FINANCING OF CRISIS MANAGEMENT SYSTEM IN POLAND IN THE YEARS 2007–2017

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Abstract: The paper characterizes financing of crisis management system in Poland in the years 2007-2017. In the main part of this paper, the normative basis for funding the crisis management system will be presented. In addition, the financing of the crisis management system in the Third Republic of Poland in the light of normative acts, such as budgetary laws, will also be presented.

Keywords: crisis management system, system of management, sources of financing.

Introduction

The aim of this chapter is to present the normative dimension of financing the crisis management system in the Third Republic of Poland. The starting point for the analysis of the normative basis for funding the crisis management system will be the analysis of the provisions of *the 2007 Crisis Management Act* and *the Act amending the Crisis Management Act 2009*. In the next part of the chapter will be presented the financing of the crisis management system in the Third Republic of Poland in the light of normative acts, such as budgetary laws. In this part the research hypothesis will be verified, which assumes that both expenditures planned in the state budget for the performance of crisis management tasks and the funds incurred for achieving this objective in the III RP in the years 2008–2017 were systematically increasing. In order to verify the above-mentioned research hypothesis, the analysis will cover the amount of expenditure planned in the state budget for the performance of crisis management tasks and the costs incurred for implementing these actions (determined on the basis of the budget implementation reports enacted by the Council of Ministers). The duration of the research will be limited to the years 2008–2017. The adoption of 2008 as the opening point for the study is due to the fact that, for the first time in the state budget, expenditure on the implementation of crisis management tasks was planned for that year. The deadline for the study of expenditure incurred for the implementation of crisis management

tasks is 2017 – this is due to the fact that this is the last year in which an analysis of the ratio of expenditures incurred for the implementation of crisis management tasks can be carried out to the level of expenditure planned for this purpose in the Budget Act.

A multi-faceted study has forced many test methods. A legally-institutional approach has been used in order to provide the legal framework for the crisis management financing. Moreover, the statistical and comparative method was used to analyse the level of financing of the crisis management system in Poland. In addition, the least squares method was used to identify the development trend of both the expenditures planned in the state budgets for crisis management tasks and the funds incurred for achieving this objective in the III RP in 2008–2017.

It should be note that the issue of public administration activities within the scope of crisis management was repeatedly undertaken in the Polish literature. A number of monographs (i.e. Nowak, 2007; Rogozińska-Mitrut, 2010; Ziarko, Walas-Trębacz 2010; Lidwa, Krzeszowski, Więcek, 2010; Skomra, 2010) and collective papers was written on the subject (i.e. Jabłonowski, 2007). The case of research on financing crisis management tasks is another issue. This issue is almost entirely missing in the literature. Aside from a few book extracts and scientific articles that approach the issue from the theoretical (Nizioł, 2011) and borough (Gliński, 2014) perspective, none of the researchers undertook the financial analysis of the practical performance of public administration on the national level. This paper, therefore, aims to fulfill a gap in the literature.

Legal aspects of financing the crisis management system in Poland

The need to enact a regulation on crisis management – including the provision of financial means necessary to organize and operate a crisis response system – was reported to the Prime Minister by the Supreme Chamber of Control already in 2003, in the results of inspections carried out in the Interior Affairs and Administration Department (The Supreme Chamber of Control 2003). However, due to political disputes, the first legal act regulating the financing of crisis management tasks – the Crisis Management Act – was passed only in 2007.

This act created the legal basis for the functioning of the crisis management system in the event of threats that require action – primarily from the public administration and the Armed Forces of the Republic of Poland – in situations that do not fulfill the requirements for the introduction of one of the extraordinary states envisaged in the *Constitution*, but require the implementation of special mechanisms to ensure effective monitoring of threats and take action to eliminate or significantly reduce them. The concept of crisis management according to the legislator, it was understood that “the activities of the public administration bodies, which are part of national security management, consist in the prevention of crisis situations,

preparing them to take control over planned actions, responding to crises and restoring infrastructure to re-establish its original character" ("Ustawa z dnia 26 kwietnia 2007 roku", 2007).

In the explanatory memorandum to the aforementioned law, it was assumed that the source of funding for crisis management tasks will be, in particular, the state budget and budgets of local self-government units (within the limits of the funds allocated to the security of citizens) (Pawełczyk, Sokal, 2014, p. 213). Income received for crisis management for territorial self-government units was supposed to be income for the implementation of own tasks – classified according to the budget classification in the Section – 750 Public Administration ("Uzasadnienie do projektu ustawy o zarządzaniu kryzysowym", 2006, p. 12).

The draft law envisages that national crisis management tasks will be financed by the state budget (in the areas owned by the Voivodes, by the minister competent for internal affairs and by other ministers managing government departments and central government administration bodies) while the implementation of tasks at the municipal, poviat and voivodeship level – will be covered by the funds provided for this purpose in the budgets of these territorial self-government units ("Rządowy projekt ustawy o zarządzaniu kryzysowym", 2006, art. 26, para. 1 and 2).

Local self-government units were to receive targeted subsidies from the state budget to finance government-commissioned tasks related to crisis management ("Ustawa z dnia 13 listopada 2003 r. o dochodach jednostek samorządu terytorialnego", 2003, art. 49, par. 1). In addition, the legislator has included in the above-mentioned draft law postulates of communities related to local self-government, assuming the principle that specific purpose reserves intended for the implementation of crisis management tasks were to be created in the budgets of individual territorial self-government units. Their amount was set at the level of up to 1% of the current expenditures of the local self-government unit (reduced by investment expenses, expenses on remuneration and derivatives and debt servicing expenses) ("Ustawa z dnia 30 czerwca 2005 r. o finansach publicznych", 2005, art. 173, par. 3). The above-mentioned system of financing crisis management tasks – passed in the form of a law on April 26, 2007 – was supposed to guarantee their effective implementation.

