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Goranka Knezević
Nemanja Stanišić
Vule Mizdraković
Singidunum University
Faculty of Business
Belgrade

PREDICTIVE ABILITY OF THE BUSINESS EXCELLENCE MODEL: THE CASE OF FOREIGN INVESTORS IN SERBIA FROM 2008 TO 2012

Abstract

This paper tests the predictive ability of the Business Excellence Model developed by Croatian researchers Željana Aljinović Barać and Vinko Belak in 2007. The model was tested on Croatian publicly listed companies from 2000 to 2006 and it showed 90% validity. Due to the similarities between Croatian and Serbian economies, we decided to test the predictive ability of this model, taking into consideration Serbian foreign investors, specifically those that used the Greenfield strategy or the M&A strategy when entering the Serbian market. We tested the model on the sample companies and their financial statements published in the period from 2008 to 2012. We tested the predictive value of the model through statistical measurement of its relationship with profitability expressed as return on assets (ROA), return on equity (ROE), and net income.

Key words: business excellence model, profitability, foreign investors, net income, return on equity

ПРОГНОСТИЧКА МОЋ BUSINESS EXCELLENCE МОДЕЛА: ПРИМЕР СТРАНИХ ИНВЕСТИТОРА У СРБИЈИ У ПЕРИОДУ 2008–2012

Апстракт

У овом истраживању тестирали смо предиктивну способност Business Excellance модела који су развили хрватски истраживачи Жељана Аљиновић

gknezevic@singidunum.ac.rs

Бараћ и Винко Белак 2007. године. Овај модел је био тестиран на хрватским компанијама чије се акције котирају на загребачкој берзи, у периоду 2000−2006. године и остварио је 90% валидности. Због сличности између хрватске и српске економије, одлучили смо да тестирамо предиктивну способност овог модела узимајући у обзир узорак састављен од страних инвеститора у Србију, посебно оних који су применили Greenfield стратегију или стратегију мерџера и аквизиција приликом уласка на српско тржиште. Модел је тестиран на узорку компанија и њихових финансијских извештаја у периоду од 2008. до 2012. године. Предиктивна вредност овог модела је доказана мерењем његове повезаности са профитабилношћу израженом стопом приноса на укупна средства (ROA, Return on Assets), стопом приноса на сопствени капитал (ROE, Return on Equity) и нето резултатом.

Кључне речи: Business Excellence model, профитабилност, страни инвеститори, нето добитак, ROE

INTRODUCTION

Nowadays, the use of various models, especially those for predicting bankruptcy, has gained importance after the financial crisis that affected Serbian economy in 2008. Altman Z-score formula is commonly used among researchers, both globally and in Serbia (Muminovic, Pavlovic, & Cvijanovic, 2011). The main reasons are its simplicity and suitability for different markets and industries, but some researchers also compare Altman Z-score formula with their originally formulated bankruptcy prediction model, based on artificial neural networks (Stanisic, Mizdrakovic, & Knezevic, 2013). Lenders and investors have to be more rigorous in their analysis and prediction of their clients' solvency (Mizdrakovic, 2012). In addition to bankruptcy prediction models, there are models developed by some agencies in order to predict corporate rating of bond issuers, such as Moody's model (Knezevic, 2010). With the development of the BEX index for Croatian companies in 2007, for the first time there was an academic model based on scientific research and proved valid on a sample of companies operating in the market very similar to the Serbian market. When it was developed, Serbian and other Balkan countries' researchers tried to test and prove its validity using the original formula of the model on the specific set of companies and discussing whether the results met the expectations (Alihodzic & Dzafic, 2012; Bubic & Hajnrih, 2012) or to compare it with other models in order to assess creditworthiness and bankruptcy prediction for a specific company (Pavlovic, Muminovic, & Cvijanovic, 2012).

