

Improvement of process efficiency in ZP HET

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Abstract:

Classical systems of measurement prevent the realization of the basic purpose of measurement, i.e. to identify actions necessary for continuous improvement. The authors of this paper, using the methodology of Balanced Scorecard (BSC) in the classical system of financial reporting, have confirmed the following hypothesis:

- Although TQM models were among the first initiatives of performance measurement that highlighted the inadequacy of traditional accounting measurements for management purposes,
- Balanced scorecard model helps to overcome its limitations for effective performance measurement. [1]

Keywords: measurement, improvement, Balanced Scorecard, Total Quality Management

1. Introduction

Improvement of effectiveness and efficiency of quality management system aims at improving financial results of the organization. After determining the mission, vision and quality objectives, planning activities contribute to:

- creation of added value (VBM - Value-Based Management, the concept of management based on value), and
- cost reduction. [2]

The subsidiary joint-stock company "Hydroelectric powerplants on Trebišnjica", Trebinje (HET) received the certificate of compliance with the requirements of standards ISO 9001, ISO 14001 and OHSAS 18001 in October 2010 (Integrated Quality Management - IQM). In a restructuring process, 5 years prior to certification, HET became an organization with joint-stock company status, with majority state ownership. This time period was analyzed in order to determine the causes of changes in value of the company and its financial solvency.

The main objective of the changes made in public sector, in the process of deregulation and restructuring, is raising of economic efficiency and effectiveness of this important sector of the economy. After analyzing the characteristics of public companies and evaluation of their functioning, attention was focused on the economic characteristics of public companies in a market economy and

development of entrepreneurship. In order to pinpoint the causes of current problems in the sector and to identify avenues of change, a clear definition of new management assignments in the process is necessary. The management of the company must possess the skills and knowledge that will help in using the synergy of accumulated knowledge and experience in public company, so that it can move the public enterprise system from the existing situation to the new desired state, whilst seeking contemporary solutions that already operate in countries with developed market economies.

Conducting business with losses in public enterprises causes a series of unintended consequences. This is primarily reflected in payments to service providers, in the standard of work and employees compensation. In the conditions thus established, the management is guided to seek the solution of economic problems in the business from the state bodies, i.e. its founders. However, providing public companies with the characteristics of business systems fundamentally changes the management functions. Instead of administering, the management functions are more akin to entrepreneurship.

2. Intellectual capital as the key driver of improvement

Business and financial reporting in compliance to international accounting standards (International Accounting Standards Board - IASB) sets new rules of determining the success of the business, fundamentally different from those in the 1950's, because traditional financial monitoring of business performance does not and can not include the main driver in the new economy - the intellectual capital. It is clear that the classic indicators of business performance, such as the increase in total revenue, profit or cash flow, do not reflect the true business ability of the company, because they do not communicate whether the company created value or not. Unfortunately, this area was completely ignored until now.

Value-added is the main criterion of success of business in today's economy. It is a fact that unproductive and inefficient production can lead to a complete impairment of companies, which not only add no value, but rather pile up losses, something that is completely unsustainable economically and contrary to TQM requirements.

Alongside conventional production factors, such as equipment and financial resources, intellectual capital is becoming a key resource. Nowadays no top-management can be allowed not to know what knowledge and skills it commands. A company that successfully uses its intellectual resources virtually ensures competitiveness in the global market. Therefore, wise use of knowledge resources becomes one of the main strategic themes in the new economy. Knowledge and capital are the basic factors of production in the 21st century. Since capital is relatively abundant, and knowledge relatively scarce, work becomes the dominant factor of production again. Of course, this is no longer physical or manual labor, but educated, experienced and organized labor. Concentration of such work produces intellectual energy that produces intellectual capital. Thus, 21st century industry will be where intellectual capital is organized. [3]

Intellectual capital of a company is all employees, their organization and the ability to create value which is valorized by the market. The starting point of analysis is business results: value added, which is calculated by subtracting the input (all costs except expenditures for employees) from the output (total revenue). The

main novelty of this concept is that expenditure for employees (salaries and other benefits) are not input, i.e. not a cost, but an investment. Employees invest knowledge and skills that the business enterprise valorizes on the market.

