

HUMAN RESOURCE INFORMATION SYSTEM AND ELECTRONIC RECRUITMENT AS INTERNAL AND EXTERNAL MANAGERIAL TOOLS IN CREATION OF COMPANIES' SUCCESS

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Abstract

In today volatile and complex business surrounding, human and informational resources represent unique way in creating companies' success. Human resources are unique according to their knowledge, skills, abilities or behaviour. In order to attract top employees, besides applying all sorts of recruiting techniques, companies need quality information software, as tool for recognizing top employees among internal ones. Additionally, in order to attract the best potential external employees, companies use electronic recruitment as important managerial tool. The main aim of this paper is to research whether Croatian companies that apply human resource information system (HRIS), as internal organisational tool, provide better business results measured through financial indicators. Moreover, additional aim of this paper is to evaluate the application of electronic recruitment, as external tool, and its correlation to companies' success as well as connection between both tools.

Keywords - human resource information system (HRIS), electronic recruitment, companies' success, information technology, multicriteria classification and ranking, binary logistic regression

1 INTRODUCTION

In order to compete, survive and succeed in business, companies need to make ideal combination of its resources. Nowadays, companies depend on human resources and informational resources as their crucial elements. Human resources represent unique way in companies' survival and development due to their specific knowledge, skills, abilities or behaviour that significantly distinguish them among the leading competitors. In order to attract top employees, besides applying all sorts of recruiting techniques, companies need quality information software (precisely human resource information system – HRIS, moreover information and technology tool - ICT) as managerial tool for recognizing top employees among internal ones. Additionally, in order to attract the best potential external employees, companies use electronic recruitment as other important managerial tool. The main aim of this paper is to research whether Croatian companies using developed human resource information system, as internal tool, provide better business results measured through financial indicators, than their competitor with lower degree of HRIS development. Moreover, additional aim of this paper is to evaluate the application of electronic recruitment, as external tool, and its correlation to companies' success as well as connection between both tools. After providing primary and secondary research within companies from the sample, selected statistical methods are applied in order to test relations between HRIS development and electronic recruitment with companies' financial success.

2 HUMAN RESOURCE INFORMATION SYSTEM – MANAGERIAL TOOL IN CREATION OF COMPANIES' SUCCESS

Human resource (HR) managers create and influence important segment of companies' strategy. Employing human resources with adequate knowledge, skills, abilities or working experience, companies possess significant human capital generating sustainable competitive advantage. How to attract, select or motivate the best human potential and how to manage their work or performances are the crucial questions that HR managers deal with. Managerial tool that provides considerable result is human resource management system (HRIS). HRIS is a system used to acquire, store, manipulate, analyze, retrieve and distribute pertinent information about an organisation's human resources [13]. Also, HRIS constitute suitable systems making it possible for the enterprise to manage the flows of information relating to its HR, as well as improving the quality of decisions related to HR,

which can be either strategic or operational, and this thanks to the automation of the administrative procedures [12]. HRIS have thus become a critical tool for integrating HR information into the organisation's business strategy and for demonstrating the positive contribution that HR can make to the bottom line through the more effective and efficient management of the organisation's HR [11].

It can be concluded that HRIS implements and combines crucial elements of different disciplines; management and information technology, whose cooperation is extremely important especially in surviving the global competition. Firstly, advances in information technology are changing the industry structure as well as the way companies operate. Furthermore, information technology is increasingly important lever that companies can use to create competitive advantage. Finally, the information revolution is spawning completely new business [10].

In the back time, HR were called personnel and all activities were limited to record keeping. During the last decades of 20th century great deal was made providing proper recruitment and selection process, but still on the level of record keeping. Finally, HRIS has evolved from the simple record-keeping to the complex analytical and management tool to assist decision making. Today, HRIS is still in charge of some simple HR activities, but also supports the process of recruitment and retention, advances performance management process, promotions, discipline, compensations and benefits, training and development as well as promotion and succession planning [7]. However, HRIS could be viewed as a hybrid of several classical types of information systems. Currently, HRIS includes features of transaction processing systems, decision support systems, communication systems and systems with elements of artificial intelligence [7]. Moreover, the major benefit of HRIS is the accurate and timely access to diverse data which it provides to HR managers and top managers. In conducting HR planning, it examines scenarios and simulations to test out different strategic alternatives [11].