It should be noted that the entry into force of the Act on crisis management influenced the level of state budget expenditures in one more aspect, namely the need to fund the creation of a new unit – the Government Security Center. The legislator estimated the costs of creating and operating this unit at approximately PLN 4 million 100 thousand per year. More than half of this amount was to be spent on remuneration and derivatives (PLN 2 million 580 thousand). The remaining part of the amount was planned to be allocated in particular for the purchase of: cars (PLN 180 thousand), equipment (office equipment and computer equipment costs PLN 520 thousand), materials (acquisition of hardware and software, office and administrative materials PLN 240 thousand), services (including repair, energy, telecommunication, heat, and training costs PLN 400 thousand). No expenditure was planned

for the purchase of premises for the seat of the Government Security Center – it was to be housed in a building at the disposal of the Ministry of Interior Affairs and Administration ("Uzasadnienie do projektu ustawy o zarządzaniu kryzysowym", 2006, pp. 11–12).

The relatively late adoption of the law on crisis management by the Parliament of the fifth term made the government of Jaroslaw Kaczynski fail to pass executive orders to the resolution (Wilk-Jakubowski, 2017, 237). Although the first Government Plenipotentiary for the Organization of the Government Security Center was to be appointed within 14 days after the announcement the aforementioned law, the Prime Minister issued an ordinance on its designation almost a month after that date ("Zarządzenie nr 64 Prezesa Rady Ministrów z dnia 15 czerwca 2007 r. w sprawie powołania Pełnomocnika Rządu do spraw organizacji Rządowego Centrum Bezpieczeństwa", 2007, § 1). Pawel Soloch, the then Undersecretary of State at the Ministry of Interior Affairs and Administration, did not contribute to the preparation of the executive law of the Crisis Management Act, which would enable the creation of a Government Security Center (the result of this situation was that the funds allocated to the creation and operation of this entity have not been utilized within the time limit).

No one but the next Government Plenipotentiary for the Organization of the Government Center for Security – Antoni Podolski – appointed on 28 February 2008, prepared a draft regulation specifying the organization and mode of operation of this entity, which was issued by the Prime Minister on 10 July 2008 ("Rozporządzenie Prezesa Rady Ministrów z dnia 10 lipca 2008 r. w sprawie organizacji i trybu działania Rządowego Centrum Bezpieczeństwa", 2008). Partial implementation of the Crisis Management Act coincided with the government's efforts to quickly prepare its amendment (it was enacted on 17 July 2009) (*Ustawa z dnia 17 lipca 2009 r. o zmianie ustawy…*).

As mentioned above – in the Crisis Management Act of 2007 local government units were obliged to create a special purpose reserve for the implementation of their own tasks in the area of crisis management up to 1% of the current expenditures of the territorial self-government unit (reduced by investment expenses, expenses on remuneration and derivatives and debt servicing expenses) ("Ustawa z dnia 26 kwietnia 2007 roku o zarządzaniu kryzysowym", 2007, art. 26). According to the provisions of the Act of 8 December 2006 amending the Public Finance Act and certain other acts, investment expenditures (investments and investment purchases) were included in property expenses ("Ustawa z dnia 8 grudnia 2006 r. o zmianie ustawy o finansach publicznych oraz niektórych innych ustaw", 2006, art. 1, indent 51). In turn, according to the provisions of the Act of 30 June 2005 on public finances, current expenditures included remuneration and derivatives of payroll and fees arising from servicing debt of a local self-government unit ("Ustawa z dnia 30 czerwca 2005 roku o finansach publicznych", 2005, art. 184, para. 1, letter a). In line with these legal arrangements, the amount of the specific purpose reserve represented the difference between current expenditure and capital expenditure (investment expenditure) ("Ustawa z dnia 26

kwietnia 2007 roku o zarządzaniu kryzysowym" 2007, art. 26, para. 4). Territorial self-government units, which have budgeted for a given year for high expenditure on investment, were therefore unlikely to be able to create a specific purpose reserve for the implementation of their own crisis management tasks (this was due to the negative balance of the difference in current expenditures relative to the investment expenditures specified in the analysed legal provision). Due to the fact that the level of expenditures earmarked for investment is one of the most important indicators determining the development of local self-government units, the problem of the negative balance of the specific purpose reserve for the implementation of crisis management tasks concerned the most dynamic municipalities. In the Act amending the Crisis Management Act, the content of this provision was modified by deleting the word "current". In addition, the percentage of the budget reserve was changed. While the amount of this amount was up to 1% of the current budget of the territorial self-government unit (which meant it could be zero), the change of the term to "no less than 0.5%" enacted in the Act amending the Crisis Management Act specified only the lower level of the specific purpose reserve for the implementation of crisis management tasks, leaving the decision of individual territorial self-government units to increase its potential ("Ustawa z dnia 17 lipca 2009 r. o zmianie ustawy o zarządzaniu kryzysowym", 2009, art. 1, indent 24).

