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Human Resources Information Systems: A Sociotechnical Perspective

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Abstract: This study analyses Human Resources Information Systems (HRIS) implementations by taking into account both social and technical factors and relationships among them which is the sociotechnical perspective. The scope of the study involves organizations having more than a hundred employees and an annual revenue of at least 100 million USD. Field research used a questionnaire for survey to obtain responses from human resources professionals and resulted with thirty one valid questionnaires and a return rate of 40.79%. The research indicated no statistically significant difference between Information Technology and Human Resources Departments with respect to management of HRIS implementation projects. Although, social challenges are also effective barriers the most influential barrier in front of HRIS implementation projects is software usability which is a technical barrier. Sociotechnical approach increases the success of HRIS implementation projects. The strongest contribution to sociotechnical perspective comes from business planning and vision as a success factor and increases the general success. The most important outcome of the research is that sociotechnical approach increases the performance of an HRIS implementation project both in terms of specific success criteria such as efficiency, effectiveness, system usage, user satisfaction and technological quality and in terms of general success evaluation.

Key words: HRIS, success factors, user values, effectiveness, efficiency, usability

INTRODUCTION

A classical definition of HRIS would suggest HRIS to be a composite of databases, computer applications, hardware and software (Biazzo, 2002) which collect, store, maintain, retrieve, manipulate and validate data of the organization about its human resources activities (Kovach and Cathcart, 1999). However, Shirivastava and Shaw (2003) suggested that any technology that serves to attract, hire, retain and maintain talent, support workforce administration and optimize workforce management. Besides a need for a formal definition, a practical definition by Van der Linden and Parker (1998) suggests that HRIS help to organize the administrative and strategic variables that human resources function is responsible of.

Original purpose of HRIS had been to standardize information gathering about and for employees of the organization (Kovach *et al.*, 2002). However, the purposes had been widened by the time; parallel to the efforts of human resources function to transform into a new dimension, if possible as fast as the speed of development of technology and the speed of change of the nature of the competition. The HRIS had become the key lever to enable human resources function to efficiently and effectively handle administration (traditionally known as

Personnel Management) and simultaneously create value through involvement in development and implementation of the corporate strategy (Mayfield *et al.*, 2003; Mercer Human Resource Consulting, 2007; Hussain *et al.*, 2007). Various types of HRIS such as paper and folders (Kovach and Cathcart, 1999; Kovach *et al.*, 2002); Desktop Office Software (Ashbaugh and Miranda, 2002; Collison, 2005), In-house systems (Ashbaugh and Miranda, 2002), Standalone applications (Ashbaugh and Miranda, 2002), Best-of-breed software (Shirivastava and Shaw, 2003), Enterprise-wide integrated software (Shirivastava and Shaw, 2003) exist. The very first HRIS did not include computers; only files and folders existed: Employee files, hardcopy payroll records and time cards often constituted an information system for the human resources department (Kovach and Cathcart, 1999; Kovach *et al.*, 2002). Today's organizations do recognize a need for a computerized human resources information system (Targowski and Deshpande, 2001) and these systems are not only for the use of large organizations having large budgets. Pressures on human resources function of the organizations and driving forces for HRIS are continuously influencing organizations. Competition is continuously shifting; markets, products, workplaces, jobs, prices, margins change inevitably and faster than ever. Cost of global shipping and communications is

decreasing and indicators such as time-to-market or cost of design are so important that some organizations are imposing global twenty-four hour workdays, which start in one continent and continues in another as the local workday ends in the previous one (Christensen, 2005).

The fierce competition removes the single pressure on line functions (mainly sales and marketing) to generate more revenue and back-office functions (mainly finance, accounting and human resources) to cost less; now all functions, including human resources, add value by either directly or indirectly helping the organization to generate more revenue and to decrease the cost bottom-line. Human resources functions are to become strategic partners if they highlight the knowledge and competency aspects of the business strategy, increase their focus on planning, organizational development and organizational design, expand the vision and application of human resources technology's capabilities to include strategic analysis and increase the business knowledge of human resources professionals (Laudon and Laudon, 2006; Lawler and Mohrman, 2003; Shirivastava and Shaw, 2003). Strategic human resources applications should enable better decision-making and value creation of the human resources department (Broderick and Boudreau, 1992; Boudreau and Ramstad, 2006; Kovach and Cathcart, 1999).

IMPLEMENTING HRIS: SOCIOTECHNICAL PERSPECTIVE

Implementation of HRIS is a critical step since it is one of the main causes in system failure (Doherty and King, 2002; Fisher and Howell, 2004). Kansal (2006) stated that enterprise resource planning software implementations are sociotechnical challenges and they require using a different approach from other technology-driven innovations. The same is also true for HRIS, as they represent a subset of enterprise resources planning software.

Technology does not automatically provide benefits. Organizational transformation is more typically met with complex, usually negative reactions (Greenwood, 2002; Van der Linden and Parker, 1998). Therefore, regardless of the initial purpose, technology can bite back (Jaffee, 2001). Within the scope of this study, sociotechnical perspective is seen as a solution or path to achieve the goals in HRIS implementations.

The technical side of an organization is application of instrumentally logical methods for the completion of tasks; that is namely machinery processes, procedures and a physical arrangement. On the other hand, the social side of an organization consists of the needs and

relationships of humans, that is namely people and their habits, attitudes, values, behavioral styles and formal and informal relationships (Jaffee, 2001; Mumford, 2003). Sociotechnical paradigm is a holistic view which studies the relationships between the social and technical parts of any system (Trist and Bamforth, 1951; Coakes, 2002). Sociotechnical design emphasizes the need for a best fit between the technical and the social aspects relating to the relationship between jobs and the needs and expectations of the individuals (Biazzo, 2002).

