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Introduction

Contemporary management control and reporting both face challenges. Consequently, a new and more sophisticated scientific approach is needed. From one point of view, interdisciplinary studies and theories are necessary. From another point of view, empirical research and practical issues call for a more specific and specialized approach. This complexity is reflected by the content of this book, which covers topics that emerge from present world's complexity. Therefore, the authors focus on ever-important issues (such as the strategic approach and its support by management control and reporting, survival of companies), and more modern issues (e.g. cultural aspects, measurement and reporting adjusted to branches, spheres and organizations and specific issues of management control and reporting).

The strategic approach to managerial control and financial statements and their role for company's survival is presented in papers by J. Dyczkowska (who addresses the question whether annual reports communicate strategic issues and focuses her study on reporting practices of high-tech companies), A. Bieńkowska, Z. Kral, A. Zabłocka-Kluczka (who explain the role of responsibility centers in strategic controlling), P. Kroflin (who explores the value-based management and management reporting examining impacts of value reporting on investment decisions and company value perception) and A. Reizinger-Ducsai (who discusses bankruptcy prediction and financial statements). The problems of management control and reporting and their adjustment to specific conditions and organizations are undertaken by T. Dyczkowski (who introduces his NGO performance model), Z. Kes and K. Nowosielski (who present the case study of the process of cost assignment in a local railway company providing passenger transportation services), S. Łęgowik-Świącik, M. Stępień, S. Kowalska and M. Łęgowik-Małolepsza (who analyse the efficiency of the heat market enterprise management process in terms of the concept of the cost of capital), and M. Pietrzak and P. Pietrzak (who discuss the problem of performance measurement in the public higher education). The cultural aspect of managerial control and reporting is explored in papers written by M. Nowak (who presents cultural determinants of accounting, performance management and costs problems showing the issue from Polish perspective using G. Hofstede and GLOBE cultural dimensions) and P. Bednarek, R. Brühl and M. Hanzlick (who provide a literature overview of planning and cross-cultural research). The specific problems and concepts of managerial control and reporting are investigated by M. Ciołek (who discusses the lean thinking and overhead costs), E. Nowak (who analyses the role of costs control role in controlling company operation), Ü. Päril, R. Koyte,

S. Näsi (who examine middle managers' mediating role in MCS implementation), R.L. Sichel (who discusses the relevance of intellectual property for management control), J. Paranko and P. Huhtala (who analyse the productivity measurement at the factory level).

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**EFFICIENCY OF THE HEAT MARKET
ENTERPRISE MANAGEMENT PROCESS IN TERMS
OF THE CONCEPT OF THE COST OF CAPITAL**

**EFEKTYWNOŚĆ PROCESU ZARZĄDZANIA
PRZEDSIĘBIORSTW RYNKU CIEPŁA W ŚWIETLE
KONCEPCJI KOSZTU KAPITAŁU**

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Summary: The paper focuses on the problem of variations in the level of the cost of capital, indicating its impact on the efficiency of the management process in an enterprise of the heat market. All the presented considerations are divided into three basic parts. The first part of the paper emphasizes the essence of estimating the cost of capital in an enterprise. The considerations presented in the second part characterize the system of the heat price regulation based on the legislative acts in force in Poland. The subsequent, third part of the paper is the presentation of the results of the empirical studies carried out in the field of the assessment of the efficiency of management of the heating company in 2005–2014. The paper is to explore and assess relationships between operational efficiency measured with ROA indicator and the level of the cost of capital. The research methods applied to achieve the objective are literature studies, descriptive analysis, trend analysis of return on assets and weighted average cost of capital and Pearson's correlation coefficient. The problem of estimating the cost of capital in the enterprises from the heat market is important and up-to-date due to its impact on efficiency of management of these enterprises.

Keywords: cost of capital, management efficiency, heat market.

