QUARTERLY JOURNAL
OECONOMIA
COPERNICANA

2014 VOLUME 5 ISSUE 4, DECEMBER

p-ISSN 2083-1277, e-ISSN 2353-1827
www.oeconomia.pl

Galchinsky, L. (2014). Model of Evaluation of the Management Effectiveness of State Corporate Rights of Industrial Enterprises in Ukraine. *Oeconomia Copernicana*, 5(4), pp. 75-94, DOI: http://dx.doi.org/10. 12775/OeC.2014.028

Leonid Galchinsky[*]
National Technical University of Ukraine, Ukraine

Model of Evaluation of the Management Effectiveness of State Corporate Rights of Industrial Enterprises in Ukraine

JEL classification: *B21; C14; C51*

Keywords: *evaluation of enterprises; efficiency of management; integral performance criteria; ordinal regression*

Abstract: *This paper proposes a method for increasing the efficiency of state corporate rights management of industrial enterprises by clarifying the evaluation of the efficiency of their management. This method is a model of comprehensive evaluation of enterprises on the basis of data that resulted in the reporting documents. Three groups of indicators were adopted and included: commercial, non-commercial and managing criteria. Integral performance criterion is the weighted sum of those three groups. Model performance evaluation was built using ordinal regression. Based on this model estimate the efficiency of state corporate rights management of industrial enterprises was obtained more accurately, providing a wide range of estimates.*

Date of submission: March 2, 2014; date of acceptance: June 15, 2014

[*] Contact: hleonid@gmail.com, National Technical university of Ukraine «KPI», Faculty of Management and Marketing, Department of mathematical modelling of the economic systems, Boulevard of Victory 37, Kyiv, Ukraine.

Introduction

The real transition of Ukraine from a planned to a market system of management turned to be a difficult and painful process. Transformation of the institution of ownership, change of organizational and economic forms of enterprises as a whole have brought positive changes in the behavior of economic communities in terms of market relations. However, the process of transformation was accompanied by array of problems, among them one of the most difficult was a low economical effectiveness of the corporate sector of economy, which emerged as a result of transfer of large and medium-sized enterprises to joint-stock companies. Except for the unresolved institutional problems peculiar to the transition period, Ukraine faced the problems in corporate governance relating to the division of property rights, corporate law deficiencies and a lack of objective evaluation of the management effectiveness of state corporate rights.

In this paper we propose a method of improving the management efficiency of state corporate rights of industrial enterprises by improving the assessment of efficiency of its management.

The statistical data given by State Statistics Committee of Ukraine indicate that the process of privatization of economic entities has become stabilized in recent years, the combined share of enterprises with state and municipal property is equal to about 7% (new.spfu.gov.ua/ukr/reports/analit/Dovidka.pdf).

However, the statistics of corporate operations of the companies with state holdings of shares suggests that public authorities responsible for the management of state corporate rights need to improve management by joint-stock companies with the participation of the state, implementing new methodologies for evaluating the effectiveness of managemnet of state corporate rights.

The relevance of the chosen research topic is determined by the fact that the state, in spite of a large-scale privatization carried out in Ukraine, still remains the biggest owner and through various management mechanisms of its property has a significant influence on the system of national economy. The objective necessity of improving the efficiency of management of state-owned enterprises with the participation of the state is related to the need to provide a wide range of economic and socially-oriented problems. One of the priorities in this direction is to find methods of objective assessment of the management efficiency of public holding of shares for different groups of enterprises. To calculate this indicator, the level of corporate governance in the company with state participation in the authorized capital of the economy needs to be defined. Such evaluation is aimed at

determination of the quality level of corporate management of enterprises with the participation of the state in collective investment fund of economic society.

