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BALANCED SCORECARD AND ANALYTIC NETWORK PROCESS IN PERFORMANCE MEASUREMENT AND STRATEGY EVALUATION: A CASE STUDY

Abstract

Performance measurement is the key component of the economic system of an enterprise. Modern business environment imposes the need to continuously find and define new concepts and models of performance measurement in order to increase the overall efficiency of the enterprise. The recession and the related economic and production difficulties the enterprises are currently facing require a deep reconsideration of the business models and managerial approaches adopted to increase the enterprises' growth and value creation. The efforts of modern management in the 21st century have been aimed at developing a wide range of models that allow managers to control, understand, and coordinate the functions of enterprises' value chain as well as integrating the models in accordance with the strategic perspective, such as the balanced scorecard (BSC) model. This paper attempts to integrate the BSC model and the analytic network process using selected enterprises in Serbia as the example. The findings of the study will show that the strategy selection is the result of the total performance calculated according to individual performance scores based on four different interrelated perspectives: financial, customer, internal business processes, and learning and growth.

Key words: performance measurement, balanced scorecard, analytic network process, strategy selection

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ПРИМЕНА BALANCED SCORECARD-А И АНАЛИТИЧКОГ МРЕЖНОГ ПРОЦЕСА У МЕРЕЊУ ПЕРФОРМАНСИ И ВРЕДНОВАЊУ СТРАТЕГИЈЕ: СТУДИЈА СЛУЧАЈА

Апстракт

Мерење перформанси је кључна компонента економског система предузећа. Савремено пословно окружење намеће потребу за континуираним изналажењем и дефинисањем нових концепата и модела мерења перформанси у циљу унапређења укупне ефикасности предузећа. Рецесија и економске и производне тешкоће са којима се предузећа данас суочавају захтевају темељно преиспитивање пословних модела и менаџерских приступа усвојених у циљу повећања раста и креирања вредности предузећа. Напор савременог менаџмента у 21. веку усмерен је на развијање широког спектра модела који омогућавају менаџерима да контролишу, разумеју и координирају функције ланца вредности, као и интеграцију истих у складу са стратегијском перспективом, као што је Balanced Scorecard модел. Рад настоји да интегрише Balanced Scorecard модел и Аналитички-мрежни процес на примеру одабраних предузећа у Републици Србији. Закључци студије показаће да је избор стратегије резултат укупних перформанси предузећа, које се израчунавају помоћу појединачних бодова перформанси израчунатих у четири различите међусобно повезане перспективе: финансије, купци, интерни пословни процеси и учење и раст.

Кључне речи: мерење перформанси, Balanced Scorecard, аналитичко-мрежни процес, избор стратегије

INTRODUCTION

Performance measurement has always been at the very heart of the economic system of any enterprise and has thus been the subject of numerous discussions among researchers and scientists at scientific conferences. Performance measurement is necessary in order for the mission and vision of the enterprise to be clarified and the strategy translated into measurable goals, which allows the enterprise not only to measure the progress of goal realisation, but also to understand what improves the results. Other benefits involve establishing responsibilities and improving decision making, fitting operational activities and resources into strategic goals, understanding the planned activities, and clearly communicating the expectations at all organisational levels. What follows is a survey of the various performance measurement definitions. Pun and White (2005) highlight the definition that performance measurement is a systematic determination of numerous activities and that the goal of the measurement is to obtain the information which will

be useful for a variety of problems and situations. Neely et al. (1995) believe that performance measurement is a process of quantifying the efficiency and effectiveness of the actions that lead to performance. According to Sinclair and Zairi (1995), performance measurement is aimed at determining how successful enterprises are at achieving their goals, while performance measures are numerical or quantitative indicators that show the extent to which each goal has been realised. Ghalayini et al. (1997) introduced an integrated dynamic performance measurement system developed in conjunction with a company. Bourne et al. (2000) introduced a framework for analyzing the implementation of performance measurement system and used it to interpret three longitudinal case studies. Hudson et al. (2001) described a research method to evaluate the appropriateness of strategic performance measurement system for small- and medium-sized enterprises. Strategic performance measurement enables enterprises to fit their business activities into the strategy and realise performance monitoring moving toward strategic goal realisation (Kennerley and Neely, 2003). Thus, strategic performance measurement may be defined as a system of measurement and reporting that quantifies the degree to which managers achieve their goals (Domanovic, 2010). This provides enterprises with funds for the management process, so that they can realise their goals, defining the key indicators of organisational performance and customer satisfaction.

