, hairdressers, and sometimes even larger manufacturing companies. According to Statkienė and Granickas (2017) illegal work is an act, which negative consequences are a failure to pay taxes to the state budget and obligations arising from a failure to implement legal contract relationships with employees and the state, as a consequence it violates legitimate interests of employees, the state and society as a whole. One of the possible reasons for this is the public goods offered by the official sector in many developing countries are less effective compared to high-income

countries. Large companies often try to bribe in order to avoid taxes and penalties for hiding them, thus increasing corruption. Corruption allows us to avoid liability and fines for unlawfully carried out economic activities. In this case, the shadow economy and corruption are mutually reinforcing, since corruption is necessary in order to expand the shadow economic activity, from which development is an integral part of bribes. In order to receive additional income from shadow economy executing entrepreneurs, public officials request bribes to benefit from the shadow market. Low-income countries are expected to have a positive (complementary) link between corruption and the shadow economy, according to Choi and Thum (2005), Dreher et al. (2009).

According to Kiyak et.al. (2013) low-income countries are more sensitive to tax and regulatory increases, inefficiencies of institutions and manifestations of corruption in political and economic activities.

Methodology

Corruption and the shadow economy are two inseparable significant social-economic phenomena. However, it is to be emphasized that the phenomena of corruption and the shadow economy are considered separately, without interconnecting these phenomena, while examining their impact on other economic and non-economic phenomena. In practice, the main indices of corruption perception assessment are distinguished:

1. *ICRG* index;
2. *IMD* index;
3. Transparency International corruption perception index.

Corruption Perceptions Index (CPI) is a derived indicator that allows countries to be classified according to perceived corruption prevalence among public sector employees and politicians. The international organization „Transparency International“ conducts business surveys and other expert studies each year to find out how corruption is understood in each country. Foreign, local experts, correspondents and business leaders take part in these surveys. Transparency International's annual publication of the Corruption Perceptions Index by the International Organization „Transparency international“ divides the world's nations into the perception of how corruption is widespread among public sector employees and politicians. Table 1 shows Transparency International's Corruption Perception Index Survey Sources.

Table 1. Corruption perception index survey sources

SOURCE	SURVEY RESPONDENTS
1. Bertelsmann Foundation. Bertelsmann Transformation Index. 2010	Experts and correspondents inside and outside the organization
2. Economist Intelligence Unit. Country Risk Service and Country Forecast. 2009	Experts

3. Freedom House. Nations in Transit. 2009	Experts living in or from the country under investigation
4. IMD, the Institute for Management Development, Lausanne, World Competitiveness Yearbook. 2008	Top and Middle-level local and international business companies
5. IMD, the Institute for Management Development, Lausanne, World Competitiveness Yearbook. 2009	Top and Middle-level local and international business companies
6. World Economic Forum. Global Competitiveness Report. 2008	Experienced leaders of local and international business companies
7. World Economic Forum. Global Competitiveness Report. 2009	Top and Middle-level local and international business companies
8. Global Insight, formerly World Markets Research Centre. Country Risk Rating's. 2009	Experts

(Source: Transparency International)

Corruption Perceptions Index (CPI) is derived from experts and businessmen surveys. CPI is evaluated on a scale from 0 to 10, where 0 indicates a high level of corruption in the country, and 10 is practically absent in the country of corruption.

In order to determine which of the corruptive nature of the criminal acts: bribery, abuse, subornation, trade impact, fraud and legalization of money or property acquired through criminal activity has a major impact on the model of multiple linear regression (MLR) for the corruption. Also, the linear multi-regression model will be used to determine which of the corruptive nature of the criminal acts on the corruption.

According to Bagdonas (2009), the model of linear regression is a generalization of one variable linear regression model in which there are more than one variable.

Hypothesis. Higher level of subornation are associated with a higher level of corruption.

To determine the relationship between variables, first need to select the appropriate variables. To determine whether there is a linear regression analysis between the corruption and corruptive nature of the criminal acts: bribery, abuse, subornation, trade impact, fraud and legalization of money or property acquired through criminal activity. Will be estimated regression model according to the following criteria:

1. **The coefficient of determination R^2 .** This coefficient is the most important characteristic of the linear regression model for prediction data, which is mandatory in all regression model descriptions. The determination coefficient compares the differences between the Y values when taking into account the regression model, with the differences between the Y values when the model is not taken into account. A very approximate interpretation of R^2 , which helps to understand its meaning, is as follows: how many percent of Y behaviour explains the behaviour of variables X.