Statement of the problem

Like any other shareholder, the state is the owner of the shares represented in the stock capital, but cannot manage the means of production of the stock corporation as a whole, being only entitled to control the reproduction of the real capital in the company as well as the direction of development pro domo sua. It is possible, provided there is a control packet of shares. As a shareholder of a separate joint-stock company, the state, possessing a control packet of shares and exercising regulatory functions, pursues the objective to carry out the tasks arising from the need to ensure social reproduction. At the same time, being a shareholder, the state cannot defend its own corporate rights. Thus, the state as the owner of the share capital performs two functions at once: it is the regulator of social reproduction and an ordinary shareholder, owner of corporate rights. This yields the proposition that the main objectives of the management of the state corporate rights (shareholdings owned by the state) are the following:

- to ensure social reproduction and increase non-tax revenues of the state budget by means of dividends or other forms of income appropriation based on the effective management of the stock ownership;
- to maximize the value of shares and increase the profit appropriated by the state shareholder in various forms with the strict implementation of its regulatory function in accordance with the tasks assigned individually.

The assessment of the effectiveness of management of enterprises with state corporate rights is quite a complex and ambiguous process. The calculation of integrated financial performance rates on the basis of the actual methods adopted by the state authorities of Ukraine and as the result adoption of decisions on the management of enterprises indicates that the results of evaluation using these methods are not informative enough for creditors, potential investors, government bodies and need to be improved (Home Site "Legislation of Ukraine", 2013).

In the most general form, the objective function of management of state property share fraction can be formulated as the simultaneous provision of non-profit social tasks and economic realization of shareholder ownership (Tarash, 2005) The multi-purpose nature of the function of shareholder management assumes multicriteria evaluation and, therefore, the use of the

integral criterion of efficiency. Thus, it requires the definition of local criteria for assessing the achievement of certain goals and the method of its mathematical"convolution" into the integral criterion. At different periods of historical development of corporations there was a change in the paradigm to assess their efficiency.

Nowadays, the candidates competing for the role of indicator of efficiency of management are balanced score card (BSC), which is "management equivalent of the stakeholder theory (Jensen, 2001), company's value maximizing based on value-based management (VBM), determined by the potential discounted cash flow of the company in conjunction with short-term indicators, reflecting the creation of value–economic value added (EVA), market value added (MVA), cash value added (CVA), shareholder value added (SVA), etc.). This article does not attempt to clarify the debate and battle of ideas in the field of research of the benefits of a criterion that best reflects the efficiency of the business. The hypothesis of this research is the assumption that the level of corporate capital management in Ukraine, as well as information support system is not yet on the level that allows to apply the most modern techniques. But the evaluation technique of management efficiency of enterprises with state corporate rights that has been existing for a long time does not qualify the management efficiency accurately.

The subject matter of this research is to propose such a technique of evaluation of management of state property without changing information database that not only takes into account the local criteria proposed in the existing techniques, but also improves the very evaluation technique.

The information database for determining the assessment of management effectiveness of state property is presented by the indicators of financial plans of state property, as well as its financial and statistical reporting.

Definition of assessment models

To obtain an objective assessment of management of the state corporate rights we have identified a number of the most relevant, in our opinion, indicators: liquidity, solvency, profitability and asset value.

An important part of the mechanism of effective management of industrial enterprise and its structure is the methodology of its analysis. The analysis of capital management of a public enterprise is the process of evaluation of key performance indicators for its functioning in order to identify reserves for the further increase in this efficiency. For this reason, the analysis of relative financial indicators is carried out.

Financial and economic indicators are considered to be relative values, which give the opportunity to compare and evaluate the effectiveness of different companies in terms of volume of output of production, number of full-time employees, etc. The result of this analysis was to determine the relative indicators that systematically characterize the impact of the use of the company's capital as a whole and its separate elements.

Estimating model definition

In order to get the objective estimate of state corporate rights management, we have determined the set of indicators which, as we suppose, are the most relevant for this purpose: liquidity, solvency, profitability and value of enterprise's assets.

The important part of efficient management of the enterprise and its structure is its analysis methodology. An analysis of public enterprise's capital management is the process of evaluating key indicators of its operation in order to identify further reserves for increasing its efficiency. Analysis of relative financial indicators is performed on this purpose.

