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Pervasive impact of corruption on social system and economic growth

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Abstract

The research reveals the statistical dependencies between the corruption level and factors of social system. There have been employed the statistical methods for analysing the situation. The countries are divided according to the adopted social model; the detected dependencies vary in different models

The research has shown that countries with different social models present different dependence between corruption and other factors of social system. The importance of corruption for development of social system is supported by many other researches. The novelty of the research is division of countries according to adopted social model; the obtained results have supported this approach.

1. Introduction

Corruption is a world-spread issue attracting attention of government institutions, state and international organisations, people.

The goal of this research is to discover the impact of corruption on indicators of national economy growth and on social development indices; the indicators are grouped according to the social model adopted within the country.

For achieving the set goal it is necessary to consider the social models functioning in the European Union, to determine the factors of social models subjected to the corruption influence and to analyse the impact of corruption.

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The analysis is implemented with employment of qualitative content-analysis, methods of grouping, comparison, statistical analysis, correlation and regression analysis. The statistical data, provided by the European Statistical Office have been used for regression analysis (Eurostat, 2013). All government expenditures have been taken per capita (if not mentioned otherwise). There have been employed the data for 7 years (2005–2011). The empirical analysis in this article is based on the Corruption Perception Index (CPI) compiled by Transparency International (TI); the values are based on impressions of business people and risk analysts, as well as local population of corresponding country. CPI ranges from 0 to 10; 10 indicates the country practically clean from corruption; the lower the index value is, the more corrupted the country is (Transparency International).

In common sense corruption is defined as an abuse of public office power for private gains and benefits (World Bank, 2007). This very wide definition makes the problem of corruption very common for the countries with different ways of governance, different social models and different prospects, since all countries have the situation of opposing private interests and power of authority.

The danger of corruption is unambiguous, though there is an approach that corruption can facilitate and enhance the economy via catalysing and intensifying business and investments (Leff, N.H., 1964; Huntington, S.P., 1968; Friedrich, C., 1972; Nye, J.S., 1967). Nevertheless, people and governments realise the danger of corruption (Méon, P.G. & Sekkat, K., 2005). Corruption gives birth to corruption.

The origin of this serious problem lies in inefficient management, which gives rise to wrong public relations; the situation when the public relations are wrong creates new forms of corruption, facilitates the expanding area of implementation of existing forms of corruption, and gives rise to new problems in society. The defects of management give birth to new defects in society (Weder, B., 2002). People find themselves in institutional trap, in inefficient stable standard situation, having self-supporting nature. It is the situation when deviation from the standard behaviour prevailing in the society can result in worse position of rebel: without giving the bribe the person does not receive the benefit, and so on. If corruption exists at all levels of society, people percept it as a standard of behaviour. Corruption becomes the natural form of society existence, it gives the certain stereotypes to the behaviour of people, the cost of corruption is lower than the price of fighting it. As a result, many countries condemn the corruption in word, but can do nothing in fact.

2. Corruption and social sphere

There are numerous researchers developing the relationships between the corruption and economic indicators and processes, corruption and factors of human capital, corruption and culture issues. However there are practically no researches devoted to describing corruption in the terms of social models.

Corruption is mainly dangerous in such areas as security, police, army, fire protection, construction especially at national level, nursing, etc. It is obvious; however, these areas become the most susceptible to corruption. Corruption not only creates wrong stereotypes of people's behaviour but also forms the wrong economic relations violating the fundamental laws of economic development.

Since human capital and social models are in the centre of author's attention the paper covers the problems created by corruption in these areas. The areas of national economy connected with social system give most possibilities for corruption (Rogers, M., 2008; Blackburn, K., Bose, N. & Haque, M., 2006; Haque, M. & Knellar, R., 2007).

Such spheres as healthcare system and system of education, police, and construction present the clash of interest of population and officials in all countries; nevertheless, the level of corruption is different in all countries. It is impossible to determine the level of corruption according to the economic development of the country, for example, corruption in Uruguay is lower, than in France, and it is lower in Hungary than in Czech Republic or Turkey (Transparency International).

Considering the fact that the source of the most cases of corruption is social and economic spheres, it is possible to consider the issue of corruption from the point of view of Social model adopted within the country.