Croatian researchers use the BEX index to measure a company's financial performance and possible gains and losses measured by investor's multiplier and industry's risk rating (Belak, Aljinovic, & Vuko, 2011). In its basic version, this model is developed to predict and evaluate

current and potential financial performance of Croatian publicly owned companies, and the authors' intention was not to formulate the model for measuring and predicting corporate bankruptcy. Accordingly, the BEX model has a possibility to evaluate financial performance and to predict financial success and excellence of a company, which makes it more qualitative than bankruptcy prediction models such as Altman's, Ohlson's, or Argenty's models. Bankruptcy prediction models, as well as performance analysis models, are based on specific ratios, whose values are jeopardized by accounting policies chosen by companies and accounting estimates (Pavlovic et al., 2012). Some ratios are affected by changes in macroeconomic conditions (Sarlija & Jeger, 2011). Despite the fact that the validity of bankruptcy prediction models is not proved in the majority of the cases in the Serbian market, we assume that the BEX model can be used and tested for its adequacy in predicting companies' performance and we hypothesize that its predictive value can be proven on the sample of Serbian foreign investor companies. We chose foreign investor companies for our sample because we assumed that these companies come from industries that are not significantly affected by the financial crisis (telecommunications, food industry, pharmaceuticals, etc.), so the results of the model would not be biased in this respect. Consequently, if the model adequately ranks companies from various sectors and markets, then it should be tested in terms of its reliability in predicting performance of the companies within a two-year lag period.

The structure of the paper is as follows: the first part introduces the reader with the BEX model as a composite measure of corporate performance; the second part is related to the theoretical background of the research and the analysis of the macroeconomic indicators of investment opportunities during and after the financial crisis in Serbia, followed by the defined hypothesis, sample structure, and methodology of this research. In the final part of the paper we presented the research results and possibilities of using the same model in future studies in this field.

BEX MODEL

Composite measures of corporate performance or solvency prediction using ratio analysis are various: Altman Z-score, Kralicek DF indicator, Tafler's model, BEX model, and other models. In the specific case of Serbian investors, we decided to use the BEX model, the Business Excellence Model created in 2007 by authors Vinko Belak and Željana Aljinović-Barać (Belak & Aljinovic-Barac, 2008). This model was created to be used for analyzing Croatian companies whose shares are bought and sold on the Croatian stock market, but since the model is not dependent on the capital market indicators, it can be used by other companies, especially limited liability companies, that prevail in our sample. The model is based on four financial indicators to assess business excellence, such as the following:

$BEX = 0.388 \times ex1 + 0.579 \times ex2 + 0.153 \times ex3 + 0.316 \times ex4$,

where:

*ex*1 – profitability, EBIT / Total Assets;

*ex*2 – value creation, Net Business Profit / Equity × Price;

*ex*3 – liquidity, Working Capital / Total Assets;

*ex*4 – financial strength, 5 × (Profit + Depreciation+ Amortization) / Total Liabilities.

Total business excellence is evaluated using the BEX index in the following manner:

BEX index higher than 1, good companies;

BEX index between 0 and 1, upgrading necessary.

Detailed ranking of companies regarding their BEX index is presented in the following table:

Table 1. Business excellence ranking

Business Excellence Index, BEX	Business Excellence Ranking	Expectations for the future
Higher than 6.01 – 4 years consecutively	World Class	Company operates with top results which is also to be expected for the next 4 years, if management continues with upgrades
Higher than 6.01	World Class	Company has excellent operation and this is to be expected over the next three years, if management continues with upgrades
4.01-6.00	Excellent	Company has excellent operation and this is to be expected over three years, if management continues with upgrades
2.01-4.00	Very good	Company has very good operation and this is to be expected over the next two years if management continues with upgrades
1.01-2.00	Good	Company has good operation and it can be expected only if upgrades are made
0.00-1.00	Limited area between good and bad	Business excellence is positive, but not satisfactory. It is necessary to make serious upgrades
Lower than 0, negative	Poor	Existence is threatened. Urgent restructuring and upgrading is needed, otherwise poor business operations will continue to threaten the survival (probability is over 90%)

Source: (Belak et al., 2008)

Statistical research with the application of scientific methods proved the prognostic property of the BEX index by testing it on real data of companies quoted at the Croatian capital market in the period from 2000 to 2006. The testing procedure proved that the model had over 90% validity. Because of the similarities between Serbian and Croatian economies in terms of privatization, development of capital markets, state of capital market, or illiquidity of that market, with both economies depending more on bank loans than on stock market, we decided to use the BEX index as a composite measure of business excellence for the Serbian Greenfield and M&A investors. Although it was not developed for any specific industry, this model was used by some researchers in Serbia, who applied it on specific industries (Bubic et al, 2012). We strongly believe that the BEX index can be tested to show its predictive value in the case of Serbian companies – foreign investors in particular.

