APPLICATION OF MULTICRITERIA DECISION MAKING THROUGH FINANCIAL, HUMAN RESOURCES AND BUSINESS PROCESS ASPECT IN VERIFICATION OF COMPANIES' SUCCESS

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Abstract

Striving in volatile and competitive business environment, companies have to reveal the ideal path to survive and provide sustainable success, which can be validated using objective and subjective criteria. In order to fulfil stakeholders' demands, many companies use different types of non financial indicators, characterising them as subjective ones. Authors lately argue about the usage of subjective criteria and validating them equally as objective ones, approving positive relationship between subjective and objective criteria.

The main aim of this paper is to research whether the most successful Croatian companies regarding financial ratios show the similar results by other groups of criteria, as human resource management evaluation and evaluation of the business process success.

In order to evaluate success of Croatian public companies, those are ranked by three groups of criteria using Simple Additive Weighting Method (SAW) for subjective criteria and PROMETHEE II method for objective criteria. Weighted least square (WLS) method was used in order to define weight of each criterion.

Key words: *Human resource management, Subjective criteria, Objective criteria, Organisational performance, Multicriteria decision making*

1. INTRODUCTION

Striving in today's volatile and competitive business environment and additionally confronting with the world's recession, companies have to reveal the ideal path to survive and provide sustainable success. However, the best practise is investment, whereas it can never be understood as cost, but as benefit which will in future create company's overall success and possible competitive advantage.

Companies' success can be validated using objective (mostly used) criteria as well as using subjective criteria. Usage of subjective criteria arose from different stakeholders' requirements. In order to fulfil stakeholders' demands, many companies start to use different types of non financial or subjective indicators. Many authors lately argue about the usage of subjective criteria and validating them equally as objective ones. At the other hand, considerable number of authors statistically approved positive relationship between subjective and objective criteria.

The main aim of this paper is to research whether the most successful Croatian companies regarding financial ratios (as objective group of criteria) show the similar results by other groups of criteria, as human resource management evaluation (considering quality of realisation of particular HR practice) and evaluation of the business process success (subjective groups of criteria). The research was conducted among Croatian public companies listed on Croatian Stock Exchange Market. All Croatian public companies were contacted in order to get primary source of information using written survey. General managers or human resource managers were contacted in order to give their personal opinion regarding the level of development of human resource management within the company as well as to validate the success of its business process (mostly regarding employees, customers and quality management practices). This information was considered as subjective criteria. Further, companies' financial indicators (using financial documents) were considered as objective criteria.

In order to evaluate success of Croatian public companies those are ranked by three groups of criteria using Simple Additive Weighting Method (SAW) for subjective criteria and PROMETHEE II method for objective criteria. Weighted least square (WLS) method was used in order to define weight of each criterion.

2. LITERATURE REVIEW

In order to create companies' success, companies use different strategies. As to fulfil the purpose of this paper, just some of the possibilities in creation of the companies' success are analysed. Firstly, investments in particular human resources practices are regarded, including its influence on

companies' success. Additionally, employees, customers as well as quality management practices are explained and researched in more detail.

2.1. Human resources as a source of competitive advantage

A firm enjoys a competitive advantage when it is implementing a value-creating strategy not simultaneously implemented by large numbers of other firms (Barney, 1991). If a firm's valuable resources are absolutely unique among set of competing and potentially competing firms, those resources will generate at least a competitive advantage and may have the potential of generating a sustained competitive advantage (Barney, 1991). Considering all companies' resources, human resources are those that enable company to be considerably distinguished from others regarding their knowledge, skills, abilities or behaviour.

Human resource management (HRM) can be described as quite complex social system which is characterised as the unique for each company. More detailed researches of HRM influence on companies' performances began 15-20 years ago. Huselid (1995) was an originator, researching the link between the system of HRM called High Performance Work Practice (HPWP) and firm performances, such as: turnover, productivity and corporate financial performance. Results showed that these practices had an economically and statistically significant impact on all three outcomes.

