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Performance Indicators of Management Buyouts Using the Analytic Hierarchy Process Method

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Background and Purpose: In Slovenia, few management buyout (MBO) studies have been carried out. The focus was mostly on the motives for acquisition of companies and the success rate of the acquisitions. This paper aims to analyse the indicators which suggest an impending bankruptcy or financial restructuring of companies and explore how these indicators are different for successful and unsuccessful MBOs.
Methodology: In the survey, we included 23 selected MBOs in Slovenia between 2005 and 2008, using the following financial and non-financial indicators: profitability, performance, solvency and liquidity, using the analytic hierarchy process method. The key aim of the survey was to use financial and non-financial indicators to study if target companies where bankruptcy or financial restructuring has not yet been initiated prevalently have higher aggregate values compared to those in which bankruptcy or financial restructuring procedures have already begun. Thus, we used the selected indicators to demonstrate one of the possible methods to predict the success of a particular MBO.
Results: We found that in most examples of unsuccessful MBOs, target companies have poorer results in terms of performance, solvency and liquidity, when compared to successful MBOs. Based on the selected areas, we divided the results into four quarters. We found that most target companies where MBOs had been unsuccessful are ranked in a lower quarter than most of the target companies where the MBOs had been successful.
Conclusion: The papers main contribution is the finding that the selected financial and non-financial indicators differ in cases of successful and unsuccessful MBOs. This knowledge helps us to find ways of avoiding these situations in the future.

Keywords*: Management buy-outs; Management; Bankruptcy models; Financial and non-financial indicators; the analytic hierarchy process*

1 Introduction

Corporate buyouts are tools which investors use to maximize the market value of shareholders' assets through positive synergies, corporate restructuring, product diversification, concentration of ownership, tax benefits, penetration of new markets, and replacing poorly-performing management staff (Ross et al. 1993; Bešter 1996; Damodaran 2001; Weston et al. 2001; Lahovnik 2013; Kamoto, 2017). According to Paredes (2003), corporate buyouts affect shareholders, corporate management, supervisors, employees, customers, suppliers, creditors and the local community where the company operates.

An MBO happens when the target company's managers are the buyers of the controlling share. In the United States of America (USA), MBOs were first introduced in the middle of the 20th century, whereas they did not occur in the United Kingdom (UK) until the late 1970s. Franks and Harris (1989) emphasize that managerial theories argue that managers are primarily acting to serve their own interests, their wealth, they aim to build an empire, create security, reputation, and only then the owners' interests are considered. MBOs include three entities in particular, namely the buyers (i.e. the management), the target com-

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pany's shareholders, and the financiers of the MBO.

A buyout of the target company is mostly financed through debt which is then transferred onto the target company. This way, financial leverage effects are used, and we speak of a leveraged buyout (LBO). For this reason, it often happens that target companies become insolvent. Michel and Shaked (1990) argue that financial effects of insolvency strongly affect the lenders, shareholders, analysts, creditors, investment bankers and other stakeholders in MBO and LBO transactions. Easterwood et al. (1997) further claim that there is empirical evidence of MBOs exploiting the target company's assets.

According to Mencinger (2009), many LBO companies were no longer able to repay their loans by 2009, resulting in a 15% increase in bankruptcies in the European Union, and in the USA, 50% of all LBOs ended up going bankrupt. While by the end of the past century the share of own financing increased, financing from other sources was still higher (DePamphilis 2003; DePamphilis 2012).

In this paper, we will begin by presenting a theoretical overview of existing literature dealing with business failure models and indicators[1] and the research methodology, followed by an empirical study of selected MBOs in Slovenia. We will verify if most target companies where MBOs had been unsuccessful[2] have poorer values of selected indicators compared to target companies where the MBOs had been successful. Further, we will distribute the target companies into four quarters, ranking from most to least successful. Over the course of our study, we encountered certain limitations, which we have described below.

2 Literature Review

Yadav (1986) claims that early signals indicating potential bankruptcy or financial restructuring allow the management and investors to take preventive measures, such as changes in business policy, reorganization of the financial structure, and voluntary liquidation. Furthermore, Cheng (2012) and Amendola et al. (2017) argues that use of financial indicators to predict bankruptcy or financial restructuring is nothing new. Events from 2008 reinforced the need for predicting and preventing future bankruptcies of companies and also giving time to react.

2.1 Bankruptcy Models

Bellovary et al. (2007) argue that, in terms of models used to predict bankruptcy or financial restructuring, 28 studies were done in the 1980s, 53 in the 1980s, 70 in the 1990s, and 11 in the 2000-04 period. The models used between 1970 and 2004 were as follows: multivariate discriminant analysis (63), logit analysis (36), probit analysis (7), neural networks (40) and others (26).

In 1930 Smith and Winakor (1930) designed one of the first bankruptcy prediction models, where the efficiency ratio was used. They studied financially distressed companies in the span of 10 years prior to bankruptcy or financial restructuring, using 21 different financial indicators. They established that companies had worse indicators even a few years before bankruptcy or financial restructuring, proving the usefulness of financial indicators in predicting bankruptcy events. It should be emphasized, however, that this was a time of economic recession, which came as a result of the 1929 stock market crash (Aliakbari 2009; Cheng 2012).

Below is a presentation of a few models in more detail.

Univariate and Multivariate Analysis

Using univariate analysis in the period from 1920 to 1929, FitzPatrick (1934) performed a survey on 20 companies which did not go into bankruptcy, and 20 which did. He analyzed 13 financial indicators, and the study showed a significant differences between the indicators for either group.

Furthermore, Beaver (1966) used univariate analysis to study 30 financial indicators which are signals of bankruptcy or financial restructuring up to five years prior to the aforementioned procedures. The following areas were studied: (i) cash flow ratios, (ii) net income ratios, (iii) debt to asset ratios, (iv) liquid asset to total asset ratios, (v) liquid asset to current debt ratios, (vi) turnover ratios. He found that the following six financial indicators were most useful for predicting bankruptcy or financial restructuring: (i) cash over total debt, (ii) net income over total assets, (iii) current liabilities and long-term liabilities over total assets, (iv) working capital over total assets, (v) current ratio, (vi) defensive ratio. According to Cheng (2012), the predictability of two indicators, namely the total debt over total assets and net income over total assets, was higher than 50%. Other indicators were satisfactory in the first and second year (87%), but did not do well in the years to follow, while the selection of financial indicators was determined subjectively, according to the industry and company type.