2. **ANOVA p-value.** When calculating the multiple linear regression (MLR) among variables based on p (Significance F), the hypothesis must be tested:

Hypothesis H_0 is rejected, if $p < \alpha$. α in this case, the materiality level chosen is 0,05.

Hypothesis H_0 is not rejected, if $p > \alpha$. In this case, the null hypothesis is rejected, which means that the regression model is inappropriate.

3. Regression coefficients and their significance. The Pearson correlation coefficient will be used to determine the relationship between the selected dependent and independent variables. When calculating the relationship between variables, the values obtained are estimated: the correlation coefficient, or -1, the stronger the negative connection bound to the variables, the more this coefficient is closer to 1, the stronger the positive relationship immediately connects the variables.

4. Record linear regression equation.

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_jx_j$$

Where: y - is the dependent variable,

x - is the explanatory variable,

a - is the intercept,

b - is the slope of the line.

According to Čekanavicius and Murauskas (2014), a good regression model is that the determination coefficient R^2 is greater than or equal to 0.20 and the ANOVA p value is lower than the chosen level of significance, which is chosen in this study 0.05.

Corruption Perception Index Analysis

Regarding corruption, one of its most important indicators is the Corruption Perception Index. The Corruption Perception Index (later-CPI) is a complex indicator that allows countries to be ranked according to their level of corruption assessment. This index shows how governments succeed in controlling corruption in the public and policy sectors. CPI score scale is 0 to 10. Ten points mean that the state is extremely "transparent" and corruption does not exist in practice. Countries with a CPI of no more than 5 points are considered to face major corruption problems and fail to stop corruption.

Meanwhile, 0 means that there is a high level of corruption in the state. Figure 1 shows the change in the Lithuanian Corruption Index in 1999 - 2016.

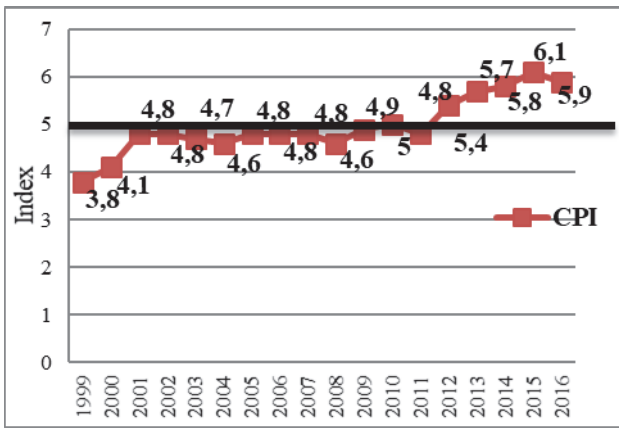


Fig. 1. Lithuanian Corruption Perceptions Index for 1999-2016
(Source: Transparency International)

The picture shows that during the whole analysis period, the lowest CPI in Lithuania was in 1999-2000 and correspondingly stood at 3.8 - 4.1 points. Since 2001 by 2010, CPI have changed very slightly: 2001 - 2002 was stable and reached 4.8 points, 2003-2004 slightly decreased to 4.7 and 4.6 points. Since 2005 The Lithuanian CI rose to 4.8 points and remained until 2008. 2001 to 2015 the increase in the Lithuanian CPI is noticeable, which means that the level of corruption in the country has been decreasing and the country's economy has been "transparent". 2015 According to the CPI study, Lithuania has achieved the highest ever rating.

In comparison, Figure 2 shows the change of the other two Baltic States - Latvia and Estonia in the CPI 2012 - 2016. It is advisable to compare the Corruption Perceptions Index of these 3 countries, as these are young states who have regained independence less than a decade ago. During the entire period of independence, Lithuania, Latvia and Estonia experienced a lot of instability, ranging from growth to a sharp fall in 2008, which was due to objective reasons - the global financial crisis that began.

