MEASURING HUMAN RESOURCE MANAGEMENT PERFORMANCE IN HOTEL COMPANIES

ABSTRACT

A new method for measuring HRM performance, based on fuzzy logic principles, has been proposed, where Mamdani Fuzzy Inference System (MFIS) as a measurement tool is used with the intention to provide a contextual approach (hotel industry) and in which HRM indicators score is calculated for each activity. A questionnaire survey of HR managers was conducted and an expert group was included to create rules for HRM performance evaluation. Four models where domain, functions and membership rules are set for each HRM activity could be used as a template for measuring HRM performance in middle sized hotel companies.

KEYWORDS: Human Resource Management, HRM performance measuring, Hotel industry, Mamdani Fuzzy Inference System,

1. INTRODUCTION

Between scientific conclusions on Human Resource Management (HRM)and the actual state in practice there is a gap(Yeung 2011;Huselid 2011) and we should worry about the fact that HR managers are unfamiliar with many of the basic research findings in the field (Rynes et al., 2002). In the hotel industry, research has focused on measuring and questioning HRM weakness and performance (Kelliher and Johnson, 1987; Hoque, 1999; Haynes and Fryer 2000; Lucas 2002; Tsaur and Lin 2004; Cho et al., 2006; Chad and Katou, 2007; Quintana-Deniz, et al., 2007; Yang and Fu, 2009; Choi and Dickson, 2010, Boella, Goss-Turner, 2013) where the configuration of research philosophy, theories and methodology were "copy/paste" models from studies made in other sectors. Commitment to a particular research philosophy, ways of understanding and defining HRM concepts and performance concepts and the quality of methodological frameworks are basic elements for measuring HRM performance at the scientific level. The problem is in the fact that these configurations are just state-of-the art HRM knowledge and the focus should be on creating an approach or developing measurement tools which are more applicative and useful in practice. Research philosophy and theory frameworks are not starting points for HR managers in their measurement process which is more focused on getting results on which they can position themselves within the organisational and broader contexts. In the hotel industry, the strongest influences on HRM decision-making relate to the product market and ownership and a particular approach to HRM and business strategy (quality oriented) can be universally relevant within the industry (Hoque, 2000). Management style, stakeholders' needs and the perception of key indicators of HRM operations should also are also elements determining measurement of HRM performance in practice. Although measuring HRM performance in practice and for scientific purposes is not harmonised, at the end of the story, the most important is that they both serve HR leaders and decision-makers.

The complexity of measuring HRM performance is evident in the little progress made in establishing *ways* to measure HR system (Guest, 2011), where the key problems are about the lack of consensus regarding what constitutes the correct set of HRM practices (Guest, et al., 2013). Even when the same HR practices are included in different studies, researchers may still use different measurements (Becker and Gerhart, 1996). Different theories (e.g. contingency theory, system theory, institutional theory, the perspective of the role of behaviour, resource-based theory, attribution theory, industrial relations, AMO fremework

and stakeholders' theory) were bases for understanding and defining HRM wherein different approaches to measurement are developed (e.g. HR accounting, HRM balance scorecard, universalistic, contingency and configuration approach). Despite their different characteristics, common to all approaches to HRM evaluation is the fact that they are developed on a classical set of theory principles and Boolean logic where exact determination is if an element belongs to a set or not. In reality, this relationship is not always crisp and exact, e.g. the answer to the question of whether HRM is successful or not does not have to be exactly in the domain *yes* or *no*. The intention of this paper is to move from boxes of Boolean logic (from domain *yes* or *no*) towards fuzzy logic (within domain *yes* or *no*). Although this study is purely positivist and it seeks exact (grade) determination of HRM activity performance in the circumstances of the hotel sector, by using Mamdani Fuzzy Inference System (MFIS) as a measurement tool, the "grey zone" between answers *yes* or *no* is taken into account. Therefore the basic research question of this study is: in what measure could this methodological perspective (fuzzy logic background and MFIS as a measurement tool) be useful, both for scientists and HR managers? This paper is organised in such a way that the next section provides an analysis of up to date approaches to measuring HRM, chronologically and according to their shared characteristics, with the focus on their logical background and differences. The next section shows a methodology framework with explanation of MFIS application and the results are given. The implications for scientists and managers and suggestions for future research are given in the last section of the paper.

2. THEORETICAL FRAMEWORK

2.1. APPROACHES TO MEASURING HRM

There are many reasons for measuring HRM (Paauwe, 2004; Pološki Vokić 2011) however, they gain in popularity by providing evidence that HRM systems contribute to organisational performance. Various theoretical frameworks are discussed and surveys are made in various national, sectoral and organisational contexts where the hotel industry was a part of these samples. Since the 1990s progress has been made in research of HRM within the hotel industry. Approaches to measuring HRM in general, such as in the hotel industry, have changed from measuring the efficiency of HRM operations, developing "best practice"

indexes and creating HR multiperspective scorecards to developing complex causal chain models. Chronologically, there are three phases (Boudreau and Ramstad, 2003):