Sociotechnical approach states that in order to benefit from technical initiatives (such as a new system or software) as much as possible, the fundamental approach of sociotechnical thinking is optimization of the relationship between technical imperatives and the social and psychological needs of employees (Jaffee, 2001). Mumford (2003) suggested that, in order to achieve this objective, sociotechnical approach takes into account the fact that different employees in an organization have their own needs, interests and values influencing their enthusiasm about accepting change. Sociotechnical perspective is joint optimization of technical and social sub-systems so that results of both sub-systems are positive indicating effective accomplishment of tasks and continuous social relationships and commitments. In other words, results would be sub-optimal if a technical system exists at the expense of a social system.

Implementation teams, which consist of people from technical backgrounds, like to attach all benefits to the technical side of the organization (machine, system or software) and all implementation problems to the social system (Willmott, 1994). However, costs, benefits and risks of the technology belong to the whole sociotechnical system, not just the machine (or software in HRIS) in isolation. One thing to note at this point is that people with technical backgrounds, or information technology professionals according to Doherty and King (2002) often do not have the training, skills and motivation to recognize and address social issues in information systems implementations.

SUCCESS CRITERIA FOR HRIS IMPLEMENTATIONS

Haines and Petit (1997) suggested that measurement and comparison of return on investment would be ideal success criteria for HRIS implementations. Implementation of information systems should ultimately improve business results of the organizations and therefore long-term performance of key business performance indicators such as gross margin is the base for the ideal measurement of success (Nicolau, 2004).

The success criteria for HRIS implementations are efficiency, effectiveness, system usage, user satisfaction and technological quality.

Efficiency: According to Society for Human Resources Management's Research on Human Resources Technology in 2005 three of the top five successes reported by participants have relation to efficiency which are decreasing cycle time for processing employee information transactions, less time spent on administrative work and human resources department's ability to manage the workforce with the same number of human resources staff (Collison, 2005).

Effectiveness: Society for Human Resources Management's 2005 research on Human Resources Technology indicates that two of the top five successes are relating to effectiveness (Collison, 2005): Increasing accuracy of employee information and managers' increasing access to employee information.

System usage: System usage is a success criterion to measure the frequency of the use of HRIS and two tiers exist: User level and organization level. At user level system usage is a criterion to observe daily operations of the function and in relation to the behaviors of the users. At organization level, system usage is a success criterion to measure institutionalization and it considers consolidation of behaviors of the users and perspective of the management. User level system usage is an essential and actually a notably practical criterion especially in cases where the use of the new technology is voluntary (Haines and Petit, 1997; Ruta, 2005). System usage is a sociotechnical success criterion within the scope of this study since it is part of the user acceptance of information technology, which has social roots.

User satisfaction: Besides customer satisfaction as a success criterion, user satisfaction is the only criterion which considers attitudes and beliefs (Haines and Petit, 1997). As sociotechnical perspective suggests, user satisfaction deserves attention in order to realize the future benefits of the system and users are mainly human resources professionals within the scope of this study. Social side of organizational change may be one of the most important factors that affect user satisfaction (Deng and Gupta, 2005) and as Greenwood (2002) suggests, may even decide the success or failure of a sociotechnical project.

Technological quality: Technological quality is a success criterion to measure technical success in the

implementation and it is part of the system quality. Technological quality deals with the structure of the HRIS' sophistication and mainly aims to reduce technical risks and data redundancies. HRIS that have higher success according to technological quality criteria have integration to their environment above a certain level, do not result in data redundancies, hold accurate information and provide that information at the right format and in the right time (De Lone and McLean, 1992).

SOCIO CHALLENGES OF HRIS IMPLEMENTATIONS

User values: Users do not have a choice to use the new human resources information system or not to use it. That choice has actually been already made by the management, in favor of the new system. Reactance theory literature suggest that in cases of mandatory use and strict communication of the situation, removal of personal freedom by an authority leads individuals to certain reactions (Brehm, 1966) and these reactions are quite often in the opposite direction (Bushman, 1998). This means that users may not have a positive approach for the new system regardless of its properties. According to Farahbakhsh *et al.* (2007) any information system implementation should have a focus on staff empowerment and improvement of their attitudes towards the information system.

Smith (2003) found clash with the existing culture to be a failure factor in his study analyzing 75 organizational change efforts that had business process design as an objective. Normally, innovation-values fit occurs in successful change efforts. This concept explains the extent to which target users perceive that use of innovation will foster (or conversely inhibit) the fulfillment of their values and an innovation that runs counter to the current values of a group has a lower probability of adoption and more likely to result in unintended (negative) outcomes (Fisher and Howell, 2004).

User profiles: Potential users of a human resources information system are usually either competent at the previous information systems but are not willing to learn a new system or do not have any computer experience at all but are willing to learn computers in general and the new software specifically. Both user profiles propose a challenge to the implementation and the process suffers from inertia (McAfee, 2003).

According to Haines and Petit's research on Conditions for Successful HRIS in 1997, work experience in present position, computer experience and understanding of programming are effective on system

success which consists of user information satisfaction and system usage in the study. In Haines and Petit's (1997) study, work experience had a negative effect on user information satisfaction and computer experience and understanding of programming has a positive effect on system usage. Fisher and Howell (2004), also suggested that people without technical backgrounds and people with low level of computer self-efficacy have difficulty due to the complexity and technical details of a new human resources information system. According to Shirivastava and Shaw (2003) past usage of HRIS determines usability perception and the intention to use the system again, which are both among the success criteria for HRIS implementations.