Chenhall (2005) identified integrative information as a key dimension of strategic performance measurement systems, which assists managers in delivering positive strategic outcomes. A successful performance system is a set of performance measures (i.e. a metric used to quantify the efficiency and effectiveness of actions) providing an enterprise with useful information that helps to manage, control, plan, and perform the activities undertaken in the enterprise. The information retrieved from the performance measurement systems must in turn be accurate, relevant, timely (provided at the right time), and easily accessible for the persons who require it. Furthermore, performance measures must also be designed to reflect the most important factors influencing the productivity of different processes that can be found in the enterprise. Designing such a performance measurement system is a difficult task, and what is to be considered as an optimal performance measurement system will also differ from case to case (Tangen, 2005). It is crucial to understand how the performance measurement systems have to evolve and become integrated in the management models of organizations. Numerous performance measurement and management models have been proposed (Taticchi et al., 2010), which might be classified into three groups (Tangen, 2005). The most prominent model in the last decade is the balanced scorecard (BSC) model. The success of an enterprise is the result not only of the performance management in the four BSC perspectives, but also of measurement and

management of intangible assets. With recognition that, in the 21st century, intellectual capital, as a set of organizational intangible and knowledge asset value drivers, affects the enterprise's value creation processes, it is necessary to identify the way of measuring intellectual assets. The goal of this paper is to integrate the BSC model and the analytic network process into the performance measurement process. Accordingly, the first part is dedicated to the BSC and analytic network process methodology and literature review.

The second part of the paper covers the case study of a cookware manufacturing enterprise in Serbia. Since the performance measurement process is multidimensional, and considering the significance of the traditional BSC perspectives in calculating the total performance of the enterprise, we used the analytic network process as a method for decision making in uncertainty conditions in order to evaluate relative significance of the perspectives and, implicitly, their significance for optimal strategy selection.

METHODOLOGY AND LITERATURE REVIEW

BALANCED SCORECARD

The increased competition and the need for corporate strategy implementation are the reasons to consider a new model of reporting that goes beyond traditional metrics and collects information on the observed value causes in the new economy (Stefanovic et al., 2004). For example, the Negotiation Committee (The Conference Board) of the Canadian Institute of Chartered Accountants (CICA) has reported that traditional accounting-based measures of efficiency are too obsolete, that they lack a predictive power, reward the wrong behaviour, and do not make key business changes until it is too late. The Negotiation Committee has also concluded that these measures provide an inadequate consideration of resources such as intellectual capital (Waterhouse, 1999). Consequently, the Committee has proposed that strategically oriented performance measurement systems should measure non-financial as well as financial performance. Similarly, the report by the American Institute of Certified Public Accountants (AICPA) recommended that companies should expose the leading, non-financial measures of critical business processes such as product quality, reproduction cycle, innovation, and employee satisfaction (American Institute of Certified Public Accountants, 1994). At the same time, the research conducted by the Institute for Managerial Accounting in the United States provided support for the recommendations made by the CICA and the AICPA (Institute of Management Accountants, 1996). The research showed that only 15% of respondents said that their measurement systems supported the management's business objectives very well, while 43% of respondents rated their measurement systems from less than

adequate to poor. On the other hand, 60% of respondents said that they had undertaken a major overhaul or were planning to replace their current systems for measuring effectiveness.

It is generally believed that the best measures of efficiency are those that are connected with business strategy. In addition, the efficiency measures should be focused on and reward behaviour that contributes to business success (Kaplan & Norton, 1992; Kaplan & Norton 1996a b; Atkinson & Epstein, 2000). Starting from the comprehensive literature in the field of enterprise efficiency measurement, many entrepreneurs around the world have wondered whether their performance measurement systems are adequate. In addition, there is an interest in the question of whether non-financial criteria such as customer satisfaction, employee satisfaction, and innovation are useful indicators of future enterprise performance.

Long-term survival of an enterprise depends on the fulfilment of market requirements through the process of creating long-term value. The traditional systems for measuring efficiency were subjected to criticism because they were closely linked to financial data and efficiency on the functional level, so they often failed to capture organizational long-term business success. Historically, business processes and business excellence were in the focus of a long-term value creation process. On the contrary, the studies in the literature call for a change of emphasis toward the "innovation process" (Kaplan and Norton 1996a; Simons, 2000).