The first phase -*HR accounting (HRA)* in the given period - showed the added value as a result of investments in various activities related to HRM end-users. Philips et al. (2001) distinguish three approaches to HRM accountability (1. Early approaches (1960s-1970s): HR MBO, Employee attitude surveys, HR case studies and HR auditing, 2. Solid, value-added approaches (1970s-1980s): HR key indicators, HR cost monitoring, HR reputation and Competitive HR benchmarking and 3. Leading-edge approaches (1980s-1990s): ROI process, HR effectiveness index, Human capital measurement, HR profit centre). Developing bundles of key HR activities was very popular and it involved defining a list of appropriate activities and its indicators whose sums indicate the aggregate value of HRM performance (e.g. Guest and Peccei, 1994, MacDuffie, 1995). Leading-edge approaches include more composite methods such as HR profit centre and ROI processes where Fitz-Enz's (2000) study on the ROI of human capital is the most popular. In this group it is important to highlight Svieby's Intangible Assets Monitor (1997),Watson Wyatt's Human Capital Index (1999), Mayo's Human Capital Monitor (2001) and the Guthrie Index of HRM Performance.

The second phase – *HR Dashboard,* initially was focused on creation of adapted versions of Kaplan and Norton's (1992) balance scorecard for HRM based on a) customer, b) internal/business process c) innovation and learning and d) financial perspective to better account for the importance of human resources. Later, Paauwe (2004) developed the 4logic HRM scorecard which is not based on a set of predefined best practices, but on achieving four fits: strategic, horizontal, organisational and environmental, where every performance perspective and every logic (strategic, societal, professional and delivery) has its own distinct set of criteria, which helps management to make choices and to monitor and evaluate the actions chosen. In the same period, Bowen and Ostroff (2004) introduced the concept of Strength of the HRM System and argue that a strong HRM System (when it is perceived with high distinctiveness, consistency and consensus) leads to strong situations that send a consistent message to employees about the kind of behaviours which are valued by the organisation and allow employees to perceive what is required and enable them to adopt the desired behaviours. Coelho et al., (2012) in two studies, confirmed that the Strength of the HRM System is empirically supported.

The third phase - *Causal Chain* - developed various models in linking HRM variables and employee variables to financial outcomes (e.g. Boselie et al., 2005; Katou and Budhwar, 2010) were included in these models. Measuring HRM initially was focused measuring HRM

operations efficiency, where the focus on the HR function was observed exclusively, which can omit the value of talent. The "best practice" indexes limitation is in using one description of HR practices to represent an entire organisation, the HR scorecards is measuring only the "learning and growth" category while causal chains simplify reality (Boudreau and Ramstad, 2003).

According to their shared characteristics, all approaches are grouped into five clusters (Pološki Vokić, 2011): 1) measuring HRM using accounting principles (HR accounting, HR cost monitoring, HR auditing, HR cost–benefit analysis, Return on investment (ROI) in HR), 2) measuring HRM using management techniques (HR case studies, HR profit centre, HR management by objectives, HR key indicators, HR scorecard, HR benchmarking), 3) measuring of individual HRM activities (by quantitative indicators), 4) aggregate evaluation of HRM (HR effectiveness index, HR profit and loss account), 5) measuring HRM department (measuring service, quality and productivity).

In the most of these approaches multivariate statistical methods are used (e.g. factor analysis, regression analysis, cluster analysis, path analysis and SEM) to group variables and to explain the relationships between them, in which causality determination is based on probability theory where, for all Boolean algebras are used. Much of what counts as social science today is based on Boolean logic with two true values 0 and 1 (Arfi, 2010). It relies on the fundamental binary relationship between an object o and a set A and there is nothing in between. That relationship of belonging is described as a *characteristic function*. If X is a universal set and $A \subseteq X$ is a subset, then characteristic function $\chi : X \rightarrow \{0,1\}$ to arbitrary element of the universe $x \in X$ joins the value 1 if $x \in A$, and value 0 if $x \notin A$ (true or false). On the contrary, in fuzzy sets theory an element is allowed to partially belong to a set where a two-part set $\{0, 1\}$ is transformed into interval $[0\ 1]$. Fuzzy sets are, therefore, generalisations of classical sets (Lelli, 2001) or extension of classical set theory (Zimmerman, 2010) and in the last five decades has advanced in different ways and disciplines such as computer science, medicine, robotics, expert system and operations research such as in management science.

2.2. MEASURING HRM ON FUZZY LOGIC

Fuzzy logic, in contrast to Boolean logic, allows the ambiguity of answers where boundaries are not sharply defined. The purpose of using the instruments of linguistic fuzzy modelling is, on the one hand, an exact mathematical data processing that excludes unwanted

subjective influence and, on the other hand, the natural expression of the expertly defined vague evaluations using natural language (Zemkova and Takasova, 2011). Instead of characteristic functions, fuzzy logic uses *membership functions* $\mu : A \to [0\ 1]$, where the $[0\ 1]$ is a closed set of all real numbers between 0 and 1. A set *A* together with the corresponding membership function $\mu_A(x)$ is called fuzzy set $(A, \mu_A(x))$ which is abbreviated to only *A*, where $\mu_A(x)$ is interpreted as a possibility that element *x* belongs to fuzzy set *A*. If t $\mu_A(x)$ = 1, then *x* certainly belongs to the fuzzy set *A*, if $\mu_A(x) = 0$, then *x* certainly does not belong to fuzzy set *A*, and if $0 < \mu_A(x) < 1$, then there is $\mu_A(x)$ degree of possibility that element *x* belongs to fuzzy set *A* (Tsoukalas and Urlig, 1996).