Aliakbari (2009) used univariate analysis to confirm that four indicators affect the company's likelihood of bankruptcy: profitability, leverage, activity and cost structure. Furthermore, Dimitras et al. (1996) argue that the most important financial indicator is solvency, followed

1 In analyzing bankruptcies in the USA, in most cases the phrase "business failure" is used, which refers to a company which is undergoing one of the insolvency procedures. This can include bankruptcy or financial restructuring/compulsory settlement, therefore we use the term bankruptcy or financial restructuring to refer to the foregoing.

2 According to Tutuncu (2014), unsuccessful MBOs and LBOs are those that went bankrupt.

by profitability.

Multiple discriminant analysis is an example of multivariate analysis. One such model is the so-called Altman bankruptcy Z-score model, which evaluates the company's financial well-being.

In a study carried out on 33 companies which went into bankruptcy and on 33 companies that did not, Altman (1968) chose five categories (liquidity, profitability, leverage, solvency, and activity) among 22 indicators, which the study showed were best used in combination to predict bankruptcy. The model is intended for production companies whose stocks are quoted on the stock exchange. He also chose five indicators, namely (i) working capital over total assets ratio (factor value: 1.2), (ii) retained earnings over total assets (factor value: 1.4), (iii) earnings before interests and taxes (EBIT) over total assets (factor value: 3.3), (iv) market value equity over book value of total debt (factor value: 0.6), (v) sales over total assets (factor value: 1). It turned out that the bankruptcy prediction model had a 94% accuracy rate. In 95% of the cases it correctly separated companies headed for bankruptcy from those not declaring bankruptcy one year prior to the bankruptcy, in 72% of the cases it predicted the bankruptcy two years ahead of the bankruptcy, in 48% of the cases it predicted the bankruptcy three years ahead of the bankruptcy, in 29% of the cases it predicted the bankruptcy four years ahead of the bankruptcy, and in 36% of the cases it predicted the bankruptcy five years ahead of the bankruptcy. It further turned out that the bankruptcy event can be predicted up to two years ahead of the start of the actual bankruptcy.

Logit and Probit Analysis

Ohlson (1980) studied both these analyses, using multiple logistic regression to predict bankruptcy. His study included 105 companies in bankruptcy in the period from 1970 to 1976, nine independent variables and data up to three years ahead of the bankruptcy. In the first year model, the probability rate was 85.1%, 87.6% in the second year model, and 82.6% in the third year model (Balcaen and Ooghe 2006; Cheng 2012).

Both these models were subsequently used by Gentry et al. (1985), using cash flow indicators as independent variables. Their sample included 33 companies from various industries, in the period between 1970 and 1981. The probability rate was 83% one year prior to bankruptcy, and 77% three years prior (Nunthaphad 2001; Cheng 2012).

Neural Network

Jandaghi et al. (2011) used an analysis of general neural networks to study 120 Iranian companies (60 in bankruptcy and 60 "matched" companies). Based on popularity in literature, data accessibility and expert evaluation, they defined four areas which affect a company's likelihood of bankruptcy, and within these areas they defined ten financial indicators, assigning weights to each. These areas and financial indicators are: liquidity (current ratio and quick ratio), leverage (debt to equity ratio and debt to asset ratio), operating (inventory turnover ratio and total asset turnover ratio) and profitability (return on shareholder's equity, profit margin, return on total assets and gross margin).

K & P Model

Clark et al. (1997) used the so-called K&P model (Koundinya & Puri model), which uses the analytical hierarchy process model (AHP), using the decision tree to predict bankruptcy or need for corporate restructuring (Aliakbari 2009; Gurau 2013; Barbuta-Misu and Codreanu 2014).

As argued by Clark et al. (1997) and Gurau (2013), the model applies the AHP method, dividing financial risk into four hierarchical levels and three categories of financial risk. Thus, financial risk is determined by four attributes, namely liquidity position, earning power, asset utilization and financial flexibility. These attributes are weighted using pairwise comparisons on each hierarchical level, based on the goal on the subsequent level.

Furthermore, Huo (2006) defines the K&P financial risk model, which has three categories of financial risk and measures the financial risk of four attributes, namely liquidity position (current ratio and cash flow to sales ratio), earning power (net profit margin and total asset turnover), asset utilization (inventory turnover and total asset turnover) and financial flexibility (interest coverage, debt ratio and debt to equity ratio).

2.2 Financial and Non-financial Indicators

Bellovary et al. (2007) argue that a total of 752 different indicators were used in studies of predicting corporate bankruptcies, with the following ten being used most commonly:

- Net income / Total assets (54 times),
- Current ratio (51 times),
- Working capital / Total assets (45 times),
- Retained earnings / Total assets (42 times),
- EBIT/ Total assets (35 times),
- Sales / Total assets (32 times),
- Quick ratio (30 times),
- Total debt / Total assets (27 times),
- Current assets / Total assets (26 times),
- Net income / Net worth (23 times).

Furthermore, Cheng (2012) argues that financial indicators are most often used in predicting bankruptcies, as they are, for the most part, determinable using formulas, they can be tracked and are expressible in numbers. He studied five financial indicators which determine whether a company is in good health or if it is likely to go into bankruptcy. The indicators are as follows: (i) profitability (return on sales, return on assets and return on equity), (ii) solvency or liquidity (quick ratio, current ratio, current liabilities to

net worth, current liabilities to inventory, total liabilities to net worth and fixed assets to net worth), (iii) efficiency (collection period, inventory turnover, sales to net working capital, assets to sales and account payable to sales), (iv) stability (leverage or gearing ratio and interest cover ratio), (v) investor ratios (earning per share, price-earnings ratio and dividend yield).