Since then, many other authors have conducted similar researches. Some researches were based on isolated HRM practices or activities while certain researches regarded human resource bundles, more precisely defined as a set of different human resource activities which create mutual synergic effect on dependent variable. One of the popular researches was done by MacDuffie (1995). He researched influence of isolated HRM activities as well as HRM bundles on companies' productivity. This research revealed greater influence among internally consistent HR practices (HR bundles) and dependent variable.

Similar research was done within US steel production lines where authors researched influence between innovative work practices (incentive pay, teams, flexible job assignments, employment security and training) and companies' productivity. Once again there was noticed larger effect between group of these practices (HR bundle) and companies' performance than between isolated practices and dependent variable (Ichinowski, Shaw and Prennushi, 1997). Stavrou and Brewster (2005) used 80 different HR variables (combined within 15 different HR bundles) and business performance (composite measure of profitability, productivity and service quality). The exploration revealed that six bundles had positive and one negative relation to performance. Reichel and Mayrhofer (2006) used

72 HR variables (combined within 4 HR bundles) and researched its relationship to subjective performance measures (personal opinions about companies' performance in accordance to competition) and objective performance measures (productivity, ROI and cash flows). All 4 HR bundles revealed significant relationship with objective measures, while 3 HR bundles revealed also significant relationship with subjective performance measures.

2.2. Business process – adding value to the company

Due to the number of different stakeholders and their demands, companies are forced to evaluate, analyse and improve many items of business process. For the purpose of this paper, the attention is focused on different items relating employees, customers and quality management practices.

In previous section great attention was made towards employees, but at first place regarding investments in all aspect of human resource management. This section is dealing employees' behaviour, attitudes, satisfaction or commitment. Employees' behaviour influence customer satisfaction, which in turn impacts shareholders' satisfaction. Further, this is at the same time influencing employees' satisfaction in the form of investment in employees' development, bonuses, compensation, stock options (Muse et al., 2005). The former authors tested the relationship between organisational commitment to employees (OCE)[1] and performance. These results revealed positive relationship between OCE and company performance (ROA, ROS and return on cash flow).

On the other hand, there can be noticed employees commitment to organisation. However, shareholders evaluate a company's performance not by whether a company's employees are happy, but by the corporate financial performance. Also, one may argue that happier employees are more likely to have higher job satisfaction. A higher job satisfaction translates into higher productivity whereas shareholder wealth is very likely to be maximized (Chan, Gee and Steiner, 2000). Researched conducted among 100 Best Companies to Work For, showed that the employee-happy companies had higher average performance than their comparable companies. To conclude, there was noticed positive correlation between employee happiness and corporate financial performance (Chan, Gee and Steiner, 2000). Furthermore, employee attitudes can influence customers especially their satisfaction and decision making about certain manufacturer. Employee attitudes (overall employee attitudes, customer orientation, employee empowerment and employee engagement) reported positive effect on customer satisfaction with service, conducted within US grocery stores (Simon et al., 2008).

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[1] OCE is defined by an organisation's action toward and treatment of its employees.

Furthermore, employee attitudes affect customer satisfaction, but simultaneously customer satisfaction yields positive results within sales performance. Firms that are enable to satisfy customers can expect to lose market share to rivals. Beforehand research also revealed positive relationship between customer satisfaction with service and store sales (as company performance), showing a positive and statistically significant effect (Simon et al., 2008).

Another research showed that customer-oriented companies[2] have remarkable impacts on performance relative to other aspects. This research showed a linear relationship between customer-orientation and organisational (financial and nonfinancial) performance (Jandaghi et al., 2011).

Additional crucial elements in creation of successful business are quality management practices and regular strategies for its application. The survival and prosperity of Japanese manufacturers are achieved through quality management practices, some of them are: total quality management, just-in-time production and total productive maintenance. Paper researching the linkage between Japanese quality management practices and competitive performance showed significant association with every performance measure (Phan, Abdallah and Matsui, 2011). Quality management practices classified by high performance and statistical significance were: small group problem solving, employee suggestions, cross-functional product design, housekeeping and process control.

