Major Models of Economic Security Evaluation at Enterprises and Their Applicability to Telecommunication Companies

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Abstract:

Purpose: This article aims at synthesizing existing research areas and approaches to assessing the level of economic security at the corporate level and adapt the results to the specifics of the telecommunication's industry. Effective study of the problem of economic security is possible only in case of the combination of distribution, market, and institutional paradigms, based on the combination of methodological and empirical-quantitative approaches.

Design/Methodology/Approach: The article meaningfully describes the main approaches to the definition and methods for assessing the economic security of enterprises, as well as the applicability of these methods to Russian telecommunication's companies. Based on this analysis, strategic directions to ensure the economic security of modern Russian telecommunication's enterprises have been determined.

Findings: Four strategic directions can be identified to improve economic security: improving telecommunication and information technologies; creating and selling new telecommunication products and services; improving business processes; increasing energy efficiency and production ecology.

Practical Implications: The results of the analysis can be used to determine the main directions of ensuring the economic security of a telecommunication's company.

Originality/Value: The originality of the authors' approach is to develop and test the conceptual approach to assessing the economic security of corporate entities and the opportunity for its industry adaptation to the features and business processes of specific types of economic activity.

Keywords: Economic security, telecommunication's industry, logistic models, MDA-models, ranking models.

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1. Introduction

At the current moment, there are many scientific schools in economics dealing with the problem of economic security. The established views on this issue can be divided into three areas: distribution, market-competitive and institutional. The distribution concept is based on forecast calculations in the framework of the reproduction approach when using the current state to meet social needs (Magomedov, 2012). In the framework of the market concept, the phenomenon of economic security is viewed from the point of view of the marketing approach, where economic security is considered as ensuring sales of products, which guarantees the existence of an economic system in the long term (Ganus, 2009).

The third direction is institutionalism, an economic theory focused on economic institutions ("rules of the game") (Tambovtsev, 2009; Volchik, 2007). However, at the same time, this paradigm is largely divorced from real economic processes in which the relationship between agents is handled quantitatively. Therefore, it is logical to argue that effective study of the problem of economic security is possible only with a combination of distribution, market and institutional paradigms.

2. Major Models of Economic Security

It is feasible to reveal the most famous models for evaluating economic security and their applicability to telecommunication's companies. Two largest telecommunications companies in Russia, namely Rostelecom PJSC (the leading fixed-line company), Mobile TeleSystems PJSC and Megafon PJSC (two leading mobile companies) are considered as estimated companies. These models can be in the form of logistic regression (logit-model) or simple regression (MDA-model).

The first scholar to propose a logistic regression method to assess the company's economic security was George Olson in 1980. This model is provided below.

$$P = \frac{1}{1 + e^{1.32 + 0.407K_1 + 6.03K_2 + 1.43K_3 - 0.0757K_4 + 2.37K_5 + 1.83K_6 - 0.258K_7 + 1.72K_8 + 0.521K_9}} \tag{1}$$

where P – probability of bankruptcy (takes a value in the range from 0 to 1); K_1 – the enterprise's size factor; K_2 – the loan capital ratio; K_3 – the share of the company's working capital; K_4 – the ratio of the company's current debt to its current assets; K_5 – company's asset profitability; K_6 – the ratio of the company's net working capital to total debt; K_7 – a dummy variable (equal to 1 when the company's net income is negative or equal to 0 for the last 2 years, if the value is different); K_8 – a dummy variable (equal to 1, if the current debt of the company exceeds its current assets or is 0, if not); K_9 – the ratio of change of enterprise's net income for the last two years (Olson, 1980).

Another model is the Joo-Ha three-factor logit model developed on the basis of statistics for 46 South Korean companies. The economic security assessment is as follows.

$$P = \frac{1}{1+e^{-1,1062K_1+0,00682K_2+0.1139K_3}} \tag{2}$$

where P – probability of bankruptcy (takes a value in the range from 0 to 1); K_1 – the ratio of interest payable to revenue; K_2 – the ratio of the amount of profit before tax to the total amount of the company's liabilities; K_3 – the ratio of company revenue to receivables (Aleksandrova and Proskurina, 2014).