Financial and economic indicators are considered in relative terms which allow comparing and estimating the efficiency of operating of differently-sized enterprises. As the result of this analysis the relative indicators, systemically characterizing the use of enterprise's capital and its particular elements, were determined. The composition of local criterions for performing the integral estimate of the efficiency of state property management is shown in Table 1.

Much attention in the methodology is given to indicators measuring the efficiency of management, namely, the cost of capital. As the majority of experts in corporate management note, the main goal of many industrial enterprises with the share of state capital is increasing capitalization that is the value of assets (Copeland *et al.*, 2000; Voronkova, 2008). Therefore, one of the most important prerequisites for effective capital management is to estimate its value. The cost of capital is the price the company pays for his involvement from different sources. Cost of capital is the amount of fixed payments, which should be provided by the company to its owners (investors, creditors) with the amount of capital involved.

Table 1. The types of local criterions of state property management efficiency

	Criteria
1. Financial and economic criteria	
1.1	Ratio of fixed assets depreciation (K_1)
1.2	Return on investment (K_2)
1.3	Cash ratio (K_3)
1.4	Return on assets ratio (K_4)
1.5	Quick liquidity ratio (K_5)
1.6	Working capital ratio (K_6)
1.7	Coverage ratio (K_7)
1.8	The volume of net income (revenue) from the sale of goods (works, services) (K8)
1.9	The volume of net income (loss) (K_9)
	2. Non-commercial criteria
2.1	Utilization of labor resources (K_{10})
2.2	Profit ratio of labor (K_{11})
3. Management performance criteria of plant facilities	
3.1	Dividend capacity factor (K_{12})
3.2	Weighted average cost of company's capital (K_{13})

Source: own study on the basis of http://www.spfu.gov.ua.

The weighted average cost of capital is the minimum amount of return that investors expect to get from their investments. The estimated weighted average cost of capital is the main indicator of criterial evaluation of capital management efficiency. This figure is evaluated at the enterprise and it is influenced by many factors, partly:

- the average interest rate in the financial market;
- the availability of different financial sources (bank loans, commercial loans, private issue of shares and bonds, etc.);
- sectoral operational features that determine the duration of the operating cycle and the level of liquidity of assets employed;
- The ratio of the volumes of operational and investment activities;
- the enterprise's life cycle;
- the level of risk undertaken by operating, investing and financing activities

The formalization of the integrated evaluation of the management effectiveness state corporate rights

Basing on the performed analysis the integral criterion can be represented in a general form:

$$P_i = f(P_{еф}, P_c, P_y), \quad (1)$$

where:

P_i – integral indicator of state corporate rights management efficiency estimate;

f – certain function;

$P_{еф}$, P_c, P_y – estimates of financial and economic, social and managerial indicators of management efficiency;

Later we present the structure of each of the P-indicators and more detailed model structure.

Let us consider the financial and economic component of the given model (economic criterions of efficiency)

Equation (1) is a functional model which can be built basing on statistical data of homogeneous industrial objects' operation:

$$P_{еф} = P_{еф}(f_2(K_1, K_2, \ldots K_7)) \quad (2)$$

where:

f_2 – function, showing dependence of efficiency from variables;

$P_{еф}$ – overall estimate of financial and economic criterions;

$K_1 – K_7$ - financial and economic criterions.

Let us consider the non-commercial component of the given model (social criterions of efficiency).

$$P_c = P_c (f_3 (K_{10}, K_{11}) \quad (3)$$

where:

f_3 – function, showing dependence of efficiency from the value of partial criterions;

P_c – overall estimate of non-commercial criterion;

K_{10}, K_{11} – non-commercial efficiency criterions.

Let us consider the managerial component of the given model (managerial criterions of efficiency).

$$P_y = P_y (f_4 (K_{12}, K_{13}) \quad (4)$$

where:

f_4 – function, showing dependence of efficiency from the value of local criterions;

P_y, – overall estimate of non-managerial criterion;

K_{12}, K_{13} – managerial efficiency criterions.

In the given problem functional dependence needs to be specified, as this is the only way to get the quantitative estimates of the efficiency.