Similarly, within UK manufacturer, respondents were asked to evaluate nonfinancial measures in order of importance and relating certain business/management practices. The respondents considered five measures (out of 19) as critically important. Those measures relate to customer satisfaction and are as follows: on time delivery customers, number of complains from customers, number of customer returns, efficiency and defects (evaluating them 5.8-6.7 on the scale 1-7). Respondents evaluated following measures as the least important, but at the same time as quite important, evaluating them 4.1-5.2 (on the scale 1-7). Those were as follows: rework, employee lateness, staff turnover, employee attitudes and batches (Maskoud, Dugdale and Luther, 2005).

2.3. Financial performances

Financial indicators are still fundamental in determining company's health and prosperity. Those indicators are the oldest (used over the long period of time), the mostly used and the most popular focusing mostly on companies' profitability. Financial indicators are easily to obtain because those can be easily located within the most important as well as regular and required financial reports.

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[2] Customer orientation can be defined as an organisational culture which creates certain behaviour effectively and efficiently to generate more value for buyers (Narver and Slater, 1990).

Moreover, any comparison (to competitor or within the industry) is easily accomplished due to their balance

As mentioned before the usage of nonfinancial indicators arose lately due to the increase of stakeholders' demands. Those indicators have certain benefits. Firstly, those are related to companies' strategy, success of company in many circumstances depends on intangible assets (measured through nonfinancial indicators) and financial indicators can not comprehend all sorts of business contribution.

2.4. Subjective vs. objective indicators

Although, prior topic was concentrated on polemics between the use of financial and nonfinancial indicators, this topic will be arguing about the usage of objective vs. subjective performance indicators. Great majority of nonfinancial indicators are subjective ones, made on respondents' personal opinions. Certain authors (Stavrou and Brewster, 2005) excerpt the importance of equal usage of objective and subjective measures. Subjective measures are more oriented in determining the entire company's performance, while objective measures are concentrated on single financial indicators (mostly: productivity, profitability, ROA etc). Evaluation of the objective indicators requires from respondents to determine single indicator relative to their main competitors or standards, while objective evaluation requires absolute evaluation of each indicator.

The advantage of subjective criteria can be noticed in the fact that the collection of subjective criteria is cheaper in comparison to objective ones. Additionally, sometimes objective indicators that are alternative to subjective ones do not exist. Stavrou and Brewster (2005) argument that subjective and objective indicators used as alternative measures, show stronger link (such as comparison of subjective and objective measures of productivity as well as profit) than comparison of subjective measures of productivity and profit or comparison of objective measures of productivity and profit.

3. RESEARCH METHODOLOGY AND DATA

The following topic is describing used methodology, sample of the research and variables.

3.1. Methodology

For the purpose of the empirical part of the paper, there has been provided primary as well as secondary type of the research. Primary research included written survey distributed to all Croatian

public companies listed on Croatian Stock Exchange Market. It was designated to the human resource managers (or general managers if company does not have organized Human Resource Department), investigating their subjective opinions on the level of development and quality of realisation of particular HR practices within their company. Additionally, they were asked to evaluate development of the entire business process (mostly regarding employees, customers and quality management practices). Respondents were evaluating particular items using 1-5 Likert scale (1-negative grade; 5-excellent grade).

Secondary research included collection of financial data from companies that have participated in the first round of the research. Data were subtracted from the companies' balance sheets and income statements, all transparent on the Zagreb Stock Exchange Market.

Furthermore, in order to provide all necessary ranking PROMETHEE II method and Simple Additive Weighting Method (SAW) have been conducted as appropriate methods to treat the multicriteria problem of the following type:

$$Max\{f_1(a), f_2(a), ..., f_n(a) : a \in K\} \tag{1}$$

where K is a finite set of possible actions (here enterprises), and f_j are n criteria to be maximized.

Simple Additive Weighting Method (SAW) was applied in order to rank actions by group of subjective criteria. For every $a \in K$, let us consider the following function:

$$F(a) = \sum_{j=1}^{n} w_j f_j(a), \tag{2}$$

where w_j are weights associated with each criteria and $f_j(a)$ is an evaluation of this action. In this paper we use weighted least square (WLS) method for determination of weights of the criteria (Babic, 2011) and $f_j(a)$ obtain values 1-5 (1-negative grade; 5-excellent grade). According to SAW, higher value of the function F the better is the action.