However, there are certain concerns about the potential invasion (and abuse) of employee privacy, but also about costs (purchase, development and maintaining costs). Nevertheless, HRIS is recognized as managerial tool assigned for different users. Operational users need to process routine transactions and to answer general enquires relating to personnel records. Middle managers need to generate regular and ad hoc reports for day to day planning, decision making and control. Finally, senior managers need this tool in order to deal with strategic planning, policy formulation and decision making. Having accessible data enables HR planning and managerial decision making to be based to a greater degree on information rather than relying on managerial perception and intuition [14]. Nevertheless, not only HR managers have to be involved in application of HRIS, but there is need for strong collaboration between them and information technology (IT) managers.

3 USAGE OF ELECTRONIC RECRUITMENT AS MODERN WAY OF PERFORMING BUSINESS

Recruitment represents the process of attracting a pool of qualified applicants in order to ensure people with unique skills, know-how and values required by companies' objectives. Whenever possible, companies use internal sources of recruitment, but can not avoid external resources. Although, many companies are using traditional search engine techniques, due to modern business requirements companies apply new methods, such as electronic recruitment. High growth of electronic recruitment is the result of many advantages it has in accordance to traditional methods, but it is also the result of the growth in the usage of Internet. The Internet has changed the ways job seekers and companies think about the recruiting function [6]. Although usage of Internet and electronic recruitment raises questions of privacy and security issue [5] as well as it excerpts discrimination issue among Internet users and non-users [9], it also provides many advantages over traditional recruiting methods. Electronic recruitment allows employers to broaden the scope of their search, with the emphasis being put on the high-quality candidates who are mostly young, computer literate, educated employees at the worldwide level. Except higher investments at the start, electronic recruitment reduces recruiting costs at all (newspaper advertisements, job fairs and head hunter fees, mailing costs and reduced workload for human resource department). Additional benefits of electronic recruitment are recognized as faster hiring process, efficient feedback and accessibility at any time [2]. Consequently, companies are usually dedicated to electronic job posting, direct online applications, detailed selection process information and faster feedback. Online job recruitments, online CV databases, electronic applications, applicant management systems, corporate skill databases and IS supported workflows are just few examples how IS support recruitment process [8]. Electronic recruitment as a part of HRIS speeds up

the entire process, provides more objective screening, reduces HR staff demands. Process can also be provided with candidates virtually anywhere, it is more realistic and it less expensive as it was told previously. HRIS enables HR managers to provide proper decision making securing the value of human resources enabling HR to be real strategic partner in the process of organizational development. In order to secure maximum from this system support, it has to be effectively adopted by employers and interplayed between HR departments, specialized departments, service centers and external service providers [8].

4 RESEARCH METHODOLOGY AND DATA SELECTION

4.1 Methodology

For the purpose of the empirical part of the paper, primary and secondary researches have been conducted. Primary research included written survey distributed to all Croatian public companies listed on Croatian Stock Exchange Market. Survey was designated to the HR managers, investigating their subjective opinions about development of HRIS activities within their company. Secondary research included evaluation of companies' official web pages (participated in the first round of the research). It was oriented on topics dealing with electronic recruitment (exist or not exist). It also included collection of financial data of the same companies. Data were subtracted from the companies' balance sheets and income statements transparent on Zagreb Stock Exchange Market.