International studies also showed better accuracy in predicting bankruptcies when financial and non-financial indicators were used (Wright et al. 1996; Grunert et al. 2004; Mondal 2008; Altman et al. 2010; Pervan and Kuvek 2013; Aruldoss et al. 2015; Jones 2017). Pervan and Kuvek (2013) further argue that studies have demonstrated that models which include both financial and non-financial indicators have a 9% better accuracy in predicting insolvency of companies. Non-financial indicators are, for example, firm age, number of employees, quality of accounting information, dependence of key customers, firm owners personal credit performance and management quality.

Mondal (2008) used the so-called Hybrid Score model to study six companies undergoing bankruptcy in the period from 1990 to 1999, which corresponds to 10 to 1 years ahead of bankruptcy, and assigned weights for 16 ratios. The sum of the weights equals 1, and they were determined through applying a number of mathematical models. Market implied ratios are distance to default (years prior to bankruptcy), probability of default and asset volatility[3]. Financial ratios are liquidity, profitability and solvency. Liquidity ratios are current ratio, quick ratio, inventory turnover and current cash debt coverage. Profitability ratios are profit margin, cash return on sales, asset turnover, return on assets, return on common equity, earnings per share and price – earnings ratio. Solvency ratios are debt to total assets and times interest earned. The lower the leverage rate, the healthier the company is and the lower the likelihood of bankruptcy, the higher other financial indicators are, the more a company is able, or fit, to tackle short-term and long-term liabilities. It turned out that in most cases, financial deficiencies had already been apparent in companies which later went into bankruptcy.

In their study, Wright et al. (1996) studied 110 MBO in the UK, in the period from 1982 to 1984. Out of these, 57 MBOs continued operating successfully, while 53 MBOs were unsuccessful. The research included financial variables (liquidity, leverage, turnover per employee, profitability, net worth to total assets, total assets, capital intensity, etc.) and non-financial variables (new products introduced after buy-out, plans to change (reduce) employment three years after buyout, share of the equity held by management, etc.) between the individual years. The study used the t-test, discrimination models and the logit model. They discovered that liquidity has a strong negative impact on the probability of an unsuccessful MBO, and it already becomes apparent one year prior to bankruptcy. Capital intensity, on the contrary, is linked to a lower probability of MBO failure.

Table 1 shows an overview of financial and non-financial indicators used in different studies in the past. We also used the indicators ourselves for the purposes of the study, and are presented below.

Table 1: An overview of some prior researches of used indicators (Source: authors)

Category/ Indicator	Prior Researches
Profitability	Altman (1968), Courtis (1978), Arrington et al. (1984), Wright et al. (1992), Dimitras et al. (1996), Herst and Hommelberg (2002), Park and Han (2002), Bellovary et al. (2007), Mondal (2008), Pušnik and Tajnikar (2008), Aliakbari (2009), Manea (2009), Jandaghi et al. (2011), Cheng (2012) and Le and Viviani (2017).
Business performance[4]	Wright et al. (1996), Safieddine and Titman (1999), EVCA (2001), Harris et al. (2005), Amess and Wright (2007), Wright et al. (2007), Cressy, Munari and Malipiero (2008), Mondal (2008), Kaplan and Strömberg (2009), Manea (2009), Jelic and Wright (2011), Pervan and Kuvek (2013) and Jones (2017).
Solvency	Beaver (1966), Bellovary et al. (2007), Pušnik and Tajnikar (2008), Jandaghi et al. (2011), Cheng (2012) and Jones et al. (2017).
Liquidity	FizPatrick (1932), Altman (1968), Tamari (1970), Arrington et al. (1984), Skok (1992), Wright et al. (1996), Clark et al. (1997), Huo (2006), Bellovary et al. (2007), Mondal (2008), Pušnik and Tajnikar (2008), Manea (2009), Jandaghi et al. (2011), Gurau (2013), Jones et al. (2017) and Le and Viviani (2017).

3 The bankruptcy probability and asset volatility indicators were calculated using the Merton model (Mondal 2008).

4 The business performance indicator demonstrates the characteristics of a company, which may, inter alia, include the number of employees, positive and negative cash flows of companies, net profit and net loss (including company insolvency), etc. (AJPES 2016). In our study, we included the number of employees and company performance from the perspective of insolvency.

2.3 Study Aims and Hypotheses

Numerous theories and studies of unsuccessful MBOs focus mainly on shared financial characteristics of companies which became insolvent. According to Cain and Davidoff Solomon (2011), on the one hand there are some reservations against performing an MBO, while on the other hand there are some reasons to proceed with the MBO. Jensen (1991) argues that the more MBOs are financed through debt, or the greater the financial leverage, the higher the probability that the MBO itself will not be successful.

In our study we used selected financial and non-financial indicators to show which indicators affected the success or failure of MBOs in Slovenia. In this context, we focused mainly on the following goals:

- Compare selected MBOs in Slovenia and categorize individual MBOs as successful and unsuccessful, using comparable elements,
- Analyze what values appear in successful and unsuccessful MBOs using the AHP method according to different areas of interest,
- Based on the results, we classified the MBOs into four quarters (ranking from most to least successful).

In our study, we tested the following hypotheses (H) and auxiliary hypotheses:

- **H_1:** *Most target companies where MBOs had been unsuccessful have poorer values of selected area-specific indicators, compared to target companies where the MBOs had been successful.*
- H_{11}: Most target companies where MBOs had been unsuccessful have poorer values of indicators in the area of profitability, compared to target companies where the MBOs had been successful.
- H_{12}: Most target companies where MBOs had been unsuccessful have poorer values of indicators in the area of business performance, compared to target companies where the MBOs had been successful.
- H_{13}: Most target companies where MBOs had been unsuccessful have poorer values of indicators in the area of solvency, compared to target companies where the MBOs had been successful.
- H_{14}: Most target companies where MBOs had been unsuccessful have poorer values of indicators in the area of liquidity, compared to target companies where the MBOs had been successful.
- **H_2:** *Based on the entire selection of indicator, most target companies where MBOs had been unsuccessful are ranked in a lower quarter than most of the target companies where the MBOs had been successful.*
- H_{21}: Most target companies where MBOs had been unsuccessful are ranked in the 3rd or 4th quarter - that being the worst result.
- H_{22}: Most target companies where MBOs had been unsuccessful are ranked in the 1st or 2nd quarter - that being the best result.