There is also a more modern logit model for the Russian economy. It consists of 5 main coefficients, which were selected using correlation analysis (Zhdanov, 2011).

$$P = \frac{1}{1+e^{-4,32+1,25K_1+0,12K_2+0,07K_3+0,34K_4+2,17K_5}} \tag{3}$$

where P – probability of bankruptcy (takes a value in the range from 0 to 1); K_1 – the profitability ratio of company's current assets; K_2 – the company's self-financing ratio; K_3– the ratio of company's mobile and immobilized assets; K_4 – the company's asset turnover ratio; K_5 – the company's current liquidity ratio. According to this model, the probability of bankruptcy of Rostelecom PJSC, MTS PJSC and Megafon PJSC is calculated below. The results are introduced in Table 1.

Table 1. *Economic security evaluation at Rostelekom PJSC, MTS PJSC and Megafon PJSC for 2015, according to Zhdanov model (based on financial statements of companies)*

Indicator	Value of the indicator		
	Rostelekom PJSC	Megafon PJSC	MTS PJSC
K_1 – the profitability ratio of company's current assets	0.36	0.75	0.051
K_2 – the company's self-financing ratio	1.036	0.22	14.05
K_3– the ratio of company's mobile and immobilized assets	8.44	0.01	3.14
K_4 – the company's asset turnover ratio	0.506	0.21	0.14
K_5 – the company's current liquidity ratio	0.516	4.7	0.89
P – probability of company's bankruptcy	*0.86*	*0.17*	*0.59*

Thus, the probability of bankruptcy of Rostelecom PJSC is 86% (extremely high), while the probability of bankruptcy of Megafon PJSC is 17 % (low), and the similar indicator of MTS PJSC is 0.59 (high). In turn, E. Altman, after researching data from more than 60 US enterprises, developed a five-factor model for assessing the economic security of an enterprise (Altman, 2000). It is based on the assessment of

the so-called "Z-score" credit index, the calculation formula for which is given below:

$$Z = 1{,}2K_1 + 1{,}4K_2 + 3{,}3K_3 + 0{,}6K_4 + K_5 \qquad (4)$$

where K_1 − the ratio of company's working capital to the amount of its assets; K_2 − the ratio of company's accumulated profit to its assets; K_3− the ratio of income before tax to total assets; K_4 − the ratio of the market value of the company's shares to borrowed funds; K_5 – company's asset turnover. Since the final indicator value for Rostelecom PJSC, Megafon PJSC and MTS PJSC is in the range from 1.2 to 2.9, the enterprises are in the grey zone, the probability of bankruptcy is below average.

Table 2. *Assessment of the economic security of Rostelecom PJSC, MTS PJSC and Megafon PJSC for 2015 according to the Altman model (based on financial statements of companies)*

Indicator	Value of the indicator		
	Rostelekom PJSC	Megafon PJSC	MTS PJSC
K_1 − the ratio of company's working capital to the amount of its assets	-0.12	-0.061	-0.04
K_2 − the ratio of company's accumulated profit to its assets	0.26	0.136	0.012
K_3− the ratio of income before tax to total assets	0.497	0.417	0.027
K_4 − the ratio of the market value of the company's shares to borrowed funds	0.00024	1.053	0.9235
K_5 – company's asset turnover	0.506	0.6297	0.585
Final value (Z)	2.36	2.16	1.2

Davydova-Belikov diagnostic model is one of the first regression models for assessing the economic security of a company developed in the Russian Federation. It has the following form:

$$R = 8{,}38K_1 + K_2 + 0{,}054K_3 + 0{,}63K_4 \qquad (5)$$

where R – the final value; K_1 − the ratio of working capital to assets; K_2 − the ratio of net profit to equity; K_3− the ratio of revenue to assets; K_4 − the ratio of net profit to production costs (Davydova and Belikov, 1999). The coefficient K_1 is of great importance to this model, its relative importance being 8.38. The value of R for Rostelecom PJSC, MTS PJSC and Megafon PJSC needs to be calculted.

Another MDA model uses the tools of factor and correlation analysis, it has been found that 4 indicators play the greatest role in assessing economic security. These indicators were used as the basis for the development of a factor model for

diagnosing the economic security of industrial enterprises. The factor model is presented below:

$$R = 1 - 0{,}98К_1 - 1{,}8К_2 - 1{,}83К_3 - 0{,}28К_4 \qquad (6)$$

where R – the final value; K_1 – the share of company's working capital in the formation of assets; K_2 – the ratio of revenue to company's equity; K_3 – the equity ratio to company assets; K_4 – the ratio of company's net profit to equity.