Furthermore, appropriate statistical methods are applied in order to test relations between HRIS development and application of electronic recruitment with companies' financial success. After reliability analysis by Cronbach's Alpha, the companies' classification is done using non-hierarchical k-means cluster method according HRIS and electronic recruitment. The term cluster analysis [1] encompasses a number of different algorithms and methods for grouping objects of similar kind into respective categories. A general question facing researchers in many areas of inquiry is how to organize observed data into meaningful structures, that is, to develop taxonomies. In other words, cluster analysis is an exploratory data analysis tool that aims at sorting different objects into groups in a way that the degree of association between two objects is maximal if they belong to the same group and minimal otherwise. Cluster analysis does not presuppose any statistical significance, and it is therefore recommended to use appropriate statistical tests in practical analyses. So, nonparametric Kruskal Wallis test confirmed the obtained classification results. Further the companies are ranked according HRIS and electronic recruitment by multicriteria PROMETHEE method [15]. The multicriteria problem is:

$$\text{Max}\{f_1(a), \dots, f_n(a) | a \in K\}, \quad (1)$$

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

For each action $f_j(a)$ is an evaluation of this action. 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 :

$$P: K \times K \rightarrow [0, 1], \quad (2)$$

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 (usual, U-shape, V-shape, level, linear and Gaussian) of this preference function are proposed to the decision maker [3] and [4]. The effective choice is made interactively by the decision maker and the analyst according to their feeling of the intensities of preference.

Relevant nonparametric tests are used for testing companies' business success regarding average HRIS development and average electronic recruitment application and for testing relationship between companies with developed HRIS and applied electronic recruitment (binary values). Finally, binary logistic regressions are estimated to find dependence of companies' financial success and HRIS development. Significant odds ratio shows if company with developed HRIS has higher probability of financial success.

4.2 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 companies with uncompleted data, total number of companies within the sample was 69. Those were distinguished regarding their main activity, service industry (60.9%) and manufacturing industry (30.1%). The greatest share of the sample corresponds to large enterprises (52.9%), following medium size enterprises with 42.6% of companies and small enterprises with only 4.4% of the sample. The average number of the employees within HR department is 5.32 with the greatest proportion of those possessing secondary school diplomas. The share of companies that fulfil all six issues regarding electronic recruitment (see 4.3) is just 0.54%, while the structure of companies that do not fulfil any of six issues is 68.85%. The average grade regarding application of electronic recruitment (1-6) is negligible 0.77.

4.3 Variables

Evaluating development of companies' HRIS, respondents took into consideration its four particular aspects, such as: record keeping and administration tasks (HRIS 1), HR planning (HRIS 2), training and HR development (HRIS 3) and performance management (HRIS 4). These variables were chosen according to previous researches, but also according to the need and use of Croatian companies regarding human resource management in general and their application of HRIS. Respondents were evaluating particular aspect using 1-5 Likert scale (1-negative grade; 5-excellent grade). Part of the research dealing with electronic recruitment was oriented to evaluation of six particular aspects, such as: application link for opening position (ER 1), possibility for e-mail application (ER 2), link for opening positions (ER 3), currently open position (ER 4), information regarding career development within company (ER 5), information of selection process within the company (ER 6). Researcher had to evaluate each aspect using 0 – not existing or 1 – existing option within particular company. Finally, data subtracted from companies' financial reports included following financial ratios: profitability ratios (NPM – net profit margin, ROA – return on assets and ROE – return on equity), liquidity ratios (CR – current ratio, QR – quick ratio and WC – working capital) and leverage ratios (DR – debt ratio, ICR – interest cover ratio and FS – financial strength). These ratios were chosen according to propositions of renowned Croatian authors and characteristics of Croatian companies.

5 RESULTS

In the empirical part of the paper, there has been provided non-hierarchical k-means cluster method, according to companies HRIS and electronic recruitment in order to provide companies' classification (table 1). Reliability Statistics Cronbach's Alpha for companies' HRIS is 0.840 which implicates good internal consistency, while for electronic recruitment is 0.756 implicating acceptable internal consistency. Further, k-means cluster method was used in order to introduce three different clusters. Anova test (F-test p-value) used for both classifications, shows that all HRIS contribute to statistically significant difference among defined clusters. Regarding development of companies' HRIS, cluster 1 form companies with the greatest degree of HRIS development, mostly service industry (66%). Cluster 3 represents companies with the lower degree of HRIS development, mostly service industry (62%). Cluster 2 represents companies with the lowest degree of HRIS development, mostly manufacturing industry (80%). It is expected that service industry will be characterised with the greatest degree of HRIS development. Service industry depends mostly on HR and their knowledge, skills and abilities and is reasonable that those companies invest more and maximally develop their crucial resources.