In studies in the tourism context, fuzzy logic and its different measurement instruments were used, e.g. to apply a general fuzzy control model to service quality processes in the hospitality industry (Petrovic-Lazarevic and Wong, 2000), for tourist arrival forecasting (Hadavandi, et al., 2011), for testing models of certain factors affecting the quality-customer relationship (Mousavi et al., 2011), for analysis of tourism destination competitiveness (Huang and Peng, 2012) and to select a cruise port of call location (Wang et al., 2014). In the HRM field, it wasn't used for aggregate measurement of HRM performance, but more for evaluating single activities. Hong and Lee (1996) proposed a general learning method as a framework for automatically deriving membership functions and fuzzy "if-then" rules from a set of given training examples. Lovrich et al., (1999) made formulation of a new approach for recruiters' evaluation. Petrovic-Lazarevic (2001) used analytic hierarchy procedure with a focus on the candidate selection process in order to minimalize a subjective assessment while selecting the right candidate for a vacant work position. Golec and Kahya (2007) used one of the fuzzy models in order to minimalise subjective assessments when selecting candidates and assessment of employee work performance. By using the fuzzy Delphi technique, Toloie-Eshlaghy and Peydaie (2011) created a model of human resources excellence in the Iranian public sector. Zemkova and Talasova (2011) demonstrate the different possible applications of fuzzy sets in HR management with a focus on employee evaluation.

Different fuzzy tools (e.g. Fuzzy Rasch, fuzzy-AHP method and evolutionary fuzzy systems) were used in previous studies to evaluate the possibility of each of those values and it allows incorporation of unquantifiable information, incomplete information, unobtainable information and partial facts into the decision model (Kroemar et al., 1999). Fuzzy inference system (also called fuzzy-rule-based systems, fuzzy expert systems, fuzzy modelling, fuzzy

associative memory, fuzzy logic controllers, and simply fuzzy systems) is one of the fuzzy measurement tools which is successfully applied in fields such as automatic control, data classification, expert systems, computer vision and decision analysis (e.g. Ohdar and Ray, 2004; Carrera and Mayorga, 2008). Until now it has not been used in measuring HRM performance in general and in hotel business environment as specific part of tourism. Only large hotel companies can allow themselves to experiment with HRM practice (Hoque, 1999) and in large hotel companies are formal HRM department, which is the major reason that this paper is focused on hotel industry and not on other entities in tourism.

3. METHODOLOGY

3.1. RESEARCH INSTRUMENT

The questionnaire created for HRM managers is used for quantitative data collection on the four implemented actual HRM activities (recruitment, rewarding, development and retention) on which HR managers have the greatest influence. There are four reasons for choosing these HR activities: 1) they are the most frequently observed activities in research which most often appear in "bundles" of HRM practice significant for company performance (Boslie, et al., 2005), 2) in Croatia, so far only companies with more than 500 employees were found to have implemented and to carry out on a regular basis a whole range of HRM activities (Pološki Vokić and Vidović, 2008) and they are at the beginning of their HRM evaluation practice (Pološki Vokić, 2011), 3) HRM in the Croatian hotel industry doesn't have a strategic role, so, according to HR managers, these are basic activities, 4) in Croatia, only 15% of total hotel capacities are international hotel brands, which indicates that HRM is formalised in a lesser measure. The questionnaire consists of 23 open questions (quantitative indicators of HRM activities). It is an objective rating scale based on indicators according to Philips (1996), selected in cooperation with HR managers in hotel companies and adjusted to the Croatian hotel sector. This scale is developed in such a way as to collect data on full time and seasonal employees, such as on front line and back-room employees, with the aim to aggregate each activity separately and all to one firm-level measure of HR practice. There are

sixteen indicators of four HRM activities defined as key indicators for the Croatian hotel sector (table 3).

3.2. DATA-COLLECTION PROCEDURE AND SAMPLE CHARACTERISTICS

With the aim to establish the actual state of HRM in the Croatian hotel industry, statistical units of research are hotel companies with over 50 employees. In 2012, there were 93 active hotel companies (Register of legal entities of the Croatian Economic Chamber) at the national level. The first step of data collection refers to interviews with HR managers about their perceptions of HRM within their hotel organisation. It should be noted that HR managers in Croatian hotel companies didn't accept well the fact that an "outsider" measures their work, and at the beginning of the survey they mainly emphasised that information about HRM is a trade secret. The second step was sending questionnaires to HR managers in hotel companies. The final sample was 32, representing a return rate of 34.4%, which could be seen as acceptable if hotel business seasonality is taken into account and that in the field of HRM practice - organisational performance link in the hotel sector is 36%-37.1% (Hoque, 1999; Cho et al., 2006). The third step were interviews with five experts with long term experience as HR managers in hospitality (4 of them were from hotel companies and one has a proper HR agency). After fuzzy inference system procedure was explained, the expert group received a detailed explanation about their role in the step of aggregation, where they had to create "if–then" rules in terms of low, middle and high HRM performance. Fuzzy inference systems were developed in mathematical software MatLab 9.7.