3. Corruption and its effects: literature review

The end of the 20th and the beginning of the 21st centuries were rich in empirical researches, investigating the impact of corruption on different spheres of human life and society.

A great deal of researches are not only devoted to corruption but also have different approaches to it. Leff N.H. (1964) and Friedrich, C. (1972) think that corruption can facilitate and enhance the economy via catalysing business and investments.

Nevertheless, the majority of researchers suppose corruption to cause immense problems to economy and society.

Vinod, H.D. (1999) studies the corruption using statistical data. According to his estimation corruption affects national economy and act of corruption of $1 imposes a $1.67 burden on the economy. The author considers the internet as a means of fighting the multiplication effect of corruption. Mo, P.H. (2001) also analyses the ways the corruption can influence the economy. His empirical study reveals that 1% of increase in estimated corruption level produces decrease of economy growth by 0.72%. Such researchers as Mauro, P. (1996, 2002), Leite, C. and Weideman, J. (1999), Tanzi, V. and Davoodi, H. (2000), Abed, G. and Davoodi, H. (2000) process the statistical data for proving that there are negative relations between the corruption and the economy growth demonstrated via the GDP per capita growth.

The researchers also investigate the impact of corruption on investment as a vehicle of economy development. These studies (Mauro, P. (1996), Ades, A. and Di Tella, R. (1997), Tanzi, V. and Davoodi, H. (1997)) reveal negative relations between these indicators. According to Wei, S. (2000), Drabek, Z. and Payne, W. (1999), Habib, M. and Zurawicki, L. (2001) the foreign investors suppose corruption to be the blocking factor for active investment activities.

Al-Marhubi, F.A. (2000) discoveres the positive relationship between corruption and inflation levels.

The real exchange rate also suffers with corruption acts; this fact was supported by Bahmani-Oskooee, M. and Nasir, A. (2002). Their investigation consideres 65 countries, and reveals the fact that the currency depreciation is the result of the high level of corruption within the country.

Abed, G. and Davoodi, H. (2000) show that the corruption increases income inequality: a one-standard deviation increase in the growth rate of corruption reduces income growth of the poor by 7.8 percentage points per year. Rose-Ackerman, S. (2008) argues that corruption also tends to distort the allocation of economic benefits leading to inequitable income distribution. Mauro, P. (2002) states that corruption level has direct effect on expenditures on health and education, reducing them significantly, since these projects offer few opportunities for rent seeking. Gupta, S., Davoodi, H. and Tiongson, E. (2000) show that corruption reduces the level of social spending fosters education inequality, causes unequal distribution of land.

However, Filmer, D. and Pritchett, L. (2001), Kaufmann, D., Kraay, A. and Mastruzzi, M. (2003) do not find any statistical validations that considerably increase in investments in healthcare have any significant influence on the indicators of population health.

Gupta, S. and Verhoeven, N. (2006) consider the probable significant dependence between increased investment in healthcare and population health indicators really exists, and these investments effectively decrease the child mortality and increase the life expectancy; the level of child mortality is lower in countries with a low level of corruption and a high level of administration quality, compared to the countries with low corruption rating.

Grekoff, I. (2013) explains these differences in the statistical analysis interpretation by the fact that there are different situations with corruption in different countries; different countries demonstrate different efficiency of government administration. The countries, investing in healthcare system directly, have better health indicators than other countries where government administration and investment management are not well established.

4. Interdependence of corruption and the factors of social systems

The goal of this research is determining the interdependence between the national economy development and corruption level, and between social indicators and corruption.

The statistical analysis, correlation and regression analysis is employed for determining the interdependent factors. The influence of corruption on the factors, significant for every model, has been examined.

4.1. Human Development Index (HDI)

Human capital has become the key factor of post-industrial economy, and it is the resource which mostly determines the position of the country in the innovative post-industrial world. Consequently, human capital is a determinant of social system and simultaneously it is pre-determined by it.