Regarding companies' classification in accordance to electronic recruitment, companies forming cluster 1 (mostly service industry 67%), usually do not use electronic recruitment as a mean of recruiting process. Furthermore, cluster 3 corresponds to the companies that provide electronic recruitment (majority manufacturing industry 62%). Cluster 2 form companies which apply electronic recruitment to maximum degree within their HR strategy. Cluster 2 is equally comprised of service (50%) and manufacturing industry (50%). Greater placement of manufacturing companies regarding application of electronic recruitment isn't surprised, because those companies usually employ greater number of employees and electronic recruitment represent process which is easier to obtain and has lower costs. HRIS and electronic recruitment means and medians in appropriate clusters confirmed previously provided classification results. Interpreting Kruskal-Wallis test it can be noticed statistically significant difference regarding development of HRIS within defined clusters. Development of HRIS

and electronic recruitment application confirm mean ranks from nonparametric Kruskal-Wallis test. The same statistically significant difference is notified regarding application of electronic recruitment within provided clusters.

Table 1. Companies' classification using non-hierarchical k-means cluster method according HRIS and electronic recruitment

Companies					
Classification according HRIS (values 1-5)			Classification according Electronic recruitment (values 0-1)		
Cronbach's Alpha: 0.840			Cronbach's Alpha: 0.765		
Kruskal Wallis test: $p < 0.001$	Manufact. industry N (%)	Service industry N (%)	Kruskal Wallis test: $p < 0.001$	Manufact. industry N (%)	Service industry N (%)
CLUSTER 1: mean rank: 50.4** mean=4.13*** median=4.00***	11 (34%)	21 (66%)	CLUSTER 1: mean rank: 24.5** mean=0.018*** median=0.00***	16 (33%)	32 (67%)
CLUSTER 2: mean rank: 3.0** mean=1.55*** median=1.75***	4 (80%)	1 (20%)	CLUSTER 2: mean rank: 61.6** mean=0.583*** median=0.59***	4 (50%)	4 (50%)
CLUSTER 3: mean rank: 20.1** mean=2.91*** median=3.00***	11 (38%)	18 (62%)	CLUSTER 3: mean rank: 57.4** mean=0.409*** median=0.33***	8 (62%)	5 (38%)
ANOVA (HRIS)			ANOVA (Electronic recruitment)		
Aspects		p-value*	Aspects		p-value*
HRIS 1		<0.001	ER 1		<0.001
HRIS 2		<0.001	ER 2		<0.001
HRIS 3		<0.001	ER 3		<0.001
HRIS 4		<0.001	ER 4		<0.001
			ER 5		<0.001
			ER 6		0.079

*The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal; **Mean rank is calculated for average appropriate variables according to Kruskal Wallis test; ***Mean and median are calculated for average appropriate variables

Source: According to survey analysis

Table 2. Types of preference functions, weights and companies' ranking according to HRIS and electronic recruitment by multicriteria PROMETHEE II method

CRITERIA	Ranking according to HRIS (values 1-5)				Ranking according to Electronic recruitment (values 0-1)***					
	IS1	IS2	IS3	IS4	ER1	ER2	ER3	ER4	ER5	ER6
Min/Max	max	max	max	max	max	max	max	max	max	max
Type	4*	4*	4*	4*	2**	2**	2**	2**	2**	2**
Indifference Treshold	2.80	2.80	2.80	2.80	0.50	0.50	0.50	0.50	0.50	0.50
Preference Treshold	3.20	3.20	3.20	3.20	-	-	-	-	-	-
Weight	0.25	0.25	0.25	0.25	0.17	0.17	0.17	0.17	0.17	0.15
	Manufact.		Service		Manufact.			Service		

	industry N (%)	industry N (%)		industry N (%)	industry N (%)
Percentiles 0-20:	6 (37%)	10 (63%)	Percentiles 0-20:	4 (67%)	2 (33%)
Percentiles 80-100:	8 (57%)	6 (43%)	Percentiles 80-100:	***	***