It should be emphasized that the legislator assumed that the Act amending the Crisis Management Act would not have financial implications for the state budget (the implementation of new tasks by the public administration did not contribute to the creation of new posts in government and self-government administration offices). On the other hand, the bill influenced the specific purpose reserve of local self-government units intended to carry out their own tasks in the field of crisis management. From the calculations presented in the Explanatory Memorandum to the aforementioned project, it was apparent that the proposed provision should result in an increase in the amount of the specific purpose reserve created in the budgets of all local government units, in 2007, to a minimum of approximately PLN 280 million ("Uzasadnienie do projektu ustawy o zarządzaniu kryzysowym", 2006, p. 12).

Financing the crisis management system in Poland

Determining the amount of expenditures envisaged in the state budget for the performance of crisis management tasks – after the entry into force of the 2007 crisis management law – was made possible by the enactment of the Act of 8 December 2006 amending the Public Finance Act and certain other acts ("Ustawa z dnia 8 grudnia 2006 r. o zmianie ustawy o finansach publicznych oraz niektórych innych ustaw", 2006, art. 1, indent 38). One of the aims of this amendment was the introduction of the obligation to prepare a task-based budget

structure, which was to be a tool to support the process of good public funds management, to increase the transparency of their spending. Within the task budget, the legislator was obliged to prepare a statement of tasks – within the planned expenditure amounts – together with a description of the objectives of the tasks concerned.

Crisis management measures in task budgets in 2008-2016 were most often planned within the function of internal security and public order. They included, among others, the implementation of such tasks as: (1) ensuring state security in crisis situations and natural disasters (through the establishment of the Crisis Management Centre of the Minister of Internal Affairs and Administration and emergency notification centers) – the objective of this task was to improve the coordination of services, ensuring quick access to data on forces and means possible to use in crisis situations, as well as conducting an audit of existing databases and software in order to determine the possibilities of system integration and raising awareness of government administration employees and the society about dealing with threats (the implementation of the latter objective included, inter alia, the organization (a) national crisis management exercises, (b) training and courses for government and local administration in crisis management, (c) training briefings for representatives of schools of the State Fire Brigade, crisis management departments, voivodeship headquarters of the State Fire Service and directors of civil defense training centers, (d) trainings for the employees of the Headquarters of the State Fire Service and to provide them with opportunities to participate in symposia, conferences and crisis management workshops, (2) protecting citizens and the maintenance of public order – this task included the subdivision of crisis management planning and critical infrastructure protection, aimed at ensuring the conditions for the efficient and effective operation of crisis management and critical infrastructure protection by developing the National Crisis Response Plan and the National Plan for Critical Infrastructure Protection. (3) civil protection and crisis management – a task which included, inter alia, such sub-tasks as: (a) coordinating the emergence of crisis response plans and improving the secure flow of information between entities, (b) providing government administration and the public with information on how to deal with emergencies, (c) cooperation with the European Union and NATO structures (the objective was to transfer best practices in the field of crisis management to the national level), (d) planning, response and crisis management, development of crisis response procedures, (e) prevention and recovery from natural disasters (the objective of which was the construction, reconstruction, modernization and repair of technical infrastructure destroyed or damaged by natural disasters as well as technical infrastructure to prevent or minimize the effects of natural disasters), (f) coordination of crisis management and counter terrorism projects and (g) emergency notification system (emergency number 112).

In task budgets, expenditure on crisis management was also planned in other functions. One of them was the economic policy of the country. As part of this function – additional funds were planned for the sub-task of supporting energy security, the aim of which was to

provide reserves under conditions of crisis; the purpose of another of the sub-tasks of this function was to provide strategic reserves in line with the needs of the state in a crisis situation; in turn, within the framework of the task: computerization of activity and building the information society, the sub-task of the maintenance of IT systems was highlighted, which aimed, inter alia, to improve the quality of communication in the crisis management system.

In the budget acts for 2008-2015, expenditure on crisis management was planned in several parts of the budget: internal affairs (ranging from PLN 400,000 in 2008 to PLN 7,306,000 in 2014), education and training (from PLN 3,000 in the budget acts for 2012 and 2013 to PLN 200,000 in the budget act for 2008), environment (funds planned for crisis management within this part of the budget were increasingly smaller year on year – they ranged from PLN 37,000 in 2008 to PLN 0 in 2010–2017) and culture and national heritage protection (oscillated between PLN 0 in the budget acts for 2009–2010 and 2012–2015 – to PLN 30,000 in the budget act for 2011). Moreover, funds for the implementation of crisis management tasks were planned in the budgets of voivodships (they ranged from PLN 1,818,000 in the budget act for 2010 to PLN 5,195,000 in the budget act for 2009).

Reports on the implementation of state budgets in the years 2008–2017 show that expenditures on the implementation of crisis management tasks were incurred within three budget parts: (1) internal affairs (ranging from PLN 2,977,000 in 2008 to PLN 8,475,000 in 2014), (2) education and training (from PLN 3,000 in the budget acts for 2011-2013 to PLN 50,000 in the budget act for 2009) and culture and national heritage protection (expenditures within this budgetary category were incurred only in 2011 – they amounted to the sum of PLN 12,000). Moreover, funds for the implementation of crisis management tasks in the years 2008–2015 were also incurred within the budgets of voivodships (they ranged from PLN 2 158 thousand in 2010 to PLN 5 350 thousand in 2015).

Based on the data presented in this subsection, it is possible to verify the hypothesis that both expenditures planned in the state budget for the performance of crisis management tasks and the funds incurred to achieve this objective in the III RP in the years 2008–2017 were systematically increased. It was assumed that the institutions of the state in the analysed period of time ascribed more and more importance to the problem of crisis management which resulted, inter alia, from a definite expansion of the catalog of non-military threats.