Business Excellence is based on the transfer of principles and tools of quality management into business management, or in other words, the ultimate goal of TQM-based quality management is achieving organization's business success in terms of finances and meeting the demands of all stakeholders. TQM is a combination of all approaches to quality management, aimed at improving company performance. This is a business philosophy, lifestyle, culture of its people and the choice of techniques for successful realization of company goals. [4]

3. Analysis of financial position and rentability of HET

When something brings a definite yield it is termed productive. When it yields a paid revenue, it is said to be rentable or viable, and when it is successfully done with evident benefits and profit, it is said to be effectively and efficiently completed.

Production of HET is specific in the sense that all energy produced is delivered to the electric power system of Republika Srpska, but without a direct influence on charging for it.

The concept of "value analysis" was first used by J. D. Miles in 1946 in the U.S., when he was doing research of supply market for "General Electric" company. His definition of value analysis was as follows: "The analysis of value is a set of techniques which determine the unnecessary costs, i.e. costs that do not contribute to the creation of value, service, use-value, appearance and safety of a product, of satisfying the needs and requirements of the customers." He pointed out that 20% of the cost usually make 80% of product value and vice versa, that 80% of costs generates only 20% of its value. [5]

No.	Year	Domestic consumption	Other buyers	Variable cost	Fixed cost	Average price
		pf/kWh	pf/kWh	pf/kWh	pf/kWh	pf/kWh
1	2006.	3.040	5.800	0.610	3.310	3.920
2	2007.	3.040	5.800	0.610	3.310	3.920
3	2008.	4.060	6.500	0.590	4.350	4.940
4	2009.	4.060	6.500	0.590	4.350	4.940
5	2010.	4.010	6.700	0.590	4.350	4.940

Table 1 Prices of electric power at Trebišnjica HEPP, prescribed by RERS.

The analysis of HET efficiency concentrates on fixed costs, that participate with over 80% in the prescribed price of electric power.

Process-oriented integrated quality system (IQM) is, in certain ways, the modern concept of business performance management, which combines various managerial approaches - best practices, under the "conceptual umbrella of quality management" [6], with the task of building the capacity of a business to effectively adapt to its environment.

The methodology of cost determination is based on setting the required revenue and production plan. Required income is determined on the basis of justifiable costs of operation and maintenance, which include depreciation costs (costs of business activity - the cost of wages and salaries, depreciation, costs of materials and spare parts, fuel and energy costs, costs of taxes and contributions ...) and approved return on equity, which is determined on the basis of approved rate of return on capital required for funding of the regulatory basis (the value of fixed assets necessary for carrying out activities, plus net working capital). The rate of return with which approved rate was calculated is 2% (Table 1).

HET is an organization that operates as part of a holding company "Electric Power Industry of Republika Srpska" (hereinafter referred to as MH ERS) and its main activity is production of electric power.

Electricity as a "sui generis" commodity has many specificities, unlike most other goods. At present, only the basic characteristics of electric power is considered, most notably the simultaneity of its production and consumption, which effectively prevents "storage" and delaying the satisfaction of consumer needs, diversity and large number of consumers, characterized by both voltage levels and volume of consumption and also the fact that electricity is an indispensable condition for normal life and work. However, as for all other goods, the laws of the market increasingly apply to electricity. This is reflected in supply, demand, marketing, pricing, state influence on the work and operations, the level of living standards, market development, the level of economic development, then consumer habits and influence of many other internal and external factors on the demand for a product .

Price also represents a special way of communication between producers and consumers, as a signal that indicates availability of a product or service. This feature of price is relevant for electric power also, as for all other products and services.

Large capital investment, long period of construction and use of energy capacity with the essential nature of this product in any society, imposes a need for a system of electricity pricing which would provide adequate signals to investors, producers and consumers, in order to support a healthy economy.

Keeping prices below cost, for social and industrial reasons, was not common only in developing countries, but in some developed countries as well. The consequences of such policies are extremely expensive and are reflected primarily in the irrational and excessive energy consumption, excessive depletion of national resources, as well as environmental damage due to increased pollution.

On the other hand, excessive electricity prices would negatively affect the competitive power of industry, as well as deprive people of an essential good. Hence, the establishment of the equilibrium level of electricity prices is not in any

way easy to achieve in practice, since pricing is essentially a compromise between different (conflicting) interests and goals.

Thus, in situations when development of electric power capacity is to be encouraged, if private ownership is dominant, the use of historical cost model is insisted upon, primarily through regulation of rates of return, which provides lower risk and an incentive for investors.