Streszczenie: W opracowaniu podjęto problem kształtowania się poziomu kosztu kapitału, wskazując jego wpływ na efektywność procesu zarządzania w przedsiębiorstwie rynku ciepła. Całość prezentowanych rozważań podzielono na trzy zasadnicze części. Pierwsza część opracowania eksponuje istotę szacowania kosztu kapitału w przedsiębiorstwie. Rozważania zaprezentowane w części drugiej charakteryzują system regulacji cen ciepła w oparciu o akty prawne obowiązujące w Polsce. Kolejna, trzecia część opracowania jest prezentacją wyników badań empirycznych przeprowadzonych w zakresie oceny efektywności zarządzania przedsiębiorstwem ciepłowniczym w latach 2005–2013. Opracowanie ma na celu poznanie i ocenę zależności występujących między efektywnością operacyjną mierzoną za pomocą wskaźnika

rentowności aktywów i poziomem wskaźnika kosztu kapitału. Metodami badawczymi zastosowanymi do realizacji celu są studia literaturowe, analiza opisowa, analiza trendu wskaźnika rentowności aktywów i średnioważonego wskaźnika kosztu kapitału oraz współczynnik korelacji liniowej Pearsona. Problematyka szacowania kosztu kapitału w przedsiębiorstwach rynku ciepła jest ważna i aktualna z uwagi na jej wpływ na efektywność zarządzania tymi przedsiębiorstwami.

Słowa kluczowe: koszt kapitału, efektywność zarządzania, rynek ciepła.

1. Introduction

The efficiency of the management process depends on the efficiency of decisions which influence adaptation capacity of enterprises operating in the conditions of permanent changes of the exogenous and endogenous environment [Krupski 2005, p. 72; Niemczyk 2013, p. 35; Nogalski 2009, p. 7; Stachowicz 2011, p. 201]. Therefore, the essence of efficiency should emphasize the achievement of intended goals while maintaining the appropriate relationship between the effects and incurred expenditure in both statistic and dynamic terms [Nowicka-Skoron 2000, p. 68,70; Pentland 2014, pp. 58–65]. The achievement of the intended efficiency in an enterprise requires taking a range of decisions based on reliable information [Akerlof 1970, pp. 488–500; Hamel 2009, pp. 91–93; Hayes 2012, pp. 1–10], on the basis of which it is possible to assess the course of the economic processes [Sudoł 2011, p. 112; Grudzewski et al. 2010, p. 36]. The decision-making process in the area of efficiency requires periodic evaluation using selected measures and tools [Stabryła 2010, pp. 7–12; Romanowska 2014, p. 175; Reeves, Love, Tillmanns 2012, pp. 76–83]. The measure reflecting efficiency in an enterprise, in the most concise form, is profitability [Sierpińska, Jachna 2015, pp. 195, 289–298]. The indicator of return on assets (ROA), allowing for explaining the reasons and directions of changes of the examined relationships, has a significant cognitive value.

In the light of the above, an important element supporting decision-making processes in an enterprise is the concept of the cost of capital measured with weighted average cost of capital (WACC). The level of the cost of capital in an enterprise provides information on opportunities for gaining capital, prospects for taking investment activities and improvement in operational effectiveness in a company [Nowak 2013, p. 162; Dziawgo, Zawadzki 2011, p. 22]. The choice of measurements and assessment of selection alternatives in the area of efficiency is an important aspect of the decision-making process since its accuracy affects the efficiency of decision-making [Kościelniak 2014, pp. 65–72]. The aim of the paper is to explore and assess the relationships between operational efficiency measured with ROA [Wnuk-Pel 2006, p. 4; Rummler, Brache 2000, pp. 50–72] and the level of WACC. To achieve the objective, the following methods were applied: literature studies, descriptive analysis, trend analysis and Pearson's correlation coefficient [Nowak 2005, pp. 61–64; Nowak

2003, pp. 42–46]. The empirical studies were carried out on the basis of the data from the financial statements of the selected company of the heat sector in Poland.

2. Estimating the cost of capital in an enterprise

Taking into account the fact that the cost of capital can be analyzed in terms of the price which the recipient of capital must pay for the opportunity of using the investor's capital, one should remember to consider the rate of return granted to the investor [Sierpińska, Jachna 2005, pp. 289–298]. This means that the cost of capital, considered as the expected rate of return for investors equals the minimum rate of return expected from the specific investment which the investor is able to accept [Damodaran 2006, p. 4], compared to alternative investments at the similar level of risk, possible to develop on the market [Berk, DeMarzo 2007, p. 141]. It should be underlined that the level of the cost of capital is defined by the market since it is dependent on the preferences of all investors, not only the selected ones. Estimation of the cost of capital is conducted with WACC in accordance with the following formula [Nita 2007, p. 85]:

$$WACC = u_e r_e + u_u r_u + (1 - T) u_d r_d, \quad (1)$$

where:

WACC – weighted average cost of capital;

u_e – share of routine cost in total capital employed;

u_u – share of preferred cost in total capital employed;

u_d – share of cost of capital in total capital employed;

r_e – cost of normal equity;

r_u – cost of preferred capital;

r_d – cost of foreign capital;

T – marginal tax rate.