PROMETHEE II method was applied in order to rank actions by group of objective criteria. For each action, $f_j(a)$ is an evaluation of action a (here financial ratio of the enterprise). When we compare two actions $a, b \in K$ we must be able to express the result of this comparison in terms of preference. We, therefore, consider a preference function $P : K \times K \rightarrow [0,1]$ representing the intensity of action a with regard to action b. In practice, this preference function will be a function of the difference between the two evaluations $d = f(a) - f(b)$, and it is monotonically increasing. Six possible types (for details see Brans. J.P. and Mareschal, B. (1989)) of this preference function are proposed to the

decision maker. The effective choice is made interactively by the decision maker and the analyst according to their feeling of the intensities of preference. In each case zero, one or two parameters have to be fixed:

- q is a threshold defining an indifference area;

- p is a threshold defining a strict preference area;

- s is a parameter the value of which lies between p and q.

Now, we can define a preference index:

$$\Pi(a,b) = \frac{\sum_{j=1}^{n} w_j P_j(a,b)}{\sum_{j=1}^{n} w_j}, \qquad (3)$$

where w_j are weights associated with each criteria. Finally, for every $a \in K$, let us consider the two following outranking flows:

- leaving flow:

$$\phi^+(a) = \sum_{b \in K} \Pi(a,b) \qquad (4)$$

- entering flow:

$$\phi^-(a) = \sum_{b \in K} \Pi(b,a) \qquad (5)$$

The leaving flow ϕ^+ is the measure of the outranking character of a (how a dominates all the other actions of *K)*. Symmetrically, the entering flow ϕ^- gives the outranked character of a (how a is dominated by all the other actions). The action is better if the leaving flow is higher, and the entering flow lower. The PROMETHEE I gives a partial preorder of the set of actions in which some actions are comparable, some others are not. When the decision maker is requesting a complete ranking, the net outranking flow may be considered:

$$\phi(a) = \phi^+(a) - \phi^-(a) \qquad (6)$$

and the higher the net flow the better is the action. All the actions of *K* are now completely ranked (PROMETHEE II).

3.2. Sample of the research

The survey was distributed (in 2009 by post mail) to 232 companies with the response rate of 32.76%. After subtracting financial and insurance companies from the sample, due to the specificities of their business as well as different structure of their asset and value of their financial indicators, total number of companies within the sample was 69.

3.3. Variables

In order to create first group of criteria (subjective criteria regarding quality of realisation of particular HR practice) respondents were asked to evaluate 9 different HR practices[3] including 4 different activities within each practice. In order to create second group of criteria (subjective criteria regarding quality of realisation of the entire business process) three different categories were evaluated[4]. As third group of criteria (objective ones) the following were used: ROS, ROA, CR, QR, DR and FS[5].

4. RESULTS

After providing PROMETHEE II and Simple Additive Weighting Method (SAW), the following ranking for 69 Croatian companies was obtained (table 1).

The predisposition was that the best Croatian companies ranked by first criteria, would generated the greatest results including the other two groups of criteria. The first column (HR) represents the ranking according to human resource management evaluation (considering 9 groups of different human resource practices and 4 different activities by each group, listed below). Top 10 Croatian companies regarding the first group of criteria (subjective criteria) represent large Croatian companies with

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[3] Included practices and particular activities were as following: **job analysis** (job description, defined tasks, defined expected results, job rotation); **human resource planning** (adjustment of individual and organisational needs, short-term planning, medium-term planning, long term planning); **recruiting and selection** (data basis, media, interviews, tests); **training and education** (courses, life long education, socialisation, team work), **motivation** (internal promotion, decision making, monetary bonuses, non-monetary benefits); **performance appraisal** (usage of objective indicators, feedback, usage of the results, usage for all levels of employees); **compensation packages** (incentives, sickness benefits, other benefits and allowances, profit sharing); **job safety and health programs** (social welfare, job safety, safety of special groups of employees, wellness programs); **human resource information system** (staff administration, planning, training and development, performance appraising).
[4] Categories were as following: **customers** (satisfaction, loyalty, expetations, complaints); **employees** (satisfaction, turnover, absenteeism, development); **quality management practices** (product quality, innovations, implementation of new business, employee involvement, realisation of determined goals)
[5] ROS – return on sales; ROA – return on assets; CR – current ratio; QR – quick ratio; DR – debt ratio and FS – financial strenght werte chosen according to propositions of renowned Croatian authors and characteristics of Croatian companies.

organized Human Resource Departments dedicating great attention to human resources and its development. Those companies comprehend the importance of human resource investments which would definitely in the future show its influence on financial companies' performances.