In a situation where state ownership is dominant, orientation is toward long-term marginal costs. On the other hand, application of market models is possible only at the stage of full maturity of electric power industry, when there is ample or even surplus of production capacity, when a complete electrification of the national territory is attained and when transmission and distribution networks and supporting technical infrastructure is at such a level that enables an unobstructed competition in production and retail. [7]

Power sector restructuring and the transition from a fully regulated monopoly system to a partially regulated one, with liberalization of electricity market, has become a reality in our country. This process is followed by a series of transitional issues (expected and unexpected), both institutional and technical, economic and organizational, which significantly affect both creation and functioning of electricity market.

In course of the first transition years, follow signing preferential trade agreements with the EU, these counties increasingly opened up, foreign direct investments flow significantly went up, leading to a radical change of production structure, assisted by a geographic proximity of the EU market. Although it was logical developing countries would start with sectors showing competitive advantages (*low-tech* sectors in the first place), they rapidly progressed thanks to quick learning, organizational and managerial capacities. This, therefore, implies that backward economic structure may sometimes under certain circumstances be an advantage, since adoption of *hi-tech* at short notice skips an intermediary phase.[8]

Regulations of economic relations in the mixed holding company "ERS" (MH ERS) regulates mutual economic relations of joint stock companies engaged in the electrical activity in Republika Srpska (RS), in order to provide timely and consistent implementation of the prices set by the Regulatory energy commission of RS (RERS) and the State electricity regulatory commission of BiH (SERC).

Electricity can not be sold at prices lower than cost (CP), which includes all other costs determined by RERS and SERC. Specificity of electricity as a commodity is indicated by a number of concepts, entities and relationships in mutual negotiation and distribution of revenue. Hence, there are domestic consumption, exports, imports, qualified buyers, unqualified buyers, independent retailers, distribution companies, balance surpluses up to planned balance quantities, unplanned realizations in relation to planned balances, approved suppressed energy, average price, weighted average price, tariffs given by RERS and SERC, transmission company fee, independent system operator, etc.

The ratio of fixed and variable costs in approved price is determined by RERS. Distribution companies report the average price realized by calculating 15% distribution losses. Production and transfer negotiate revenue distribution, so the

management of efficiency of the subjects in electricity sector is a very complex process.

4. Defining goals through analysis of cause-effect relationships between financial and non-financial performance of the organization

Financial position and rentability of HET is analyzed through data in annual financial statements, disaggregated into components through the prism of BSC perspectives.

The very fact that the company has, in the process of ownership transformation into a joint stock company with majority state capital, transferred from the zone of operations with losses into the area of operations with a positive financial result, requires a deeper analysis of financial structure and development of rentability position, as well as detection of determining factors of positive tendencies and also latent gains and losses. The following sections of the analysis aim at that.

It should be noted that a significant part of microeconomic theory of companies deals with the relationship between profit and capital. From the point of businesses continuity, there is a requirement that these two variables be consistently, quantitatively and substantially distinguished. In doing so, priority is given to maintaining and enhancing the capital. The reason is obvious. One can not consider profit before capital for its creation is preserved.

The relationship between capital and income can be viewed simply as the ratio between stock and flow, or as a relation between the state and changes. Capital goods of a company have the character of wealth, while income is the flow from that wealth. Hence, profit is the excess income above the amount required to maintain (minimum) initial value of capital. The result of the enterprise business is the maximum amount it can dispose of during a period, provided it fully preserves the capital invested in it at the beginning of the period.

Total realized income in a given period does not represent the amount of income. This needs to be divided in two parts: one part that represents profit and may be spent, and the part that must be reinvested in order to maintain initial equity and to preserve the economic potential for the future.

The fact that the income and capital preservation are tightly connected, i.e. that one can not be achieved without the other, indicates the complementary nature of the goals of the company. But since one of them specifies the minimum requirements for achieving the other, they are also in this respect clearly differentiated: one as the supreme goal of business policy, the other as a minimum. One could briefly say that maintenance and increase of capital is a target-condition, and that profit is a target-result of business policy. [9]

Starting point for analysis of financial position and rentability is year 2003 and time period of 3 years ending with year 2005, is selected. Ownership transformation was made in that time period.

Equity turnover ends when the sum of actual cost of products equals the sum of total capital invested. Analogously, the sum of realized products shown as cost minus depreciation are a representative item that expresses the effect of working capital turnover.

The essence of working capital management is in finding optimal solutions in the level and structure of all components of these funds and coordination of their dynamics, in order to ensure normal course of production (or operations) with maximum financial effects.