*Level preference function; **U-Shape preference function;

***According to electronic recruitment there were companies with the same (the worst) ranks

Source: According to authors' and survey analysis

Furthermore, table 2 shows matrix types of preference functions and criteria's weights for multicriteria PROMETHEE II ranking method. Companies' ranking has been provided according to the degree of HRIS development as well as application of electronic recruitment. Observing ranking in accordance to HRIS development it is visible that up to 20th percentile overcomes service industry (63%). On the other hand, companies with the lower degree of HRIS development (80th-100th percentile) in majority belong to the manufacturing industry (57%). Consequently, firstly ranked companies according to application of electronic recruitment in majority are manufacturing companies (67%). Explanation for these results is the same as following table 1; service industry invests more in managing HR as their crucial resource, while manufacturing industry usually seeks more for modern tools of selection, fortifying this process as more easily to obtain.

From table 3 is evident significant statistical difference regarding companies' financial success (mean rank) within industry and the average development of HRIS. According to profitability ratios (NPM and ROE) and observing all companies from the sample, it is evident that companies with higher degree of HRIS development provide greater financial results. The same observation can be noticed regarding liquidity ratio (QR) and leverage ratio (FS). If we segment companies according to their industry, even stronger relationship is noticed between the level of HRIS development within service industry and companies' success. Sustainable investment in HR and their development within service industry results with companies' financial success.

Consequently, HR investments can not be observed as temporary companies' costs, but as significant investments in companies' future development and sustainable competitive advantage. Testing relationship between application of electronic recruitment and companies' financial success, any statistical significant relationship wasn't evident. Weak results can be explained with the fact that Croatian companies still do not invest proper effort (time and money) in enhancing recruitment process, but simultaneously advancing entire management process and securing recognisable success.

Table 3. Mann-Whitney U test of business success regarding average HRIS development and average electronic recruitment application

		Mann-Whitney U test: p-value			
		HRIS			Electronic recruitment
		All	Service industry	Manufact. industry	All**
Profitability ratios	NPM	0.009*	0.045*	0.061	0.196
	ROA	0.117	0.925	0.068	0.551
	ROE	0.044*	0.157	0.116	0.825
Liquidity ratios	CR	0.167	0.049*	0.280	0.682
	QR	0.022*	0.040*	0.043*	0.453
	WC	0.167	0.049*	0.280	0.682
Leverage ratios	DR	0.642	0.698	0.720	0.621
	ICR	0.104	0.731	0.154	0.600
	FS	0.014*	0.134	0.048*	0.720

*Particular financial ratios (mean rank) are significantly higher within companies with developed HRIS; **Statistically significant difference is not evident regarding companies success (mean rank) according to industry and electronic recruitment application

Source: According to survey analysis

According to Chi-square test, shown in table 4, it is clear that there is no statistically significant relationship between companies that have the highest degree of HRIS development and companies that apply electronic recruitment (p-value 0.381). Wilcoxon Signed Ranks Test shows statistically significant difference between companies with highly developed HRIS and companies that in general apply electronic recruitment for the purpose of successful business. Observing in more detail, 33 companies out of 69 have the highest degree of HRIS development and in the same time use electronic recruitment. Further, only 3 companies are recognised as companies with higher degree of electronic recruitment application than HRIS development for the purposes of HR. Finally, 32 companies are identified as those which do not apply electronic recruitment at all, but have highly developed HRIS. According to McNemar test, it can be concluded that there is evident statistically significant difference between HRIS development and application of electronic recruitment among the same companies.