Table 1: Companies' ranking according to human resources, business process and financial criteria

Company/Group of critera	HR[6]	BP	FIN.	Company/Group of critera	HR	BP	FIN.
Atlantik grupa d.d.	1	2	26	Borik d.d. Zadar	34	50	59
Auto Hrvatska d.d.	2	1	5	Sunce Koncern	34	39	42
Helios Faros d.d.	3	65	67	Zlatni otok d.d.	38	33	13
Siemens d.d.	4	19	8	Plava laguna	39	22	11
Čakovečki mlinovi d.d.	5	3	4	MIV	40	28	21
Drvenjača d.d.	6	17	22	Jadran hoteli d.d. Rijeka	41	31	37
Maistra Rovinj	7	10	32	Đakovština d.d. Đakovo	42	27	29
Hrvatski duhani d.d.	8	36	34	Istraturist Umag	43	38	20
Tekstilpromet d.d. Zagreb	9	18	7	Tankerkomerc d.d.	44	29	64
Jadranski naftovod d.d.	10	9	10	Unijapapir d.d	45	45	49
Žitoproizvod d.d.	11	23	3	Hoteli Cavtat d.d.	46	42	12
Konzum d.d. Zagreb	12	5	18	Vodoprivreda Vinkovci	46	24	14
Lantea grupa d.d.	13	53	52	Puris d.d. Pazin	48	48	58
HG spot	14	63	65	Drvna industrija Spačva	49	43	55
Ingra d.d.	15	21	57	Hoteli Novi	50	59	47
Uljanik plovidba d.d.	16	19	15	Končar elektoindustrija d.d.	51	67	36
Božjakovina d.d.	17	64	44	Arenaturist d.d. Pula	52	60	33
Viktor Lenac	18	16	2	Institut IGH d.d.	53	13	19
Rovinjturist d.d.	19	30	25	Finvest Corp d.d	54	61	27
Koestlin	20	25	38	Imunološki zavod	55	57	60
Jadran tvornica čarapa	21	32	43	Tang tvornica alata d.d.	56	56	16
Zvijezda d.d.	22	12	35	Agromeđimurje d.d. Čakovec	57	47	40
Uljanik	23	35	28	Jadroagent d.d.	58	52	6
Liburnia riviera hoteli	24	49	17	Hoteli Podgora	59	46	63
Sunčani Hvar d.d.	25	34	66	Željezara Split	60	55	68
Poljoprivredno poduzeće Orahovica	26	26	41	Hotel Medena d.d.	61	58	51
Slobodna Dalmacija d.d.	27	11	54	AD Plastik d.d.	62	62	46
Hoteli Zadar d.d.	28	4	48	Apartmani Medena d.d.	63	7	56
Puljanka d.d. Pula	29	51	39	Viadukt d.d	64	67	30
Solaris	30	14	24	HTP Orebić	65	67	62
Varteks d.d.	31	54	53	Franck d.d.	66	6	9
Jadranka d.d.	32	37	23	Brodomerkur d.d.	67	8	31
Turist hotel d.d. Zadar	33	44	1	Herbos d.d.	68	15	50
Blue sun - Sunce koncern - Hotel Tučepi	34	39	45	Adriachem	69	66	69
Blue sun - Sunce koncern - Zlatni rat	34	39	61				

Source: Authors research, 2012.

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[6] HR - human resource management evaluation (1st group of subjective criteria); BP - evaluation of the business process success (2nd group of subjective criteria); FIN. – financial indicators (group of objective criteria).

The other group of criteria (subjective criteria) was made upon evaluation of business process success, considering customers, employees and typical quality management practices used within the process. The third group of criteria (objective criteria) was made upon selection of the most important financial indicators.