3 Methodology

Numerous methods and models are being used in predicting bankruptcies or financial restructurings, as are financial and non-financial indicators. For the purposes of our study, we used the AHP method and the Expert Choice application, which enables the hierarchical determination of weights for specific criteria and subcriteria, regarding their importance.

According to Bolster et al. (1995), the key distinction between the AHP method and other multiple criteria decision-making methods is that the AHP method allows for systematically structuring any complex multidimensional problem.

3.1 AHP

In the assessment of successful or unsuccessful MBOs, we can use multiple criteria decision making, where we simultaneously consider multiple criteria and subcriteria, which makes it easier for us to make decisions. One of the decision-making methods using multiple criteria simultaneously is the AHP method, which helps us in deciding which alternative is better, considering the specific goal, criteria and subcriteria.

A key advantage of the AHP method is setting weights and measuring the value of alternatives through pairwise comparisons (Čančer 2005; Čančer and Mulej 2006). AHP method was used for criteria and subcriteria comparisons, to gain weights of importance of criteria and subcriteria. For the evaluation of alternatives, value functions that are included in the multi-attribute value/ utility theory, were used.

Another key advantage is measuring the decision-maker's inconsistency. It must be equal to or less than 0.1 (Saaty 1987; Donegan et al. 1992; Liang 2003). Consistency index that measures the consistency of the decision maker is calculated as follows (Čančer 2003):
where:

- λ …. largest eigenvalue of a matrix;
- k … number of attributes.

$$CI = \frac{\lambda_{\max} - k}{k - 1} (1)$$

Consistency ratio is calculated by using the following formula (Čančer 2003):

$$CR = \frac{CI}{R} (2)$$

where:

- R ... randomly consistency index.

The AHP method can be used for quantitative and qualitative criteria, where a hierarchical model is formed based on the goal, criteria and subcriteria, as well as alternatives for each decision-making problem separately. Thus, solutions for decision problems are sought in a multiple-criteria environment, to structure the complexity, perform measurements on a ratio scale and synthesis. The AHP method helps the decision makers determine which information still needs to be obtained in order to assess the effect of factors in complex conditions, for finding potential inconsistencies in making judgments about criteria importance and preferences to alternatives, for encouraging ideas in creative processes, and assessing the efficiency thereof (Forman and Gass 2001; Čančer 2003; Gavade 2014).

We performed an evaluation of MBO success rate using the AHP method in six steps, as follows (Saaty 1994; Saaty 1999; Belton and Stewart 2002; Čančer 2003; Čančer et al. 2006; Čančer and Mulej 2013; Expert Choice 2015):

4. *Problem definition:* describing in detail the problem, and specify the global goal, criteria and alternatives.
5. *Elimination of unacceptable alternatives*: specifying the requirements for the alternatives, evaluate and eliminate unacceptable alternatives, i.e. alternatives which fail to meet the requirements.
6. *Problem structuring*: specifying the global goal on the highest level, followed by criteria, subcriteria, while alternatives are on the lowest level. This way we form the decision tree.
7. *Establishing priorities:* expressing judgements about the importance of the criteria and preferences to the alternatives. It is recommended to include the relevant experts for specific field. The AHP method is characterized by the hierarchical way of assigning weights for the criteria, where the sum of the weights for each group of criteria with respect to the higher level criterion equals 1.
8. *Synthesis to obtain the final (aggregate) alternative values*: so that local priorities are changed into global priorities, and are then added up for each alternative on the last level of the model. As the criteria are structured in two levels, the aggregate alternatives' values are obtained by (Čančer 2012):

$$v(X_i) = \sum_{j=1}^{m} w_j \left(\sum_{s=1}^{pj} w_{js} v_{js}(X_i) \right) \quad (3)$$

for each i = 1, 2, ..., n

where:

- $v_{js}(X_i)$ … local value of the i^{th} alternatives with respect to the s^{th} attribute of the j^{th} criterion;
- w_{js} ... weight of the s^{th} attribute of the j^{th} criterion;
- w_j ... weight of the j^{th} criterion;
- p_j ... number of the j^{th} criterion subcriteria.

9. *Sensitivity analysis and verification:* to determinate the performance analysis, which shows how alternatives are more desirable in comparison with other alternatives according to individual criteria and with regard to the global goal.

Bagchi and Rao (1992) argue that the AHP method is useful in cases which involve complex problems and multiple criteria, where not all may be objectively measurable and where the need arises to evaluate the effectiveness of the program or project. The success or failure of MBOs depends on many factors, including the financial dimensions, industry, size, personality characteristics, products and growth. Criteria may include: financial characteristics, growth potential, employees (corporate climate and interpersonal relations), competitive advantages, organizational skills, size and products.

Furthermore, Strinivasan and Kim (1987), Zopounidis and Doumpos (2002), Stuer and Na (2003) and Sum (2015) argue that the AHP method may also be used in finance, specifically in capital planning, financial instrument selections, mergers and acquisitions, predicting bankruptcies or corporate restructuring, and predicting foreign interest rates. Kwak (2012) states that the AHP method is useful in predicting bankruptcies mainly because it allows the use of both financial and non-financial indicators.

In the period between 1995 and 1998, Park and Han (2002) studied 2144 companies in bankruptcy and companies where the bankruptcy process had not yet begun. They used the AHP method and the Expert Choice application. The model has four hierarchical levels, the second level contains two fields (financial and non-financial indicators), while each field has criteria and subcriteria within those criteria. Financial indicators have five criteria: stability, profitability, activity, productivity and growth. Non-financial indicators also have five criteria: business profitability, competitive advantage, manageability, reliability and miscellaneous. Each level also has specified weights, where the pairwise comparison method is used. Eigen-vector method was used for deriving weights from pairwise comparison matrices. In determining weights, the consensus of the group was calculated using the geometric mean of individual judgments with involvement from experts/analysts from credit rating companies and analysts (credit risk) from banks.

The Expert Choice application allows using the AHP scale when expressing judgments on criteria's importance and preferences to alternatives (Čančer 2003). In our study we used Eigen-vector method for deriving weights from pairwise comparison matrices.