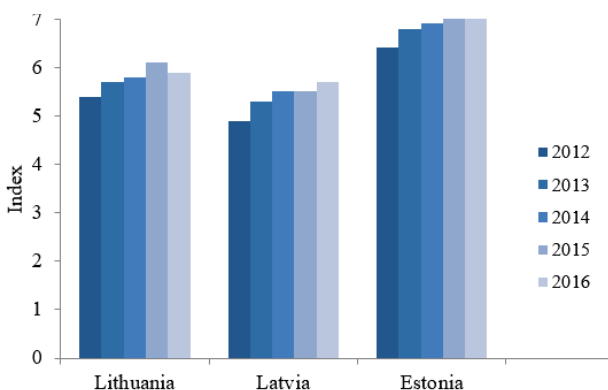


Fig. 2. The change of the perception index of the Baltic States in 2012-2016.
(Source: Transparency International)

Based on the picture above, we can see that in the whole analysed period, the highest CPI indicator was in Estonia. Every year from 2012 by 2015 the indicator

increased from 6.4 to 7. 2016 CPI remained stable and reached 7 as of 2015.

As for Latvia in 2012-2014 The CPI indicator is growing every year: in 2012 it reached 4.9 and in 2014 has grown to 5.5. 2015 the indicator remained stable, but in 2016 the indicator rose to 5.7.

The CPI indicator in Lithuania has been growing like in Latvia since 2012 till 2015 However, in 2016 the indicator slightly decreased compared to 2015 and amounted to 5.9. Based on „Transparency International“2012-2016 survey in the three Baltic States, Estonia has the lowest level of corruption, followed by Lithuania, and followed by Latvia.

Table 2. Lithuania's place in the region according to the corruption awareness index for 2007-2016 between the European Union and other Western European countries

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Lithuania's place in region	25	27	23	No information	22	23	20	20	15	16

(Source: Transparency International)

In Table 2 below, we can see what place Lithuania occupies in 2007-2016 according to the Corruption Perceptions Index compared to the European Union and other Western European countries, are ranked in total by 30 countries. The lowest ratings for CPI in Lithuania are from 2007 to 2008, when Lithuania ranked 25-27 out of 30 countries. 2011-2012 Lithuania was ranked 22-23 by the CPI, while in 2013-2014, remained at 20th place. According to the submitted table, Lithuania occupied the highest place in 2015. - 15th place, and 2016 16th place It can be assumed that in recent years, Lithuania has the lowest level of corruption during the 10-year period analysed.

Figure 3 shows the number of registered criminal offenses in the public service and in the public interest.

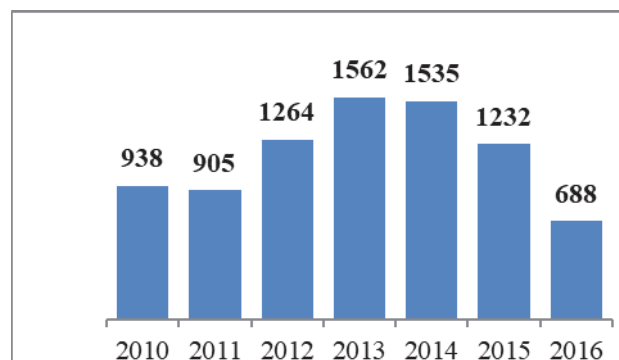


Fig. 3. Statistics on registered criminal offenses for the civil service and public interests
(Source: concluded on the basis of data of the Prosecutor's Office of the Republic of Lithuania)

Based on the data presented in Figure 3, in 2010, In Lithuania, 938 criminal offenses were registered to civil service and to public interest. 2011 this number has fallen by almost 4% and amounted to 905. In 2012 the number of criminal offenses to the public service and public

interests increased significantly to 1264, which is almost 40% more than in 2011 2013. The number of registered criminal offenses for the civil service and public interests was the highest during the whole analysis period and reached 1562, which is almost 24% more than in 2012. From 2014 the number of registered criminal offenses for the civil service and public interests declined annually. 2015 compared to 2014 this number has already dropped by almost 20% and reached 1232. Meanwhile, in 2016 the number of registered criminal offenses for the civil service and public interests was the lowest during the entire period under consideration, and amounted to just 688, which is almost 45% less than 2015.