In the sample, hotel companies which employ between 101 and 200 persons dominate (30% of them) followed by hotel companies which employ between 50 and 100 persons (22% of them). Further, 13% of them are in the category between 401 and 500 employees and over 500 employees. Just one hotel company from the sample was in the category between 301 and 400 employees and. The majority of ownerships were domestic and private (46%) and form a part of the Adriatic region (81%). Women dominate in HRM positions making up 67% of the sample (table 2). The average age of HR managers is 42 years, while average work time in hotel companies is 14 years and in HRM is 11 years. The majority of HR managers are highly educated in the sample with domination of HR managers whose university education is in the field of law (39%) and economy and business administration (23%).

3.3. DATA ANALYSIS

Fuzzy inference system represents a formal mathematical model for shaping of human knowledge and conclusions when the numerical data is uncertain or linguistic or, generally speaking, if the data is of a different character and is imprecise, approximate or insecure. According to the way outputs are determined, there are two types of fuzzy inference system; 1) *Mamdani-type inference* **-** in which the fuzzy sets from the consequent (the final part of fuzzy rule) of each rule are combined through the aggregation operator and the resulting fuzzy set is defuzzified to yield the output of the system, 2) *Sugeno-type* **-** in which the consequent of each rule is a linear combination of the inputs where output is a weighted linear combination of the consequents. In this study, Mamdani inference system is used where the performance of HRM in hotel companies is calculated using four inputs (four HRM activities).It is chosen because it greatly simplifies the computation whose application is performed in four steps: fuzzification, rule evaluation, aggregation and defuzzification (picture 1).

Picture 1:*FUZZY INFERENCE SYSTEM APPLICATION*

Source: adapted from Letichevsky et al., (2007)

In the *first step* (fuzzification of the input variables), to each input variable (HRM activity) several categories are joined, to which membership function is added, defined in the domain of that variable, with (true) values in the interval [0 1]. In the *second step* of rule

evaluation, fuzzified inputs are applied to the antecedents of the fuzzy rules. Because fuzzy rules have multiple antecedents in this study, the fuzzy operator AND is used to obtain a single number that represents the result of the antecedent evaluation. Formulation of the fuzzy rule by the expert group is based on their experience and knowledge. The *third step* is aggregation of the rule outputs. This is a process of unification of the outputs of all rules. The final, *fourth* step is defuzzification where input is a fuzzy set (HRM activity) and the output is a single crisp number (grade of performance) and rules are evaluated.

4. RESULTS

The results of this study are divided into three parts: 1) descriptive analysis of HRM activities (table 1), 2) developing FIS methodological framework as a tool for measuring HRM performance (tables 2 and 3) and 3) testing its validity (table 4).

Table 1:*DESCRIPTIVE STATISTICS OF HRM INDICATORS*

For each HRM indicator the arithmetic mean is calculated and indicators with monetary value expressed in Croatian kunas are converted into US dollars according to the bank exchange rate. Further step (fuzzification) implies domain determination which is illustrated by table 4 for each HRM activity. For indicators: a) recruitment costs of employees, b) monthly gross (1) salary per employee with manager's contracts, c) number of highly educated employees who left a hotel company of their own free will, d) number of operational employees who left a hotel company of their own free will and e) number of career development programme participants, relative values are calculated.

Table 2: *FUZZIFICATION OF HRM ACTIVITIES*

In the aggregation process, formation of "if-then" rules is assisted by the expert group. There are 89 rules for four HRM activities. In their creation process, the experts have taken into account hotel company size and the characteristics, problems and challenges of HRM in that environment. Examples of the first and the last rules are given:

Rule 1. IF the recruitment cost of employees is average AND vacant position filling time for seasonal employees is long AND vacant position filling time for full–time employees is long AND the growth rate of employees is low, THEN the recruitment performance degree is low.

Rule 89. IF the number of highly educated employees who left a hotel company of their own free will is low AND the number of operational employees who left a hotel company of their own free will is low AND the number of career development programme participants is high, THEN the retention performance degree is high. Most of the rules (32) are developed for rewarding activity, which has the most indicators, then for development activity (23), recruitment activity (21) and finally for retention activity with 13 developed rules. Additionally, to all rules weights were given, and their logic was checked by means calculation. Deffuzification of fuzzy sets of HRM activities resulted in a single crisp number, in the shape of grade 3, where all values *above* grade 3 imply high performance, grade 3 implies average performance and *under* grade 3 implies low performance. Table 3.represents the values of quantitative HRM activity indicators which imply average performance (grade 3).

Table 3: *INDICATOR VALUES OF AVERAGE PERFORMANCE*

According to deffuzification offuzzy sets of input variables:

- recruitment *activity* in the hotel company sample profile could be categorised as successful (high performance) if the costs of staff recruitment (per employee) are 76 USD, vacant position filling time for seasonal employees *is shorter* than 61 days, vacant position filling time for full- time employees *is shorter* than 46 days and if the rate of growth of employees in total is 12.5%.