User perceptions: Kossek *et al.* (1994) suggested that perceptions of potential users of a new technology have a critical impact on the success of the implementation. According to McAfee (2003), the new processes affect multiple groups and especially these groups' fear will increase the likelihood of inertia in the implementation. Unless users have guidance to the objectives of the new information system, they have a tendency to perceive the new system as something bad and stay at a distance as much as possible, either consciously or unconsciously. Human resources professionals have a tendency to worry that the new human resources information system will result in their replacement or they will have critics for not already doing a good enough job (Brooks, 2006). Balancing valuing the past with the need to change is difficult since people have a tendency to believe that changes mean failures due their past experience (Christensen, 2005). Perceptions that control over tasks will be less, social interactions will be less or of lower quality, several jobs will be lost, resulting jobs will be worse etc. are just other examples of reactions, whenever the potential users have no guidance to the mindset of the implementation period. Sense making and signaling can also be thought of as socio challenges that have direct relations to user perceptions. According to historical data and social interactions, users of the new information system can start to make interpretations and derive conclusions regarding the implementation process through sense making (Fisher and Howell, 2004). Signaling theory suggests that when individuals face uncertainty, they will use the information that is available to make inferences about other aspects of the situation (Spence, 1973). Isabella (1990) notes the importance of symbolism and suggests that interpretations can even be made from actions, gestures or decisions of organizational leaders. As Fisher and Howell (2004) suggest, people with less information are even more likely to participate in

sense making or signaling processes. Fisher and Howell (2004) also suggested that, these interpretations may receive confirmation or not the resulting impression takes an aura of truth, whether or not the impression matches reality. These resulting impressions can influence emotional reactions and behaviors and accordingly the success of organizational systems and interventions. Therefore organizations should be ready to address possible interpretations at all stages of an organizational change (Fisher and Howell, 2004).

TECHNICAL CHALLENGES OF HRIS IMPLEMENTATIONS

Usability: Usability of HRIS brings about lower effort expectancy in users and therefore increases user acceptance of information systems with easiness and speed for completion of a task (Fisher, 2002). Users have high level of frustration and anger regarding technology and therefore universal usability should be the goal in order to ensure highest use of technology (Shneiderman, 2000). Designing easy-to-use HRIS is difficult (Schramm, 2006; Van der Linden and Parker, 1998).

Complexity: The features of an information technology are the result of a complex development process which consists of several decisions (trade-offs) between complexity and simplicity (Fisher and Howell, 2004). Increasing functionality, enhancing features and integrity are results of decisions made in favor of complexity; in addition, increasing likelihood of programming errors, increasing user training needs, decreasing program stability and the possibility of overwhelming users with extraneous features are also results of decisions made in favor of complexity. McAfee (2003) suggested that introduction of many new processes all at once and especially complexity of new processes increase the likelihood of inertia and misspecification in the implementation. McAfee (2003) also suggested that introduction of information technology enabled novel processes that are distinctively different from the current processes increases the likelihood of resistance in the implementation. Aiman-Smith and Green (2002) stated that more complex technologies have association to lower user satisfaction of information systems.

CRITICAL SUCCESS FACTORS IN HRIS IMPLEMENTATION PROJECTS

Critical success factors are concepts to be taken care of in order to yield a high technological quality, efficient and effective human resources information system that gains user acceptance and provides user satisfaction. The

following critical success factors are not mutually exclusive from each other and actually most of them have their roots or constructs in other critical success factors in the list. In order to reach system success with a pre-determined criteria, a separate review for each critical success factor is executed first and then a thorough analysis determines the final approach.

The following list presents critical success factors in alphabetical order:

- Adopt changes in human resources jobs (Brooks, 2006; Marchand *et al.*, 2000; Kossek *et al.*, 1994)
- Business plan and vision (Nah and Delgado, 2006; Kovach *et al.*, 2002; Tansley *et al.*, 2001; Yeung and Brockbank, 1995)
- Careful selection of a third-party vendor (Kovach *et al.*, 2002)
- Change management (Nah and Delgado, 2006; Kerber and Buono, 2005; Ruta, 2005; McAfee, 2003; Nah *et al.*, 2003; Markus and Benjamin, 1997)
- Clear communication (Nah and Delgado, 2006; Ruta, 2005; Fisher and Howell, 2004; McAfee, 2003; Shirivastava and Shaw, 2003; Smith, 2003; Maurer, 2002; Oz and Soski, 2000; Souza and Collado, 2000; Keil *et al.*, 1998; Yeung and Brockbank, 1995)
- Detailed Requirements Analysis (Nah and Delgado, 2006; Fisher and Howell, 2004; Smith, 2003; Kovach *et al.*, 2002; Fisher, 2002; Haines and Petit, 1997)
- End-user Involvement (Ruta, 2005; Laudon and Laudon, 2006; Biazzo, 2002; Fisher, 2002; Kovach *et al.*, 2002; Souza and Collado, 2000; Yeung and Brockbank, 1995; Kossek *et al.*, 1994; Franz and Robey, 1984)
- Leadership and project championship (Nah and Delgado, 2006; Deng and Gupta, 2005; Kerber and Buono, 2005; Ruta, 2005; Laudon and Laudon, 2006; Smith, 2003; McAfee, 2003; Rogers, 1995; Yeung and Brockbank, 1995)
- Project management (Laudon and Laudon, 2006; McAfee, 2003; Shirivastava and Shaw, 2003; Smith, 2003; Souza and Collado, 2000; Falkowski *et al.*, 1998; Keil *et al.*, 1998; Jiang *et al.*, 1996; Yeung and Brockbank, 1995; Chou and Chen, 2008)
- Skill set of the implementation team members (Nah and Delgado, 2006; Shirivastava and Shaw, 2003; Fisher, 2002; Tansley *et al.*, 2001; Jiang *et al.*, 1996; Yeung and Brockbank, 1995)
- Support for users (Ruta, 2005; McAfee, 2003; Aiman-Smith and Green, 2002; Venkatesh, 1999; Haines and Petit, 1997; Kossek *et al.*, 1994; Mathieson, 1993)

MATERIALS AND METHODS

The scope of this study involves organizations having more than one hundred employees and an annual revenue of at least 100 million USD. The organizations are operating at a certain level of competitiveness and are dealing with various issues relating to human. Figure 1 demonstrates the research model. Field research uses a questionnaire for survey to obtain responses from human resources professionals. The questionnaire stands on the literature survey and contains improvements by experts. These experts are a general manager of a leading best-of-breed HRIS vendor and a senior consultant of a leading human resources management consulting company. The questionnaire has further refinement with five random respondents in order to eliminate questions with poor response rates.