Measuring human capital is a difficult, complex, and ambiguous process. The Index of the Human Development Indicator (HDI) is used all over the world, and there is no doubt it is one of the major measures of the human capital development. Nevertheless the certain difficulties appeared in the process of employing this index in the investigation. The Reports on this index were always published with time lag of 2 years. So, in 2009 there was published the Report on HDI for year 2007, however, in year 2010 there was published not the Report for 2008, but the Report for year 2010, with simultaneous change of method of calculation of this index. Consequently, the indices for 2008 and 2009 were not published, and starting from 2010 this index is a brand new index. The old method assumed that HDI consists of 3 equal ranking components:

- *income*, determined by GDP at PPS in US$;
- *education*, determined by adult literacy indicator (with weight of 2/3) and gross enrolment index (with weight of 1/3);
- *length of life*, determined by Life expectancy.

For each of these indices the fixed minimal and maximum values have been determined:

- life expectancy – 25 and 85 years;
- adult literacy – 0% and 100%;
- gross enrolment – 0% and 100%;
- real GDP per capita at PPS in US$ – 100 and 40 thousand.

The indices are calculated according to:

$$\text{Index} = \frac{x_i - x_{min}}{x_{max} - x_{min}} \tag{1}$$

Income index is calculated differently in accordance with the diminishing marginal utility principle:

$$W(Y) = \frac{\log y_i - \log y_{min}}{\log y_{max} - \log y_{min}} \tag{2}$$

The final index is calculated as arithmetical mean of three indices.
According to new method the calculation is complicated by new components.
The following indices are used:
- Life expectancy index

$$LEI = \frac{LE - 20}{83.4 - 20} \tag{3}$$

- Education index

$$EI = \frac{\sqrt{MYSI * EYSI}}{0.951} \tag{4}$$

    o   Mean Years of Schooling Index

$$MYSI = \frac{MYS}{13.2} \qquad (5)$$

    o   Expected Years of Schooling Index

$$EYSI = \frac{EYS}{20.6} \qquad (6)$$

- Income Index (II)

$$II = \frac{\ln(GNIpc) - \ln(100)}{\ln(107.721) - \ln(100)} \qquad (7)$$

Finally, the HDI is a geometric mean of the previous three normalized indices:

$$HDI = \sqrt[3]{LEI * EI * II} \qquad (8)$$

The content of indices has also changed:

- LE: life expectancy at birth;
- MYS: Mean years of schooling (Years that a 25-year-old person or older has spent in schools);
- EYS: Expected years of schooling (Years that a 5-year-old child will spend with his education in his whole life);
- GNIpc: Gross national income at PPS per capita.

The above-described difficulties create the situation when processing the time series data becomes rather questionable. The research (Popova, Y., 2013a) offers the way of overcoming this difficulty, but this method is not quite appropriate for the current research; it is the reason for using the statistical data for years 1993–2007, before the method of index calculating was changed; other indices employed in comparison, correspond to the same time span.

4.2. Social models functioning in Europe

The society functioning within the state can be described with a special social model, showing the way how this process happens. Any social model has certain elements which can be mentioned in a flexible order: taxation, social insurance, public services, regulations (Holostova, Y., 2009).

Nowadays the European social models are classified in the following way:

- Scandinavian Model (or Nordic Model, or Social-Democratic Model, or Institutional Model), distributing the social benefits among all citizens of the country; its cardinal principle is egalitarianism;
- Anglo-Saxon Model (or Liberal Model, or Beveridge Model) distributes the social benefits among people who need this social support; there are rigid limitations for the benefits accessibility;
- Continental European Model (or Bismarck Model, or Conservative Model) states that the social support can be given to the people who have been presented on the Labour Market and who have some social funds;
- Mediterranean Model (or Subsidiary Model, or Catholic Model) assumes significant social support of aged people from the state and simultaneously dependence on person representation on the labour market (Gritsenko, N., 2002).

For the purposes of the research under consideration the European countries have been grouped in accordance with the type of the social models adopted in the certain society. The Scandinavian model is represented by such countries as Denmark, Iceland, Finland, Sweden, and Norway. Germany, France, Austria, Estonia, Lithuania, Poland and Latvia present the Continental model. The Liberal model is implemented only in two countries – the United Kingdom and Ireland, and Catholic or Mediterranean Model functions in three countries – Spain, Italy and Portugal.

Table 1 presents the Human Development Index (HDI), calculated as average values for all the countries representing the corresponding social model.