In the last decade, discussions about enterprise efficiency measurement were associated with the concept of BSC – developed by Robert Kaplan, the Harvard Business School, and David Norton, president of a Massachusetts consulting firm, in the early 1990s. This concept is built on the premise that companies are no longer able to gain a sustainable competitive advantage by developing only tangible assets. In other words, the company's ability to build "intangible assets" or "intellectual capital" has become a critical success factor in creating and maintaining competitive advantage. BSC calls managers to first introduce a wide range of criteria or scorecards. These scorecards serve as dials on the dashboard and enable greater profitability; likewise, managers are better positioned to primarily serve their employees, customers, and shareholders.

Many books, articles, and case studies on this topic appeared during this period. The Harvard Business Review called the BSC idea the most significant management idea in the past 75 years, and the organization called the Balanced Scorecard Collaborative serves as the central clearing house for what is called a "balanced scorecard evolution" (Kaplan & Norton, 1996a; Kaplan &Norton, 1996b; Kaplan & Norton, 2000; Nils-Göran et al., 1999).

However, the BSC is not without limitations. Many studies investigate the general limitations of the concept (Butler et al., 1997;

Epstein & Manzoni, 1998; Nørreklit, 2000; Heinz, 2001; Kennerley & Neely, 2002; Olson & Slater, 2002).

The basic premise of the BSC is simple. Financial measures are, and always will be, important but have to be supplemented with other indicators that predict future financial success. The four perspectives of the BSC will allow companies to record financial results and, at the same time, supervise the process of building skills that are necessary for obtaining the "intellectual capital" or "invisible assets", which is necessary for future growth and improved competition. Unlike the traditional efficiency measurement system based on financial control as a core, BSC starts with an organizational vision and strategy. The attempt is to translate vision and strategy into performance measures that can be followed and used to measure success in the process of their implementation. The premise for achieving this translation is to define a set of goals and measures in each of the four interrelated perspectives: financial, customer, internal business processes, and learning and growth of employees.

BSC identifies the indicators (measures) for each specific goal under those four perspectives and also indicates the interactions among them. In order to implement the BSC model, management must determine the significance of all relationships among the perspectives together with their relative importance. In this sense, the analytic network process might represent significant support.

Analytic Network Process

The analytic network process (ANP) is a method for decision support developed by Thomas Saaty (2001). The model allows the inclusion, quantification, and objectification of all relevant tangible and intangible factors in the decision-making process, as well as all the existing influences between decision criteria and alternatives.

The procedure of applying the ANP model of decision making has five steps (Saaty, 2005):

1) **Decomposition of the problem**. Decision problem is decomposed into its main components.

2) **Cluster formation for the evaluation**. After defining the objectives of decision making, it is necessary to generate the clusters for the evaluation by the criterion, sub-criterion (if possible), and cluster alternative.

3) **Structuring of the ANP model**. The ANP model is applied to different decision-making problems in the field of marketing, health, politics, military issues, society, predictions, etc. Its accuracy of forecasting was proved through impressive applications in the field of economic trends, sports events, and other events, whose outcome became known only later.

4) **Pairwise comparison and prioritization**. In this step it is necessary to compare pairs of elements of decision making, as well as the synthesis of priorities for all the alternatives. The estimations are made by

the fundamental 1-9 scale (Table 1), which was shown by the comparative study to most adequately simulate human thinking.

5) **Sensitivity analysis of the solution**. It is finally possible to perform decision and sensitivity analysis in terms of the impact on the final outcome, according to the importance of certain criteria or sub-criteria for a given solution, and by analyzing how big or small these indicators are.

Table 1. The 1-9 scale of relative significance

Intensity of Importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favour one activity over another
5	High importance	Experience and judgment strongly favour one activity over another
7	Very high or demonstrated importance	An activity is favoured very strongly over another; its dominance is demonstrated in practice
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	Mean values between two adjacent estimates	When compromise is needed
Reciprocals of the above	A reasonable assumption	If activity *i* has one of the above nonzero numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*

Source: Saaty & Kearns, 1985, p. 27.

