Multi-Attribute Value Measurement Approach to Assess Business Sustainability

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ABSTRACT

The relationship between balanced scorecard (BSC) and company's value as an area of inquiry has sustained interest among researchers over the past decade. More recently, some have challenged the notion differential value among companies through multi-attribute value measurement (MAVM) as it evolves into a ubiquitous sustainability-like set of technologies. This study examines the relationship between the BSC implementation through economic value added (EVA) and its differential business value to firms using analytical hierarchy processing (AHP) method as one of application of multi-attribute value measurement. By drawing upon multi-attribute value theory, this paper develops a process framework to assess business sustainability and overall performance of firms that effectively deploy and use balanced scorecard (BSC). Using data from Lithuanian telecommunication company, the study finds empirical support for the developing an individualized balanced scorecard, combined with EVA, which brings additional value created along with a number of sustainability oriented dimensions. These findings are discussed as optimistic results for developing multi-attribute value theory as a major causal driver of sustainability. The paper has practical relevance for the effectiveness of the balanced scorecard inside a telecommunication company, particularly as it is gaining additional importance due to the fact that the concept brings increasing value for a company.

Keywords: multi-attribute value measurement (MAVM), sustainability, balanced scorecard (BSC), analytical hierarchy process (AHP), economic value added (EVA), Simple Additive Weighing (SAW).

1. INTRODUCTION

Multiple-attribute value theory (MAVT) can be used to address problems that involve a finite and discrete set of alternative policies that have to be evaluated on the basis of conflicting objectives (Beinat, Nijkamp 1998). For any given objective, one or more different attributes or criteria are used to measure the performance in relation to that objective. These aspects, the impacts of all alternative options for all attributes, which are usually, measured on different measurement scales. MAVT can be used to assess the sustainability of a policy because it allows to simultaneously taking into account indicators that refers to the three dimensions of sustainability: the economic, the social and the economic one. In other words, it can be used to combine information in such a way that it can clarify sustainable development aspects. MAVT can incorporate the following aspects as separate criteria to compare alternative policies: (de-)coupling aspects, adaptability and (ir-)reversibility (Sharifi, Herwijnen 2002, Herwijnen 1999).

Multiple-attribute value theory (MAVT) is a compensatory technique. This means that the method does allow compensation of weak performance of one criterion by a good performance of another criterion. MAVT aggregates the options' performance across all the criteria to form an overall assessment. Well known and often used MAVT methods are Simple Additive Weighing (SAW) and Analytic Hierarchy Process (AHP).

The paper focuses on a complementary system of managerial metrics, which was created; the system gives opportunity to link EVA system to the Balanced Scorecard (BSC) through multi-attribute value measurement (MAVT) and analytical hierarchy processing (AHP) to assess business sustainability. The balanced scorecard was presented as a mechanism for identifying value drivers and drilling down into the operations of the telecommunication company. Afterwards, these complementary frameworks were combined through the MAVT and AHP methodology, to develop a comprehensive measurement system for assessing the overall performance and sustainability of telecommunication company.

2. STRATEGIES FOR SUSTAINABLE VALUE CREATION OF ENTERPRISE

The conception of Value Based Management was created in the late 1980s. The new approach put an emphasis on management style that included finance and strategy. From this standpoint it is possible to analyze value drivers and identify corporate strategy that leaded to better creation of company's value. Due to the reason of integrating strategy and value, Value Based Management is the key point to finding better investment opportunities and following strategic movements. Value Based Management used in practice showed that constant decisions cannot be made and strategy development must be a continuous process. (Clackworthy 2006, Fong *et al.* 2007). Managing for value is a competitiveness advantage of company. Value Based Management involves transforming behavior in a way that encourages employees to think and act like owners (Martin, Petty 2001). Understanding what influences the value of the business is part of Value Based Management. According to Copeland, Koller and Murrin (1996), the organization cannot act directly on value. It has to act on things it can influence, such as customer satisfaction, cost, capital expenditures, and *etc.* The closer look will be taken at analyzing value drivers through financial perspective. Researchers vary as to the number of these value drivers; for instance, five (Ruhl and Cowen 1990), six (Moskowitz 1988), and seven (Rappaport 1998, Mills and Print 1995, Mills *et al*. 1992). Turner (1998) has identified eight value drivers. Creating value of the company, the most accurate value drivers are: weighted average cost of capital (WACC), return on invested capital (ROIC), growth rate (g), and economic value added (EVA). There are several reasons for

ROIC – a ratio for measuring firm's operating profitability that shows the expected rate of return on net new investment – to be a widely used measure:

1. The historical performance of a company can be evaluated;
2. It is component when calculating company's earnings growth rate;
3. It is the leading component in economic value added (EVA);
4. It indicates if company's wealth is being created or destroyed.