The final version of the questionnaire had been sent to human resources professionals of 76 organizations fitting to the criteria. Thirty one of the questionnaires are back, which yields a return rate of 40.79%. Given the complex nature of the subject and confidentiality concerns of the human resources professionals, return rate can be thought of as high.

All respondents of the questionnaire are from the human resources departments of the organizations. Eighty one percent of the respondents are either managers or directors of human resources and they increase the reliability of the responses since they are professionals who take role both in the decision-making and the implementation processes of HRIS. Participating organizations have 1,849 employees on average and an annual average turnover of 1,652 million USD.

The literature survey proves that implementation of HRIS has both technical and social aspects (Biazzo, 2002; Coakes, 2002; Jaffee, 2001; Trist and Bamforth, 1951). However, information technology professionals may not always have the necessary skills to manage social issues

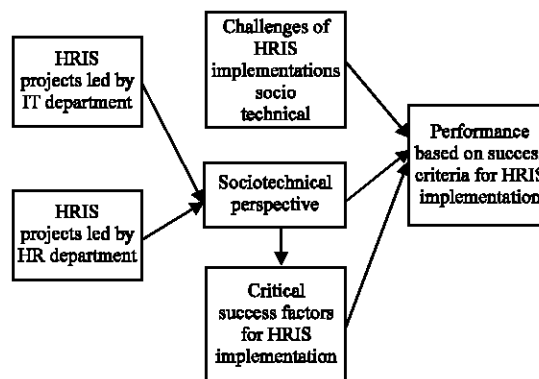


Fig. 1: Research model

in information systems implementations (Doherty and King, 2002). The sociotechnical perspective of an HRIS implementation may depend on the owner of the project which leads the following hypothesis:

H₁: HRIS implementation projects led by human resources professionals include a more sociotechnical perspective compared to those implementation projects led by information systems professionals

Even good technology can be sabotaged if it is perceived to interfere with the established social network (Martinsons and Chong, 1999). Users and interactions among them are important sources of challenges in human resources information systems implementations. Socio challenges affect both the implementation period and accordingly the success factors of the system. According to Yeung and Brockbank's survey on human resources technology implementations in 1995, a significant decline in employee morale was reported after the implementation. According to these findings, Yeung and Brockbank (1995) point out "morale problems caused by the endemic fear of change" as one of the major obstacles in the way of successful reengineering of human resources function through information technology implementation.

Based on the sociotechnical perspective of this study, socio challenges need to be managed in order to benefit as much as possible from the new human resources information systems. The following hypothesis is based on this assumption:

H₂: Sociotechnical challenges have more influence as barriers to HRIS implementations

As some research studies indicate (Doherty and King, 2002; Fisher and Howell, 2004; Kansal, 2006) correlation between some specific critical success factors and sociotechnical emphasis of HRIS implementation projects may exist.

H₃: Some critical success factors such as Adopt changes in human resources jobs, Change management, Clear communication, End-user involvement, Skill set of the implementation team members and Support for users are found more in implementations with a sociotechnical perspective

Basic reason of implementation of IS is gaining strategic advantage by improving key indicators of success. Among these indicators efficiency, effectiveness, system usage, user satisfaction and

technology quality explains the success clearly (Collison, 2005; Deng and Gupta, 2005; Greenwood, 2002; Haines and Petit, 1997; Ruta, 2005). A sociotechnical emphasis in HRIS implementation projects would enhance these indicators. The hypothesis wording this approach is the following:

H_{4a}: HRIS built with a sociotechnical systems perspective result in higher performance in terms of efficiency, effectiveness, system usage, user satisfaction and technological quality

Literature survey shows that IS implementations may have failure due to lack of managerial skills of IT professionals (Doherty and King, 2002). Having a managerial approach will lead to success of the project which means a correlation between sociotechnical emphasis in HRIS implementation projects and general success evaluation of HRIS implementation projects.

H_{4b}: HRIS built with a sociotechnical systems perspective result in higher performance in terms of general system success

Conflicts among people and other problems of organizational change environment may create a barrier in front of implementation efforts (Brehm, 1966; Bushman, 1998; Smith, 2003). Differences between actual and ideal applications of implementation projects can decrease while increasing the general success of HRIS implementation projects in organizations.

H₅: Organizations would choose to emphasis critical success factors such as adopt changes in human resources jobs, change management, clear communication, end-user involvement, skill set of the implementation team members and support for users more in order to increase general system success

RESULTS

SPSS 16.0 is the software of analysis phase of the study.

The answers to following two questions tested H₁: Which department led the implementation project of your current HRIS? and Please rate sociotechnical factors according to their being taken into account in the HRIS implementation project you experienced/managed. Five points Likert scale was used for answers.

Table 1 shows the t-test with a confidence level of 0.90 shows that there is no evidence from the field

Table 1: Comparison of sociotechnical approach ratings in projects led by information technology and human resources departments (Confidence level = 0.90) (N = 31)

Independent-samples t-test results	Projects led by information technology departments	Projects led by human resources departments
Mean	3.14	3.42
SE Error Mean	0.14	0.17
Observations	7	24
df	22.91	
t-test	-1.24	
90% Confidence interval of the mean difference	Lower -0.65	Upper 0.11

Table 2: Comparison of software usability and user profiles challenges' average rating of being barriers to implementation projects (Confidence level = 0.90)

Paired-Samples t-test results	Software usability	User profiles
Mean	3.48	2.97
Variance	1.79	1.03
Observations	31.00	31.00
df	56.00	
t-test	1.71	
P(T ≤ t) one-tail	0.05	
t Critical one-tail	1.30	
P(T ≤ t) two-tail	0.09	
t Critical two-tail	1.67	

research in order to say that human resources professionals emphasis sociotechnical factors more in their HRIS implementations in comparison to their colleagues in information technology departments.