For there is no a priori information on the above function, implementation of research problems implies a choice of such functional dependence that would allow getting efficiency estimate with an acceptable accuracy. Preferably, this function would capture hidden patterns and would not be too complicated to have an easy interpretation. Practice shows that simple linear function often allows getting suitable problem solution. It is well known that its use is easy enough. This dependence is shown below:

$$P_i = \alpha_1 P_{e\phi} + \alpha_2 P_c + \alpha_3 P_y , \quad (5)$$

where:

$\alpha_1, \alpha_2, \alpha_3$ – weighting coefficients for determining the overall efficiency,

$P_{e\phi}$, P_c, P_y – the estimates of financial and economic, non-commercial and managerial indicators.

There are specific conditions for the values of α_i (и=1,3):

$$\text{a) } \alpha_1 + \alpha_2 + \alpha_3 = 1, \qquad (6)$$
$$\text{b) } \alpha_i > 0$$

Values of weighting coefficients $\alpha_1, \alpha_2, \alpha_3$ have to be chosen by an expert (expert estimating), thus determining the propriety order of each component of integral criterion.

Efficiency's expert estimating

Basing on the proposed scale of management efficiency estimate, the efficiency P_i can be evaluated as in the table below (Table 2).

Table 2. Ordinal scale of management efficiency

Estimate	Parameter (1 to 5)	The overall estimate
Excellent	5	Efficient
Good	4	
Mediocre	3	Satisfactory
Unsatisfactory	2	Inefficient
Poor	1	

Source: own study.

Let us pay more attention to the proposed scale of management efficiency estimating, partly we will consider the financial criterions.

1. Excellent or 5 – the enterprise does not have overdue payables. The commercial criterions estimates (net income, net profit, liquidity ratios, solvency, depreciation, return on assets and activities) are in the normal range. The dividends are paid in the amount not smaller than defined in the financial plan. The asset value is increasing.
2. Good or 4 – the overdue payables of the enterprise are decreasing. The commercial criterions estimates (the ones mentioned above) are likewise in the normal range. The amount of dividends paid is slightly smaller than defined in the financial plan. Asset value is not increasing.

3. Mediocre or 3 – the overdue payables are decreasing. More than 4 of all commercial criterions estimates are in the normal range. Dividends are not paid in the amount defined in the financial plan.
4. Unsatisfactory or 2 – during a covered period an enterprise does not have or reduces the volumes of debt, on other payments in a budget and other non-budgetary payments, coefficient of ROA of activity of enterprise less than, that 0,01. The enterprise's amount of losses is reducing.
5. Poor or 1 – over the given period the company does not reduce neither overdue payables nor unsatisfied payments to the budget or non-budget payments. The company's return on assets ratio is much less than 0.01. The enterprise's amount of losses is not reducing.

The use of given methodic implies involving some number of experts and organizing the estimating procedure in order to make the specific estimate of an actual enterprise. The estimating has to be performed frequently enough (at list once in a quarter) over the big number of enterprises. Naturally this leads to high complexity and expensiveness of the procedure, and makes it necessary to look for the alternative methodic of efficiency estimating.

The essence of the method proposed in this study is in a joint expert examination of integral efficiency for some selection and estimating of partial indicators of enterprise's activity, which were represented above. In case of obtaining the stable dependence of integral efficiency from the set of partial indicators on some reliable data sample, the integral estimate can be calculated basing on the report data in the future.

In order to obtain the expert estimates, an anonymous survey of experts was used, followed by a test of consistency. The coefficient of variability did not exceed 0.2.

With the help of expert estimates the values of integral efficiency criterion were determined on the given scale for the set of Ukrainian machine-building enterprises for the period from 2005 to 2009 on a quarter bases.