The Special Investigation Service of the Republic of Lithuania presented a study "Map of Lithuania's Corruption 2016". The results of this study are presented in Figure 4.

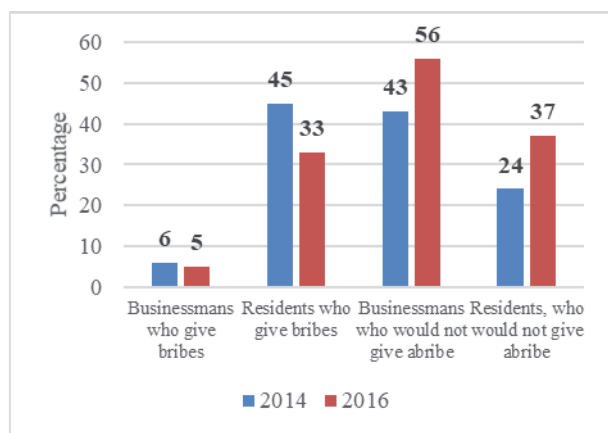


Fig. 4. Lithuanian Corruption Map in 2016 (Source: concluded on the basis of data of the Prosecutor's Office of the Republic of Lithuania)

According to Fig. 4, we see that in 2016, as many as 13% of the population said they would not bribe in order to solve certain problems and to benefit themselves. It also increased significantly in 2016 compared to 2014 entrepreneurs who say they would not give a bribe. 2016 as compared with 2014, the percentage of people who gave bribes decreased, in 2014 it reached 45%, and in 2016 already 33%. According to the survey data, the percentage of entrepreneurs who gave bribes remained almost the same: in 2014, amounted to 6% and in 2016 5 percent. Summarizing the results of the investigation of the 2016 Lithuanian Corruption Map, it can be stated that in 2016, in Lithuania, the situation among the population and businessmen who have given a bribe has decreased compared to 2014.

Research company „Transparency International” announced a report on „World Corruption Barometer 2016”: Europe and Central Asia. This report reveals some positive changes in Lithuania's corrupt situation. For example, the report states that in Lithuania in 2013, compared with 2016 the population dropped by almost four times (from 23% to 6%), who have faced a bribe when encountered with traffic police. There is also a decrease in the number of people who have given bribes in health care institutions (from 35% to 24%). According to the report of the World Corruption Barometer 2016, in Lithuania only 7% of the informal tax has been reported

to the relevant institutions by a civil servant or equivalent person, and one of the main reasons preventing the population from reporting more intensively about corruption is the fear of consequences. The positive trends of the conducted social studies suggest that the decrease in the number of corruption-related criminal acts in Lithuania is largely due to preventive activities carried out - various social advertising campaigns, anti-corruption education programs, etc.).

In order to determine which of the corruptive nature of the criminal acts: bribery, abuse, subornation, trade impact, fraud and legalization of money or property acquired through criminal activity has a major impact on the model of multiple linear regression (MLR) for the corruption. In order to determine the relationship between corruptive nature of the criminal acts and the selected variables, the Pearson correlation coefficient was calculated. The Pearson correlation coefficient allows one to determine the different variables (strong, weak, positive and negative). Regression analysis allows one variable to be predicted for another variable. Table 3 provides a correlation analysis of the variables of the corruptive nature of the criminal acts.

Table 3. Correlation analysis of the corruptive nature of the criminal acts

	Corruption	Bribery	Abuse	Subornation	Trade impact	Fraud	Legalization of money or property acquired through criminal activity
Corruption	1						
Bribery	0,857	1					
Abuse	0,515	0,034	1				
Subornation	0,844	0,967	-0,021	1			
Trade impact	0,919	0,948	0,297	0,868	1		
Fraud	0,449	0,137	0,862	-0,036	0,424	1	
Legalization of money or property acquired through criminal activity	0,374	0,526	-0,191	0,566	0,332	-0,190	1

(Source: own)

The Pearson Correlation Coefficient allows you to estimate the strength of the linear coupling between variables. How this factor is closer than 1, the linear relationship between variables is stronger. From the table 3 we see that strong positive correlation is between bribery and subornation, with a correlation coefficient of 0,967, also between bribery and trade impact with a correlation coefficient of 0,948 and trade impact and corruption with a correlation coefficient of 0,919.