H₂ had been tested using the answers to the following question: Please rate the following challenges of human resources information systems according to their being barriers to your human resources information systems implementation project

First of all, before going deep into analysis regarding user profiles, user values, user perceptions, system usability and system complexity, reliability of these items are tested. The reliability test resulted in a Cronbach's Alpha value of 0.88.

As being a barrier in HRIS implementation projects, the average ratings for user profiles (2.97), user values (3.23), user perceptions (3.16), software responsibility (3.48) and software complexity (3.19) were measured with five points Likert scale (1: very little, 5: very much).

Having applied t-test to the average ratings of challenges in human resources information systems implementations in pairs, only difference can be found between user profiles and software usability. So, Table 2 shows the results for the t-test applied.

The results shown in Table 2 mean that software usability is being experienced as a barrier somewhat more than user profiles. Other than this pair, there is no difference at a confidence level of 0.90 between the challenges.

Table 3: Correlation coefficients between critical success factors and sociotechnical approach of HRIS implementation projects (N = 31)

Critical success factors	Sociotechnical approach of HRIS implementation projects
Business plan and vision	0.55**
Adopt changes in human resources jobs	0.53**
Detailed requirements analysis	0.41*
Careful selection of a third-party vendor	0.40*
Skill set of implementation team members	0.36*
Project management	0.30
Clear communication	0.28
Change management	0.20
End-user involvement	0.16
Leadership and project championship	0.13
Support for users	0.07

*Correlation is significant at the 0.05 level (two-tailed). **Correlation is significant at the 0.01 level (two-tailed)

H₃ uses the answers to two questions, one of them being please rate the following critical success factors of HRIS according to their being taken into account in the HRIS implementation project you experienced/managed? and the other one being please rate sociotechnical factors according to their being taken into account in the HRIS implementation project you experienced/managed. Five points Likert scale was used for answers to both questions.

Table 3 presents the correlation coefficients between all critical success factors in HRIS implementation projects and rating of sociotechnical approaches of HRIS implementation projects. This means that an increase in one of these two parameters (either the critical success factors or the sociotechnical approach of the implementation) means also an increase in the other parameter. Therefore, H₃, which says that some critical success factors such as Adopt changes in human resources jobs, are found more in implementations with a sociotechnical perspective, is true. Actually, one step further from H₃, as all correlation coefficients are positive, actually H₃ is not only true for adopt changes in human resources jobs, change management, clear communication, End-user involvement and Support for users, all of the critical success factors in this study share this truth.

Analysis of the Table 3 shows that the highest (positive) correlation or the strongest relationship between a critical success factor and sociotechnical approach of HRIS implementations is for Business Plan and Vision with a correlation coefficient of 0.55 (significant at the 0.05 level). Adopt changes in human resources jobs, detailed requirements analysis and careful selection of a third-party vendor and skill set of the implementation team members also have statistically significant correlations of 0.53, 0.41, 0.40 and 0.36, respectively to sociotechnical approach of HRIS implementations. However, project management, change

management, clear communication, end-user involvement, Leadership and project championship and Support for users do not have statistically significant correlations to sociotechnical approach of HRIS implementation projects.

Besides correlation, a multiple linear regression model has also been built for sociotechnical approach of HRIS implementations. In the multiple linear regression model, critical success factors are candidates for independent variables, sociotechnical approach of HRIS implementations is the dependent variable and stepwise regression method tries to find the best model describing the dependent variable.

Table 4 shows the model. Linear regression model reveals similar results with the correlation analysis: The critical success factor having the highest correlation coefficient enters to the model which is business planning and vision.

The answers to two questions, one of them being how would you rate the performance of the HRIS implementation project that you experienced/managed according to the following success criteria? and the other one being please rate sociotechnical factors according to their being taken into account in the HRIS implementation project you experienced/managed test the H_{1a}

Table 4: Linear regression model for estimating sociotechnical approach of HRIS implementations

Regression model	Values
R	0.55
R ²	0.31
Adjusted R square	0.28
SE of the Estimate	0.64
Coefficients	Constant: 1.99 Business plan and vision: 0.38
Excluded Variables	Adopt changes in human resources jobs Careful selection of a third-party vendor Change management Clear communication Detailed requirements analysis End-user involvement Leadership and Project championship project management Skill set of implementation team members Support for users

Table 5 shows the correlation coefficients between sociotechnical approach rating of HRIS implementation projects and success criteria

As it can be seen from the Table 5, sociotechnical approach of HRIS implementation projects has positive correlation with all success criteria. Therefore, H_{1a} which says that HRIS built with a sociotechnical systems perspective result in higher performance in terms of efficiency, effectiveness, system usage, user satisfaction and technological quality, is true.

Analysis of Table 5 shows a statistically significant relationship between effectiveness and sociotechnical approach of HRIS implementation projects. Besides correlation, a linear regression analysis tested the relationship between the sociotechnical approach and each success criterion. As Table 6 demonstrates Model 2 presents sociotechnical approach (X) as a strong predictor and provides a regression equation with significant relation to Effectiveness (Y) where, R² = 0.19 and sig. = 0.01. The final model is:

$$Y = 1.77 + 0.49 X$$

The correlations between sociotechnical approach and each success criterion and the R Squares of the relating models have similar characteristics. Pairs with higher correlation result in linear regression models with higher R²-values.