Constructing of the model of integrated estimation

In order to estimate $P_{еф}$ objectively, a concrete dependence between activity indicators and the set of financial and economic efficiency criterions has to be built.

$$P_{e\phi} = \sum_{i=1}^{7} Ki * \beta i \quad , \tag{8}$$

where:

$P_{e\phi}$ – the estimate of financial and economic criterions;

K_1 - K_7 – local criterions displayed in table 2;

β_1 - β_7 – weighted coefficients of the commercial indicators influence.

$$P_c = \beta_8 K_8 + \beta_9 K_9 \, , \tag{9}$$

where:

P_c – the estimate of noncommercial criterions;

K_8 , K_9 – local criterions displayed in table 2;

β_8, β_9 – weighted coefficients of the noncommercial indicators influence.

$$P_y = \beta_{10} K_{10} + \beta_{11} K_{11} \, , \tag{10}$$

where:

P_y – the estimate of managerial criterions;

K_{10} - K_{11} – local criterions displayed in table 2;

β_{10} - β_{11} – weighted coefficients of the managerial indicators influence.

Then the integral indicator P_i will be as follows:

$$P_i = \sum_{i=1}^{3} \varphi ij \, , \tag{11}$$

where:

P_i – integral indicator as weighted sum of the partial criterions;

φ_{ij} – reduced coefficients;

α_j, β_i – weighting coefficients;

$\varphi_{ji}=\alpha_j*\beta_i$ (j=1,3).

With sufficient statistics, this problem reduces to the construction of well-known multivariate regression, which is based on the method of least squares (OLS).

The constructing of the estimation of management efficiency based on the multivariate linear regression

Analysis and estimate of management efficiency is based on the real data of financial reporting of Ukrainian machine-building enterprises from 2005 to 2009 (Reports and FAQs, 2011).

As a result of the preliminary analysis of the control sample of actual data two variables (K_8 and K_9) were excluded from further consideration as they cannot be scaled. Moreover, K_9 representing net profit correlates strongly with profitability ratio (K_4) and also is fairly correlated with the set of some other local criterions.

In order to evaluate the OSC a special software package SPSS was applied as it has the corresponding procedure built-in. Analysis of the resulting regression dependence properties shows significant but insufficiently high Pearson correlation dependence with value at 0.45 (Table 4). This value is high enough to claim that there is a certain connection between the values of integral indicator and the set of local indicators, but it is not high enough for achieving the acceptable accuracy in calculating the integral estimate basing on the local indicators.

Table 4. Standard deviations

Pearson's correlation coefficient	R=.45
The value of Fisher criterion	F(9.168)=4.7658 p<.00001
Standard error	1.4587

Source: own calculations

Analysis of the coefficient estimates for the eleven independent variables showed that only 4 of the 11 indicators are of satisfactory assessment by the standard deviation. Besides, correlation matrix shows dependence between independent variables. This means that the obtained dependence is not just inaccurate, but also unreliable.

So the attempts to build a simple model of estimating the efficiency of corporate management basing on the plain multivariate linear regression were not successful. The reasons of the failure include a number of factors, such as:

- A significant deviation of the distribution function of the regressors from the normal distribution function;
- regressors intercorrelation.

But the main reason of the failure in building the regression is that the measurement scales of endogenous and exogenous variables are different by their nature.

The peculiarity of this regression lies in the fact that for estimating the parameters independent (endogenous) variables have to be taken from statistical reports, while the efficiency, which is an exogenous variable, has to be estimated by experts. This raises the question about the adequate choice of regression dependence. The question itself is the following: which scale is adequate for estimating both incoming (i.e. statistical data) and outgoing (expert estimated) data?

The constructing of the estimation of management efficiency basing on the ordinal regression

Since multivariate linear regression cannot provide the acceptable solution, a new adequate approach has to be worked out. Such an approach exists and it is represented in generalized additive models (hereafter GAM). GAM is a generalization of the multiple regressions. As in the linear regression model to predict the dependent variable Y, in additive models instead of common coefficients for each predictor a certain function, allowing foreseeing the dependent variables value with more accuracy, is evaluated.

A generalized linear model differs from a general linear model, whose particular case is a multiple regression, in two main points:

Firstly, distribution function of the dependent variable can be non-Gaussian and is not necessarily continuous. Secondly, the values of dependent variable are formed as a linear combination of regressors, which are connected (linked) with the dependent variable through the link function.