The aforementioned hypothesis (formulated in the introduction of this thesis) was verified using statistical methods. In practice, it is possible to determine the development tendency function (trend function) of the amount of expenditures planned in the state budget for carrying out crisis management tasks and the funds incurred to achieve these tasks in a specific period of time6. This hypothesis can be verified statistically by extracting the

6 The development tendency function (trend function) is understood as slow, regular and systematic changes in the amount of expenditures planned and incurred for carrying out crisis management tasks, resulting from the main causes, which are observed in a sufficiently long period of time (10 years). Due to the long-term character

development trend from the time series using several mathematical methods (including the analytical method of least squares or mechanical method of moving averages). The methodology for determining the structural parameters of the development trend of the amount of expenditures planned in the state budget for carrying out crisis management tasks and the funds incurred to achieve these tasks using the least squares method is presented below.

The analytical method of extracting the tendency function of the amount of expenditures is based on finding a specific mathematical function for a given time series. The scientific goal in this case is to select of an appropriate class of the trend function and to estimate its structural parameters. Since it is recommended to use a selected type of trend function which should be of low complexity and the parameters of the function should have a substantial impact on the amount of expenditures planned and incurred for crisis management tasks, the approximation linear trend function of II type was chosen as a function of development trend, as a particular type of regression function $\hat{y}_i = a_0 + a_1 \cdot x_i$, in which the explanatory variable is time ($x_i = t$).

When the residual components ξ_t are taken into account, the trend function takes the general formula:

$$\hat{y}_t = a_0 + a_1 \cdot t + \xi_t$$

where: $\hat{y}_t$ – the theoretical (resulting from the estimated trend function) values of expenditures planned or incurred in the period of time *t*,

a_0 – the free term to determine the amount of expenditures for $t = 0$,

a_1 – the parameter which determines the average increment (positive or negative) of expenditures per the time increment unit *t*,

ξ_t – the residual component.

By using a method of calculating the structural parameters of the trend function with the use of the least squares method, the *T*-expression which is the function of two variables a_0 and a_1: $T = \sum_{t=1}^{n} (y_t - \hat{y}_t)^2 = \sum_{t=1}^{n} (y_t - a_0 - a_1 \cdot t)^2$ should reach a minimum value. Because the

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of these changes, the trend function analysis may be carried out with the use of statistical methods. See more: M. Sobczyk, *Statystyka*, Warszawa 2001, p. 317.

necessary condition for the existence of the minimum extremum of the function of two variables is the zeroing of partial derivatives $(\frac{\partial T}{\partial a_0}=0,\ \frac{\partial T}{\partial a_1}=0)$, the following system of normal equations is obtained:

$$\begin{cases} 2\sum_{t=1}^{n}(y_t - a_0 - a_1 \cdot t)(-1) = 0 \\ 2\sum_{t=1}^{n}(y_t - a_0 - a_1 \cdot t)(-t) = 0 \end{cases} \Leftrightarrow \begin{cases} n \cdot a_0 + a_1 \sum_{t=1}^{n} t = \sum_{t=1}^{n} y_t \\ a_0 \sum_{t=1}^{n} t + a_1 \sum_{t=1}^{n} t^2 = \sum_{t=1}^{n} t \cdot y_t \end{cases},$$

where: n – the number of years of observation on the basis of which the trend function is estimated,

y_t – the empirical values of expenditures (planned or incurred, respectively),

$\bar{y} = \frac{\sum_{t=1}^{n} y_t}{n}$ – the arithmetic average of the empirical values of expenditures (planned or incurred, respectively),

$\bar{t} = \frac{\sum_{t=1}^{n} t}{n}$ – the arithmetic average of the time increment unit t.

The solution of the system of equations are the values of variables a_0 and a_1, which can be calculated from the relationships:

$$\begin{cases} a_0 = \dfrac{\sum_{t=1}^{n} t^2 \sum_{t=1}^{n} y_t - \sum_{t=1}^{n} t \sum_{t=1}^{n} t \cdot y_t}{n \sum_{t=1}^{n} t^2 - (\sum_{t=1}^{n} t)^2} \\ a_1 = \dfrac{n \sum_{t=1}^{n} t \cdot y_t - \sum_{t=1}^{n} t \cdot \sum_{t=1}^{n} y_t}{n \sum_{t=1}^{n} t^2 - (\sum_{t=1}^{n} t)^2} \end{cases} \Rightarrow \begin{cases} a_0 = \bar{y} - a_1 \cdot \bar{t} \\ a_1 = \dfrac{\sum_{t=1}^{n} t \cdot y_t - \bar{y} \sum_{t=1}^{n} t}{\sum_{t=1}^{n} t^2 - \bar{t} \sum_{t=1}^{n} t} \end{cases}$$

In this way, similarly to the two-dimensional linear regression function, it was possible to present development trends for both planned and incurred expenditures for crisis management

tasks. In addition as part of the verification of the mentioned research hypothesis, the degree of compliance of expenditures planned and incurred for crisis management tasks with the theoretical expenditures obtained on the basis of the determined trend function was assessed[7]. The basis for determining the accuracy of the matching degree are differences between the empirical values, which are understood as actual values (planned or incurred expenditures) and theoretical values (resulting from the estimated trend function).

Synthetic measure of dispersion of actual values around theoretical values is the variance of the residual component, which is known as a residual variance (remainder variance):

$$s^2(\xi_t) = \frac{\sum_{t=1}^{n}(y_t - \hat{y}_t)^2}{n-k} = \frac{\sum_{t=1}^{n}\xi_t^2}{n-k},$$

where: k – the number of estimated trend function parameters (for a linear function with one explanatory variable $k = 2$).