H_{1b} considers the answers to two questions, how would you rate the general success of the HRIS

Table 5: Correlation coefficients between sociotechnical approach rating of HRIS implementation projects and success criteria (N = 31)

Success criteria	Sociotechnical Approach of HRIS Implementation Projects
Effectiveness	0.44*
User satisfaction	0.34
Technological quality	0.33
System usage	0.17
Efficiency	0.11

*Correlation is significant at the 0.05 level (two-tailed)

Table 6: Linear regression models having sociotechnical approach as the independent variables and each success criterion as the dependent variable

Model	Independent variable	Dependent variable	R ²	Constant coefficient	Coefficient of the independent variable
1	Sociotechnical approach	Efficiency	0.01	2.83	0.13
			F = 0.34	t = 3.78	t = 0.58
			Sig. = 0.57	Sig. = 0.00	Sig. = 0.57
2	Sociotechnical approach	Effectiveness	0.19	1.77	0.49
			F = 6.84	t = 2.75	t = 2.62
			Sig. = 0.01	Sig. = 0.01	Sig. = 0.01
3	Sociotechnical approach	System usage	0.03	2.86	0.18
			F = 0.91	t = 4.47	t = 0.95
			Sig. = 0.35	Sig. = 0.00	Sig. = 0.35
4	Sociotechnical approach	User satisfaction	0.11	1.74	0.41
			F = 3.73	t = 2.40	t = 1.93
			Sig. = 0.06	Sig. = 0.02	Sig. = 0.06
5	Sociotechnical approach	Technological quality	0.11	1.64	0.44
			F = 3.47	t = 2.01	t = 1.86
			Sig. = 0.07	Sig. = 0.54	Sig. = 0.07

Table 7: Summary of actual and ideal average ratings for critical success factors and their comparison using t-test (N = 31 and Confidence level = 0.90)

Critical success factors	Average actual rating	Average ideal rating	t-statistic value	Ideal value greater than actual value?
Adopt changes in human resources jobs	3.71	4.19	2.36	Yes
Business plan and vision	3.65	4.35	2.94	Yes
Careful selection of a third-party vendor	3.58	4.16	2.46	Yes
Change management	3.06	4.19	5.40	Yes
Clear communication	3.68	4.42	3.66	Yes
Detailed requirements analysis	3.81	4.58	4.28	Yes
End-user involvement	3.52	4.13	2.91	Yes
Leadership and Project championship	3.74	4.26	2.49	Yes
Project management	3.61	4.42	3.85	Yes
Skill set of implementation team members	3.58	4.19	2.87	Yes
Support for users	3.81	4.23	2.50	Yes

implementation project that you experienced/managed? and Please rate sociotechnical factors according to their being taken into account in the HRIS implementation project you experienced/managed. The answers for general evaluation are in five points Likert scale (much less than expected = 1, much more than expected = 5).

Correlation analysis between sociotechnical approach rating of human resources information system implementation projects and general success evaluations results in a correlation coefficient of 0,26 which is not significant at neither the 0.01 level or the 0.05 level.

The relationship between the sociotechnical approach of a human resources information systems implementation project and general success of the project has also been analyzed by building a linear regression model having sociotechnical approach as the independent variable and general success of the project as the dependent variable. The linear regression model has an R²-value of 0.07 (F = 2.13/Sig. = 0.16), constant coefficient of 2.43 (t=4.56 / Sig.=0.00) and sociotechnical approach coefficient of 0.23 (t = 1.46/Sig. = 0.16).

The answers to two questions, one of them being please rate the following critical success factors of HRIS according to their being taken into account in the HRIS implementation project you experienced/managed? and the other one being please rate the following critical success factors of HRIS according to their ideals levels of application in order to increase the success of the HRIS implementation project you experienced/managed? tested H₅.

Table 7 shows actual and ideal average ratings for critical success factors and the results for mean comparison tests using t-test in order to see if ideal ratings are actually higher than actual ratings. Each critical success factors' actual set of values and ideal set of values have been applied t-test at a confidence level of 0.90 with H₀: μ_{IDEAL} - μ_{ACTUAL} = 0 and H₁: μ_{IDEAL} - μ_{ACTUAL} > 0.

Critical t value for one-tail test at a confidence level of 0.90 is 1.30; therefore ideal critical success factors are higher than the actual ones if t statistics value for the analysis is greater than 1.30.

Table 7 shows that ideal ratings are higher than actual ratings for all critical success factors at a confidence level of 0.90.

This means that respondents would like to emphasize all critical success factors more in order to increase general system success. H₅, which says that organizations would choose to emphasize critical success factors such as adopt changes in human resources jobs, change management, clear communication, end-user involvement, skill set of the implementation team members and support for users more in order to increase general system success, is true.

CONCLUSION AND FUTURE RESEARCH

The history of HRIS includes a number of failures (Fisher and Howell, 2004), as well as successes and social factors are important sources for these failures (Furumo and Melcher, 2006). However, there is a lack of research on HRIS implementations with an equal focus on technical and social factors. Therefore this study aimed to analyze HRIS, with a specific focus on implementations and from specifically a sociotechnical perspective.

Within the scope of study human resources professionals of the organizations evaluate HRIS as “must-have” tools to administer modern human resources management systems such as Organizational Development, Performance Management, Career Planning, Total Reward, Flexible Benefits etc. As HRIS gain importance and become must-have tools, organizations move to best-of-breed or enterprise-wide integrated HRIS within the last years, leaving desktop office software, in-house systems and standalone applications back.

Although, the research started with an expectation of finding at least one of the social challenges as the strongest barrier in front of HRIS implementations the results do not support this argument. Software usability which is a technical challenge is the strongest barrier. Major challenges of HRIS implementations that the literature indicates (user profiles, user values, user perceptions, software usability and software complexity)

still continue to exist in organizations although social and technological developments occurring in corporate environments.

Contradictory to assuming that human resources professionals may have a more sociotechnical approach, the field research shows that HRIS implementation projects can be led by either Human Resources or Information Systems departments since the leading department will not influence the sociotechnical perspective of the implementation.