In addition to the regression models of economic security assessment, there are also rating models. A rating model for assessing the economic security by N.N. Selezneva and A.F. Ionova is introduced first.

$$R = 25\frac{К_1}{3} + 25\frac{К_2}{2} + 20\frac{К_3}{1} + 20\frac{К_4}{0{,}3} + 10\frac{К_5}{0{,}2} \qquad (7)$$

where R – the ranking of the enterprise; K_1 – the enterprise stock turnover ratio; K_2 – the current liquidity ratio; K_3 – the enterprise capital ratio; K_4 – the asset turnover ratio; K_5 – enterprise sales profitability (Selezneva and Ionova, 2013).

Saifullin and Kadykov calculated a comprehensive indicator of assessing the company's economic security for domestic organizations:

$$R = 2К_1 + 0{,}1К_2 + 0{,}08К_3 + 0{,}45К_4 + К_5 \qquad (9)$$

where R – the ranking of the enterprise; K_1 – the ratio of the company's own funds; K_2 – the company's current liquidity ratio; K_3 – the asset turnover ratio; K_4 – the commercial margin indicator; K_5 – the company's return on equity (Troyanovskiy, 2003). It should be noted that the ratio of the company's security with its own funds is the most significant in this model. However, considering innovative industries, which include telecommunications, reliance solely on their own funds is not typical. Therefore, this model is not suitable for evaluating the economic security of telecommunications companies.

Economic security evaluation by A.V. Postushkov's model is produced by the five-factor model:

$$R = 0{,}1К_1 + 2К_2 + 0{,}08К_3 + К_4 + 0{,}45К_5 \qquad (10)$$

where R – the ranking of the enterprise; K_1 – the company's current liquidity ratio; K_2 – the ratio of the company's security with its own working capital; K_3 – the company's equity turnover ratio; K_4 – the company's return on equity; K_5 – the company's sales profitability ratio.

The economic security evaluation according to the Postuskov model has the scope for calculating the onset of bankruptcy up to 6 months (Postushkov, 2007). Table 3 calculates the value of the indicator for Rostelecom PJSC, MTS PJSC and Megafon PJSC in 2015. Since R is less than 1, the state of economic security of the enterprise is low and there is a high risk of bankruptcy after 6 months. It should be noted that the importance of the ratio of the company's own working capital in this model is so high that it eliminates all other factors.

Table 9. *Economic security evaluation of Rostelecom PJSC, MTS PJSC and Megafon PJSC for 2015 according to the Postuskov model (based on the companies' financial statements)*

Indicator	Value of the indicator		
	Rostelekom PJSC	Magafon PJSC	MTS PJSC
K_1 − the company's current liquidity ratio	0.52	0.875	0.894
K_2 − the ratio of the company's security with its own working capital	-3.8	-2.985	-2.864
K_3 – the company's equity turnover ratio	0.51	0.6297	0.141
K_4 − the company's return on equity	0.08	0.276	0.187
K_5 – the company's sales profitability ratio	0.08	0.156	0.021
R – the ranking of the enterprise	-7.48	-5.486	-5.43

A rating model is also analyzed in this paper, its weights selected by the method of expert assessments. As an example, the model of the French scientist J. De Palyan can be considered. This model is also called the credit-men method (Kapanadze, 2012).

$$R = 25K_1 + 25K_2 + 10K_3 + 20K_4 + 20K_5 \qquad (11)$$

where R – the ranking of the enterprise; K_1 − the company's quick liquidity ratio; K_2 − the company's creditworthiness ratio; K_3 – the company's equity immobilization indicator; K_4 − the company's inventory turnover ratio; K_5 – the company's receivables turnover ratio.

The first two indicators K_1 and K_2 have the greatest weight number. It is these indicators that largely determine the final rating indicator. Table 10 calculates the value of the indicator for Rostelecom PJSC, MTS PJSC and Megafon PJSC in 2015. Since the final value of R is greater than 100, the state of the enterprise's economic security does not cause concern. It can be concluded that the implementation of innovative technologies will positively affect the net profit of the telecommunications company. A number of domestic scholars share their view on this conclusion (Ryazanov, 2017).

3. Strategic Directions for Ensuring the Economic Security of Modern Russian Telecommunication Enterprises

Four strategic directions to enhance economic security can be identified with regard to Russian telecommunications enterprises (Figure 1).