Average linear positive correlation is between abuse and corruption with a correlation coefficient of 0,515 and between Legalization of money or property acquired through criminal activity and Subornation here correlation coefficient is 0,566. Weak linear positive correlation is between fraud and corruption with a correlation coefficient of 0,449, also between legalization of money or property acquired through criminal activity and corruption with a correlation coefficient of 0,374. Very weak linear positive correlation is between abuse and bribery with a correlation coefficient of 0,034 also between trade impact and abuse with a correlation coefficient of 0,297.

Hypothesis testing. After calculating the values of the suitability corruptive nature of the criminal acts variables, we obtained a Significance F value of 0, 007. α is the materiality level chosen in this case, which is equal to 0,05.

The following results were obtained after calculating the values. ANOVA: $F = 115,69$ and $p = 0,007$. Since $p < 0,05$, H_0 is rejected, due to the fact that there is a statistically significant linear relationship between the corruption and corruptive nature of the criminal acts.

Regression model evaluation. After checking the hypothesis, the determination coefficient R^2 is calculated. Determination coefficient shows the significance of the independent variable, in this case, of the corruption dependent variables - bribery, abuse, subornation, trade impact, fraud and legalization of money or property acquired through criminal activity. Table 4 presents a summary of the linear regression model indicators, which shows how the dependent variables explain the change in the independent variable.

Table 4. Summary of indicators of the linear regression model of the corruptive nature of the criminal acts (Source: own)

Regression Statistics	
Multiple R	0,999
R Square	0,998
Adjusted R Square	0,989
Standard Error	35,895
Observations	6

From the table below we can see that the calculated coefficient of determination is equal to 0,9989. The literature states that the higher the coefficient value, the model is better suited for the data. If $R^2 = 0,89$, one can assume that the model describes the data very well. In this case, the estimated $R^2 > 0,89$, therefore, it can be stated that the linear regression model is valid.

Figure 5 illustrates the linear regression of the three most influential factors for corruption: bribery, subornation and trade impact.

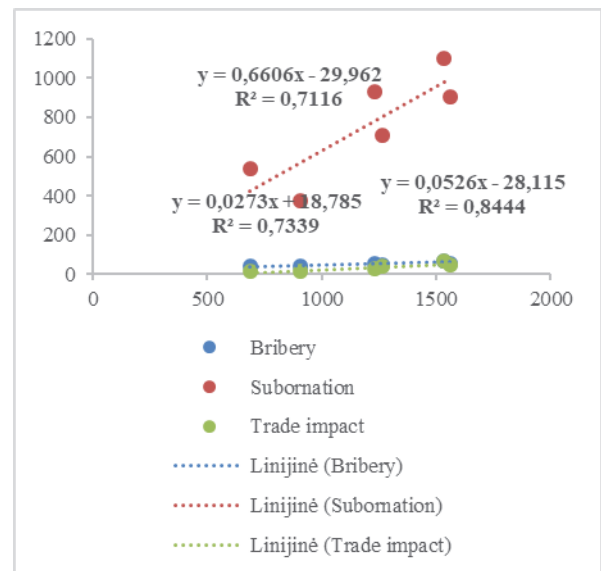


Fig. 5. Linear regression equations for corruptive nature of the criminal acts (Source: own)

Based on the linear regression equation for the equations for corruptive nature of the criminal acts, we can see that the regression equation can be applied to all variables, because determination coefficient R^2 is high, which means that bribery, subornation and trade impact affects corruption.

Discussion

Corrupt offenses are very diverse and sometimes difficult to identify. Corruption risk indicators are measured indirectly by assessing the most risk-prone areas of corruption: public procurement, supervision of companies and institutions controlled by the municipality, transparency, openness and accessibility of services, taking into account violations detected by the competent authorities and other discrepancies in legal norms and anti-corruption activities of the municipality. Corruption indicators can be assessed in two ways. First of all, these are objective data that show concrete corruptive facts and the level and prevalence of criminal acts in the self-government. However, knowing the latency of corruption-related crimes (only one case of corruption is detected in 100), one cannot categorically deny corruption phenomena, even if, during a certain period of time, there was no corruption in a municipality's territory.