When there is sociotechnical perspective critical success factors are already involved in an HRIS implementation project. However, business planning and vision is the most critical success factor influencing sociotechnical approach. Since, business planning and vision is the responsibility of senior managers, sociotechnical perspective has its roots in top management of the organization. This study provides evidence that sociotechnical perspective will help to increase effectiveness of the HRIS implementation projects. Sociotechnical approach increases the performance of an HRIS implementation project not only in terms of specific success criteria such as efficiency, effectiveness, system usage, user satisfaction and technological quality but also general success evaluation.

The major limitations of the study depend on the field research; specifically questionnaire and the respondents. The questionnaire aims to find out an organization's experience about HRIS implementation projects' challenges, critical success factors, success criteria, sociotechnical approach through single items. In addition, the questionnaire evaluates an organization's HRIS implementation project based on only one human resources professional. A future research with a larger questionnaire and sample would help a better understanding of HRIS implementation projects.

The HRIS are critical tools which can make human resources departments move to a new level where they can both efficiently perform operations and effectively create value. On the other hand, HRIS are also investments of a considerable size and like all other investments getting return for them are also crucial for organizations. Findings of this study should assist researchers who provide light on the field of HRIS and support human resources professionals in increasing the success of their HRIS implementations.

REFERENCES

Aiman-Smith, L. and S.G. Green, 2002. Implementing new manufacturing technology: The related effects of technology characteristics and user learning activities. *Acad. Manage. J.*, 45: 421-430.

- Ashbaugh, S. and R. Miranda, 2002. Technology for human resources management: Seven questions and answers. *Public. Pers. Manage.*, 31: 7-20.
- Biazzo, S., 2002. Process mapping techniques and organizational analysis. *Business Process Manage. J.*, 8: 42-52.
- Boudreau, J.W. and P.M. Ramstad, 2006. Talentship and HR measurement and analysis: From ROI to strategic organizational change. *Human Resour. Plann.*, 29: 25-33.
- Brehm, J.W., 1966. *A Theory of Psychological Reactance*. Academic Press, New York, ISBN-10: 0121298507.
- Broderick, R. and J.W. Boudreau, 1992. Human resource management, information technology and the competitive edge. *The Executive*, 6: 7-17.
- Brooks, A., 2006. Dispelling HRs fear of technology takeover. *Employee Benefit Plan Rev.*, 60: 6-8.
- Bushman, B.J., 1998. Effects of warning and information labels on consumption of full-fat, reduced-fat and no-fat products. *J. Applied Psychol.*, 83: 97-101.
- Chou, C.M. and J.M. Chen, 2008. A design of exit mechanism for information system project de-escalation. *Inform. Technol. J.*, 7: 137-142.
- Christensen, R., 2005. *Roadmap to Strategic HR: Turning a Great Idea into a Business Reality*. AMACOM, Saranac Lake, New York, USA.
- Coakes, E., 2002. Socio-Technical Thinking-An Holistic Viewpoint. In: *Sociotechnical and Human Cognition Elements of Information Systems*, Clarke, S. (Ed.). Idea Group Inc., USA., pp: 1-4.
- Collison, J., 2005. 2005 HR technology: Survey report. Society for Human Resources Management, March 2005.
- De Lone, W. and E. McLean, 1992. Information systems success: The quest for the dependent variable. *Inform. Syst. Res.*, 3: 60-95.
- Deng, H. and P. Gupta, 2005. Critical Success Factors for Information Systems Implementation: An End-User Perspective. In: *Managing Modern Organizations with Information Technology*, Khosrow-Pour, M. (Ed.). Idea Group Publishing, USA.
- Doherty, N.F. and M. King, 2002. From Technical Change to Socio-technical Change: Towards a Proactive Approach to the Treatment of Organizational Issues. In: *Sociotechnical and Human Cognition Elements of Information Systems*, Clarke, S. (Ed.). Idea Group Inc., USA., pp: 22-40.
- Falkowski, G., P. Pedigo, B. Smith and D. Swanson, 1998. A recipe for ERP success. *Beyond Comput.*, 4: 44-45.
- Farahbakhsh, M., S. Fozounkhan, H. Sadeghi-Bazargani, A. Zakeri, N. Houshiyan, N. Asmani and A. Naghili, 2007. The study of health information system performance from managers and expert's viewpoints. *Inform. Technol. J.*, 6: 227-231.