THEORETICAL BACKGROUND OF THE RESEARCH

Many researchers try to test various models using Serbian companies as a sample, but so far, no one has tested the predictive ability of the BEX model. In the Serbian market, the BEX model is used to test the performance of agricultural enterprises in Vojvodina during the current crisis (Bubic et al., 2012). Other studies try to test the predictive ability of other models such as various types of Altman Z-score using the sample of Serbian publicly listed companies from the non-banking sector (Muminovic et al., 2011). Likewise, some authors tested the Kralicek DF indicator using Belgrade Stock Exchange companies (Alihodzic, 2013). Academicians tested the Zmijewski model using statistical analysis and describing type I and type II errors (Pavlovic, Muminovic, & Cvijanovic, 2012). All of these selected models are related to their bankruptcy-prediction ability for the Serbian Belgrade Stock Exchange companies.

Although some of the previous models were tested during the financial crisis that hit the Serbian economy, we decided to test the BEX model and its predictive ability in the period during and four years after the crisis. Therefore, we find it important to briefly analyze microeconomic indicators in Serbia in the period from 2008 to 2012. In order to get a clearer insight into the economic risks of doing business in Serbia in the abovementioned period we present the following table:

Table 2. Main macroeconomic indicators in Serbia in the period from 2008 to 2012

Economic indicator	2012	2011	2010	2009	2008
Real GDP, YOY %	-1.5	1.6	1.0	-3.5	3.8
Consumption, YOY %	-1.8	-1.1	-0.9	-2.8	6.7
Investment, YOY %	15.8	12.6	-6.8	-23.3	16.1
Government, YOY %	2.6	-0.4	0.3	-4.6	-0.2
Exports, YOY %	1.8	3.4	15.3	-8.0	9.8
Imports, YOY %	1.9	7.0	3.1	-19.1	9.6
Unemployment Rate, %	23.9	23.0	19.2	16.1	13.6
Real Wages, YOY %	1.1	0.2	1.0	0.8	5.6
Money Supply (M3), YOY %	9.4	10.3	12.9	21.5	9.8
CPI, YOY %	12.2	7.0	10.3	6.6	8.6
National Bank of Serbia Repo Rate, %	11.3	9.8	11.5	9.5	17.8
Current Account Deficit (% of GDP)	10.7	9.1	6.7	6.6	21.6
General Government Deficit (% of GDP)	6.5	4.9	4.7	4.5	2.6

Source: (National Bank of Serbia, 2014)

Table 2 shows the main macroeconomic indicators in Serbia during the financial crisis. Real GDP in this period dropped from 3.8 percent in 2008 to -1.5 percent in 2012, while unemployment rate grew for about 10.3% in the same period. Consumer price index in the same period increased from 8.6% to 12.2% and general government deficit increased from 2.6% to 6.5% of GDP. All of the data presented above reveals a deterioration of all macroeconomic indicators, as a result of the impact of the global economic crisis on Serbia and the companies chosen for the sample.

HYPOTHESIS, SAMPLE STRUCTURE AND METHODOLOGY

Hypothesis for the research

The working hypothesis is that BEX can be a good predictor of a company's performance measured by net income, ROA, and ROE with a two-year lag period. In order to test this hypothesis, we proposed the following additional hypotheses:

H1: BEX 2008 can be a good predictor of profitability in terms of ROA in 2010, ROE in 2010, and net income earned in 2010;

H2: BEX 2009 can predict ROA, ROE, and net income in 2011;

H3: BEX 2010 should be related to performance of the sample companies in 2012 measured by ROA, ROE, and net income.