Ronay and Basar (2009) wrote about the implication of AHP/ANP methodology in the implementation of BSC, where they showed the measurement of total performance of insurance companies by the combined application of BSC and ANP. Valério and Whitaker (2007) showed how the observation of the dependence of the elements can improve the decision-making process. Tjader et al. (2009) demonstrated the application of BSC-ANP model in the strategic decision making. Ucal and Oztaysi (2009), as well as Ming-Chang (2007), applied the BSC-ANP in the evaluation of the measure of company performance. In their case study in the telecommunications sector, Pramod and Banwet (2010) first used the BSC to identify the key indicators of business operations and then used the ANP for the supply chain management process. We should also

mention the works of Jovanovic and Krivokapic (2008) and Ayvaz and Pehlivani (2011), which offer summarized information on the application of AHP and ABC methodology in the efficient implementation of BSC, as well as the work of Stevanovic and Stankovic (2012) which covers the application of multi-criteria analysis and the TOPSIS method in the selection of the optimal model of measuring the business performance of an airport.

THE CASE STUDY IN SERBIA

The focus of analysis is company C, which is known throughout former Yugoslavia for its production of cookware, especially enamelled cookware, and which has positioned itself as a competitive market actor while it applies the strategy of the ambitious follower in certain market segments. Since the company belongs to a mature industry branch, the competition is extremely fierce. There are relatively high input/entrance barriers, so there is no new competition in the enamel programme; however, substitution, i.e. cannibalism is present to a great extent. The industry in which the company does business is not attractive, the growth is small, and it is highly unlikely that the situation will improve. All the actors who stir the changes are usually limited, so the changes have short-term effects, and some of them, such as changes of social attitudes and the way of life, can have a negative impact. The majority of the competition stops its production and resorts to outsourcing. Company C wishes to become the absolute leader on the domestic market and the ex-Yugoslav markets with the dominant market contribution. The company would like to be present in the former Soviet Union markets as a brand recognizable by its quality and to be different from its competition. The original estimations by the company stated that the potential of the domestic market is relatively stable in the following five years, so a single-digit growth was expected. Potentially the biggest growth is expected for the aluminium cookware, with a slightly steadier growth for *Inox* cookware, whereas the enamelled cookware is expected to be withdrawn from the market.

The company's goals are the following:

1. It is expected that the company would be the leader in the industry in the markets of former Yugoslavia.
2. It is estimated that by 2012 the company would enter the Russian market. This trend of development presupposes a number of activities which the company undertakes with its partner from Moscow, from designing the package to planning in order for the cookware by this manufacturer to become a recognized brand within the enamelled cookware industry in Russia in 2009.
3. The directions of further expansion are primarily the markets of Ukraine, followed by other countries of the former Soviet Union.

The market value of enamelled cookware in Russia is estimated at approximately €46 million at domestic export prices. According to the research of METROT from Moscow, by 2011, at unsteady dynamics company C can reach the sales of €8.8 million, which would imply a market presence of 19%. The biggest threat to such a development of the market presence is the membership of Russia in the WTO, which would increase the entrance barriers to the Russian market. The doors would open for the competition from Poland, China, and Japan, and the basic instrument of the competitive advantage would be the price. Based on everything stated above, the key issue for company C is the choice of the optimal strategy to approach the Russian market. In view of that, it is first necessary to perform a SWOT analysis in order to identify all the strengths and weaknesses of the company, as well as the opportunities and threats from the surroundings, which will greatly determine the strategic position of the company on the internal and external market.

Balanced scorecard analysis

According to Kaplan and Norton (1992), the evaluation of strategic decisions of a company includes analysis from the four perspectives: finance (F), marketing (M), internal processes (I), and learning and development (L). The BSC model could be considered as a performance measurement and management model that represents an extended accounting report and evaluates the company's performance from four perspectives: finance, marketing, internal business processes, and learning and growth. Likewise, the BSC could be considered as a strategic management model, which evaluates the company's strategy from the same perspectives. Table 2 shows these perspectives and the most important performance indicators based on the management of company C.

As shown in Table 2, the goals of company C are classified according to the four perspectives. They include the goals that most appropriately reflect the defined strategy. The third column shows the relevant performance measures based on which the efficiency of the goal realization could be defined. The last column represents the target values by all performance measures according to the four perspectives, which could be considered as benchmarks for the purpose of comparison with the real values.