Aggressive working capital management model requires only a varying amount of current assets financed by short-term sources, while the permanent working capital and fixed assets must be financed from long-term sources.

Owned net working capital fund, as a difference between net capital and fixed assets is negative, which indicates an undesirable situation, in that part of fixed assets which are bound long-term to the corporation, are funded from short-term sources. This means that on maturity of these short-term sources, one has to look for new sources in order to preserve the property.

In financial management theory and economic practice, net working capital is important as part of long-term resources used to finance working capital, because it increases the financial potential of the organization.

Poor dynamics from that period indicate the worsening financial position of the organization, although positive trends were evident in the dynamics of loss reduction, reduction of long-term liabilities, short-term loans and short-term receivables. However, all this requires a deeper analysis of the structure of participation and nominal effects in order to verify improvements. It is therefore hard to discuss improvements without a "deep" structural and ratio analysis of company's balance. A good result in the short term is not necessarily a good long-term result. (Table 2)

Year	Production		Retail income		Expense		Business result	
	GWh	Index	000 KM	Index	000 KM	Index	000 KM	Index
2003.	961,5	100,0	44.086	100	46.159	100,0	-1.854	100
2004.	1.222,4	127,1	49.041	111.2	51.875	112.3	-2.614	140.9
2005.	1.268,9	132,0	54.788	124.2	41.361	89.6	13.600	733.5

Table 2 Basic financial indicators trend

From Table 2 one can see that in this period there was a significant increase in production in natural units of GWh. For year 2004 there was a 27 percentage points increase in natural production, that resulted in a disproportionate increase in revenue from sales of only 11 index points. The reasons for these trends are precisely in the complexity of the problems of power sector and tariff system.

In year 2005 one can already see a proportional change in the relation of production and realization of revenue from sales. For the analysis of financial

position and rentability of HET, it is necessary to establish a system of indicators that accurately reflect the state of the organization with clearly differentiated improvement drivers, within the organization and outside - RERS, MH ERS, the Ministry of Industry, Energy and Mines, Government and the Assembly of RS, since the electricity sector is very complex and electricity is an input in all aspects of economy, so the power sector affects overall price stability in the market.

There is an obvious importance and direct impact of realized cost savings on the improvement of financial results in the analyzed period.

Based on this conclusion, further analysis was done of the trends of financial performance as reported in the official annual reporting forms (income statement, balance sheet, the annex, changes in the capital status, cash flow ...) for the period from 2006 to 2010.

Year	Measure				Goal 2/1	Alarm	Measurement interval
	Price prescribed by RERS pf/kWh	Realized Cost price pf/kWh	Index 2/1	1/2	% <110	% 110	1 year
2006	3.92	4.03	103	97	65.38	55	
2007	3.92	5.73	146	68	73.08	58	
2008	4.94	5.44	139	91	70.51	60	
2009	4.94	4.36	88	113	75	66.67	
2010	4.94	3.45	70	143	78	69.23	

Table 3 Defining improvements based on cost price trend

FINANCIAL PERSPECTIVE	USER PERSPECTIVE
<p>Income statement</p> <ol style="list-style-type: none"> 1. Total cost 2. Business result profit/loss 3. Gross salaries and compensations <p>Balance sheet</p> <ol style="list-style-type: none"> 4. Liquid assets 5. Short term liabilities 6. Receivables from sales <p>Cash flow balance</p> <ol style="list-style-type: none"> 7. Outflows on payment of dividends 8. Investment outflows --- trend points to the need to analyze the structure 9. Investment inflows <p>Capital changes</p> <ol style="list-style-type: none"> 10. Changes in capital status at the end of interval relative to the start of interval <p>Annex</p> <ol style="list-style-type: none"> 11. Investment value during reporting interval 12. Fairs, commercials, advertizing costs, part of other costs 13. Manufacturing services costs 	<ol style="list-style-type: none"> 14. ZP HET part in MH EPRS gross production 15. Cost-price (CP) recommended by RERS 16. Part of profit that belongs to minority owners (shareholders), on Supervisory Board's decision 17. Number of energy re-balances (MH ERS)
INTERNAL PROCESS PERSPECTIVE	LEARNING AND DEVELOPMENT PERSPECTIVE
<ol style="list-style-type: none"> 18. Number of plant outages due to failures 19. Number of plant outages longer 20. than 8 hours 21. Total expenses per kWh 22. Gross wages and salaries as part of total expenses 23. Net income per kWh 24. Profit per kWh 25. Total signed commercial contracts 26. Number of investment contracts and participation in total contracts signed 27. General liquidity indicator working capital / short-term liabilities 28. ROA=net income/total active 	<ol style="list-style-type: none"> 29. Number of employees in production and technology greater than 60% 30. Number of workplace injuries 31. Annual expenses for fairs etc. per employee

Table 4 Set of performance measures for resource use, differentiated by BSC dimensions

There is an obvious importance and direct impact of realized cost savings on the improvement of financial results in the analyzed period.