- high performance of *rewarding activity* in a hotel company could be successful if the percentage share of total labour costs in operative costs *is higher* than 22.5%, gross (1) salary per employee without manager's contracts *is higher* than 880USD, gross (1) salary per employee with manager's contracts *is higher* than 1,247.03 USD and the percentage of total costs of benefits in the total amount of salary *is higher* than 12.5%.
- the activity of *development* in hotel companies could be successful if; the total costs for additional services to employees are *higher* than 110 USD, the percentage of educational costs in total salaries is *higher* than 2.5%, the number of educational hours per employee annually is *higher* than 21hrs, the annual number of hours of a front line employee spent in additional education is *higher* than 50hrs and the annual number of hours of a professional support employee spent in additional education is *higher* than 26hrs.
- *retention activity* is based on the relative values where their averages are taken into account. For example, if the hotel company proportion of highly educated employees who left the hotel company of their own free will *is below* 1.8%, the proportion of operational employees who left a hotel company of their own free will *is lower* than 6.3%, and the share of employees who are involved in the progression of the programme/career development is *above* 4.7%, this activity is in the domain of high performance.

The validity of four FIS models for four HRM activities was tested by simulation, where the intention was to determine the functioning of these models upon entry of optimal and worst HRM practice indicators and on ten randomly chosen hotel companies from this research sample (table 4). Simulated models confirm that the grade for lowest (failed) performance is 2.3 and the highest is 3.68. When FIS model calculates a grade in the range 2.3-3.00, the performance of those HRM activities in a hotel company will be categorised as low. When the grade is 3.00, the performance is average and in the range between 3.01 -3.68 has high performance. Average performances (in the shape of aggregate grade) are calculated on ten hotel companies from the sample.

Table 4:*AGGREGATE GRADE OF HRM PERFORMANCE*

The highest performance was in recruitment activity in the first hotel company and the lowest was the activity of development in the same company. The aggregate grade of HRM performance is calculated as the average of all activity performances within a hotel company and, in this example, *low performance* is dominant. Additionally, the performances of HRM activities across ten hotel companies, where it is evident that there is high performance in recruitment and retention activities, were calculated.

5. THEORETICAL IMPLICATIONS

At the scientific level in the HRM field, huge progress has been made on probability and classical set theory principles of measurement. This study should be taken as an intention of "looking from a different angle". Organisations are individually different and struggle with different internal and external situations and an attempt is made to move out of Boolean logic boxes in measuring HRM performance and direct methodological frameworks to measurement by contingency (situational) approach. A developed approach to measurement is focused on functional HRM and, although it does not evaluate the contribution or HRM added-value effect in a hotel company and does not provide an understanding of decisions taken, it can be useful in an intention to express HRM in financial terms, which Toulson and Deewe (2004)see as a prerequisite to earning credibility. Although based on quantitative indicators, this approach is "softer" and useful for positivist studies, because it allows one to except and measure the "grey zone" of reality. In contrast to statistical methods where values of input variables are "rounded off" and averages are used, in fuzzy logic, the assessed value

output variables are in great measure equivalent to reality, because different conditions, problems and challenges are taken into account in the process of rule/rules creation and it handles the concept of partial truth, where the truth value may range between completely true (e.g. successful) and completely false (unsuccessful). Fuzzy set theory gives an answer to how much a variable is in a set while probability theory is focused on how probable it is that a variable is in a set.

Langley (1999) encouraged strategic HRM scholars to increase the diversity of methodological approaches to more often include methods that are capable of generating new insights about processes and complex dynamics, in addition to the dominant approach of testing variance theories. An analysis of the "black box" (HRM practice-performance link) falls into the category of testing variance theories (Morris, 2005) and after three decades of research, authors (Guest, 2011, Guest et al., 2013; Jackson et al., 2014) still highlight the importance of providing an explanation for 'how' black box happens. Establishing causality, levels of analysis, data aggregation and measurement validity are many of the methodological challenges for strategic HRM, similar to those for other areas of management (Jackson et al., 2014). The contribution of this study is in developing a methodological framework of data aggregation of HRM performance in the hotel business context. It includes a method of MFIS, which allows new insights into processes of evaluation of HRM by rules creation, where an expert group and their knowledge and experience in practice, has an important role. To bridge the gap between science and practice, HR managers need to be informed about the best available scientific evidence concerning workplace issues ("evidence-based management", EBM) (Rynes et al., 2001;Cohen, 2007;Rynes, 2007), which is achieved by this study. Practitioners are included in the process of decision making about research problems; they are asked to discuss the relationships between proposed indicators, to estimate all possible scenarios related to performance of certain HR activities and all other details important for measurement.

By this research, the validity of MFIS as an instrument for (aggregate) measuring HRM performance is confirmed. The creation of four fuzzy inference systems where domain, membership functions and rules are set for each HRM activity could be used as a template for measuring HRM performance in hotel companies. It should be highlighted that 87% (28 companies) of this sample are middle sized hotel companies with less than 500 employees, so it could prove useful, especially for that hotel company profile. At the scientific level, MFIS could be used as a tool for data aggregation in the HRM field, such as for HRM

benchmarking. It could contribute to providing an explanation of "how" to improve the weaknesses of quantitative measurement in HRM performance in the hotel industry.