Figure 1*. The structure of the main directions of improving the economic security of the Russian telecommunications company (compiled by the authors)*
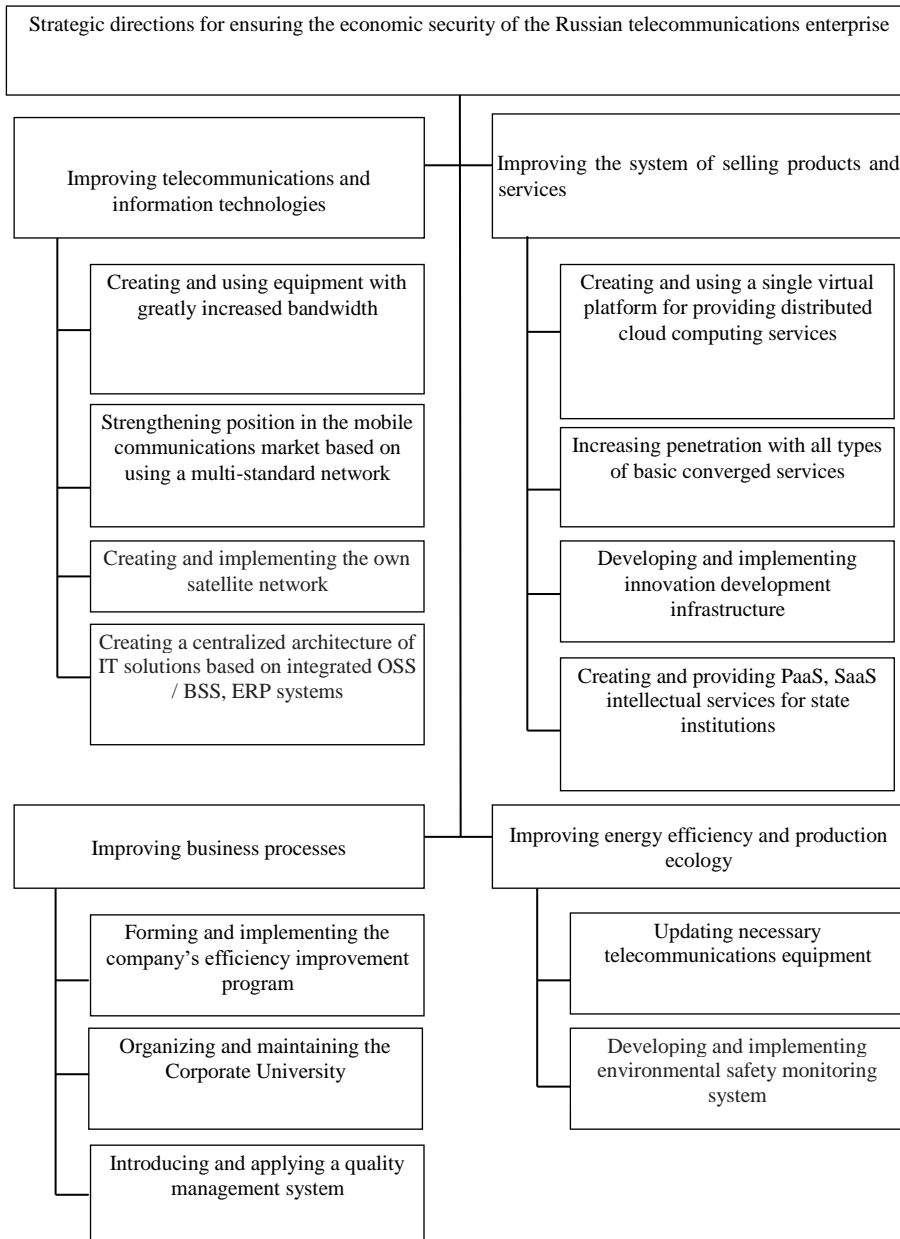
The first direction is focused on improving telecommunication and information technologies on the basis of the introduction of an organizational-functional system for the development, introduction and commercialization of products.

The second strategic direction providing for economic security improvement of modern Russian telecommunications companies is creating and selling new telecommunications products and services.

The third strategic direction to improve the economic security of modern Russian telecommunications companies stipulates on developing business processes.

The fourth strategic direction to improve the economic security of modern Russian telecommunications companies is to increase energy efficiency and production ecology.

3. Conclusion

Thus, the economic security of the telecommunications enterprises is evaluated on the basis of the synthesis of distribution, market and institutional concepts. Based on this evaluation, the main directions for ensuring the economic security of modern Russian telecommunication's enterprises are defined.

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