Based on this conclusion, further analysis was done of the trends of financial performance as reported in the official annual reporting forms (income statement,

balance sheet, the annex, changes in the capital status, cash flow...) for the period from 2006 to 2010.

Improvements in about 30 indicators were defined. Starting hypothesis has been confirmed with their inclusion in the selected set of targets for tracking trends observed in 5 years (Table 4).

5. Research results

Basic tenets of QPR Scorecard model developed in the case of HET are based on the following facts:

The developed model accumulates information from annual reports.

There are three basic series:

- Actual data series;
- Target data series;
- Alarm data series.

Series of target and alarm data relate to the values that serve as a reference for a series of current data to be entered.

In order to facilitate visualization of processed results, achievements are shown in different colors, usually in bright colors of traffic lights.

There is an evident increase in corporate performance in the years observed, expressed in percentage points for four BSC perspectives (Table 5).

This clearly shows the specific benefits of described approach in improving performance of HET.

Godina	BSC	FP	PK	PIP	PUiR
2006	40.67	48.43	38.68	40.37	32.35
2007	56.72	57.70	62.58	55.92	41.86
2008	56.63	60.87	67.37	69.41	58.04
2009	69.07	69.5	68.64	70.53	54.47
2010	74.16	76.55	71.87	70.37	56.36

Table 5 Presentation of results in performance measures of resource use, differentiated by BSC dimensions.

6. Instead of conclusion

In the next step, it would be possible to apply CRI (Check, Review, Improve) approach on objectives related to improving efficiency of the organization through BSC perspectives, to measure, analyze and improve the level of implementation. In practice, CHECK refers to analysis of annual financial statements. Drivers of improvement are defined by establishing cause-effect relationships of financial with non-financial performance in BSC perspectives and this stage can be defined

as a phase of REVIEW. At the end of the spiral, continuous IMPROVEMENT must be implemented in the definition of business objectives for the coming period.

Achievement of these goals is possible through cost control in the sense of achieving better results with the same or lower costs. Satisfying requirements includes efficiency improvement. Continuous improvements through application of modern methods and management techniques of "total quality" philosophy are measured, analyzed and improved using the system of activity based costing (ABC system).

Making reasoned management decisions can only be based on facts, so parallel application of several cost systems becomes a necessary condition of efficient management and measurement, analysis and process improvement. This highlights the importance of ISO 9001:2008 standards and process approach to management of the organization and implementation of continuous improvement. The ultimate aim of QMS process-based approach is continuous improvement. ABC system of monitoring costs, and other modern methods and techniques of cost management (FC-Feature Costing, Total Product Life Cycle Costing-TLCPS; Target Costing-TC; Kaizen Costing-KC; Take back Costing-TBC...) are a prerequisite to satisfying the requirements of ISO 9000 standards, as detailed in sections 5, 6, 7 and 8 of [10].

The key success factors of HET would be:

1. Quality and motivating HR policy in the organization.
2. New investments and increase of capital value.
3. Continuous improvement of efficiency through reduction of negative deviations of realized CK in relation to the price recommended by RERS to maximum 10%.

Analysis of financial position of HET has shown opportunities to increase efficiency in managing costs. The hypothesis that BSC method facilitates measurement, analysis and performance improvement in organization is confirmed. The facts that HET has been certified under the requirements of ISO 9001, ISO 14001 and OHSAS 18001 and that finance department started using Financial Management Information System (FMIS-SAP) in 2011 are encouraging. What remains to be done in the future, is the choice of measurable objectives and their constant improvement through CRI-method (checking, reviewing, improving), thus continuously improving organizational effectiveness of HET.

The most important usage of the performances management are the following:

- better and with more quality planned goals accomplishing (it is very common to go over planned goals)
- faster and better decision making
- all employees are focused on organization's goals
- management and employees have more self-respect and motivation. [11]

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