Sample Structure and Materials

The research was conducted on a sample of 36 Serbian investor companies using Greenfield or M&A as their investment strategy. Their annual financial reports from 2008 to 2012 were reviewed and companies were selected for the sample according to the following criteria:

a) only non-banking sector companies were chosen;

b) companies that entered the market through privatization were excluded;

c) only companies that are on the NALED's (National Alliance for Local Economic Development) list of investors were used;

d) only companies that submitted a full set of financial statements to the Serbian Business Register Agency in the period from 2008 to 2012 were included;

e) companies with missing data or incomplete data in their financial statements were excluded from the sample.

The following table presents the sample structure for this research:

Table 3. Research sample structure

Year	No. of Companies
2008-2012	36

Source: Authors' database

As seen in the table, the number of companies in the sample remained the same throughout the selected period. The sample was consistent during the research and consisted of 36 companies chosen according to the previously established criteria.

Variables and Methodology

The BEX index is composed of the following four variables: profitability (EBIT/total assets), value creation (net operating profit / equity × price), liquidity (working capital / total assets), and financial strength (5 × (profit + depreciation + amortization) / total liabilities). Other variables tested in the model are ROA, ROE, and net income. All of the variables, except net income, are ratio variables, but net income is an absolute number and it is expressed in euros. After concluding the calculation all of these variables for the sample companies, we conducted a statistical analysis of the data using the SPSS software. The purpose of the SPSS analysis was to test if the financial profitability of the companies can be predicted by the BEX index. The same statistics is usually used in applied statistical textbooks (Keller, 2005).

The time period that we chose to test the model is the period from 2008 to 2012. In this period Serbian economy was affected by the global financial crisis, so the results of our statistical analysis also reflect the effects of the crisis.

RESULTS AND DISCUSSION

We decided to choose a "two-year lag period" in order to test the predictive validity of the BEX index on the sample of Serbian investor companies by correlating it to ROA, ROE, and net income.

The following pairs of variables and their respective correlations were tested on the sample:

BEX 2008 correlated to ROA 2010;

BEX 2009 correlated to ROA 2011;

BEX 2010 correlated to ROA 2012.

We chose BEX to be used as the independent variable, while ROA was chosen as the dependent variable. The same procedure was applied to all pairs of variables. To test the relationship, we chose the Pearson correlation coefficient (r).

The results show that there were no correlations of the BEX index in the respective period with ROA obtained two years after the BEX index result. One of the results obtained is presented below.

Table 4. Model summary for BEX index in 2008 and ROA in 2010

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.184[a]	0.034	0.005	0.157

a. Predictors: (Constant), BEX2008

Source: Authors' database

Table 5. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.030	1	0.030	1.187	0.284[b]
Residual	0.848	34	0.025		
Total	0.877	35			

a. Dependent Variable: ROA2010

b. Predictors: (Constant), BEX2008

Source: Authors' database

Based on the previous table, we can conclude that there was no statistically significant relationship between the two variables in the model, because R is 0.184, which means that the relationship is positive, but its strength is determined to be weak. Likewise, the F-test outcome is not significant because Sig. = 0.284 (higher than 0.05), so we conclude that the model does not fit the data.

Almost the same results were obtained for the other pairs of data that we tested on the sample. From all of the above, we can formulate a conclusion that the BEX index does not possess the ability to predict the profitability of a company measured by ROA within a two-year lag

period. Therefore, we have to reject the hypothesis proposed at the beginning of this research.

In the next section, we tested the adequacy of the BEX index and its correlation with ROE. We tested the association between the following pairs of variables:

BEX 2008 correlated to ROE 2010;

BEX 2009 correlated to ROE 2011;

BEX 2010 correlated to ROE 2012.

There were no statistically significant relationships found between the above mentioned variables, which is shown on the example of BEX 2008 and ROE in the following tables:

Table 6. Model summary for BEX index in 2008 and ROE in 2010

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.085[a]	0.007	-0.022	105,652

a. Predictors: (Constant), BEX2008

Source: Authors' database

Table 7. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2,768.716	1	2,768.716	0.248	0.622[b]
Residual	379,522.194	34	11,162.417		
Total	382,290.910	35			

a. Dependent Variable: ROE2010

b. Predictors: (Constant), BEX2008

Source: Authors' database

As we noted above, there was no statistically significant correlation between BEX 2008 and ROE 2010 – $r(34) = 0.085$, $p > 0.05$.