Table 2. BSC perspectives of company C

Perspectives	Goals	Performance measures	Objectives 2010	Objectives 2011
Finance	1. Maintain or increase the profit margin of the enterprise	EBIT (F_1)	10%	11%
		EBITDA (F_2)	9%	10%
	2. Total revenue increase	Operating revenue in mil. EUR (F_3)	35	28
	3. Labour costs control	Average salary per employee in EUR (F_4)	650	550
Marketing	1. Increase customer satisfaction on the domestic market	Product user satisfaction (M_1)	1	1
		Customer satisfaction with business relationship and service (M_2)	1	1
		Customer satisfaction with product (M_3)	1	1
		Average customer satisfaction (M_4)	1	1
	Number of customer complaints	Complaints in export (M_5)	0.05%	0.04%
		Complaints in domestic sale (M_6)	0.15%	0.15%
	2. Continuously supply new products for our customers	The number of newly introduced products in Russia per year (M_7)	10	9
		Number of new items per year (M_8)	10	9
		Total share of new products (M_9)	22%	18%
Internal processes	1. Investment in process automation	Reducing the number of people required for the production plant (I_1)	100	95
		Number of derived automated lines (I_2)	2 times a year	3
	2. Productivity increase	Realisation in EUR per employee per year (I_3)	45,000	45,000
		Productivity (I_4)	100%	100%
		Absence of employees (I_5)	6%	5%
	3. Reducing the time for introduction of new products	Deviation of launch time in relation to plan (I_6)	0	0
		Average time of launch per item group (I_7)	6 months	5
	4. Reducing the time for customer query processing	Time of query processing in days (I_8)	3 working days	2
		Time of sample creation (I_9)	0.80	0.75
	5. Reducing the number of pieces that are outside of standard quality	Non-desired items in enamelled and non-stick cookware (I_{10})	3	3
		Rejected items in enamelled and non-stick cookware (I_{11})	1	1
		Rejected items in *Inox* cookware (I_{12})	1	1
Learning and growth	1. Increase the ability of employees	Number of training hours per employee (L_1)	64	70
	2. Employee evaluation	Average management score (L_2)	4.5	4.5
		Average rating of specialists (L_3)	4.5	4.5
		Average score of workers (L_4)	4	4
	3. Introduction of an exclusive line of enamelled cookware with chrome trim	Launch time must be less than 9 months (L_5)	<9	<8

Construction of the ANP model and comparison of the pair elements of the model

The assumptions underlying the model are the following:

1) Observation of company C, which conducts business in the cookware manufacturing industry;
2) Time frame is two years, 2010 and 2011;
3) Perspectives and indicators are identified by means of BSC interviews and questionnaires.

For the purpose of evaluating the key indicators of business operations for the observed company, we formed a suitable ANP model taking the given theoretical assumptions and the problem description as a starting point, and taking into consideration the actual state of the surroundings and the answers given in the BSC questionnaire. The structure of the ANP model is presented by the ANP network as follows (Figure 1):

1) The cluster *Perspectives* includes the primary factors, i.e. the usual BSC perspectives that should be taken into consideration as criteria when evaluating the indicators of business activities: financial, marketing, the internal processes, and learning and development;

2) The cluster *Financial perspectives (F)*: in this perspective, the strategy should enable growth, profitability, and risk control from the point of view of the stockholders. That is why this cluster includes the financial measurements of performance such as EBIT, EBITDA, the business income in millions of euros, and the average earnings of each employee in euros. It is represented by the group of indicators F (F_1, F_2, F_3, and F_4);

3) The cluster *Marketing perspectives* (*M*), which is represented by the group of indicators M (M_1, M_2, ..., M_9);

4) The cluster *Internal processes (I)*, which is represented by the group of indicators I (I_1, I_2, ..., I_{12});

5) The cluster *Learning and development (L)*, which is represented by the group of indicators L (L_1, L_2, ..., L_5);

6) The cluster *Alternatives*, which is represented by alternative strategies of company entry into the Russian market:

S_1 – the strategy of joint presence with the Russian partner

S_2 – the strategy of taking over the cookware manufacturing factories in Russia.

Among and within these clusters there are interactions that should be taken into consideration when comparing the following pairs:

1) *The finance perspective* is under the influence of the *marketing perspective* and the *internal processes*;

2) *The marketing perspective* is under the influence of *internal processes* and *learning and development* ;

3) *The internal processes* are under the influence of *learning and development* ;

4) Within the cluster of *perspectives* there is internal interdependence.