3.2 Procedure

3.2.1 Data Collecting

We obtained the data for our selected areas and indicators from various databases (Agency of the Republic of

Slovenia for Public Records and Related Services, Securities Market Agency and a database that allows a broad overview of the condition of companies operating in the Slovenian market and helps discover links between related parties), annual reports and balance sheets of individual companies. Out of 28 MBOs in Slovenia during the period from 2005 and 2008, which were subject to the Takeovers Act, we collected data for 23 selected MBOs. We did not select MBOs where the acquiring companies were deleted from the court register. We have also selected only one MBO, although some target companies appeared two times.

In our study we used financial and non-financial indicators, and those which were more frequently used and which are considered to be the best predictors of bankruptcy or financial restructuring (Table 1). We used the data referring to the year in which the MBO was carried out, and in some cases for three years after the MBO, since the study focuses on the MBO year, and on MBO success or failure status. Thus we sought to prove that unsuccessful MBOs had inferior indicator values when compared to successful MBOs, both in the year of the MBO and three years thereafter.

3.2.2 Data Analysis

First we used the comparison/benchmarking method. Out of 23 selected MBOs in Slovenia in the period from 2005 to 2008 insolvency procedures were initiated in 10 MBOs, while financial restructuring was initiated in six cases of MBOs. In our study, we assumed that unsuccessful MBOs were those where companies ran into liquidity issues after the MBO was completed, and where insolvency proceedings or preventive restructuring proceedings were initiated; while successful MBOs were considered to be cases where target companies did not run into insolvency or preventive restructuring proceedings. Out of 23 MBOs, seven were successful and the rest unsuccessful.

We then used selected indicators and set weights to perform benchmarking of successful and unsuccessful MBOs in Slovenia. We used the AHP method, supported by the Expert Choice application.

3.2.3 Proceeding of the Research

Defining the problem
All selected indicators, broken down by individual areas/categories are presented in Table 2.

Elimination of unacceptable alternatives
We included only 13 alternatives (MBO) in the study, as we are unable to obtain information for all 23 alternatives with respect to all criteria and subcriteria. Some alternatives primarily operated as holding companies, therefore it was not reasonable to use some indicators in their assessment (i.e. especially indicators relating to the operations of the business). Out of 13 alternatives, five are successful MBOs and eight are unsuccessful MBOs.

Structuring the problem
We structured the problem using the decision tree: we entered the goal being determining values of MBOs, followed by the criteria which represent four areas: profitability, business performance, solvency and liquidity, attributes/indicators for each area (subcriteria) and alternatives/target companies.

Assessment of the criteria's importance and preferences to alternatives
The data on individual MBOs according to the subcriteria was measured using the increasing and decreasing value functions and direct method. We used increasing value function for the subcriteria return on equity 1, return on equity 2, return on assets 1, return on assets 2, employment, current ratio 1, current ratio 2, quick ratio 1 and quick ratio 2, decreasing value function for the subcriterion debt to asset ratio 1 and debt to asset ratio 2, and direct method for the subcriteria management quality. With the direct method we entered data from 0 to 1, where the best value was 1 (not business failure), and the worst was 0 (business failure, depending on the number of years prior the business failure).

In multiple-criteria decision-making, the weights are often determined in groups, rather than individually, since individuals lack sufficient knowledge, experience, and there are also different opinions and priorities. In these cases, it is important to choose a suitable method for combining/unifying weights for the individual.

In the study, we set the weights depending on the importance of the impact on predicting bankruptcies or financial restructuring, and depending on the effect on the MBO (Table 1). We compared the importance of individual criteria compared to the importance of other criteria within a particular area. In this context, we had assistance from experts (analysts) dealing with valuations and restructurings (3) and financial scientists (1), and we used the compromise method. In the determination of weights we used the pairwise comparisons, taking into account individual indicators from past studies, their frequency of use, and available data.

Synthesis
The most common aggregation tool used in multi-criteria decision-making is the weighted arithmetic mean (Čančer 2012). In our study we have combined weights using the weighted arithmetic mean. The equation how we combined weights of criteria and values of MBOs is written in Chapter 3.1 AHP (Synthesis to obtain the final (aggregate) alternative values).

4 Results

4.1 Criteria importance

To express the importance of the areas of profitability, solvency, business performance and liquidity we used pairwise comparisons. Thus, for example, the criteria of profitability and solvency are equally important, while the profitability is twice as important as the business performance criterion. If the criterion in the column is more important than the criterion in the row, we used parenthesis, for example, the criteria of solvency is twice as important as the business performance. The inconsistency ratio is 0 (Table 3).

When assessing the importance of the attributes of the profitability criterion, we used the pairwise comparison, too. The subcriterion net return on assets 1 and net return on assets 2 are 1.5 times more important than net return on equity 1 and net return on equity 2. The subcriterion net return on assets 1 is equally important as the attribute net return on assets 2. The subcriterion net return on equity 1 is equally important as the attribute net return on equity 2. The inconsistency ratio is 0.

When assessing the importance of attributes for the business performance criterion, we used the following pairwise comparison: the subcriterion management quality is 1.5 times as relevant as the employment criterion. The inconsistency ratio is 0.

The following pairwise comparison was made for the attributes of solvency criterion: the attribute debt to asset ratio 1 is equally important as the attribute debt to asset ratio 2. The inconsistency ratio is 0.

When assessing the importance of attributes for the liquidity criterion, we used the following pairwise comparison: the current liquidity ratio 1 subcriterion is equally as important as the current liquidity ratio 2, and 1.5 times as important as the quick liquidity ratio 1 and quick liquidity ratio 2. The inconsistency ratio is 0.