In order to provide further ranking of companies' performances, the table 2 lists companies (from total of 69) that are ranked according to each criteria as 1-20. There are 8 companies that are ranked as 1-20 according to single criteria. Once again, these companies can be presented as large enterprises considering at the same time importance of human resource investments and quality management practices. Investments in human resources (quality realisation of each human resource practice) as well as application of quality management practices lead to company recognition, sustainable company advantage and entire company success (evaluating using financial indicators).

For further analyse there has been provided correlation testing in order to test the link between each criteria. The correlation coefficients (Spearman's correlation) as well as statistical significance of each testing are shown in table 3.

Table 2: Companies' ranking (1-20) according to three groups of criteria

Company/Criteria	HR	BP	FIN.	Company/Criteria	HR	BP	FIN.
Auto Hrvatska d.d.	2	1	5	Jadranski naftovod d.d.	10	9	10
Siemens d.d.	4	19	8	Konzum d.d. Zagreb	12	5	18
Čakovečki mlinovi d.d.	5	3	4	Uljanik plovidba d.d.	16	19	15
Tekstilpromet d.d. Zagreb	9	18	7	Viktor Lenac	18	16	2

Source: Authors research, 2012.

Table 3: Correlation testing among each group of criteria

Criteria	HR/BP	HR/FIN.	BP/FIN.
Cor. coef.	0.407	0.278	0.446
P	0.001	0.021	0.000

Source: Author research, 2012.

All correlations are statistically significant and positive. Correlation between companies ranking according to human resources evaluation and financial criteria is considered as the weakest one (0.278). In order to test this correlation in more details there has been conducted further analyse. Each financial indicator (making group of financial criteria) is correlated in accordance to human resource management evaluation (considering quality of realisation of particular HR practice). All correlations, accept correlation between CR and HR evaluation are statistically significant and positive, but rather weak (0.034-0.371) what confirms the results from the table 3.

Table 4: Correlations of particular financial indicators and human resource evaluation

Financial indicators	ROS	ROA	CR	QR	DR	FS
Cor. coef.	0.317	0.034	-	0.294	0.371	0.341
P	0.009	0.005	-	0.015	0.003	0.004

Source: Authors research, 2012.

Additionally, correlation between business process and financial indicators is considered as the strongest one (0.446). Furthermore, there has been provided ranking of companies according to business process criteria and financial indicators, taking into consideration companies 1-20 according to each criteria.

Table 5: Companies' ranking (1-20) according to business process and financial indicators

Company/Criteria	BP	FIN.	Company/Criteria	BP	FIN.
Auto Hrvatska d.d.	1	5	Konzum d.d. Zagreb	5	18
Siemens d.d.	19	8	Uljanik plovidba d.d.	19	15
Čakovečki mlinovi d.d.	3	4	Viktor Lenac	16	2
Tekstilpromet d.d. Zagreb	18	7	Institut IGH d.d.	13	19
Jadranski naftovod d.d.	9	10	Franck d.d.	6	9

Source: Authors research, 2012.

Observing table 5 it can be noticed that 10 companies are ranked as 1-20 (out of total) in accordance to business process criteria and financial indicators. Comparing it to table 2 (ranking according to all criteria), just two additional companies are included within the last table. This confirms the fact that 50% of companies (from top 20) are ranked as the same observing financial indicators (as objective criteria) and business process (as subjective criteria).

5. CONCLUSION

Companies today have not only to strive for financial results, but have to make investments and effort for all other aspects of business. Investments in people will create additional effect on entire business process and financial performances, because human resources, as companies' unique resource, influence organisational performance. Additionally, human resources create, implement and improve entire business process (affecting different company's stakeholders) influencing company's financial performances. According to the presented results, it can be concluded that three researched groups of criteria are correlated with positive statistical significance. Also, there could be discussed influence of financial indicators on proper development of human resources (and its quality of realisation) as well as on implication on business process. Potentially, companies who are leader according to financial

indicators could provide greater investments within other two segments of business. Moreover, this research proves that correlation among subjective and objective performances exists. These results uphold theory about the same relevance of objective and subjective organisational performances.

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