While analyzing the cost of capital in accordance with formula (1), it should be pinpointed that, in the field of foreign capital, the impact of income tax rate is taken into account, which reduces the level of the cost of capital. The presented formula seems to be simple to apply; however, different technical solutions used by professional entities dealing with enterprise valuation allow for the conclusion that the estimation of capital is a complex task [Duliniec 2012, p. 6]. The presented solution is not free from disadvantages. Treating capital as the payable source of financing, one should remember that its components are not homogenous. Using market value to estimate the cost of capital reflects the claims of investors but limits the objectivity of estimations. The conducted considerations indicate that the selection of techniques for estimating WACC should take into account the size of an enterprise with its capital structure and the expectations of investors in the field of the level of return on capital employed (ROCE).

3. Heat price regulation system in Poland and estimation of the cost of capital

The heat market in Poland is a natural monopoly. It is regulated by the Energy Regulatory Office, subsequently referred to as the market regulator. The enterprises of the heat market in Poland, holding a license for producing, sending and distributing heat by heat networks, are obliged to follow the legal provisions regulating heat prices in Poland.¹ The Energy Act in Poland allows two methods of price fixing. The first method consists in determining the level of operating costs and the cost of capital (the market regulator uses the term “return on equity” instead of “cost of capital”). The other method is based on defining a price ceiling. On account of the aim of the paper, the attention has been drawn to the first method, including operating costs and return on equity, since the system of price ceiling refers to enterprises producing heat in the process of cogeneration, including electricity.

The basis for fixing heat tariffs is the sum of justified costs and justified cost of capital. The level of justified costs refers to fixed and variable operating costs of licensed companies. The legislator, while defining justified costs, did not harmonize the record with the Polish regulations of the Balance and Tax Law, which brings about difficulties in appropriate interpretation and identification and the way of their establishment both by the enterprises of the heat market in Poland and the heat market regulator.

For many licensed heating companies, estimating the cost of capital for fixing tariffs is a methodologically complex and labor-intensive process. The amount of justified return on equity should take into account the equity and foreign capital, the level of interest rates on financial markets, the risk of conducted activity, the value of assets of heating companies, the possibility of reducing operating costs and the price of heat from alternative sources. The general nature of legal regulations in the field of fixing heat prices led to developing guidelines in the area of estimating the cost of capital for the purposes of calculating prices for heat and transmission services. The methodology of estimating the cost of capital for the purposes of tariff is based on weighted average cost of capital (WACC). The formula of WACC (see formula 2) for licensed heating companies was extended to the elements which are to motivate enterprises to increase operational efficiency and lead to investment activities aimed at recreating fixed assets.

$$WACC_{pre-tax} = r_d \times \frac{D}{D+E} + \frac{r_e}{1-t} \times \frac{E}{D+E} + p, \quad (2)$$

¹ See: The Act of 10 April 1997 on Energy Law (Journal of Laws 2012, item 1059, of 2015 items 151, 478, 942.) Art. 3, paragraph 1, item 31, Regulation of Minister of Finance of 17 September 2010 on detailed rules for preparing and calculating tariffs and settlements due to heat supplies (Journal of Laws of 2010 No.194 item 1291), Information (No. 9/2013) on the rules and how to determine and include return on equity in tariffs for heat.

where:

- $WACC_{pre-tax}$ – weighted average cost of capital;
 r_d – cost of foreign capital;
 r_e – cost of equity;
 t – rate of corporate income tax;
 D – value of foreign capital;
 E – value of equity;
 p – efficiency bonus.

The market regulator suggested two types of bonus to motivate licensed heating companies to increase operational efficiency and invest. The first type of bonus is the efficiency bonus which is added to WACC, when planned revenues for the first year of using prices are lower than basic prices, established on the basis of the previous heat tariffs or fees. This means that licensed heating companies may include higher return on equity in the heat price if it does not bring about a significant increase in tariffs for heat.