The first step for transition to GAM was to perform the scaling of variables-regressors. According to the definition, scaling is the operation of ordering the underlying empirical data by translating them into bar graph evaluation. In the process of ordering each element of the sample is provid-

ed with a special score (LAMP LIFE index), which sets the position of the observed result on an interval scale (Naresh & Malhotra, 2005).

Local values of the efficiency can be estimated according to the certain interval scale of management efficiency estimating, where the efficiency criterions have their standard values displayed in Table 3.

Table 3. Standard values of coefficient by the efficiency scale

Indicators	**Standard values**				
	Excellent or 5	**Good or 4**	**Mediocre or 3**	**Unsatisfactory or 2**	**Poor or 1**
Ratio of fixed assets depreciation (K_1)	0.6	0.7 – 0.8	0.82 – 0. 85	0.83 – 0.99	1
Return on investment (K_2)	0.05 – 0.09	0.03 – 0.06	0. 00 – 0.02	0	- 0.1
Cash ratio (K_3)	>=0. 2	0.15 – 0.2	0.1 - 0.15	0.05 – 0.1	0
Return on assets ratio (K_4)	0.1	0.2 – 0.8	0	0.9 – 0.1	- 0.1
Quick liquidity ratio (K_5)	1	0.5	0.7 – 0.6	0.9 – 0.8	0.5
Working capital ratio (K_6)	0.5 – 1	0.3 – 0.5	0.2 – 0.3	0.1 - 0.2	0.1
Coverage ratio (K_7)	2-2.5	2.0 - 1.7	1.4 – 1.7	1.1 – 1.4	1.1 or less
Utilization of labor resources (K8)	Growing tendency			Decreasing tendency	
Dividend capacity factor (K9)	Growing tendency			Decreasing tendency	
Dividend capacity factor (K_{10})	Depends on the profit				
Weighted average cost of company's capital (K_{11})	Growing tendency			Decreasing tendency	

Source: Chikhacheva (2010).

In the general linear model the response variable Y is linearly associated with the values of X variables, while in the generalized model dependence is following (McCullagh, 1980):

$$Y = g(b_0 + b_1*X_1 + ... + b_m*X_m), \quad (12)$$

where *g(…)*-function. The inverse function of g(...), let us call it $g_i(...)$, is called the linked function; so that:

$$g_i(\mu) = b_0 + b_1*X_1 + ... + b_m*X_m, \quad (13)$$

where μ denotes the expected value of Y.

Instead of evaluating the separate parameters (such as regression scales in multiple regression), in GAM the non-parametric function, linking the determined variables values with the values of predictor, is searched. The choice of function is an important element for building the GAM. The recommendations on the choice of the link function are given in the table below (Bühl & Zöfel, 2007).

Table 4. Link functions

Linked function	Mathematical expression	Preferable to the use
Logit	In (p/(1-p))	Uniformly distributed categories
Complementary log-log	ln(-ln(1-p))	Higher categories are represented more strongly
Negative log-log	-ln(-ln(p))	Lower categories are represented more strongly
Probit	The inversion of the cumulative standard normal distribution	Normally distributed frequency
Cauchit	tan(7t(p-0.5))	Appearance of the peak values

Source: Bühl and Zöfel (2007).

The evaluation of optimal estimates is much more complicated compared to the OLS. But nowadays there are special statistical packages able to solve such problems on software market. In particular, statistical package SPSS has special module Ordinal Regression (Menard, 2001), helping systematically perform the procedure of obtaining the linear regression, including the link function choice. Statistical basis for the calculations was represented by the same report data regarding machine-building industry of Ukraine which was used for OLS method, and the array of independent enterprise's estimates provided by experts within the proposed scale. Before performing the procedure Ordinal Regression, a conversion of the efficiency from scalable into ordinal scale was made.

The results for estimates obtained with the given method (ordinal regression) are much better compared to the estimates obtained with OLS method. The best link function turned out to be Logit function (Link function: Logit) .

In order to check whether the observed frequencies significantly differ from the expected ones obtained with the help of the model, a chi-squared Pearson test was made. Its results indicate slight difference of values (p = 0.0), which means that a high level of approximation was achieved (Table 5):

Table 5. Measures of harmonization in different methods

Method	Value
Cox and Snell	0.767
Nagelkerke	0.804
Mcfadden	0.472

Source: own calculations.