Economic Value Added measures true economic profit, or the amount by which the earnings of a project, an operation, or a corporation exceed (or fall short of) the total amount of capital that was originally invested by the company's owners (Bloomsbury business library 2007). Accounting net income is not enough if it doesn't translate into cash returns that exceed the individual investor's own opportunity costs. When a company is able to earn more than it has invested, the business is adding value, whereas, if there are not enough earnings generated, the value is destroyed (Bhalla 2004; Soenen 2005, Fletcher and Smith 2004). At the beginning, company is concerned on future returns, for this reason FCF and EVA are metrics to evaluate future possibilities on investments made and at the business growing stage when returns from investments are generated, that are measured with ROIC as this measure is used for past results analysis and in this way can be compared to expectations if they are fulfilled. In a growing company that is making investments, the goal from value drivers' analysis is to find factors that are making impact to investment returns, as it reduces or increases value. The problem that may lead to wrong interpretation of company's performance is a growth rate, as it reaches its maximum at the beginning of business, while a fast and aggressive expansion policy is being held, and then lowers a lot, when company has fulfilled its business development projects. The higher a firm's operating profit margin and capital turnover, the higher its operating profitability. Researchers (Jie, Xun 2007, Kwan 2006, Lert 2005, Ly *et al.* 2007, Miller *et al.* 2004, Meng, Weerasinghe 2006, Parise, Casher 2003, Roman *et al.* 2006, Yaozhong, Øksendal 2007, Martins, Galdi 2006) are putting an emphasis on value improvement through value drivers. According Hawawini and Viallet (2005) a higher operating profit margin is achieved by:

1. Increasing sales through higher prices and/or higher volume at a higher rate than operating expenses;
2. Reducing operating expenses at a higher rate than sales.

A higher capital turnover is achieved through a better use of the assets required to support the firm's sales activity:

1. A faster inventory turn;
2. A shorter collection period for the firm's receivables;
3. Fewer fixed assets per EUR of sales.

Returns from investments can be measured according the following measures: return on assets (ROA), return on equity (ROE), and cash flow return on investment (CFROI) and other.

3. INTEGRATING EVA AND THE BALANCED SCORECARD

Kaplan and Norton (1992) presented the balanced scorecard (BSC) as a performance measurement tool. The balanced scorecard has gained prominence as a way of integrating financial and non-financial performance measures into an overall control system (Atkison *et al.* 1997, Hoque, James 2000, Malina, Selto 2001, Simons 2000). it appears promising to use the balanced scorecard methodology to integrate environmental and social management with the general management of a firm (Figge *et al.* 2001). For many years the telecommunication industry is a good example of detailed performance measurement system (Pieper 2005). This industry has a specific balanced scorecard implementation, which is not relevant for other industries.

Managers of many companies seek to improve profitability in a competitive environment, profitability is needed for increasing value of a company. This is the reason of implementing value-based measures, one of which is Economic Value Added (EVA). Companies should switch beyond narrow metrics to the usage of EVA like a strategic decision tool; this will help in improving of implementation of value based management (VBM). The process should include identified value drivers, integration of budgeting with strategic planning, and development of a sophisticated performance measurement system (Stankeviciene, Sviderske 2010).

The aims of the approach are to satisfy four telecommunication company's requirements regarding balanced scorecard perspectives:

1) *Strategy:* determine strategic value of telecommunication company. This strategic value to the telecommunication organization still remains unanswered and needs further consideration.

2) *People:* the recognition that the success of the telecommunication organization depends on how well its people (telecommunication professionals) are valued.

3) *Process:* apply the telecommunication business model to effectively prove added efficiency and productivity within the telecommunication organization when a remote customer monitoring system is deployed, and to prove that telecommunication service costs may potentially be reduced. A telecommunication business model must encompass all aspects of a telecommunication framework that is directed towards a metric-based strategic plan with measurable relationship across the internal and external telecommunication organization processes - from a top-down management view of how policies, procedures, processes and operations should serve the telecommunication organization to the bottom-up view of how the customer processes are made more efficient further ensuring that IT processes become more cost efficient in the future ongoing support environments (in source, outsource or managed services). There is currently no way of determining the ongoing support costs for the telecommunication organizations.