- Fisher, J., 2002. Human Factors and the System Development Process. In: Sociotechnical and Human Cognition Elements of Information Systems, Clarke, S. (Ed.). Idea Group Inc., USA., pp: 203-223.
- Fisher, S.L. and A.W. Howell, 2004. Beyond user acceptance: An examination of employee reactions to information technology systems. *Hum. Resour. Manage.*, 43: 243-258.
- Franz, C. and D. Robey, 1984. An investigation of user-led system design: Rational and political perspectives. *Commun. Acm.*, 27: 1202-1209.
- Furumo, K. and A. Melcher, 2006. The importance of social structure in implementing ERP systems: A case study using adaptive structuration theory. *J. Inform. Technol. Case Appl. Res.*, 8: 39-58.
- Greenwood, D.M., 2002. Gaining and sustaining organizational support through a sociotechnical intervention. *Consulting Psychol. J. Prac. Res.*, 54: 104-115.
- Haines, V.Y. and A. Petit, 1997. Conditions for successful HRIS. *Hum. Resour. Manage.*, 36: 261-275.
- Hussain, Z., J. Wallace and N.E. Cornelius, 2007. The use and impact of human resource information systems on human resources management professionals. *Inform. Manage.*, 44: 74-89.
- Isabella, L.A., 1990. Evolving interpretations as a change unfolds: How managers construe key organizational events. *Acad. Manage. J.*, 33: 7-41.
- Jaffee, D., 2001. *Organization Theory: Tension and Change*. McGraw-Hill, USA.
- Jiang, J.J., G. Klein and J. Balloun, 1996. Ranking of system implementation success factors. *Project Manage. J.*, 27: 49-53.
- Kansal, V., 2006. Enterprise resource planning implementation: A case study. *J. Am. Acad. Business*, 9: 165-170.
- Keil, M., P.E. Cule, K. Lyytinen and R.C. Schmidt, 1998. A framework for identifying software project risks. *Commun. Acm.*, 41: 76-83.
- Kerber, K. and A. Buono, 2005. Rethinking organizational change: Reframing the challenge of change management. *Organization Dev. J.*, 23: 23-39.
- Kossek, E.E., W. Young, D.C. Gash and V. Nichol, 1994. Waiting for innovation in the human resources department: Godot implements a human resources information system. *Hum. Resour. Manage.*, 33: 135-159.
- Kovach, K.A. and C.E. Cathcart, 1999. Human resource information systems (HRIS): Providing business with rapid data access, information exchange and strategic advantage. *Public. Pers. Manage.*, 28: 275-281.
- Kovach, K.A., A.A. Hughes, P. Fagan and P.G. Maggitti, 2002. Administrative and strategic advantages of HRIS. *Employment Relations Today*, 29: 43-48.
- Laudon, K.C. and J.P. Laudon, 2006. *Management Information Systems: Managing the Digital Firm*. 10th Edn., Prentice Hall, New Jersey.
- Lawler, E.E. and S.A. Mohrman, 2003. HR as a strategic partner: What does it take to make it happen?. *Hum. Resour. Plann.*, 26: 15-29.
- Marchand, D.A., W.J. Kettinger and J.D. Rollins, 2000. Information orientation: People, technology and the bottom line. *Sloan Manage. Rev.*, 41: 69-80.
- Markus, M.L. and R.I. Benjamin, 1997. The magic bullet theory in IT-enabled transformation. *Sloan Manage. Rev.*, 38: 55-68.
- Martinsons, M. and P. Chong, 1999. The influence of human factors and specialist involvement on information systems success. *Hum. Relat.*, 52: 123-152.
- Mathieson, K., 1993. Effective user documentation: Focusing on tasks instead of systems. *J. Syst. Manage.*, 44: 25-27.
- Maurer, R., 2002. Plan for the human part of ERP. *Workforce Online*, September 2002.
- Mayfield, M., J. Mayfield and S. Lunce, 2003. Human resource information systems: Review and model development. *Adv. Competitiveness Res.*, 11: 139-151.
- McAfee, A., 2003. When too much IT knowledge is a dangerous thing. *Sloan Manage. Rev.*, 44: 83-89.
- Mercer Human Resource Consulting, 2007. HR transformation in Europe: A Mercer Study. Survey Report. http://www.proboards.nl/data_docs/HRT_Europe_Report_07.pdf.
- Mumford, E., 2003. *Redesigning Human Systems*. Idea Group, USA.
- Nah, F.F.H., K.M. Zuckweiler and J.L.S. Lau, 2003. ERP implementation: Chief information officers perceptions of critical success factors. *Int. J. Hum. Comput. Interaction*, 16: 5-22.
- Nah, F.F.H. and S. Delgado, 2006. Critical success factors for enterprise resource planning implementation and upgrade. *J. Comput. Inform. Syst.*, 46: 99-113.
- Nicolaou, A.I., 2004. Firm performance effects in relation to the implementation and use of enterprise resources planning systems. *J. Inform. Syst.*, 18: 79-105.
- Oz, E. and J. Soski, 2000. Why information systems projects are abandoned: A leadership and communication theory and exploratory study. *J. Comput. Inform. Syst.*, 41: 66-80.
- Rogers, E.M., 1995. *Diffusion of Innovations*. 4th Edn., Free Press, New York.

- Ruta, C.D., 2005. The application of change management theory to HR portal implementation in subsidiaries of multinational corporations. *Hum. Resour. Manage.*, 44: 35-53.
- Schramm, J., 2006. HR technology competencies: New roles for HR professional. *Society for Human Resource Management, 2005 Research Quarterly*, April 2006. http://goliath.ecnext.com/coms2/gi_0199-5467881/HR-technology-competencies-new-roles.html.
- Shrivastava, S. and J.B. Shaw, 2003. Liberating HR through technology. *Hum. Resour. Manage.*, 42: 201-222.
- Shneiderman, B., 2000. Universal usability. *Commun. ACM.*, 43: 85-91.
- Smith, M., 2003. Business process design: Correlates of success and failure. *Q. Manage. J.*, 10: 38-50.
- Souza, J.E. and J.P. Collado, 2000. Towards the unification of critical success factors for ERP implementations. *Proceedings of the 10th Annual Business Information Technology (BIT) Conference*, Nov. 1-2, Manchester, UK., pp: 1-9.
- Spence, A.M., 1973. Job market signaling. *Q. J. Econ.*, 87: 355-374.
- Tansley, C., S. Newell and H. Williams, 2001. Effecting HRM-style practices through an integrated human resource information system. *Pers. Rev.*, 30: 351-370.
- Targowski, A.S. and S.P. Deshpande, 2001. The utility and selection of an HRIS. *Adv. Competitiveness Res.*, 9: 42-56.
- Trist, E.L. and K.W. Bamforth, 1951. Some social and psychological consequences of the Longwall method of coal getting. *Hum. Relat.*, 4: 3-38.
- Van der Linden, G. and P. Parker, 1998. On paradoxes between human resources management, postmodern and HR information systems. *Account. Manage. Inform. Tech.*, 8: 265-282.
- Venkatesh, V., 1999. Creation of favorable user perceptions: Exploring the role of intrinsic motivation. *MIS Q.*, 23: 239-260.
- Willmott, H., 1994. Business process re-engineering and human resource management. *Pers. Rev.*, 23: 34-46.
- Yeung, A. and W. Brockbank, 1995. Reengineering HR through information technology. *Hum. Resour. Plann.*, 18: 25-37.