Another measure of stochastic structure is the standard deviation of the residual component $s(\xi_t)$, which is the square root of the residual variance. This indicator provides information on the average deviation of the actual values of the response (dependent) variable from the values calculated on the basis of the trend function.

It is possible to determine how much percentage of the average level of observed variability of the response variable (i.e. expenditures planned or incurred, respectively) are random deviations of the obtained trend function on the basis of the coefficient of residual variation $r(\xi)$, which can be determined from the relationship: $r(\xi) = \frac{s(\xi_t)}{\bar{y}}$.

The matching of both trend functions (for expenditures planned or incurred, respectively) to empirical data can be determined by the convergence coefficient (coefficient of indetermination) φ^2:

7 The following stochastic structure measures, which are used to determine the degree of compliance of empirical data with theoretical data, are analysed in the monograph: the average errors in the assessment of the structural parameters $D(a_0)$ and $D(a_1)$, including the standard deviations of the residual component $s(\xi_t)$, the coefficients of indetermination φ^2 and determination R^2, as well as the coefficients of residual variation $r(\xi)$. In the case of small standard deviations of the residual component $s(\xi_t)$, small coefficients of residual variation $r(\xi)$, relatively low values of the convergence coefficient φ^2, relatively high values of the determination coefficient R^2 and low errors in the assessment of the structural parameters $D(a_0)$ and $D(a_1)$, it can be assumed that the linear function of the development trend in the given years quite well describes the amount of expenditures planned and incurred, respectively, for carrying out crisis management tasks.

$$\varphi^2 = \frac{s^2(\xi)}{s^2(y)} = \frac{\sum_{t=1}^{n}(y_t - \hat{y}_t)^2}{\sum_{t=1}^{n}(y_t - \bar{y})^2}$$

This coefficient is the ratio between the part of the variability of the analysed phenomenon that has not been explained by the explanatory variable, i.e. time, and the total variability of the response variable. On this basis the determination coefficient R^2, which provides information which part of the changes in the value of the response variable has been explained on the basis of the estimated trend function in relation to the total variation of the response variable is determined. Since the relationship $s^2(y) = s^2(\hat{y}) + s^2(\xi)$ is fulfilled:

$$R^2 = \frac{s^2(\hat{y})}{s^2(y)} = \frac{\sum_{t=1}^{n}(\hat{y}_t - \bar{y})^2}{\sum_{t=1}^{n}(y_t - \bar{y})^2} = 1 - \frac{s^2(\xi)}{s^2(y)} = 1 - \varphi^2$$

By analysing the trend function, it is also possible to determine average errors in the assessment of the values of variables a_0 and a_1, because the estimation was based on the results of the sample for the particular period of time (10 years). The mean standard errors for estimating variables a_0 and a_1 for the linear trend function are calculated from the relationships:

$$\begin{cases} D(a_0) = \sqrt{\dfrac{s^2(\xi_t)\sum_{t=1}^{n} t^2}{n \cdot (\sum_{t=1}^{n} t^2 - n \cdot \bar{t}^{\,2})}} \\ D(a_1) = \dfrac{s(\xi_t)}{\sqrt{(\sum_{t=1}^{n} t^2 - n \cdot \bar{t}^{\,2})}} \end{cases}$$

As part of the verification of the above-mentioned research hypothesis, the significance of the slope of the linear trend function was assessed. The test was based on the verification of the hypothesis of the lack of linear dependence between the analysed features (expenditures) on the basis of the value of the calculated parameter a_1. In practice, the closer 0 is to a_1, the alignment is worse. In order to verify the zero hypothesis H_0 ($a_1 = 0$) against the alternative

hypothesis H_1 ($a_1 \neq 0$) statistic is used, which is a random variable with the *t*-student's distribution: $t = \frac{a_1}{D(a_1)}$.

The obtained *t*-statistics are compared with the critical value of the distribution $t_{\alpha;n-2}$ from the tables of the *t*-student distribution for a given significance level and a specified number of degrees of freedom (for linear function with one explanatory variable: *n*-2). When the condition $|t| > |t_{\alpha;n-2}|$ is fulfilled, the H_0 hypothesis is rejected in favour of the alternative hypothesis H_1, which assumes a systematic linear relationship, which means the significance of the a_1 slope of the trend function. If the condition is not fulfilled, the H_0 hypothesis is accepted, which means that the significance level *F* is above the assumed value α, i.e. the results are statistically insignificant for the assumed significance level α.

First of all, the statistical analysis of the expenditures planned in the state budget for carrying out crisis management tasks in 2008–2017 is carried out on the basis of the data presented in Table 1.

Table 1.
Expenditures planned for the implementation of crisis management tasks in the budgetary acts in the years 2008–2017

Year	**The amount of planned expenditures for the implementation of crisis management tasks (in PLN thousand)**
2008	4 154
2009	11 480
2010	8 592
2011	9 502
2012	10 112
2013	9 998
2014	10 481
2015	11 592
2016	15 971
2017	11 268*

* It should be noted that in the budget for 2018, PLN 11,775 thousand was planned for the implementation of crisis management tasks (only in 2016 the expenditure planned for this purpose was higher).

Source: own elaboration based on budgetary acts from the years 2008–2017.