4) *Technology:* telecommunication company's primary purpose is to provide qualified telecommunication service to customers. The technology of production should also be improved and the cost reduced through technological progress.

These four telecommunication company requirements would further need to be linked to measure systems from a Strategy, People, Process and Technology performance perspective.

Combining EVA and BSC to achieve strategic alignment to enhance value of both tools by combining them in a single application could be an effectively usage of EVA calculation to drive the definition of categories within Balanced Scorecard's financial perspective.

4. THE MAVT AND AHP-BASED VALUATION FRAMEWORK

AHP, as one of the MAVT instruments, is a multi-criteria decision support system, developed by Saaty (1996) and discussed by Podvezko (2009), that allows a decision maker to structure a complex problem in the form of a hierarchy. Generally, the AHP methodology is a method, which splits out a sophisticated case into several components, organizes these components (variables) into a hierarchic order, settles numeric values to subjective judgments on the relative importance of each variable, and synthesizes the judgments in order to identify which variables have the highest priority and should be acted up to influence the outcome of the situation. AHP consolidates personal values and judgments in a logical way.

Some applications of the AHP model have been already made in a plenty of different problems in order to improve decision making process (Hogan, Olson 1999, 2004, 2006; Ishizaka, Lusti 2004; Travana 2004). The most important aspect of the AHP model includes the ability to reconcile sophisticated quantitative and qualitative information in the process of decision making. Furthermore, the simplicity of use and ability to adjust the consistency into the decision-making process bring additional benefits of AHP method.

Hogan, Olson and Sillup (2009) propose that there are four general steps required to implement the AHP. First, the decision maker identifies the criteria and determines their relative importance in achieving the goal and identifies the sub-criteria and determines their relative importance in achieving the related criterion. Second, the decision maker determines the relative importance of the ratings categories for each of the sub-criteria. Third, the alternatives are evaluated in the context of each of the ratings categories. Finally, the results are synthesized to compute the relative contribution of the alternatives in achieving the goal.

The first three steps are the same as in most MCA methods. Step 4 is specific for MAVT. MAVT is based on the assumption that in every decision problem a real value function U exists that represents the preferences of the decision maker. This function aggregates for each alternative a_j (j = 1 ... M) the criteria c_i (I = 1 ... N) that are under consideration by the decision maker.

5. INTEGRATION OF EVA AND BSC USING AHP IN A TELECOMMUNICATION COMPANY

A balanced scorecard needs to be used to realize the full value of a telecommunication company. By Schneiderman (1999) a balanced scorecard fails when company management is not familiar with information from identified relevant performance measures. As noted by Jennings, Graham (1997), the balancing of long-term development with short-term requirements for survival is a particularly important issue for companies – failing to get the budget process aligned with the strategic goals of the enterprise can make achieving this balance harder.

In order to implement a balanced scorecard system to the particular company, some steps of implementation should be fulfilled.

Strategic Analysis. The significance of clearly identified objectives is mentioned by Lingle, Schiemann (1996), who warns from so named "fuzzy objectives", because this is a reason for shortage of implementation and targeted results.

Strategy Mapping. The managers carried out a comprehensive strategy mapping of the strategic topic. Strategy mapping, as it is described by Pandey (2005), is a pictorial description of the strategy and its elements. Balanced scorecard designs in telecommunication companies normally include an elaborate process for identifying measures in order to give clear picture of company's direction towards achievement of its goals (Olve, Roy, Wetter 1999).

The telecommunication company's vision is to implement management system into the company and be recognized by stakeholders and interested parties as a leading telecommunication company by achieving a superior level of management for employees, consumers and customers. The main strategic plans of telecommunication company are: (1) to maintain existing market share and to invest more in different markets; (2) to develop economically good platform for company's future; (3) to reach growth of sales and to hold leading position; and (4) to develop and maintain relationships with governmental, regulatory and interested party groups protecting the shareholder's interest.