6. PRACTICAL IMPLICATIONS

If managers of HR do not find a suitable way of measuring and presenting the success of their work, it can hardly be expected that they will be included in strategic decisions for the company (Yeung, 2011). According to the attitudes towards this research and problems related to calculation of some indicators, in the Croatian hotel companies from sample, a lack of agility of HR managers for their work evaluation is evident. This study is made with the intention to "open" new boxes of thinking in the field of HRM performance measurement with the focus on its applicative purpose. No limitation in the number of input and output variables, the possibility to include values of different character variables in the model, the possibility to process imprecise variable values and involvement of an expert group are recognised as the advantages of using Mamdani-type fuzzy inference in the HRM dataset in this study. Besides the methodological implications, the results could serve practitioners in middle size hotel companies as a direction for four HRM activities. In the Croatian context, development activity could be taken as an example. Pološki Vokić (2008) concluded that only 41.5% of hotel companies in the sample (N=48) enlarged their spending on training and development (T&D) compared to their operational costs in the last two years and those who provided their answer invested on average in 2006 on employees' T&D only 0.99% of their yearly earnings. According to this study, development activity could be estimated as averagely successful if the percentage of educational costs in total salaries is 2.5%.However, in interpretation of these results, it should be used with caution because, for benchmarking purposes, all indicators should be standardised.

It is also important to highlight the limitation that refers to the HRM concept (functional categories of HRM) which usually has more than four activities (planning, job analysis, job design, recruitment, selection, training, rewarding, and retention and job career). In Croatian hotel companies HRM does not have a strategic role; it is reduced to four key activities, which is a limiting factor for full HRM profile analysis in hotel companies. The recommendation is to take an aspirational framework for strategic HRM (Jackson et al., 2014) as a template for defining the HRM concept in the research where the full range of HRM activities, appropriate for the research context, should be included. Fuzzy inference system is used to analyse quantitative indicators of HRM activities where the limiting factor is the final

step where four FIS systems (for each HR activity-recruitment, development, retention and rewarding) are aggregated in their average calculations. In future research, instead of calculation of FIS model value average, a new FIS model should be developed where the FIS model for each activity will represent an input variable. Also, the methodological framework should test the suitability of the Sugeno method that uses averages of weight to calculate the exact value (Kaur and Kaur, 2012). To improve the methodology developed in this study, first these fuzzy inference systems should be tested on a larger sample and in different hotel industry environments (e.g. western European countries). Second, it is important to make a quality list of key HRM indicators and combine them with estimations of HR managers, employees and guest satisfaction in hotel business context. This methodological framework is set up from the positivist research perspective and it is mainly focused on determination of the implementation of HRM activities. So, third, more standardised interviews should be used before data collection, where practitioners should be asked about details and factors which are important to them for good measurement of HRM. Additionally, the expert group should have more members and line managers should be included. During the rule creation process practitioners should be asked what it would take for them to apply evidence-based management (Cohen, 2007), in other words what would be important to them to apply the results based on measuring by MFIS.

7. CONCLUSION

Aggregate measurement of performance of HRM is a major challenge in black box research and, after huge achievements made by classical statistical methods (based on probability theory), there are still lots of limitations and challenges that need to be faced. This paper promotes a new approach to measurement of HRM performance based on fuzzy set theory, where Mamdani Fuzzy Inference System is for the first time used as a tool with the intention to provide a contextual and quantitative approach to aggregate measurement. Different conditions and challenges from practice are taken into account in the process of rule creation by an expert group to contribute to reducing the gap between science and practice and for encouraging evidence-based management. It provides a framework where relations between quantitative indicators for low, average and high HRM performance are defined. The findings introduce researchers and practitioners in hotel companies to a new phase of measurement of HRM and it can serve them for HRM benchmarking.

REFERENCES

Arfi, Badredine (2010): Linguistic fuzzy logic methods in social sciences. Berlin: Springer

Becker, Brian and Gerhart, Barry (1996): The impact of human resource management on organizational performance: progress and prospects. Academy of Management Journal 39 (4): 779- 801.

Boella, Michael and Goss-Turner, Steven (2013): Human Resource Management in the Hospitality Industry: A Guide to Best Practice. London: Routledge

Boselie, Paul, Dietz, Graham and Boon, Corine (2005): Commonalities and contradictions in HRM and performance research. Human Resource Management Journal 15 (3): 67-94.

Boudreau, John W. and Ramstad, Peter M. (2003): Strategic HRM Measurement in the 21st Century: From Justifying HR to Strategic Talent Leadership. In, M. Goldsmith, R.P. Gandossy and M.S. Efron (ed), HRM in the 21st Century, 79-90. New York, NY: John Wiley

Bowen David E. and Ostroff, Chari (2004): Understanding HRM – Firm Performance linkages: The role of the „strength“ of the HRM system. Academy of Management Review 29 (2): 203-221.

Carrera, Diego A. and Mayorga, Rene V. (2008): Supply chain management: A modular fuzzy inference system approach in supplier selection for new product development. Journal of Intelligent Manufacturing 19 (1): 1-12.