Table 4 shows the calculated values of the weights on

Table 2: Selected indicators, broken down by individual areas/ categories (Source: authors)

Category	Indicator	Description of the indicator
Profitability	Return on equity 1	Return on equity in the year of MBO
	Return on equity 2	Return on equity three years after MBO
	Return on assets 1	Return on assets in the year of MBO
	Return on assets 2	Return on assets three years after MBO
Business performance	Management quality	Number of years until business failure
	Employment	Average full-time equivalent in the year of the MBO/three years after the MBO
Solvency	Debt to asset ratio 1	Total liabilities (excluding capital)/Total assets (year of the MBO)
	Debt to asset ratio 2	Total liabilities (excluding capital)/Total assets three years after the MBO
Liquidity	Current ratio 1	Current ratio in the year of MBO
	Current ratio 2	Current ratio three years after MBO
	Quick ratio 1	Quick ratio in the year of MBO
	Quick ratio 2	Quick ratio three years after MBO

all levels. The largest impact is carried by solvency and profitability with a weight of 0.302, followed by the criteria of financing/liquidity with a weight of 0.249, and business performance with a weight of 0.147.

4.2 Synthesis

We arrived at the final values of the alternatives through synthesis. We chose the distributive rather than the ideal synthesis method, as we are comparing all MBOs and our aim is to distinguish the successful MBOs from unsuccessful MBOs from the entire selection. All five successful MBOs have higher values in the area of business performance compared to unsuccessful MBOs (Table 5 and Figure 1), followed by liquidity and solvency, where four successful MBOs are among the top five positions (Table 5 and Figure 1), and the area of profitability, where three successful MBOs are among the top five positions and where four (out of eight) unsuccessful MBOs have poorer values (Table 5 and Figure 1).

We are able to confirm auxiliary hypotheses $H_{12,}$ H_{13} and H_{14}, namely that most target companies where MBOs had been unsuccessful have poorer indicator values in the areas of business performance, solvency and liquidity, compared to target companies where the MBOs had been successful. We are able to partially confirm hypotheses H_{11}, because four out of eight target companies where MBOs had been unsuccessful have poorer indicator values in the area profitability, compared to target companies where the MBOs had been successful.

Consequently, we are able to partially confirm hypothesis H_1, namely that most target companies where MBOs had been unsuccessful have poorer values of selected area-specific indicators compared to target companies where the MBOs had been successful.

Table 5 shows the final values of the alternatives obtained with the distributive method based on the goal. The best alternative is represented by successful MBOs, namely X4 with the value of 0.165, X7 with the value of 0.109 and X9 with the value of 0.103. The worst final values are measured in two target companies where the MBO was unsuccessful, namely X10 and X12, with the value of 0.040.

4.3 Sensitivity analysis

According to the weights that were given to a specific criterion, it can be concluded that target company X4 is more successful than all other target companies and that target

Table 3: Pairwise comparison between categories (Source: authors)

Category	Profitability	Business performance	Solvency	Liquidity
Profitability		2.00	1.00	1.25
Business performance			(2.00)	(1.80)
Solvency				1.25

Table 4: Weights by categories and indicators (Source: authors)

Category	Weight	Indicator	Weight
Profitability	0.302	Return on equity 1	0.20
		Return on equity 2	0.20
		Return on assets 1	0.30
		Return on assets 2	0.30
Business performance	0.147	Management quality	0.60
		Employment	0.40
Solvency	0.302	Debt to asset ratio 1	0.50
		Debt to asset ratio 2	0.50
Liquidity	0.249	Current ratio 1	0.30
		Current ratio 2	0.30
		Quick ratio 1	0.20
		Quick ratio 2	0.20

Table 5: Final alternative values compared to the goal, using the distributive synthesis method (Source: authors)

Successful/ unsuccessful MBO	Final alternative values
X4 (successful MBO)	0.165
X7 (successful MBO)	0.109
X9 (successful MBO)	0.103
X8 (unsuccessful MBO)	0.084
X2 (successful MBO)	0.080
X3 (unsuccessful MBO)	0.079
X1 (successful MBO)	0.070
X5 (unsuccessful MBO)	0.069
X13 (unsuccessful MBO)	0.061
X6 (unsuccessful MBO)	0.051
X11 (unsuccessful MBO)	0.048
X10 (unsuccessful MBO)	0.040
X12 (unsuccessful MBO)	0.040

companies X10 and X12 are more unsuccessful than all other target companies (Table 5).

Based on the goal, we used the performance display in sensitivity analysis to see which the best are and which the worst alternatives for a specific criterion are. In the profitability criterion, the best alternative is the MBO of company X7 and the worst alternative is the MBO of company X10, in the business performance criterion the best alternative is the MBO of company X9 and the worst alternative is the MBO of company X6, in the solvency criterion the best alternative is the MBO of company X4 and the worst alternative is the MBO of company X11, in the liquidity criterion the best alternative is the MBO of company X4 and the worst alternative is the MBO of company X12 (Figure 1).

4.4 Sort alternatives into quarters

Based on the selected areas, we divided the results into four quarters, where the alternatives which demonstrated the best results are ranked in the 1st quarter, and the alternatives with the worst results are ranked in the 4th quarter. In the ranking we relied on the results we obtained through synthesis, taking into account the values of the alternatives for each criterion. The quarters are defined using the final sensitivity analysis results: because the highest values was 0.165, we set the highest value at more or equal than 0.151, then set individual quarters in intervals of 0.050. The 4th quarter lists alternatives with values between 0 and 0.050, the 3rd quarter lists alternatives with values between 0.051 and 0.100, the 2nd quarter lists alternatives with values between 0.101 and 0.150, and the 1st quarter lists alternatives with values higher than or equal to 0.151 (Table 6).

We have checked the auxiliary hypothesis H_{21}, namely that most target companies where MBOs were unsuccessful are ranked in the 3rd or 4th quarter - the worst result (Table 5 and Table 6). Based on the entirety of the selected areas, the 3rd quarter contains two successful and five unsuccessful MBOs, and the worst, 4th quarter contains three unsuccessful MBOs. Given that all target companies where MBOs were unsuccessful are located in the 3rd and 4th quarters – the worst result, we are able to confirm auxiliary hypothesis H_{21}.

We have checked the auxiliary hypothesis H_{22}, namely that most target companies where MBOs were successful are ranked in the 1st or 2nd quarter - the best result (Table 5 and Table 6). Based on the entirety of the selected areas, the 1st quarter contains one successful MBO, and the 2nd quarter contains two successful MBOs. Given that three out of five companies (more than 50 %) where MBOs were successful are located in the 1st and 2nd quarters – the best result, we are able to confirm auxiliary hypothesis H_{22}.