Table 4. Selected nonparametric tests for testing relationship between companies with developed HRIS and applied electronic recruitment (binary values)

Nonparametric tests		p-value
Chi-square test		0.381
Wilcoxon Signed Ranks Test	Negative Ranks: 32* Positive Ranks: 3** Ties: 33***	<0.001
McNemar Test		<0.001

*Electronic recruitment in total-binary < Average development of HRIS-binary;

** Electronic recruitment in total-binary > Average development of HRIS-binary;

*** Elektronic recruitment in total-binary = Average development of HRIS-binary

Source: According to survey analysis

Within table 5 there can be noticed evaluated Binary Logistic Regression Models about dependence of financial success and HRIS development relating all companies from the sample, as well as service and manufacturing industry consequently. Besides HRIS variable, profitability ratio (ROA) is used as independent variable and is related to all provided models. (Additional tests show statistically significant and strong correlation between ROA and other profitability ratios). Parameters were evaluated by iterative maximum-likelihood estimation (MLE). All models indicate only HRIS 4 as only variable influencing financial success of service as well as manufacturing industry. Parametr B > 0 points that probability of companies' financial success is higher if HRIS 4 is developed within the same company. Negative parametr B regarding HRIS 4 is significantly related to DR within manufacturing industry. Namely, lower DR corresponds to greater companies' financial success.

Table 5. Binary Logistic Regression results about dependence of financial success and HRIS development¹

Companies	Dependent variable	Independent variables	B (Wald test p-value)	Exp (B) (odds ratio)
All companies	QR	Constant	-3.024 (0.004)	0.049*
		ROA	9,047 (0.042)	8494.922**
		HRIS 4	0.552 (0.069)	1,737***
	FS	Constant	-5.142 (0.001)	0.006*
		ROA	19.310 (0.002)	2.433E8*
		HRIS 4	1.011 (0.014)	2.747**
Service industry	QR	Constant	-4,264 (0.012)	0.014**
		ROA	5.269 (0.344)	194.295
		HRIS 4	0.940 (0.047)	2.560**
	FS	Constant	-6,563 (0.008)	0.001*
		ROA	17.497 (0.017)	3.972E7**
		HRIS 4	1.345 (0.035)	3.837**

¹ Table 6 shows models including significant parameters related to HRIS development. Binary Logistic Regression Models about dependence of financial success and electronic recruitment application do not have parameters evaluated as statistically significant.

Manufacturing industry	DR	Constant	2.938 (0.058)	18.880***
		ROA	25.826 (0.045)	1.644E11**
		HRIS 4	-1.010 (0.049)	0.364**

* Significance according to 0.01; ** Significance according to 0.05; *** Significance according to 0.10

Source: According to survey analysis

6 CONCLUSION

Surviving in changing business environment, companies' crucial resources are HR, especially in combination with managerial tools (ICT tools). Attracting adequate employees is the first step in securing the best employees for the future. Depending on HR strategy and job requirements, company will attract employees from internal or external resources. Both will generate better results if proper tool is applied. Croatian companies are still at the beginning of the usage of HRIS and electronic recruitment, what is the crucial fact that made this research more difficult. Simultaneously, it was the main research limitation. Nevertheless, application of those tools already obtains positive organizational success within Croatian companies. From the results is evident that manufacturing industry outweighs service industry in application of electronic recruitment. Those companies employ considerably greater number of employees, therefore application of electronic recruitment is proper tool, speeding up the process and providing lower recruitment costs. On the other hand, greater degree of HRIS usage is evident for service industry, depending greatly on skills, abilities and knowledge of their employees.

Conclusion findings presume HR as the most important resources and continuously invest in their future development. Furthermore, empirical results indicate that companies with higher degree of HRIS development provide greater financial results, especially within service industry. Consequently, HR investments can not be observed as temporary companies' costs, but as significant investments in companies' future development and sustainable competitive advantage.

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