According to the results obtained for all the other tested variables, we conclude that the BEX index has no explanatory value in determining the profitability of a company measured by ROE within a two-year lag period and we have to reject the hypothesis.

Finally, we tested the BEX index and its relationship with net income using the following pairs of variables for the model:

BEX 2008 correlated to net income 2010;

BEX 2009 correlated to net income 2011;

BEX 2010 correlated to net income 2012.

We obtained the following results:

Table 8. Model summary for BEX index in 2008 and net income in 2010

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.362[a]	0.131	0.106	10,517.601

a. Predictors: (Constant), BEX2008

Source: Authors' database

Table 9. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	567,624,659.460	1	567,624,659.460	5.131	0.030[b]
Residual	3,761,078,143.344	34	110,619,945.392		
Total	4,328,702,802.804	35			

a. Dependent Variable: Net Income 2010
b. Predictors: (Constant), BEX2008

Source: Authors' database

Pearson correlation coefficient was 0.362 and the relationship was weak, but positive between BEX 2008 and net income 2010. The next output is related to the analysis of variance or ANOVA. What we do see here is the F-test outcome, which is a measure of the absolute fit of the model to the data. Here, the F-test outcome is highly significant (less than 0.05 as presented in the last column), so the model does fit the data.

Subsequently, we tested the relationship between BEX 2009 as the independent variable and net income 2011 as the dependent variable. The result follows.

Table 10. Model summary for BEX index in 2009 and net income in 2011

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.249[a]	0.062	0.034	16,389.025

a. Predictors: (Constant), BEX2009

Source: Authors' database

Table 11. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	6,01,135,502.847	1	601,135,502.847	2.238	0.144[b]
Residual	9,132,404,700.258	34	268,600,138.243		
Total	9,733,540,203.105	35			

a. Dependent Variable: Net Income 2011
b. Predictors: (Constant), BEX2009

Source: Authors' database

There was no correlation between these variables, because R = 0.249. When we tested the variance, the significance was Sig = 0.144, which is higher than 0.05, so the model does not fit the data.

The third set of data tested here was BEX 2010 and net income 2012 and the results were as follows.

Table 12. Model summary for BEX index in 2010 and net income in 2012

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.365[a]	0.133	0.108	15,706.099

a. Predictors: (Constant), BEX2010

Source: Authors' database

Table 13. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1,287,176,983.190	1	1,287,176,983.190	5.218	0.029[b]
Residual	8,387,173,320.179	34	246,681,568.241		
Total	9,674,350,303.369	35			

a. Dependent Variable: Net Income 2012
b. Predictors: (Constant), BEX2010

Source: Authors' database

R equals 0.365, which means that BEX 2010 positively and weakly correlates with net income in 2012. The ANOVA table shows that Sig. = 0.029 which is less than 0.05 and the model does fit the data.

Taking all of the abovementioned data in consideration, the linear regression analysis proves that the BEX index cannot predict Serbian companies' profitability measured by ROA and ROE within a two-year lag period, and we have to reject all previously established hypotheses. Correspondingly, the simple linear regression shows that BEX can be used as a predictor for net income in a two-year lag period and this relationship is determined to be true for the two pairs of variables BEX 2008–net income 2010 and BEX 2010–net income 2012. For the third analyzed pair (BEX 2009–net income 2011), we were unable to establish a relationship. This could be attributed to the financial crisis, because the results of Serbian investors in 2009 were much more inferior than before 2009 and the BEX index in that year could not predict the net income two years into the future, when the results improved considerably because companies adapted to the crisis and repositioned themselves on the market and when certain relationships existed between the variables. Some researchers pointed out that BEX usually responds negatively to the investments and also corresponds to the negative indicators of ROA and ROE (Muminovic et al., 2011), so the poor fit of the model can be explained by these facts, as well.