The parameters of the linear trend function are estimated with the use of the least squares method on the basis of the data presented in Table 11. The following values of parameters a_0 and a_1 are obtained:

$$\begin{cases} a_o = 6\ 538.80 \\ a_1 = 686.58 \end{cases}$$

The mathematically determined linear trend function on the basis of the amount of expenditures planned in the budgetary acts for the implementation of crisis management tasks in the years 2008–2017, through the applied approximation, takes the formula:

$$\hat{y}_t = a_o + a_1 \cdot t = 6\ 538.80 + 686.58 \cdot t \text{ [in PLN thousand].}$$

A graphical representation of the determined development trend function $y = \hat{y}_t$ (the function called Linear) is shown in Figure 1.

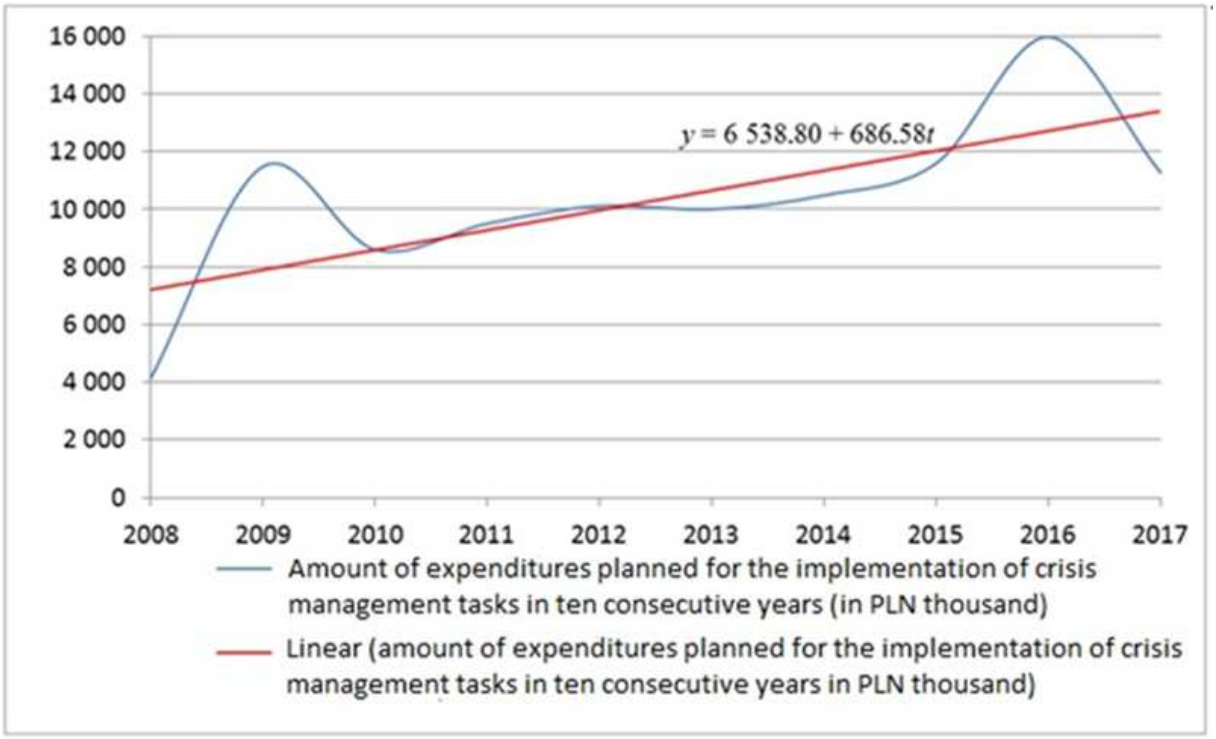

Figure 1. Expenditures planned for the implementation of crisis management tasks in the budgetary acts in ten consecutive years (2008–2017) against the background of the linear trend function *y* (in PLN thousand).

Source: own elaboration.

The obtained trend function proves the increase in the amount of expenditures planned in the budgetary acts for the implementation of crisis management tasks. It can be concluded from the estimated trend function that the expenditures planned in the budgetary acts for crisis management tasks were systematically increased (year on year by the average of PLN 686.58 thousand). The free term of the trend function indicates the theoretical amount of expenditures planned in the budgetary acts for crisis management tasks in 2007 (for $t = 0$). The theoretical amount of expenditures planned in the budgetary acts for crisis management tasks was then equal to PLN 6 538.80 thousand.

The following measures of the degree of alignment were obtained for the trend function $\hat{y}_t = a_o + a_1 \cdot t = 6\,538.80 + 686.58 \cdot t$: $s(\xi_t) = \sqrt{s^2(\xi_t)} = \text{PLN } 2\,200.95$ thousand, $r(\xi) = 0.21$, $\varphi^2 = 0.50$, $R^2 = 0.50$, $D(a_0) = \text{PLN } 1\,503.53$ thousand, $D(a_1) = \text{PLN } 242.32$ thousand and the significance level $F = 0.0220$.

It is worth noting that at the assumed significance level ($\alpha = 0.05$) and 8 degrees of freedom, the statistical test of expenditures planned in the budgetary acts for the implementation of crisis management tasks confirms the assessment of the significance of the a_1 slope of the linear trend function. In turn, the occurrence of the systematic linear trend allows us to accept the first part of the hypothesis assuming that the expenditures planned in the state budgets for crisis management tasks were systematically increased in the III RP in 2008–2017. The obtained value of the *t*-statistic (2.83) is greater than the value of the *t*-student's distribution table (2.30), which confirms the significance of the a_1 slope of the linear trend. Since the significance level *F* is below the assumed value α ($F = 0.0220$), the results are statistically significant for the assumed significance level α (5% chance of error was assumed).