Table 1. Average values of HDI for the social models

Social Model	HDI average value
Scandinavian Model	0.963
Anglo-Saxon Model	0.956
Continental Model	0.911
Mediterranean Model	0.938

According to this indicator Scandinavian Model is the Model mostly facilitating the Human Capital development. Undoubtedly, this criterion is not sufficient enough basis for choosing this Model as a reference model for comparison of the regions. Nevertheless, all other indices (see Table 2), determining the level of development of different components of human capital, also demonstrate the advantage of Scandinavian Model. According to the Life Expectancy indicator the first place is taken by the Catholic Model; this fact is conditioned and explained rather by climate parameters and specific genetic peculiarities of the population of this region than by the level of medicine, education and living standards development. Table 2 shows the indicators average for the corresponding model.

Table 2. Values of indices of human capital

Model	Index					
	GEM[1]	Dem.Ind[2]	LE[3]	QL[4]	Ed.Ind.[5]	IEF[6]
Scandinavian Model	0.899	9.4	79.7	7.767	0.987	73.9
Continental Model	0.707	7.67	76.1	6.522	0.963	69.2
Liberal Model	0.75	8.48	79.2	7.625	0.971	76.6
Catholic Model	0.776	8.00	79.8	7.615	0.956	64.8

where:
1 – Gender empowerment measure
2 – Index of Democratic development
3 – Life expectancy index
4 – Index of quality of life
5 – Education index
6 – Index of economic freedom
(Strelchonok, V. & Popova, Y., 2012a, 2012b; Popova, Y., 2011).

4.3. Statistical analysis: corruption and social system

In the process of determining the correlation dependences, common for the countries operating within the same social model, there have been mentioned the certain difficulties: not all countries, presenting the social model, have the same level of economic development, and this fact must have impact on the statistic analysis. The values showing "per capita" expenditures are so different in the countries of Continental model, that it is impossible to use

them in statistical models for obtaining the reliable and valuable results. Due to this reason the countries within the Continental model have been divided into two groups – well-developed countries and less-developed countries (it is an important note – the division took place according to economic, not human capital development). The more developed countries are presented by France, Germany, Netherlands, Austria, Czech Republic, Poland, while the less-developed countries are Hungary, Estonia, Latvia, and Lithuania. Since the economic development of the Scandinavian countries is homogeneous, the indices are very close for these countries and correlations are possible for comparison, the countries have not been divided.

Another transformation has been important for the Corruption Index. Since the level of corruption is the lowest at the value 10, then for statistical analysis it is important to transform it. The lowest value should correspond to the worst situation since all other indicators fall under this principle. As a result, the values of Corruption index have been transformed according to the rule (10 – index value). This simple operation allows turn the highest value of index into the lowest one suitable for the purposes of analysis.

Research (Popova, Y., 2014) provides the detailed analysis of the way the corruption affects the social indicators. Nevertheless, there presented the core of the idea revealed in the above-mentioned research. There was generate the correlation matrix for the social factors and corruption for every social model, and the factors with correlations above 0.7 were selected.

The Scandinavian model has demonstrated the low level of correlations, and the most important thing is absence of high correlation of Corruption factor with any other factors. Scandinavian model is the most favourable one for the Human capital development, the efficiency of all investments in social spheres is very high.

Cont.I model unexpectedly presents the greatest number of factors, demonstrating correlations between Corruption and other factors (Table 3):

Table 3. Correlation of factors in Continental social model

Factor	Value
Expenditures on education	0.9168
Quintile coefficient	−0.875
Expenditures on R&D	0.859
Level of employment	0.788
Social expenditures	0.8235

Cont.II model shows the correlations between Corruption and expenditures on poverty, value –0.758.

Next stage comprised the regression analysis to determine the factors for which the Corruption Factor is a significant one. The research was taken for the countries, grouped by models.