The basic goal of the model is to choose the optimum business strategy for company C through the prism of quantified overall performance.

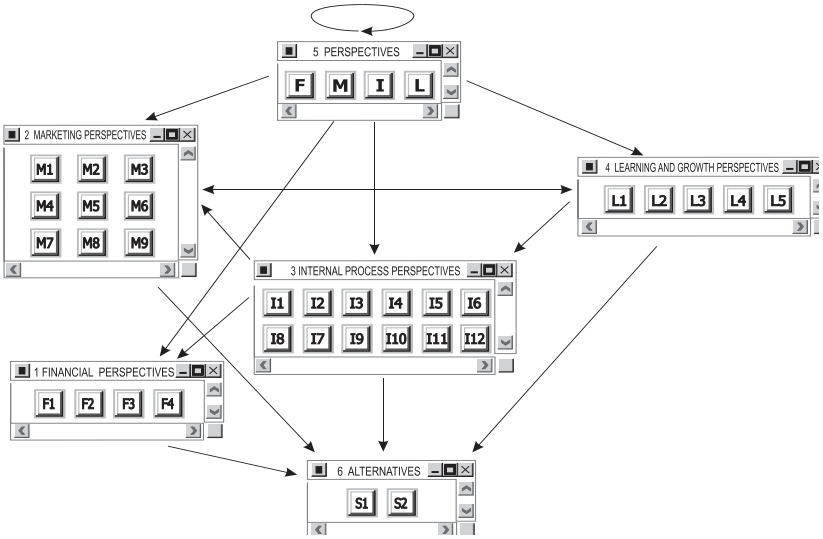

Figure 1. ANP model for the choice of optimal strategy for company C

Results of the Model

Based on the given dependencies, and by using the 1-9 comparison scale (Saaty and Kearns, 1985) and the *Super Decisions* software, we conducted a pairwise comparison of the pairs of elements of the observed decision-making problem, and obtained the following ratings of business indicators:

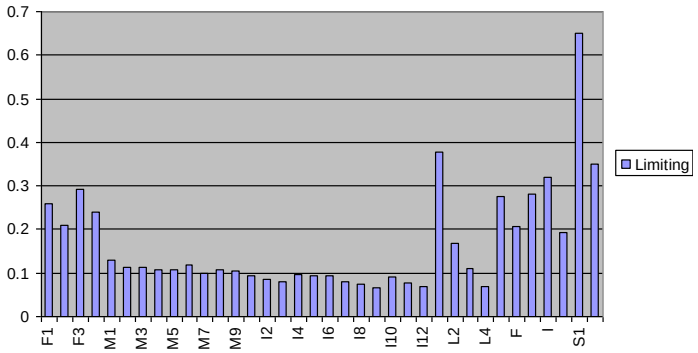

Figure 2. P*riorities of decision-making elements*

The obtained results of business operations (Figure 2) can further be used for calculating the overall performance of the company in the successive periods, as well as their comparison. Although many authors think that the four BSC perspectives have equal influence, the management of company C estimates their relative value to be unequal, so for them the biggest relative importance in terms of the strategic goals goes to the internal processes perspective (0.31949), followed by the marketing perspective (0.28115), etc., with acknowledgement of their mutual influence. Table 3 shows the goals and the reached values of business indicators for the observed company during 2010 and 2011, as well as their weighted values, whereby the ratings obtained through the ANP method serve as ponders. The overall company performance per year was a result of summing the weighted values of business indicators, obtained by multiplying the actual values of the indicators in 2010 and 2011 with the corresponding weights calculated using the ANP model. It is noticeable that the overall company performance in 2011 decreased in comparison with the previous year, as a result of lower achieved values, but also of lower goal value indicators in 2011 in comparison with 2010. Therefore, when the indicators are observed individually, it is apparent that some of them, such as F_1, F_2, M_2, M_6, etc., have weaker values in comparison with the previous period (Table 3).