A statistical analysis of the expenditures incurred in 2008–2017 for the implementation of crisis management tasks is then carried out on the basis of the data presented in Table 2.

Table 2.
Expenditures incurred for the implementation of crisis management tasks in the years 2008–2017

Year	Amount of expenses incurred for the implementation of crisis management tasks (in PLN thousand)
2008	6 785
2009	9 244
2010	8 932
2011	9 968
2012	11 751
2013	12 198
2014	12 638
2015	13 464
2016	12 213
2017	11 481

Source: own elaboration based on the annual budget reports provided by the Council of Ministers for the years 2008–2017.

For the presented data the following values of variables a_0 and a_1 are obtained:

$$\begin{cases} a_0 = 7\ 728.60 \\ a_1 = 570.69 \end{cases}$$

The mathematically determined linear trend function on the basis of the amount of expenditure incurred for the implementation of crisis management tasks in the years 2008–2017, through the applied approximation, takes the formula: $\hat{y}_t = a_o + a_1 \cdot t = 7\ 728.60 + 570.69 \cdot t$ [in PLN thousand].

A graphical representation of the determined development trend function $y = \hat{y}_t$ (the function called Linear) is shown in Figure 2.

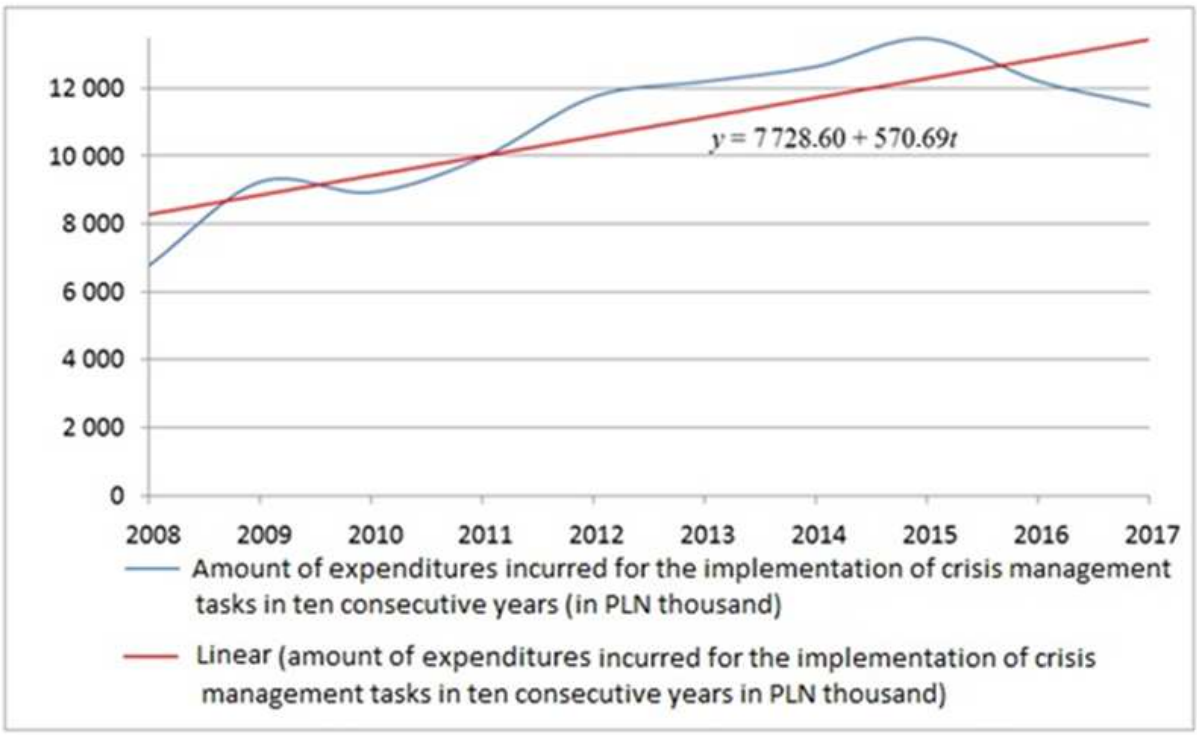

Figure 2. Expenditures incurred for the implementation of crisis management tasks in ten consecutive years (2008–2017) against the background of the linear trend function *y* (in PLN thousand).

Source: own elaboration

The obtained trend function confirms the increase in the amount of expenditures incurred for the implementation of crisis management tasks. Based on the estimated trend function, it can be concluded that these expenditures annually were increased by the average of PLN 570.69 thousand. The theoretical amount of expenditures incurred for crisis management was equal to PLN 7 728.60 thousand in 2007.

The following measures of the degree of alignment were obtained for the trend function $\hat{y}_t = a_o + a_1 \cdot t = 7\,728.60 + 570.69 \cdot t$: $s(\xi_t) = \sqrt{s^2(\xi_t)} = \text{PLN}\,1\,204.29$ thousand, $r(\xi) = 0.11$, $\varphi^2 = 0.30$, $R^2 = 0.70$, $D(a_0) = \text{PLN}\,822.69$ thousand, $D(a_1) = \text{PLN}\,132.59$ thousand and the significance level $F = 0.0026$.