Table 1. Scorecard for telecommunication company (adopted and improved from Stankeviciene, Sviderske 2010)

	High performance Organization	*Systematic Execution & Implementation of system requirements*	*Stakeholder service excellence*	*Excellence in financial performance*
Objectives/Critical Success Factors	- Attract key employees for a company; - Provide health working environment; - Increase team work and spirit of a company.	- Allow for easy storage, access, compilation and dissemination of data, know-how and experience; - Ensure good communication channels.	- Provide feedback and recommendations to internal stakeholders regarding performance and compliance with guidelines and standards to improve the business; - Insure all information is presented in-time, accurately and thoroughly.	- Improvements in operational performance; - Support appropriate targets to achieve business needs;
Key performance	- Employee satisfaction rate; - Training compliance rate; - Successful job rotation.	- Audit recommendation implementation score; - Information sharing score.	- Business improvement rate; - Management satisfaction rate; - External rating score.	- Risk management score; - Expense spending control; - Performance score; - Target achievement rate.

According to telecommunication company's strategic plan, there are four main objectives: to increase sales growth, profitability, customer and employees' satisfaction and their retention. The AHP framework was used by management to distinguish the relative importance of each of these strategic drivers and develop an index to predict overall telecommunication company performance.

To construct AHP model connecting telecommunication company's EVA mission and objectives with the balanced scorecard. An AHP model must have an exact goal, in case of telecommunication company it is to achieve an EVA target of 1 million EUR. A hierarchy is constructed to link the goal with alternatives. Alternatives can be viewed as strategic options for achieving the goal. Afterwards, the criteria are selected. They represent the measures used to access the performance of financial and non-financial drivers of value in telecommunication company (Ponikvar, Tajnikar, Pušnik 2009). This hierarchy is illustrated in Table 1 and is identified in such way:

1. Goal: Maximize stakeholder and shareholder value by achieving an EVA of 1 million EUR.
2. Strategic Alternatives: increase profitability, grow in sales, satisfy customer needs and satisfy employees' expectations as well as to retain number of customers and employees in a company.
3. Criteria: Each key performance measure is located under each perspectives of balanced scorecard.

To relate each measure with its underlying balanced scorecard perspective is one method how to be sure that each perspective has been taken into account in the process of strategy development and performance management.

The weights of each key performance measures should be selected using AHP model. AHP models need twosome comparisons to evaluate the relative importance of each of the strategic objectives and the importance of each of the criteria in meeting the EVA goal and each strategic objective. Such comparisons are presented by several modes, including verbal, numerical and graphical approaches. The weights are based on management's evaluation of the significance of the performance measure of telecommunication company's unique competitive environment. Customer and sales oriented objectives and measures were higher priorities than financial measures.

It was important to grow sales and to retain its customers in order to enhance telecommunication company's ability to capture competitor's customers.

To use key performance measures for creating an index to predict overall telecommunication company performance. Telecommunication company decided to create three possible alternatives of company's performance, depending on different targets, set by a company. Three scenarios were given and, quantifying the relative effect of each change, an index to predict the company's progress toward its strategic targets was constructed. Evaluated AHP measures can show possible company's problem areas, if the measure does not meet the target; and they also can indicate what company will do well, if the targeted goal is reached.

The maximizing criteria imply that, if their values are growing, the situation is getting better, while for minimizing criteria this means a worsening situation. The integration is achieved by normalization which helps to convert all the criteria values into non-dimensional, i.e. comparable quantities. Quantitative methods quantitatively evaluate each alternative determining the differences in the values obtained for the alternatives considered (Ginevičius 2008).

The essence of multi-criteria evaluation can be clearly shown by the so-called Simple Additive Weighting (SAW) method expressed as:

$$S_j = \sum_{i=1}^{m} \omega_i \tilde{r}_{ij}, \qquad (1)$$

where S_j is the value obtained in multi-criteria evaluation of the j-*th* alternative; ω_i is the i-*th* criterion weight; $\tilde{r}_{ij}$ is normalized value of the i-*th* criterion for the j-*th* alternative.

As can be seen from the formula (1), the normalized values of the criteria are used to determine the multi-criteria evaluation (Ginevičius, Podvezko 2008; Ginevičius 2007).

If telecommunication company's decide to choose alternative 1 for strategic planning, the overall performance will be accomplished only by 92.13 %. Only one perspective perfectly reached the target, other performance measurement perspectives fell short of its target. By alternative 1 such financial measures as RONA (12.61 % better than targeted), WACC (31.12 %) and Accounts Receivable days (15.42 %) are even better than they were targeted, the better results are also presented by such customer perspective measures: revenue from value-added partnerships (37.44 %) and on-time delivery (0.87 %), only one measure of internal business perspective is twice better than it was targeted – innovation/learning perspective measures – employee retention measure brings better results than targeted (2.91 %). Alternative 1 has only several rates, which are in bad condition, this is an employee suggestion rate (-35.15 %), some decisions should be make to improve this area.