Table 3. Business indicators of performance and the overall performance of company C in the 2010-2011 period

	Ratings (values were calculated using ANP)	Target value in 2010.	Realized value in 2010.	Result in 2010.	Target value in 2011.	Realized value in 2011.	Result in 2011.	Weighted in 2010.	Weighted in 2011.	Difference
F_1	0.129357	10%	9%	90	11%	9%	82	11.64	10.60	-1.04
F_2	0.105301	9%	9%	100	10%	9%	90	10.53	9.48	-1.05
F_3	0.145760	35	30	85.71	28	25	89.29	12.49	13.01	+0.52
F_4	0.119581	650	600	92.31	550	450	81.82	11.04	9.78	-1.26
M_1	0.023665	1	0.9	90	1	0,9	90	2.13	2.13	0
M_2	0.020903	1	0.85	85	1	0.8	80	1.78	1.67	-0.11
M_3	0.020603	1	0.85	85	1	0.9	90	1.75	1.85	+0.10
M_4	0.019531	1	0.87	87	1	0.87	87	1.70	1.70	0
M_5	0.019901	0.05%	0.05%	100	0.04%	0.05%	-25	1.99	-0.5	+1.49
M_6	0.021754	0.15%	0.18%	-20	0.15%	0.17%	-13.3	-0.44	-3.85	-4.29
M_7	0.018019	10	10	100	9	8	88.89	1.80	1.60	-0.20
M_8	0.019623	10	10	100	9	7	77.78	1.96	1.53	-0.43
M_9	0.019117	22%	20%	90.9	18%	17%	94.44	1.74	1.81	+0.07
I_1	0.009017	100	100	100	95	98	-3,16	0,90	-0,03	+0,87
I_2	0.008004	2 per year	2	100	3	2	66.67	0.80	0.53	-0.27
I_3	0.007701	45,000	42,000	93.33	45,000	40,000	88.89	0.72	0.69	-0.03
I_4	0.009085	100%	100%	100	100%	98%	98	0.91	0.89	-0.02
I_5	0.008856	6%	10%	-66.67	5%	7%	-40	-0.59	-0.35	-0.94
I_6	0.008858	0	0	100	0	0	100	0.89	0.89	0
I_7	0.007564	6 months	6	100	5	5	100	0.76	0.76	0
I_8	0.007104	3 working days	3	100	2	3	-50	0.71	-0.36	+0.35
I_9	0.006422	0.80	0.85	-6.25	0.75	0.80	-6.67	-0.04	-0.04	-0.08
I_{10}	0.008554	3	4	-33.33	3	3	100	-0.29	0.86	+0.57
I_{11}	0.007349	1	1	100	1	1	100	0.73	0.73	0
I_{12}	0.006612	1	1	100	1	1	100	0.66	0.66	0
L_1	0.013507	64	64	100	70	70	100	1.35	1.35	0
L_2	0.005966	4.5	4.2	93.33	4.5	4.3	95.56	0.56	0.57	+0.01
L_3	0.003922	4.5	3.7	82.22	4.5	4.1	91.11	0.32	0.36	+0.04
L_4	0.002417	4	3.2	80	4	3.3	82.5	0.19	0.20	+0.01
L_5	0.009860	<9	9	100	<8	9	-12.5	0.99	-0.12	+0.87
Total								∑69.68	∑58.4	

The results also indicate that the current financial crisis, the acceptance of Russia into the WTO, and the estimated performance of company C in the two successive business years have considerable impact on management estimations and on their decision concerning the entry into the Russian market, being in favour of joint presence with the Russian partner ($S_1 = 0.650365$) in comparison with the takeover strategy ($S_2 = 0.349635$).

Table 4. Sensitivity ratings of alternative strategies for the change of relative importance of indicator F_3; priorities were calculated using the Super Decisions software

Input Value: F_3	Priorities – S_1	Priorities – S_2
0.0001	0.481	0.519
0.2	0.526	0.474
0.4	0.571	0.429
0.6	0.617	0.383
0.8	0.662	0.338
0.9999	0.707	0.293

The sensitivity analysis can further show the sensitivity ratings of the alternative strategies for changes in relative importance of selected indicators of BSC performances. Thus, for example, if we observe how the growth from 0.0001 to 0.9999 of the relative importance of indicator F_3 influences the alternative ratings, we can notice the inverse movement of Strategy 2 ratings and the continuous growth of the Strategy 1 ratings (Table 4). A similar analysis can also be performed for the remaining indicators, so as to simply see which strategy is better in most cases.