Consequently, we are able to confirm hypothesis H_2, namely that based on the entire selection of indicators, most target companies where MBOs had been unsuccessful are ranked in a lower quarter than most of the target companies where the MBOs had been successful.

5 Discussion

The MBOs are characterized by the fact that managers of the target company invest in the takeover a limited amount of money, while the rest are acquired by borrowing and through loans secured by the assets of the target company itself (Anabtawi 2015). Managers who have invested their own capital in the MBO or have pledged their own assets are more engaged in the success and development of the

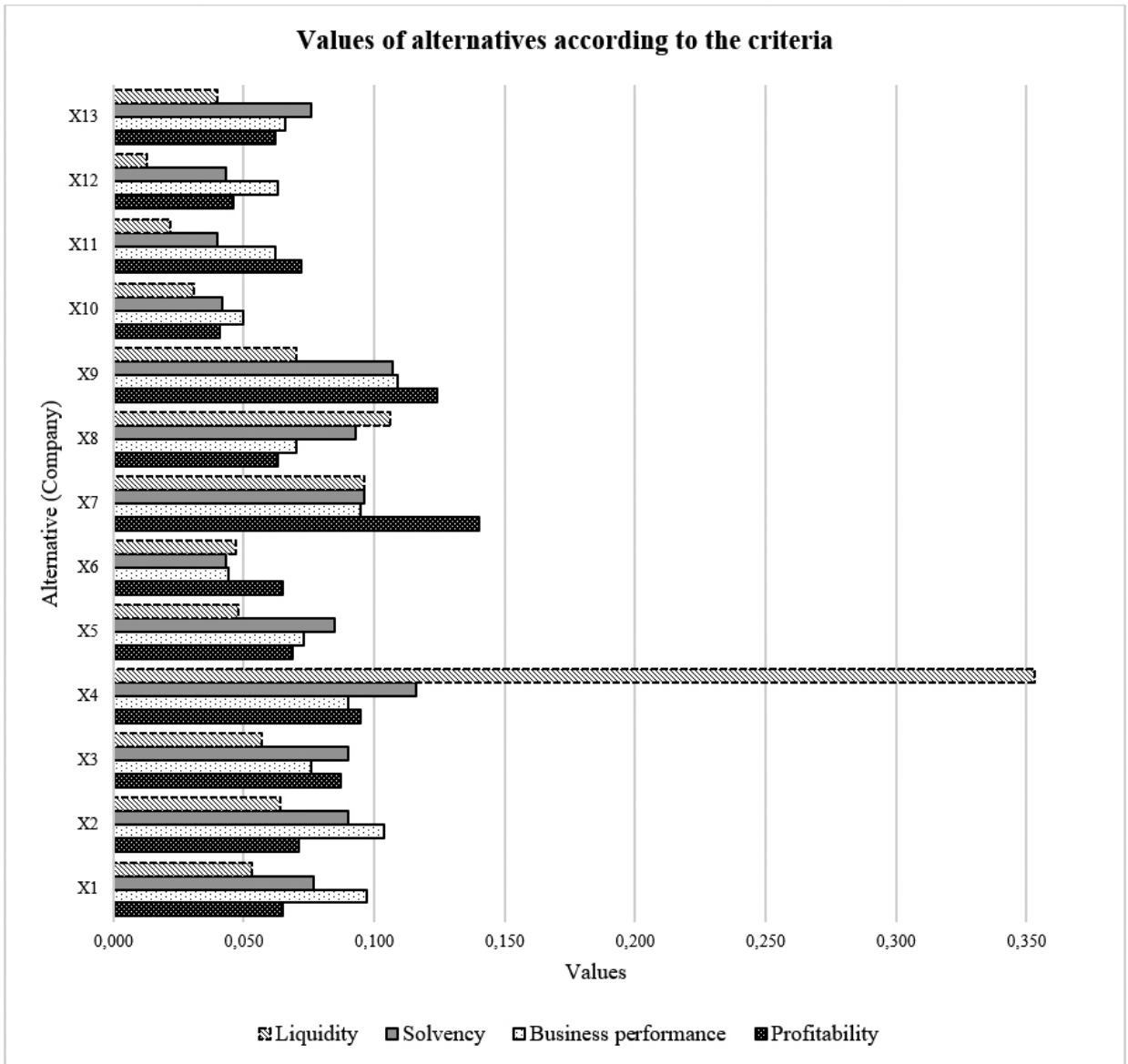

Figure 1: Values of alternatives according to the profitability, business performance, solvency and liquidity criteria (Source: authors)

Table 6: Distribution of quarters (Source: authors)

Quarter	Value of quarter
1st quarter	≥ 0.151
2nd quarter	0.101 – 0.150
3rd quarter	0.051 – 0.100
4th quarter	0 – 0.050

company. Nikoskelainen and Wright (2007) found out that the ownership of managers is one of the main factors in increasing the value of the takeover. Ownership of management is positively related to the increase in the value of the company. Furthermore, Andrade and Kaplan (1998) found out that many high-leveraged transactions end in bankruptcy and that more than 30% of the MBOs in the USA, closed after 1985, began bankruptcy proceedings. Thus it is important to determine, which indicators affect the successfulness or failure of the MBOs and reduces the likelihood of bankruptcy or financial restructuring.

The aim of the study was to determine whether differences in financial and non-financial indicators (shown in Table 2) exist between MBOs undergoing bankruptcy or financial restructuring and those who have not become subject to bankruptcy or financial restructuring (final results are shown in Table 5).

Using the AHP method and the Expert Choice application, we included Slovenian MBO cases where companies ran into bankruptcy or financial restructuring and cases where companies are still operating after the MBO. We included MBOs from different periods, industries, regions, sizes, we included both financial and non-financial indicators, and assigned weights to these indicators.

We established that most unsuccessful MBOs in Slovenia have poorer values of selected indicators in the areas of business performance, solvency and liquidity (but not in the area profitability), compared to target companies where the MBOs had been successful, partially confirming hypothesis H_1.