Out of three harmonizing measures, measure calculated by Nagelkerke method is a measure of certainty, which indicates the destiny of percentage variance, which is explained by an ordinal regression. In the given example variance estimate is at 80.4% that is high enough. Both Kendall and Spearman correlation (Kendall, 1990) (table 6) show that the connection level between given and foreseen values is high – about 80%.

Table 6. Correlations for ordinal regression model

Method	Method name	Coefficients	Eff (integral efficiency indicator)	Evaluated values of regressors
Kendall	Eff(integral efficiency indicator)	correlation coefficient	1.00	0.798
		Sig. (2-tailed)	.	0.00
		N	45	45
	Evaluated values of regres-sors	Correlation Coefficient	.798	1.00
		Sig. (2-tailed)	.000	.
		N	45	45

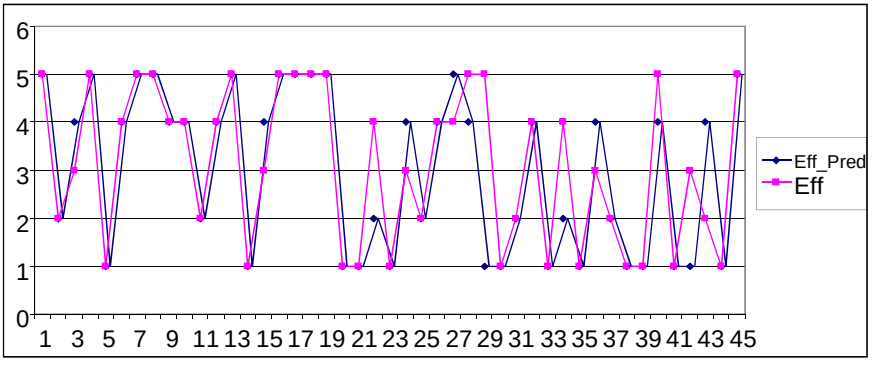
Table 6 continued

Method	Method name	Coefficients	Eff (integral efficiency indicator)	Evaluated values of regressors
Spearmen	Eff(Evaluated values of regressors)	Correlation Coefficient	1.00	.848
		Sig. (2-tailed)	.	.00
		N	45	45
	integral efficiency indicator	Correlation Coefficient	.848	1.00
		Sig. (2-tailed)	.000	.
		N	45	45

Source: own calculations.

The testing and ex-ante evaluation of the model accuracy was carried out on the data sample for the industrial enterprises. This data were not part of the set on which the model was built. Figure 1. shows good exactness of evaluation efficiency expected on this model, using data of accounting reports.

Figure 1. The graph of visual correspondence between given and predicted values of integral efficiency indicator(efficiency of ordinal scale for set data sample for the industrial enterprises)



Source: own calculations based on http://www.spfu.gov.ua.

Comparative evaluation of the efficiency of the three members of the control group of companies, "TURBATOM", "AMZ", "Meridian", whose data were not used to build the model , but also subject to analysis and evaluated by experts. These companies belong to the engineering industry of Ukraine and entered into the State Register. For objective verification of the adequacy of the model were selected by representatives of different groups of performance: high, mediocre and low. Data on their activities owned State Property Fund of Ukraine. The calculations were carried out using the efficiency model constructed by the standard method (Bühl & Zöfel, 2005). As can be seen in 35 cases out of 45, the estimates calculated by model and designed by experts evaluation coincide. In 10 cases (sprayed gray background) were differences in expert and model estimates , and in 8 cases, evaluation is not only coincide on one point , and only two cases are not the same two points.