The BEX index can be considered a useful measure, which shows future prospects of companies from various industry branches under certain conditions, as stated by its creators, such that the managers should continue with the improvements in the given companies. In our research, we proved that the BEX index value correlates with the net income results. Despite the obvious limitations of this research related to the sample comprising Serbian Greenfield and M&A investors, the observed time period, and other factors, such as the financial crisis impact, the study shows that, although the BEX index is a suitable and easily understandable composite measure of future prospects of a company, it cannot be considered relevant in terms of its predictive ability. This is due to the fact that the projection of financial performance of a company requires a more sophisticated analysis, which is based on financial and non-financial factors, so that it cannot be performed using only five financial ratios of which the BEX index is composed. Future research could be conducted to find better evidence of BEX adequacy for the Serbian market.

CONCLUSION

There are various composite measures of corporate performance or solvency prediction using ratio analysis: Altman Z-score, Kralicek DF indicator, Tafler's model, BEX model, and other models. The accuracy and results of these models were tested in Serbian economy and conclusions ranged from those that proved the results of the models on the sample companies to those that did not prove the validity of the models. It seems that there are many obstacles to their application in Serbian economy, especially after the financial crisis. These obstacles were the negative effects of the financial crisis, changes in macroeconomic indicators, extremely large investments, illiquid financial markets, etc. We developed another strategy in this context to try to assess the predictive value of the BEX index on the sample of foreign investor companies in the period from 2008 to 2012. Therefore, we tested if the BEX index correlates with ROA, ROE, and net income – the commonly used measures of profitability. Despite the fact that we hypothesized that BEX would have shown high correlation with ROA and ROE within a two-year lag period, statistical analysis proved that the correlation coefficient was very low and the supposed relationship was not significant. These results are possibly shaped by the macroeconomic indicators previously shown in Table 2. When we considered the BEX index results in the abovementioned period and net income in euros, the linear regression analysis suggested that there is a moderate relationship between the BEX index in 2008 and net income in 2010, as well as between BEX 2010 and net income 2012. In general, we can conclude that the BEX index is not suitable as a good measure of performance to use in the Serbian market, because the established relationship between the variables is weak and sometimes even non-existent.

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Горанка Кнежевић, Немања Станишић, Вуле Миздраковић, Сингидунум Универзитет, Пословни факултет, Београд

ПРОГНОСТИЧКА МОЋ BUSINESS EXCELLENCE МОДЕЛА: ПРИМЕР СТРАНИХ ИНВЕСТИТОРА У СРБИЈИ У ПЕРИОДУ 2008−2012

Резиме

У раду је тестирана прогностичка моћ Business Excellence модела на примеру финансијских извештаја страних компанија које су инвестирале у Србију као греенфиелд инвеститори и оних које су на тржиште ушле следећи стратегију мерџера и аквизиција. Прогностичка моћ овог модела тестирана је у периоду 2008−2012. године, тако што је израчуната вредност BEX индекса за све компаније, а затим је иста доведена у везу са показатељима профитабилности као што су ROA, ROE и нето добитак, али за наредне две године, након године за коју је рачунат BEX индекс. На овај начин тестирали смо неколико парова варијабли (BEX и нето добитак, BEX и ROA и BEX и ROE) покушавајући да утврдимо да ли постоји веза и колика је јачина те везе између поменутих варијабли. С обзиром на то да је BEX индекс промовисан као мерило пословне успешности компанија, овде смо настојали да ту пословну успешност измеримо са две године временског јаза, полазећи од претпоставке да је успешан онај модел који може и након две године од дана када је израчунат да потврди просперитет и успешност компаније. Међутим, резултати овог тестирања показали су да између варијабли као што је BEX индекс за четири посматране године и варијабли ROA и ROE, у посматраним годинама не постоји статистички значајна веза. Постојање средње до слабе позитивне везе је уочено између два пара варијабли, BEX индекса из 2008. и нето добитка из 2010. године, као и веза између BEX индекса из 2010. г. и нето добитка из 2012. г. Водећи рачуна да је период у којем је истраживање вршено био период оптерећен ефектима финансијске кризе која је почела 2008. г. прогностичка моћ BEX модела није потврђена, што оставља простора за размишљање о томе да ли и колико поменути модел може носити епитет модела процене успешности компаније, како је и примарно био маркетиншки промовисан.