CONCLUSION

The aim of this paper was to show the natural complementarity of ANP and BSC analyses, combining the capability of the BSC to identify the key factors for successful business operations of a company and the capability of the ANP to identify, encompass, and evaluate all the interactions and influences that exist between/among these factors. Although in practice the estimation of a company's efficiency by means of the BSC is usually conducted independently, it is evident that it is the case of the problem of multi-criteria decision making, which, bearing in mind its complexity, requires at least the same level of complexity of the approach. Furthermore, the fact that the manager's estimations of the importance of decision-making elements are on the same or different levels and are inherently subjective does not diminish the objectivity of the results. On the contrary, it helps make a more comprehensive and more accurate estimation of the overall performance of the company. The analysis of the sensitivity of obtained results has a special significance, because it can

provide the management of a company with useful information concerning different scenarios of business operations and with the choice of optimal market entry strategy.

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ПРИМЕНА BALANCED SCORECARD-A И АНАЛИТИЧКОГ МРЕЖНОГ ПРОЦЕСА У МЕРЕЊУ ПЕРФОРМАНСИ И ВРЕДНОВАЊУ СТРАТЕГИЈЕ: СТУДИЈА СЛУЧАЈА

Резиме

Мерење перформанси је круцијална компонента система економије предузећа и стога је предмет бројних дискусија међу истраживачима и научницима. Мерење перформанси је неопходно у циљу појашњења мисије и визије предузећа и превођења стратегије у мерљиве циљеве, што омогућава предузећу не само да мери успех у реализацији циљева, већ и да увиди шта конкретно доводи до побољшања резултата. Мерење перформанси је, такође, значајно јер укључује утврђивање одговорности и побољшање одлучивања, усклађивање пословних активности и ресурса са стратегијским циљевима, разумевање планираних активности и јасну комуникацију очекивања на свим организационим нивоима.

Успех и изврсност предузећа резултат је не само мерења перформанси из четири перспективе избалансиране карте резултата (Balanced Scorecard − BSC), већ и мерења и управљања нематеријалним ресурсима. Препознајући да у 21. веку интелектуални капитал, као сет организационих нематеријалних узрочника вредности, утиче на процес креирања вредности предузећа, неопходно је пронаћи начин како измерити интелектуалну активу.

Циљ рада је да интегрише модел избалансиране карте резултата и аналитичко-мрежног процеса у процесу мерења перформанси предузећа. Базична премиса модела избалансиране карте резултата је једноставна. Финансијска мерила су, и увек ће бити, значајна, али морају бити допуњена са другим индикаторима који предвиђају будући финансијски успех. Четири перспективе избалансиране карте резултата омогућиће компанијама да забележе финансијске резултате и у исто време да надгледају процес изградње вештина неопходних за стицање „интелектуалног капитала“ или „невидљиве активе“, што је неопходно за будући раст и обезбеђење оштре конкуренције. За разлику од традиционалног система мерења ефикасности који се заснива на финансијској контроли, модел избалансиране карте резултата започиње са организационом визијом и стратегијом.

Покушај је да се визија и стратегија преведу у мерила перформанси која се могу следити и искористити за мерење успеха у процесу имплементације визије и стратегије. Ово је постигнуто најпре дефинисањем сета циљева и мерила у свакој од четири међусобно повезане перспективе: финансије, купци, интерни процеси и учење и развој запослених. Аналитичко-мрежни процес (Analytical Network Process – ANP), као метод који пружа подршку одлучивању, развио је Thomas Saaty (2001) и укључује обухватање, квантификацију и објективизацију свих релевантних, материјалних и нематеријалних фактора у процесу одлучивања, као и све постојеће утицаје између критеријума одлучивања и алтернатива.

Главни циљ рада је да покаже природне комплементарности између ANP и BSC анализе, омогућавајући тако да BSC идентикује кључне факторе успешности пословања и могућности ANP да идентификује, обухвати и оцени све интеракције и утицаје који постоје између ових фактора. Иако се у пракси процена ефикасности на основу BSC модела обично спроводи независно, евидентно је да је то случај вишекритеријумског одлучивања, који, полазећи од комплексности, захтева најмање исти ниво комплексности приступа. Независно од тога, чињеница да су процене менаџера о значају елемената одлучивања на истим или различитим нивоима, и да су по својој природи субјективне, не умањује објективност резултата. Насупрот томе, ово омогућава да се направи комплетнија и прецизнија оцена свеукупних перформанси компаније. Анализа сензитивности добијених резултата има посебан значај, зато што менаџмент компаније може добити корисну информацију по основу различитих сценарија пословања и избора оптималне стратегије појављивања на тржишту.