The alternative 2 suggests that 8 measures will bring better performance than it was targeted, they are: WACC (45.98 % better performance), customer retention rate (0.75 %), revenue from value-added partnerships (17.98 %), out-of stock rate (4.83 %), accounts payable days (18.81 %), revenue from new products (17.50 %) and employee training days (38.03 %). So, choosing this alternative, not too many measures will achieve the main target, but the main attraction is that the most weighted measures reach the target and this brings the real value increase to performance index. Some measures indicate poor future results, it means that managers could pay attention to the areas where the results are worse, these areas include employee suggestion increase in a company (-55.47 %), broken packages (-54. 83%) and others. The overall performance index of alternative 2 is 106.55 %, it is even better strategic choice than the target.

The last choice is alternative 3 – the performance index of this alternative is 79.34 %, it is a little bit higher than alternative 1, but less than it is targeted. Target will be achieved by RONA (4.76 % greater than targeted), sales growth (23.32 %), accounts payable days (64.64 %), broken packages (30.435 %) and employee retention (7.41 %). The areas, where some changes should be made are concerning revenue from value-added partnership (-48.79 %), revenue from new products (-50.05 %) and employee training days (-22.02 %).

Furthermore, a value cycle of telecommunication company should be created, showing the process of value creation in a company. The first step is to understand and create company's main vision, afterwards, the direction should be made towards second step – strategic mapping. Telecommunication company had decided upon the priorities of balanced scorecard perspectives and strategic objectives. When the most important fields were clarified, the telecommunication company has invested in different business operations, such as people, process, customers and financial operations. Afterward, some performance results appear, and these results should be measured according to the value, which was brought to the telecommunication company after investment. In the case of telecommunication company the value is measured by economic value added (EVA), which is integrated in balanced scorecard

perspectives through AHP methodology. So, the performance is measured and the results are calculated, it means that based on obtained results, company's managers can make some conclusions about assess business sustainability.

This is the next step in the value cycle of a telecommunication company – knowledge, learning and assessing business sustainability. After the analysis of obtained results, managers establish new vision of a telecommunication company and the process circulated again and again.

And, finally, in order to understand the really best strategic choice for telecommunication company's value, Economic Value Added should be calculated according to results of performance. So, taking into account the fact that the main goal was to create a comprehensive measurement system for assessing the overall performance of telecommunication company through combining complementary frameworks (EVA and BSC) through the MAVT and AHP methodology, it can be proved, that the best alternative is second one, because it brings the best results for a telecommunication company, with value and performance increase.

6. CONCLUSIONS

1. The balanced scorecard is a mechanism for identifying value drivers and drilling down into the operations of the telecommunication company, whereas economic value added measures the created value for a company. The analytical hierarchy processing methodology helps to combine these two frameworks in order to develop a comprehensive measurement system for assessing the overall performance of telecommunication company.

2. The work has introduced a new framework for a telecommunication company to improve the implementation of value based management by adopting balanced scorecard in order to identify value drivers and develop a quantitative measurement system relating the telecommunication company's objectives of maximizing shareholder value.

3. The combination of EVA and BSC financial perspective has the influence to the remaining three perspectives, because if the goal is to grow sales, by increasing the average value of the product, which will lead to the purchasing behavior changes, the managers will have to institute new activities such as the increase in the quality of the delivery service. To see how the actions are really working in the system the financial outcomes should be calculated accordingly to the EVA methodology. The illustration of the achievement of overall strategy is given in using the Causal Chain example of BSC and EVA combination.

4. AHP valuation framework improves the company's capacity to predict strategy implementation on a real-time basis through increased timeliness and accuracy which gives the better opportunity to improve company's performance and to create value for future.

5. A rational framework which includes multicriteria methods is used. The maximizing and minimizing criteria are expressed in various dimensions and then integrated into one criterion. A rational approach to decision-making requires rules for the aggregation of used criteria into an evaluation score.

7. The value cycle for telecommunication company is a good strategic decision. After selected vision, balanced scorecard and strategic objectives are designed. Another step is investment to business operations, appealing to the selected objectives, after which is performance and value added measurements. Through this analysis, knowledge and learning appear for the managers. Based on this, they create new vision for a telecommunication company and the value cycle repeats more and more.

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