We also found that based on the entire selection of indicators, most target companies where MBOs had been unsuccessful are ranked in a lower quarter than most of the target companies where the MBOs had been successful, confirming hypothesis H_2.

6 Conclusion

In the study performed on 13 selected MBOs in Slovenia in the period from 2005 to 2008, we assessed whether financial and non-financial indicators differ in cases where the target company is in bankruptcy, compared to cases where the target company is solvent. We categorized MBOs between successful and unsuccessful, and defined financial and non-financial indicators within the areas of profitability, business performance, solvency and liquidity.

Using the AHP method and the Expert Choice application, we structured the problem using the decision tree. Alternatives data were introduced directly, with a decreasing or increasing value function, and we defined weights for individual areas and indicators using pairwise comparison, based on preferences. We then calculated the final values of alternatives that can help us to reduce the number of unsuccessful MBOs. We determined that most target companies where MBOs had been successful have higher final alternative values of indicators in the areas of business performance, solvency and liquidity, compared to target companies where the MBOs had been unsuccessful.

Finally, we categorized the target companies into four quarters, where the first quarter was ranked best, and the fourth was ranked worst. We found that most of the target companies where the MBO had been successful are ranked in the first or second quarter, while most companies where the MBO had been unsuccessful rank in the third and fourth quarter.

Thus, we used the selected indicators and the AHP method to demonstrate that the selected financial and non-financial indicators differ in cases of target companies undergoing bankruptcy or financial restructuring as opposed to those target companies not undergoing bankruptcy or financial restructuring.

6.1 Contributions to Theory and Practice

The study relates to MBOs performed in Slovenia in the period from 2005 to 2008, when the global economic crisis began and affected Slovenia as well. Most target companies became insolvent after the MBO, so it was necessary to find ways of avoiding these situations in the future. MBOs affect many stakeholders, such as minority shareholders, creditors, employees, customers, suppliers, etc. Reducing the number of unsuccessful MBOs or preventing bankruptcies will create a better position for all stakeholders compared to an insolvency scenario (e.g. unemployment, borrowing, etc.).

Our study included target companies which ran into bankruptcy or financial restructuring, as well as target companies which are not undergoing bankruptcy or financial restructuring. The selected target companies span various industries, sizes and regions in Slovenia, and we took into account different financial and non-financial indicators and different times prior to bankruptcy or financial restructuring. Using the AHP method and the Expert Choice application, we defined weights for individual areas and indicators, allowing us to present a bankruptcy or financial restructuring prediction model (Table 4). With the model, we can predict that it is more likely that MBO is successful or unsuccessful if certain values appear in individual areas. Individual values for criteria (in our model) are presented in Figure 1.

The criterion solvency is one of the most important area of successful and unsuccessful MBOs. It has the highest weight (same as the criterion profitability) and we found out that most target companies where MBOs had been successful have higher final alternative values of indicators in the area solvency, compared to target companies where the MBOs had been unsuccessful.

To reduce the number of unsuccessful MBOs it is important to focus on solvency. One of the solution is to change the Takeovers Act in a way that will provide

greater control over financial resources and the ability to finance MBOs.

6.2 Limitations and Further Research

The study's limitations are mainly the following:

- the analysis was limited to MBOs in Slovenia, which were subject to the Takeovers Act,
- we analyzed selected MBOs in Slovenia in the period from 2005 to 2008, where cash was the envisaged method of payment for acquired shares, and not all MBOs which were carried out,
- we focused on the indicators which we could readily gain access to,
- we used secondary sources collected from different databases, annual reports and balance sheets.

Future research should focus on MBOs abroad rather than Slovenia alone, and should include a longer time span, as well as other financial and non-financial indicators. It would also be interesting to use a different method with the same indicators.

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Kazalniki uspešnosti managerskih prevzemov z uporabo metode analitičnega hierarhičnega procesa

Ozadje in namen:. Na področju managerskih prevzemov (MBO) je bilo v Sloveniji opravljenih malo raziskav. Raziskave so se osredotočale predvsem na motive prevzemov družb ter stopnjo uspešnosti prevzemov. Namen prispevka je analizirati indikatorje, ki napovedujejo stečaj ali finančno prestrukturiranje družb, ter preveriti, kako se le-ti razlikujejo pri uspešnih in neuspešnih družbah.
Metodologija: V raziskavo smo vključili 23 MBO v Sloveniji v obdobju od 2005 do 2008, uporabili pa smo sledeče finančne in nefinančne indikatorje: dobičkonosnosti, poslovanja, plačilne sposobnosti in likvidnosti, pri čemer smo uporabili metodo analitičnega hierarhičnega procesa. Glavni cilj raziskave je s pomočjo izbranih finančnih in nefinančnih indikatorjev raziskati, ali imajo ciljne družbe, kjer se stečaj ali finančno prestrukturirane nista pričela, v večini primerov višje agregirane vrednosti, kot tiste, nad katerimi se je pričel stečaj ali finančno prestrukturiranje. Tako smo s pomočjo izbranih indikatorjev prikazali enega izmed možnih načinov, kako ugotoviti, da bo posamezen MBO uspešen oz. neuspešen.
Rezultati: Ugotovili smo, da se slabši rezultati večinoma pojavljajo pri ciljnih družbah na področjih dobičkonosnosti, poslovanja, plačilne sposobnosti in likvidnosti, kadar gre za neuspešne MBO, kakor pa v primerih uspešnih MBO. Nadalje smo glede na izbrane indikatorje rezultate razdelili v štiri kvartale. Ugotovili smo, da je večina ciljnih družb, kjer so bili MBO neuspešni, uvrščena v slabši kvartal od večine ciljnih družb, kjer so bili MBO uspešni.
Zaključek: Glavni prispevek je v ugotovitvi, da se izbrani finančni in nefinančni kazalniki razlikujejo, kadar gre za uspešne in neuspešne MBO. To znanje bo pripomoglo k preprečevanju podobnih dogodkov v prihodnosti.

Ključne besede: *managerski prevzemi; management; stečajni modeli; finančni in nefinančni kazalniki; analitični hierarhični proces*