Corruption presents a polynomial regression type for all models, but the quality of regression models represented by R^2 is very different. The Scandinavian model does no present a great. The model ContI presents relatively smooth deviations of R^2 indicator. The model ContII presents very low values of R^2 for all countries, the regression model explains very rare cases of deviations for this model. Corruption is also statistically significant factor for the level of poverty for this model. R^2 values for Poverty factor are high. These countries present the highest level of corruption and the highest level of poverty. These facts are interconnected, according to the regression model; the population of not well-developed countries with Continental social model suffer from the high level of poverty if there is a high level of corruption. Interesting results are demonstrated by the countries of ContI model. Corruption index is statistically significant factor for Quintile coefficient, Social expenditures, Employment level and expenditures on Education and R&D. Quintile coefficient shows the stratification of society, and it is expected that the level of corruption is one of the determinants of this stratification. Relations between corruption and employment are also evident: corruption influences possibility of business development, and creates direct connections with the level of employment in the country. The most significant effect of corruption from the point of view of social model is on expenditures on healthcare and education systems.

The research results support the idea that corruption has negative impact on these spheres, and adopted social model is important for determining this impact.

5. Interdependence of corruption and the factors of economic growth

Economic growth is the increase in the market value of the goods and services produced by an economy over time. It presupposes growth in trade, direct investments, an increase of resource productivity.

Since the goal of this paper is analysis of the corruption impact on the economic growth, there have been chosen the indicators, responsible for the economic development of the country. The following indicators have been considered:

- Real GDP per capita
- Resource productivity
- Development assistance
- Gross domestic expenditure on R&D
- Relative exchange rate
- Shares of exports of goods and services

Real GDP per capita is calculated as the ratio of real GDP to the average population of a specific year. It is a measure of average real income in that country. However, it is not a complete measure of economic welfare.

Resource productivity is GDP divided by domestic material consumption (DMC). DMC measures the total amount of materials directly used by an economy. It is defined as the annual quantity of raw materials extracted from the domestic territory of the focal economy, plus all physical imports minus all physical exports. It is important to note that the term "consumption" as used in DMC denotes apparent consumption and not final consumption. DMC does not include upstream flows related to imports and exports of raw materials and products originating outside of the focal economy.

Official development assistance (ODA) consists of grants or loans that are undertaken by the official sector with the ODA is here presented as a share of Gross National Income (GNI). GNI at market prices equals Gross Domestic Product (GDP) minus primary income payable by resident units to non-resident units, plus primary income receivable by resident units from the rest of the world.

The indicator provided is GERD (Gross domestic expenditure on R&D) as a percentage of GDP. "Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications" (Frascati Manual, 2002).

The REER (or Relative price and cost indicators) aim to assess a country's (or currency area's) price or cost competitiveness relative to its principal competitors in international markets. Changes in cost and price competitiveness depend not only on exchange rate movements but also on cost and price trends. Double export weights are used to calculate REERs, reflecting not only competition in the home markets of the various competitors, but also competition in export markets elsewhere. A rise in the index means a loss of competitiveness. Data source: Directorate General for Economic and Financial Affairs (DG ECFIN)

The table shows developments in shares of exports of goods and services of EU Member States in the total world exports. Data on the values of exports of goods and services are compiled as part of the Balance of Payments of each country.

These indicators have been employed in statistical analysis.

The employment of regression analysis demonstrated that there are factors of economic development for which the factor Corruption is significant. Table 4 shows these factors for every model.

Table 4. Factors of economic development for which the factor Corruption is significant

Continental I	Continental II	Scandinavian
Resource Productivity	Resource Productivity	Growth Rate
Development assistance	Development assistance	R&D Expenditures
Exchange rate	Share of export	
Share of export		

As Table 4 demonstrates, the corruption affects absolutely different sides of economic development of the countries with different social models. Rather interesting fact is the similar impact of corruption on the countries of Continental social model with different level of economic development. It is practically the unique case when they function on the same basis, since all other researches reveal different reactions of the factors on various influences.

Fig. 1 presents the diagrams of correlation of corruption factor and the indicators of economic development level within the continental model Cont_I. the scatter plot diagrams demonstrate the negative relationships between corruption level and such important indicators as Growth Rate (Fig. 1a), Resource Productivity (Fig. 1b) and Development Assistance (1c)
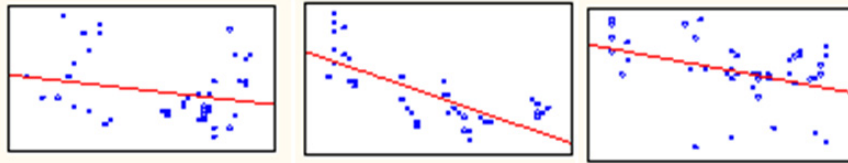