Conclusion and recommendations

Having analysed the level of corruption in Lithuania, it was found that in Lithuania between 1999 and 2016, the corruption perception index reached an average of 4.96 points, therefore it can be argued that Lithuania faces large corruption problems and is not able to stop corruption. For comparison, the analysis of corruption in Latvia and Estonia in 2012-2016 has been carried out, which revealed that in Estonia the corruption perception

index in the study period averaged 6.82 points, while in Latvia it was 5.38.

According to the Corruption Perceptions Index calculated by „Transparency International“, it was noted that in Lithuania CPI average was 4.96 points, which means that Lithuania faces corruption and is not able to stop it. Special Investigation Service of the Republic of Lithuania is proposing a digitization of government procedures as a possible anti-corruption measure. This measure can be a very effective tool for both the possibility of corruption and the reduction of corruption itself. The key idea and driving force is that electronically supplied and fully automated public services can eliminate the key factors that create positive conditions for corruption to emerge.

Based on the correlation between components of the offenses of a corruptive nature: (bribery, abuse, subornation, trade impact, fraud and legalization of money or property acquired through criminal activity), strong linear positive correlation is between bribery and subornation, with a correlation coefficient of 0,967, also between bribery and trade impact with a correlation coefficient of 0,948 and trade impact and corruption with a correlation coefficient of 0,919. Average linear positive correlation is between abuse and corruption with a correlation coefficient of 0,515 and between Legalization of money or property acquired through criminal activity and Subornation here correlation coefficient is 0,566. Weak linear positive correlation is between fraud and corruption with a correlation coefficient of 0,449, also between legalization of money or property acquired through criminal activity and corruption with a correlation coefficient of 0,374. Very weak linear positive correlation is between abuse and bribery with a correlation coefficient of 0,034 also between trade impact and abuse with a correlation coefficient of 0,297.

References

- Bagdonas, E. (2009). Socialinė statistika. Pirmoji dalis. Metodai. Technologija, Kaunas.
- Buickienė, N. (2017). Causes of corruption and their management measures in the health care system of Lithuania. *Management Theory and Studies for Rural Business and Infrastructure Development* eISSN 2345-0355. Vol. 39. No. 2: 148–156.
- Choi, J. P., Thum, M. (2005). Corruption and the Shadow Economy. *International Economic Review*. Vol. 46, no. 3, 817–836, [revised 2018 03 12], <http://dx.doi.org/10.1111/j.1468-2354.2005.00347.x>.
- Čekanavičius, V., Murauskas, G. (2014). Taikomoji regresinė analizė socialiniuose moksluose. Vilniaus universiteto leidykla.
- Dreher, A., Kotsogiannis, C., and S. McCorrison (2009), How Do Institutions Affect Corruption and the Shadow Economy? *International Tax and Public Finance*, Springer, International Institute of Public Finance, vol. 16(6), 773–796.
- Gavelis, V. (2006). Corruption is an impediment to an objective mechanism of state action. *Economics and Management: Current Issues and Perspectives*, 2 (7). [revised 2018 12 12], [http://www.smf.su.lt/documents/konferencijos/Galvanaukas/2006/Leidinys%20\(7\)/Gavelis.pdf](http://www.smf.su.lt/documents/konferencijos/Galvanaukas/2006/Leidinys%20(7)/Gavelis.pdf).
- Hibbs, D. A., Piculescu, V. (2005). Institutions, Corruption and Tax Evasion in the Unofficial Economy. CEFOS and Department of Economics, Göteborg University.
- Hindriks, J., Muthoo, A., Keen, M. (1999). Corruption, extortion and evasion. *Journal of Public Economics*, 74, 395–430.
- International word dictionary (1985). The main edition of encyclopaedias, Vilnius.
- International world dictionary (1999). Dictionary, Vilnius.
- Jagėla, M. (2005), Criminological Analysis of Legal Basis of Corruption Prevention in Lithuania. Law and police activities master thesis. Supervisor Lect. A. Raudonienė. Vilnius: University of Mykolas Romeris, Department of Criminology.
- Johnson, S., Kaufmann, D., Lobaton, P.Z. (1998). Corruption, Public Finances and the Unofficial Economy. Draft paper for presentation at the ECLAC conference in Santiago, January 26-28.
- Kaušlyaitė, J. (2009). Problems of Corruption Prevention and Control in Lithuania. Supervisor Dr. J. Aleknavičienė. Vilnius University, Department of Sociology.
- Kiyak, D., Bružaitė, E., Labanauskaitė, D. (2013). Šešėlinės ekonomikos masto ir jį lemiančių priežasčių tarpusavio priklausomybės tyrimas Lietuvoje. *Vadyba/Journal of Management*, Vol. 22, No.1, 108-120.
- Prosecutor's Office of the Republic of Lithuania (2016). Annual activity reports. [revised 2018 03 08], <https://www.prokuraturos.lt/lt/administracine-informacija/planavimo-dokumentai-ataskaitos/ataskaitos/138>.
- Schneider, F., Enste, D. (2000). Shadow economies: size, causes, and consequences, *The Journal of Economic Literature* 38(1), 77–114.
- Special Investigation Service of the Republic of Lithuania (2012). Corrupt offenses. [revised 2018 03 14], <https://www.stt.lt/lt/praneskite-apie-korupcija/praneskite-apie-korupcija/korupcinio-pobudzio-nusikalstamos-veikos/>.
- Special Investigation Service of the Republic of Lithuania (2016). Lithuanian Corruption Map 2016. [revised 2018 11 12], <http://www.stt.lt/lt/menu/tyrimai-ir-analizes/>.
- Statkienė, S.; Granickas V. (2017). Administrative and criminal liability in the case of illegal employment. *Vadyba/Journal of Management*, Vol. 31, No.2, 142-150.
- The World Bank. Anti- Corruption Report (2017). [revised 2018 02 12], <http://www.worldbank.org/en/topic/governance/brief/anti-corruption>.
- Transparency International. Korupcijos suvokimo indeksas (2017). [revised 2018 12 18], <http://www.transparency.lt/korupcijos-suvokimo-indeksas-ksi/>.