As in the case of expenditure planned in the state budgets, the statistical test of expenditures incurred for the implementation of crisis management tasks proves the assessment of the significance of the a_1 slope of the linear trend function with the assumed significance level ($\alpha = 0.05$) and 8 degrees of freedom, which allows us to confirm the systematic linear trend of the amount of expenditures incurred for the performance of crisis management tasks at the assumed significance level α. This test confirms the second part of

the aforementioned hypothesis, assuming that the funds incurred for the performance of crisis management tasks in the III RP systematically increased in the years 2008–2017. The obtained value of the *t*-statistic (4.30) is greater than the value of the *t*-student's distribution table (2.30), which allows to confirm the significance of the a_1 slope of the linear trend. Since the significance level *F* is below the assumed value α ($F = 0.0026$), the results are statistically significant for the assumed significance level α (5% chance of error was assumed).

Using the comparative method, we can analyse the ratio of expenditure incurred for the implementation of crisis management tasks in the years 2008–2017, up to the amount of expenditures planned for this purpose in state budgets. The research shows that in 2008–2009, 2010–2015 and 2017 expenditure incurred on crisis management was higher than planned in the budgetary acts.

The exception in this regard was 2009, when the amount of funds used for crisis management in the Third Republic of Poland was PLN 2,236 thousand lower than planned in the Budget Act and 2016, when expenditures incurred to perform these tasks were lower by PLN 3 748 thousand than planned (see Figure 3). This situation was due to the fact that in 2009 and 2016 there were no major natural disasters in Poland, which would necessitate intensive crisis management activities.

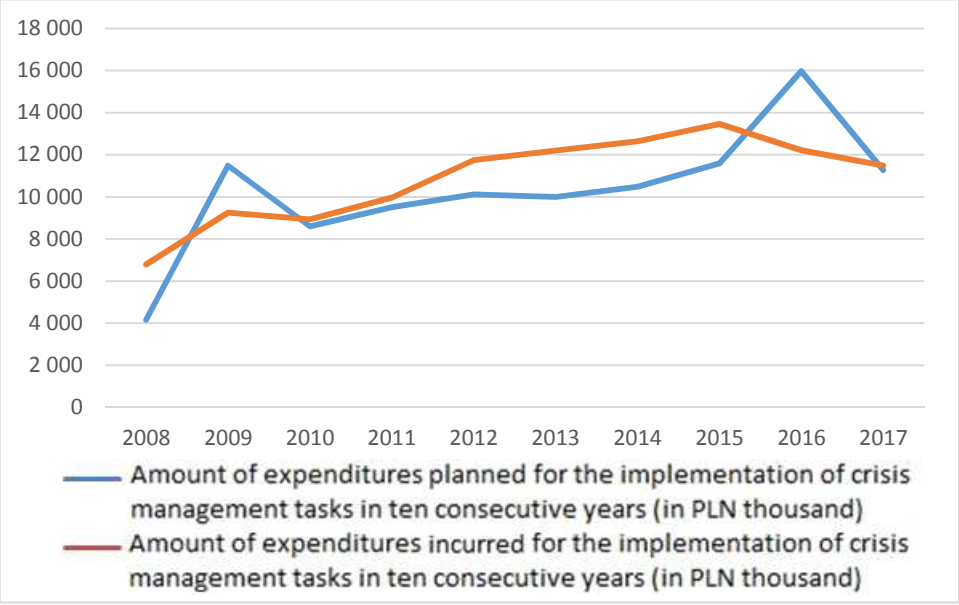

Figure 3. Expenditures planned and incurred for the implementation of crisis management tasks in the years 2008–2017 (in PLN thousand).

Source: own elaboration based on budgetary acts from 2008–2017 and reports on their implementation.

Conclusions

The analyses carried out in this paper allow for a number of conclusions: (1) the amount of expenditures planned in the state budgets for crisis management tasks was systematically increased in the III RP in 2008–2017 (year on year by the average of PLN 686.58 thousand); (2) the funds incurred for the performance of crisis management tasks in the III RP systematically increased in the years 2008–2017 (year on year by the average of PLN 570.69 thousand). Moreover, analyses of the assessment of the significance of the slope of both linear trend functions (for planned and incurred expenditures on crisis management) confirmed the occurrence of the systematic linear trends on the basis of the statistical tests. The research hypothesis formulated in the introduction of this thesis was therefore positively verified.

Research on the financing of the crisis management system in the Third Republic of Poland was deepened by an analysis of the amount of expenditures incurred for the implementation of crisis management tasks in the years 2008–2017, in relation to expenditure planned for this purpose in the budgetary laws. Studies show that in 2008–2009, 2010–2015 and 2017 expenditure incurred for crisis management was higher than planned in the budgetary laws (except in 2009, when the amount of funds used for crisis management in the Third Republic was PLN 2 236 thousand less than planned in the Budget Act and 2016, when expenditures incurred to perform these tasks were lower by PLN 3,748 thousand than planned – this was due to the fact that in 2009 and 2016 no major catastrophes occurred in Poland, which could have led to the need for intensive crisis management activities).

From the statistical point of view, the analyses carried out in this thesis show that the increase in the amount of expenditures planned in the state budgets for the performance of crisis management tasks, as well as the funds incurred for achieving this objective in the III RP in 2008–2017 were linear trends, which proves that the crisis management process has been increasingly important for state institutions. This approach is in line with the current trend of increasing the importance of crisis management, which involves extending the catalog of non-military threats (including new threats such as terrorist attacks). The quantitative and qualitative increase in threats forces state institutions not only to increase the scale of expenditures for crisis management tasks, but also to contribute to the development of regulations, including the creation of comprehensive crisis management systems to increase the effectiveness of the actions taken (integrated with international crisis management systems – in particular with the European Union and NATO systems – thus taking into account Poland's obligations resulting from membership in these international organizations).

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