Chad, Mahindra. and Katou, Anastasia A. (2007): The impact of HRM practices on organizational performance in the Indian hotel industry. Employee Relations 29 (6): 576-594.

Cho, Seonghee, Woods, Robert H., Jang, SooCheong and Erdem, Mehmet. (2006): Measuring the impact of human resources management practices on hospitality firms' performance. International Journal of Hospitality Management 25 (2): 262-277.

Choi, Youngsoo and Dickson, Duncan R. (2010): A Case Study into the Benefits of Management Training Programs: Impact on Hotel Employee Turnover and Satisfaction Level. Journal of Human Resources in Hospitality and Tourism 9 (1): 103-116.

Coelho, Joaquim P., Cunha, Rita C., Gomes, Jorge F. and Correia, Anabela (2012): Developing and Validating a Measure of the Strength of the HRM System: Operationalizing the Construct and Relationships among its Dimensions. Available on **Http://run.unl.pt/handle/10362/11154**, 15.1.2015.

Cohen, Debra J. (2007): The very separate worlds of academic and practitioner publications in human resource management: Reasons for the divide and concrete solutions for bridging the gap. Academy of Management Journal 50 (5): 1013-1019.

Croatian Economics Chamber: Register of legal entities. Available on H **Http://www1.biznet.hr/HgkWeb/do/extlogon**, 25.3.2011.

Fitz-Enz, Jac (2000): ROI of human capital: measuring the economic value of employee performance. NY: AMACOM New York

Golec, Adem and Kahya, Esra (2007): A fuzzy model for competency-based employee evaluation and selection. Computers & Industrial Engineering 52 (1): 143-161.

Guest, David E. (2011): Human resource management and performance: still searching for some answers. Human Resource Management Journal 21 (1): 3-13.

Guest, David E. and Peccei, Riccardo (1994): The nature and causes of effective human resource management. British Journal of Industrial Relations 32 (2): 219-242.

Guest, David E., Paauwe, Jaap and Wright, Patrick M. (2013): HRM and performance: achievements and challenges. John Wiley & Sons

Hadavandi, Esmaeil, Ghanbari, Arash, Shahanaghi, Kamran and Abbasian-Naghneh, Salman (2011): Tourist arrival forecasting by evolutionary fuzzy systems. Tourism Management 32 (5): 1196-1203.

Haynes, Peter and Fryer, Glenda (2000): Human resources, service quality and performance, a case study. International Journal of Contemporary Hospitality Management 12 (4): 240-248.

Hong, Tzung-Pei and Lee, Chai-Ying (1996): Induction of fuzzy rules and membership functions from training examples. Fuzzy sets and Systems 84 (1): 33-47.

Hoque, Kim (1999): Human Resource Management and Performance in the UK Hotel Industry. British Journal of Industrial Relations 37 (3): 419-443.

Hoque, Kim (2000): Human Resource Management in Hotel Industry – Strategy, Innovation and Performance. London: Routledge

Huang, Jen-Hung and Peng, Kua-Hsin (2012): Fuzzy Rasch model in TOPSIS: A new approach for generating fuzzy numbers to assess the competitiveness of the tourism industries in Asian countries. Tourism Management 33 (2): 456-465.

Huselid, Mark A. (2011): Celebrating 50 Years: Looking back and looking forward: 50 years of Human Resource Management. Human Resource Management 50 (3): 309-312.

Jackson, Susan E., Schuler, Randall S. and Jiang, Kaifeng (2014): An aspirational framework for strategic human resource management The Academy of Management Annals 8 (1): 1-56.

Katou, Anastasia A. and Budhwar, Pawan S. (2010): Causal relationship between HRM policies and organisational performance: Evidence from the Greek manufacturing sector. European Management Journal 28 (1): 25-39.

Kaur, Arshdeep and Kaur, Amrit (2012): Comparison of Fuzzy Logic and Neuro-Fuzzy Algorithms for Air Conditioning System. International journal of soft computing and engineering 2 (1): 2231-2307.

Kelliher, Clare and Johnson, Keith (1997): Personnel management in hotels-an update: a move to human resource management. Progress in Tourism and Hospitality Research 3 (4): 321-331.

Kroemer, Karl H.E., Kroemer, Henrike B. and Kroemer-Elbert, Katrin E. (1999): Ergonomics. New Jersey: Prentice-Hall

Langley, Ann (1999): Strategies for theorizing from process data. Academy of Management review 24 (4): 691-710.

Lelli, Sara (2001): Factor Analyses vs. Fuzzy Sets Theory: Assessing the Influence of Techniques on Sen's Functioning Approach. Discussion paper 01.21. Leuvren: Centre for Economic Studies

Letichevsky, Ana Carolina, Vellasco, M.aria B. R. and Tanscheit, Ricardo (2007): A fuzzy decision support system for meta-evaluation a new approach and a case study performed in Brazil. Ensaio: Avaliação e PolíticasPúblicasemEducação 15 (56): 447-462.