RECEIVED: 27 October 2018

ACCEPTED: 5 June 2019

Ligita Gasparėnienė. Prof. Dr., Mykolas Romeris University. Ligita Gasparėnienė links her research fields to the analysis of macroeconomic phenomenon's, practical decisions of outsourcing and estimation of shadow economy. In 2009, she defended the doctoral thesis on the topic "The impact on transaction costs on outsourcing contracts" (the field of economics, social sciences). During the period of 2005–2015, the researcher has published over 40 scientific articles and issued two monographs titled "The methodology of the estimation of external service transaction costs" and "Estimation of financial investment and investment projects". The basic fields of her scientific work include transaction costs, shadow economy, real estate economy. Ligita Gasparėnienė participated in 3 chartered national projects and is currently involved in the scientific national (Lithuanian) project "Digital shadow economy" as the principal researcher. Email: ligita.gaspareniene@mruni.eu.

Rita Remeikienė. Assoc. Prof. Dr., Mykolas Romeris University. Rita Remeikienė has accumulated much scientific experience in the research of self-employment and business environment conditions in transition economies. In 2012, she defended the doctoral thesis on the topic "The factors of self-employment in transition economies" (the field of economics, social sciences), which won Lithuanian Science Council's award for the best research in the field social sciences. During her scientific career, Rita Remeikiene has prepared and published over 40 scientific articles (6 of which were included in ISI basic list issues; 7 – in ISI database referred issues; 14 – in international databases referred issues, etc.). The main topics of the research are linked to the issues of expansion of opportunities in the labour market, shadow economy, outsourcing, gender gaps, and entrepreneurship. Previously, Rita Remeikienė participated in 3 chartered national projects and led the study project "Nord Plus Horizontals". At present, she is leading the scientific national (Lithuanian) project "Digital shadow economy". Email: rita.remeikiene@mruni.eu.

Greta Gagytė. PhD student in Social Innovation Doctoral School, Faculty of Economics and Business, Institute of Economics, Mykolas Romeris University. Her scientific research is about shadow economy, corruption, taxes. Greta Gagytė has also got 2 Bachelor's Degrees. First one was Professional Bachelor of Accounting in University of Applied Sciences in Vilnius. Second was Bachelor of Economics in Financial Economics studies in Mykolas Romeris University. She has also got Master degree of Economics in Business System Economics studies in Mykolas Romeris University. Email: greta.gagyte@gmail.com.