Fig. 1. Correlations of corruption and Growth Rate (a), Resource Productivity (b), and Development Assistance (c)

The scatter plot diagrams in Fig. 2 demonstrate the correlations between corruption level and the factors of economic development within the social model Cont II. The correlations show obvious negative trend between the level of corruption and such indicators as Resource Productivity (Fig. 2a), Development Assistance (Fig. 2b) and R&D expenditures.
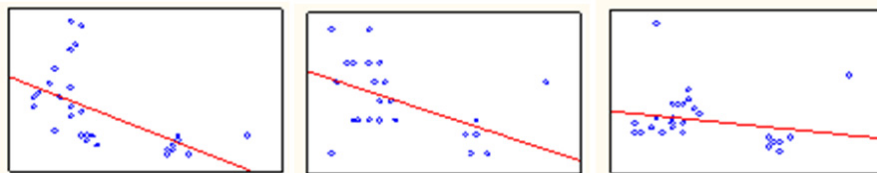

Fig. 2. Correlations of corruption and Resource Productivity (a), Development Assistance (b) and R&D Expenditures (c)

At last, Fig. 3 manifests the scatter plot diagrams showing the correlations of corruption level and the Human Development Index (Fig. 3a), R&D Expenditures (Fig. 3b) and Resource Productivity (Fig. 3c). The corruption level indicates the lowering trend for the factors of economic development of the country, as it was in the previous cases.
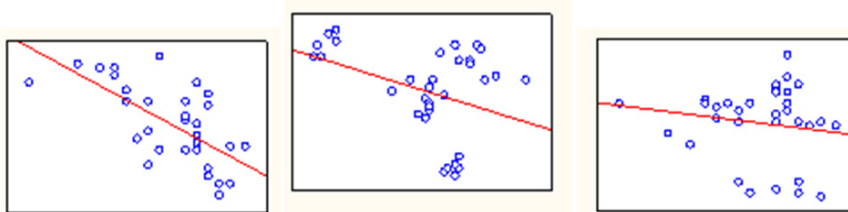

Fig. 3. Correlations of corruption and Human Development Index (a), R&D Expenditures (b) and Resource Productivity (c)

The correlations within all three models present practically the same results: corruption has very close interconnections with R&D Expenditures, presupposed for the innovative development principally important for the development of post-industrial economy, for Resource Productivity, which is again the factor of primary importance for the post-industrial economy, and other factors which are the benchmarks of the innovative economies.

It allows concluding that corruption has the same level of danger for all social systems especially in the frameworks of transit to post-industrial economies.

6. Conclusions

The paper under consideration reveals the corruption as a factor having serious impact on both social indicators and economic growth level.

The social sphere is an area of special affecting by corruption since it creates the clash of interests of private individuals, businesses and authority structure.

The efficiency of functioning such fields as healthcare system, education system, R&D field and others has a great impact on human capital development; via the human capital development they affect the national economy since the European countries are transiting to the post-industrial innovative type of development, and human capital is a factor of principal importance for this economy.

The paper reviews the researches discovering the ways the corruption can influence the economic indicators and human capital indicators. These researches provide interesting findings in this area and allow considering corruption as universal issue influencing all spheres of human life. Nevertheless, they do not comprise the analysis from the position of the social model adopted within the country. The current investigation incorporates such type of analysis. All the countries included into investigation are divided according to the social model functioning within the country.

Other researches revealed the certain differences in factors between the models; nevertheless, this research has not revealed such differences, supporting the idea about ***universality of corruption***, not distinguishing the borders of states and social models.

The impact of corruption on social system indicators is implemented via the correlation and regression analyses. Though there are certain differences in impact of corruption in different social models, in general there has been revealed the ***universal negative influence of corruption***.

The tool of regression analysis has been implemented for demonstrating the ***destructive character of corruption for economic indicators***, showing the growth of national economy in post-industrial economic environment.

There also have been displayed the scatter plot diagrams demonstrating the correlation of corruption and factors of economic development and the ***negative trends*** of these correlations

This analysis also supports the idea that corruption is ***destructive for economies without great dependence on the social model*** adopted within the country.

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