Lovrich, Misha, Petrovic-Lazarevic, Sonja and Brown, Bruce (1999): A fuzzy approach to personnel selection, working paper 44/99. Monash University, Faculty of Business and Economics, Austraila

Lucas, Rosemary (2002): Fragments of HRM in hospitality? Evidence from the 1998 workplace employee relations survey. International Journal of Contemporary Hospitality Management 14 (5): 207-212.

MacDuffie, John Paul (1995): Human resource bundles and manufacturing performance: Organizational logic and flexible production systems in the world auto industry. Industrial& labour relations review 48 (2):197-221.

Morris, Don R. (2005): Causal inference in the social sciences: variance theory, process theory, and system dynamics. In Proceedings of the 23rd International Conference of the System Dynamics Society Boston, USA, July 17 – 21, 2005.

Mousavi, Sesed Alireza, Ashraf, Maryam, Rajaey, Parisa and Toosi, Nahid Moones (2011): An study some of the factors affecting on relationship quality employee-customer in the hotel industry by Fuzzy logic. The Journal of Mathematics and Computer Science 2 (2): 348-358.

Ohdar, Rajkumar and Ray, Pradip Kumar (2004): Performance measurement and evaluation of suppliers in supply chain: an evolutionary fuzzy-based approach. Journal of Manufacturing Technology Management 15 (8): 723-734.

Paauwe, Japp (2004): HRM and Performance, achieving long term viability. Oxford University, New York, NY: Press Inc.

Petrovic-Lazarevic, Sonja (2001): Personnel Selection Fuzzy Model. International Transactions in Operational Research 8 (1): 89-105.

Petrovic-Lazarevic, Sonja and Wong, Amy (2000): Fuzzy control model in the hospitality industry. International Journal of Agile Management Systems 2 (2): 156-163.

Philips, Jack J., Stone, Ron D. and Pulliam Philips, Patricia (2001): The Human Resource Scorecard: Measuring the Return on Investment. Boston, MA: Butterworth-Heinemann

Phillips, Jack J. (1996): Accountability in Human Resource Management. Houston: Gulf Publishing Company

Pološki Vokić, Nina (2008): Važnost obrazovanja i razvoja za uspjeh hotelske industrije-slučaj Hrvatske. Acta turistica 20 (1): 9-38.

Pološki Vokić, Nina (2011): The Relationship between the Level and Modality of HRM Metrics, Quality of HRM Practice and Organizational Performance. Paper presented at the 1st Israeli Global Human Resource Management (GHRM) Conference, ORT Braude College, Israel, December 2011.

Pološki Vokić, Nina and Vidović, Maja (2008): HRM as a Significant Factor for Achieving Competitiveness through People: The Croatian Case. International Advances in Economic Research 14 (3): 303-315.

Quintana-Deniz, Agustin, Beerli-Palacio, Asuncion and Martin-Santana, Josefa D. (2007): Human resource system as antecedents of hotel industry market orientation: An empirical study in the Canary Islands, Spain. International Journal of Hospitality Management 26 (4): 854-870.

Rynes, Sara L. (2007): Editor's Afterword Let's Create A Tipping Point: What Academics and Practitioners can do, Alone and Together. Academy of Management Journal 50 (5): 1046-1054.

Rynes, Sara L., Bartunek, Jean M. and Daft, Richard L. (2001): Across the great divide: Knowledge creation and transfer between practitioners and academics. Academy of Management Journal 44 (2): 340-355.

Rynes, Sara L., Colbert, Amy E. and Brown, Kenneth G. (2002): HR professionals' beliefs about effective human resource practices: Correspondence between research and practice. Human Resource Management 41 (2): 149-174.

Toloie-Eshlaghy, Abbas and Peydaie, Mehrdad (2011): Designing the Model of Human Resource Excellence in Iranian Public Sectors. European Journal of Economics, Finance and Administrative Sciences 35: 135-154.

Toulson, Paul K., and Dewe, Philip (2004): HR accounting as a measurement tool. Human Resource Management Journal 14 (2): 75-90.

Tsaur, Sheng-Hshiung and Lin, Yi-Chun (2004): Promoting service quality in tourist hotels: the role of HRM practices and service behaviour. Tourism Management 25 (4): 471-481.

Tsoukalas, Lefteri H. and Urlig, Robert E. (1996): Fuzzy and Neural Approaches in Engineering. New York, NY: John Wiley and Sons

Wang, Ying, Jung, Kyung-ae., Yeo, Gi-tae and Chou, C.C. (2014): Selecting a cruise port of call location using the fuzzy-AHP method: a case study in East Asia. Tourism Management 42: 262-270.

Yang, Hui-O.and Fu, Hsin-Wei. (2009): Contemporary human resources management issues and concerns in the hotel industry: identifying the priorities. The International Journal of Organizational Innovation 2 (1): 201-224.

Yeung, Arthur (2011): Celebrating 50 years: how robust and relevant is our knowledge?. Human Resource Management 50 (4): 451-453.

Zemková, Blanka and Talašová Jana (2011): Fuzzy sets in HR Management. Acta Polytechnica Hungarica 8 (3): 113-124.

Zimmermann, Hans-Jürgen (2010): Fuzzy set theory. Wiley Interdisciplinary Reviews: Computational Statistics 2 (3): 317-332.