Table 7. The comparison of evaluations of efficiency

Companies		**Estimates of efficiency (C – calculated, E - expert)**															
		1	**2**	**3**	**4**	**5**	**6**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
"TURBATOM"	C	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
	E	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5
"AMZ"	C	4	4	4	4	3	4	3	4	4	4	4	4	4	3	3	5
	E	4	4	4	4	4	2	4	4	4	4	4	3	4	3	3	4
"Meridian"	C	2	1	1	2	2	2	1	1	1	1	1	4	2	2	3	1
	E	2	1	1	3	2	3	1	1	1	1	1	2	2	2	1	1

Source: own calculations based on http://www.spfu.gov.ua.

That is, by this method can reliably assess the effectiveness of companies management.

Conclusions

Thus, model was built that allows to evaluate the management effectiveness of the enterprise for homogeneous group (machine building) accurately and with a high level of reliability, using accounting data businesses. Model estimates were obtained by developing ordinal regression. This model has provided a stable and reasonably accurate of the relationship between the integral efficiency of a control and reporting indicators of enterprises. Based on this model a method can be proposed for objective

evaluation of the effectiveness of corporate rights management companies of the group (for example, mechanical engineering), which will improve the quality of the government decisions. Since the proposed model provides a more accurate assessment of a broader range than the existing one, it will take more adequate solutions for the management by the companies with government participation, increase management efficiency.

Given the characteristics of the formation and management of the corporate sector of Ukraine, state bodies should improve management corporate rights at the system of joint-stock companies with state participation. It is necessary to introduce innovative methodologies, including an evaluation of the efficiency of enterprises with state participation.

The model described in this article can serve as a element system for decisions on management of the companies with government participation. Development and implementation of such a system will demand to conduct research in the direction of further improvement of the model, data processing and possible formalization of the process of decision making.

References

Access to Public Information: [Electronic resource] //State Property Fund of Ukraine. Retrieved from http://www.spfu.gov.ua/_layouts/SPFUSiteDefinition/AccessToPublicInformation.aspx (15.02.2013).

Bühl, A. & Zöfel, P. (2005). *Einführung in die moderne Datenanalyse unter Windows. 9. Auflage*. München: Pearson Studium.

Legislation of Ukraine: Official website of the Verkhovna Rada of Ukraine. Retrieved from: http://zakon4.rada.gov.ua/laws/show/z0477-09 (15.02.2013).

Reports and FAQs, State Property Fund of Ukraine (2010). Retrieved from: http://www.spfu.gov.ua (31.12.2010).

The management of state corporate rights: State Property Fund of Ukraine. Retrieved from: http://govuadocs.com.ua/docs/255/index-158650-1.html?page=7 (15.02.2013).

McCullagh, P. (1980). Regression models for ordinal data (with discussion). *Journal of the Royal Statistical Society-Series*, 42.

Menard, S. W. (2001). *Applied Logistic Regression Analysis*. New York: Sage Publications.

Jensen, M. C. (2001). *Value maximization, Stakeholder theory, and the Corporate objective function*, The Monitor Group and Harvard Business School.

Malhotra, N. (2007). *Marketing Research: An Applied Orientation.* Prentice-Hall, Inc.

Kendall, M. G. (1990). *Rank Correlation Methods.* London: Edward Arnold.

Voronkova, A. E. (Ed.) (2008). *Diagnostics of the state of enterprise : theory and practice*. Kharkiv: Economical University Press (Ukrainian).

Copeland, T., Koller, T. & Murrin, J. (2000). *Measuring & Managing the Value of Companies*. New York: John Wiley & Sons.

Nedoroslev, S. G. (2006). *Features of joint-stock companies with state participation. Ekonomika Rossij: tendencii, perspektivy,vozmozhnosti*. Moskov: Inion Ran (Russian).

Povahznyi, A. S. (2003). Estimation of financial potential of corporation. *Regionalnye perspektivy*, 5(6) (Russian).

Povahznyi, A. S. (2003). Estimation of financial potential of corporation. *Regionalnye perspektivy*, 5(6) (Russian).

Tarash, L. I. (2005). Economic realization of joint-stock property in industry. *Ekonomika promyslovosti*, 1. (Ukranian).

Chikhacheva, J. S. (2010). A management constitutional corporate laws is in Ukraine. *Aktualni problemy ekonomiky*, 4 (Ukranian).