The other kind of bonus is the bonus for investing in fixed assets. If the level of investment in fixed assets exceeds the level of depreciation and return on equity, a licensed heating company can take into account higher bonus for investment (however, not more than 2% for production and not more than 3% for transmission activity).

Establishing the value of justified return on equity by licensed heating companies takes place in two stages. In the first stage, the level of basic revenues is determined. In the second stage, the amount of planned revenues from the sales of heat and the amount of return on equity is indicated, which constitutes a basis for calculating heat prices.

The introduced solutions amount to fixing heat prices at the level of revenues of a company producing heat. This means that heating companies may include return on equity in total revenues if the level of planned revenues for the next tariff year is smaller than or equals the level of basic revenues.

The enterprises of the heat market wishing to increase the share of return on equity in revenues may achieve this goal by increasing sales of heat or reducing the level of justified operating costs. An increase in the sales of heat has a nature of long-term decisions and is associated with the necessity to search for new customers of network heat. Reduction of justified operating costs can be implemented on the basis of short-term decisions [Nowak 2015, pp. 211–221]; however, it mainly refers to variable costs since the level of fixed costs not always depends on the decisions of the managers of a company [Jarugowa (Ed.) 2000, pp. 32–33; Chluska 2015, pp. 51–60]. At the same time, it should be remembered that the level of return on equity is dependent on the level of fixed asset utilization ratio.

4. The assessment of the efficiency of heating company management – a case study

The research tool applied for the assessment of the management process in the area of operational efficiency is the ROA indicator, since it characterizes the phenomena

of efficiency in enterprises. The empirical research was conducted on the basis of the data from financial statements of the heat and power station listed at Warsaw Stock Exchange. The analyzed heat and power station is a joint-stock company belonging to one of the largest electric corporations in the world. In Poland, the heat market is regulated; therefore, enterprises such as power stations, heat plants, heat and power stations are referred to as natural monopolies, which affects decision-making processes in these enterprises. The enterprise was selected on the basis of targeted sampling (due to the availability of data essential for conducting the empirical research). The research period is 2005–2014.

The analysis of return on assets is the starting point for the identification of factors determining the processes of taking efficiency decisions in the analyzed company. In the analyzed company, in 2010–2012 there was a fall in the value of the ROA indicator which, however, did not bring about the loss of safety level. In 2013 there was a significant fall in the level of the ROA indicator, brought about by net loss incurred by the company (ROA = 2.7%). In 2014 there was a rapid increase in return on assets, which indicates an increase in capabilities of the assets of the analyzed company to generate profits (see Figure 1). An increase in the level of the indicator informs that decisions taken in the company brought about efficient asset management.

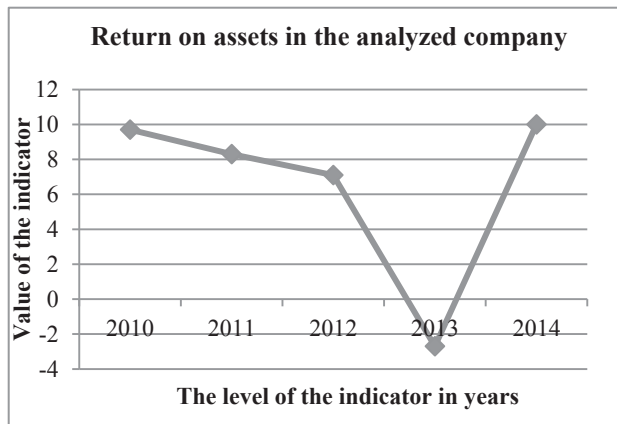


Figure 1. The level of return on assets in the analyzed company in 2010–2014

Source: author's own study.

While examining the trend of the ROA indicator in the analyzed company, one can notice a variety of managerial decisions in the field of asset management. The company is characterized by the limited capability of reducing operating costs, particularly with reference to fixed assets, which may result in distortion of the information on the market position of the company.

Decision-making in the analyzed company is determined by the assumed goal, i.e. the improvement in operational efficiency of the conducted activity. For the purposes

of a more detailed assessment of operational efficiency in the field of return on assets of the analyzed company, the research was carried out on the strength and direction of linear relationship between decision-making factors based on the study of the value of Pearson's correlation coefficient.

While analyzing the value of Pearson's correlation coefficient calculated for the discussed enterprise, one can notice a very strong positive relationship between return on assets and weighted average cost of capital. This means that along with an increase in return on equity, there is an increase in efficiency of asset management. Maintaining the high level of weighted average cost of capital in the analyzed company is beneficial for an increase in the level of utilization of assets and generating higher return on assets. The correlation is statistically significant for the examined comparisons ($\alpha = 0.05$). The research results calculated using Pearson's correlation coefficient for the analyzed company were confirmed by specifying coefficient of determination – R^2 . The criteria of assessment of the quality of the regression model are illustrated in Figure 2.

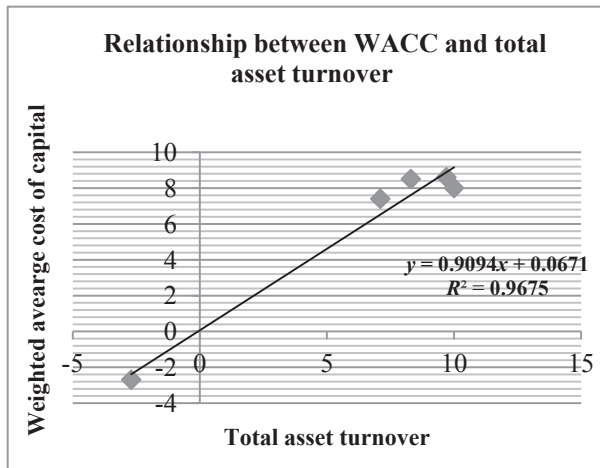


Figure 2. The results of the adjustment of the model of regression – R^2 to the empirical data for the analyzed company in 2010–2014

Source: author's own study.

The process of taking efficiency decisions in the discussed company should be preceded with testing all decision-making variants taking into account the factors determining the solution of the decision-making problem. Tests of decision-making variants are to enable the identification of possible solutions and the achievement of the intended goal. The analysis and assessment of the effects of decisions in individual variants becomes the basis for decision-making in the analyzed company.

5. Conclusion

The conducted research indicates that management efficiency in the analyzed company is conditioned by the quality and usefulness of the possessed information, rapidity and accuracy of the decisions taken and changeability of economic phenomena in the environment of the enterprise. The decisions taken at both the operational and strategic level are reflected in economic processes of the analyzed enterprise. Maintaining high operational efficiency requires the selection of appropriate instruments of modern management. The conducted research is not representative for all the enterprises of the heat market since it amounts to the case study. However, the obtained results are compliant with the data published by the Energy Regulatory Office and confirm operational effectiveness of capital companies on the heat market. The conducted research allows for the following conclusions:

- the level of weighted average cost of capital and return on assets in the surveyed company allows noticing the existence of feedback between these parameters; decisions in the field of possibilities of gaining capital and taking investment activities are directly connected with the efficiency of asset management in the analyzed company;
- investment decisions are an important parameter influencing the level of asset management in the discussed company since they may contribute to an increase in development potential or significantly weaken its financial condition in the case of inadequate investments;
- the analysis and assessment of operational efficiency in the heat sector requires considering both the level of the cost of capital and return on assets since they imply the correctness of the achieved results and allow for developing decision-making variants essential for effective management of the enterprises of the heat sector;
- forecasting future directions of development of the enterprises of the heart sector requires conducting the analysis of profitability taking into account the ordered set of profitability ratios providing retrospective and prospective information on operational efficiency.

The recommendation for the enterprises of the heat market in Poland is the implementation of development innovation allowing for efficient decision-making to improve management processes in the field of operational efficiency. Accurate recognition of the key conditions for the development of the analyzed enterprises is determined by efficiency of selecting managerial information, which directly influences efficiency of the decision-making process of the surveyed companies.

It should be underlined that the analysis of operational efficiency of the enterprises of the Polish heat market requires considering the level of heat prices and the fuel type, which is different in individual types of production plants. Heat prices in the heat and power stations producing heat in cogeneration are lower than heat prices offered by heating companies. At the same time, the profitability of the heat sector is dependent

on technological potential of individual plants. Due to the multidimensional nature of the problem of estimating the cost of capital and its impact on management processes in the field of operational efficiency in the enterprises of the heat market, some of the considerations in the paper have been presented in general terms, which, on the one hand, allowed for highlighting the complexity of the discussed problem and, on the other, inspires for further research and explorations.

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