Measuring the Impact of The HR Information System on Performance in The Context of Delone & McLean Success Model[1]

İK Bilgi Sisteminin Performans Üzerindeki Etkisinin Delone & McLean Başarı Modeli Bağlamında Ölçülmesi

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Özet

Amaç: *Bu çalışmanın amacı, insan kaynakları yönetimi (İKY) faaliyetlerinde kullanılan bilgi sistemlerinin algılanan örgütsel performans üzerindeki etkinliğini anlamaktır.*

Yöntem: *Çalışmada, bilgi sistemleri başarı ölçümünde en yaygın kullanılan yöntemlerden biri olan insan kaynakları bilgi sistemlerinin başarısını ölçmek için Delone & McLean Bilgi Sistemleri Başarı Modeli kullanılmıştır. Araştırmanın amaçlarını incelemek amacıyla bu araştırmada tarama deseni kullanılmıştır. Elde edilen veriler SPSS ve AMOS istatistik paket programları aracılığıyla değerlendirilmiştir.*

Bulgular: *Elde edilen bulgular, Delone ve McLean bilgi sistemleri başarı modeline göre, İK bilgi sistemi kullanımının büyük ölçüde bilgi kalitesi tarafından yönlendirildiği ve bilgi kalitesinin de kurumsal performans üzerinde etkisi olduğu iddiasını desteklemektedir.*

Sonuç ve Katkılar: *Bahsi geçen başarı modeline göre sadece hizmet kalitesi değişkeni kullanıcı memnuniyeti üzerinde anlamlı bir etkiye sahipken, bilgi ve sistem kalitesinin kullanıcı memnuniyeti üzerinde anlamlı ve pozitif bir etkisi gözlenmemiştir. Bunun yanında, kullanıcı memnuniyetinin algılanan kurumsal performans üzerindeki etkileri için önemli bir etki tespit edilmemiştir. Son olarak, İK bilgi sisteminin içeriği, algılanan kurumsal performansı önemli ölçüde etkilemiştir.*

Sınırlılıklar: *Çalışmanın bulguları ile genelleme yaparken, örneklem olarak seçilen deneklerin ve ülkenin doğası gereği getirilen sınırlılıklar göz önünde bulundurulmalıdır. Gelecekteki araştırmalar, İK bilgi sisteminin diğer belirli alanlarında, farklı nedensel değişkenler, ek popülasyonlar ve ek yöntemlerle genişletilmelidir.*

Anahtar Kelimeler: İnsan Kaynakları Bilgi Sistemi, Örgütsel Performans, Delone & McLean Bilgi Sistemleri Başarı Modeli

Jel Kodu: M1, M12, M15, O15

Abstract

Purpose: *The current research aim is to understand the effectiveness of information systems used in human resources management (HRM) activities on perceived organizational performance.*

Methodology: *In this study, the Delone & McLean Information Systems Success Model is used for measuring the success of human resources information systems, which is one of the most widely used for information systems success measurement. In order to examine study purposes, this research employed a survey design. The obtained data are evaluated through SPSS and AMOS statistical package programs.*

Findings: *The study's findings support the claim that, according to Delone and McLean success model, the use of HRIS is largely driven by information quality and HRIS utilization, with information quality also having an impact on organizational performance.*

Implications: *Based on the mentioned success model, only a service quality parameter has a significant impact on user satisfaction whereas no significant and positive effects of information and system quality on user satisfaction are observed. For the effects of user satisfaction on perceived organizational performance, no significant impact has been identified. Finally, the content of HRIS significantly influenced perceived organizational performance.*

Limitations: *Any generalization from the findings of this study should be done with caution because of the limitations imposed by the nature of the sampled subjects and country. Future research should extend our efforts by considering specific areas of HRIS with other causal variables, additional populations, and additional methods.*

Keywords: Human Resource Information System, Organizational Performance, Delone & McLean Information Systems Success Model

Jel Codes: M1, M12, M15, O15

1. Introduction

Human and information which are the two most important resources in the field of human resource management (HRM). Human Resources Information Systems (HRIS) combines human and information resources (IS) which is used to obtain, analyze, store and share information, may bring great benefits and organizational performance improvements if it is integrated and executed effectively. Previous researches indicated that effective use of HRIS significantly related to organization performance (e.g. Nagendra & Deshpande, 2013). For this reason, the evaluation of HRISs used in organizations by considering appropriate success criteria and measuring their effectiveness can be considered as an important input to the performance outputs of organizations. Which of these criteria will be selected in an HRIS success evaluation or which indicators will be taken into account in the measurement of organizational performance will vary according to the value judgments, strategies, goals and objectives, and priorities of the organizations (e.g. Matthews, 2011). This multidimensional perspective in assessing IS success can present some difficulties because in the measurement model that comes up when IS success is mentioned, benefits from its use, future uses, organizational impact of its use, etc. meanings as well. However, when a generalization is made about the studies to measure HRIS success, it has been seen that in order to increase HRIS success, first of all, concepts such as information quality, system utility and quality, ease of use and user satisfaction should be given importance which is previously well discussed by Delone & McLean (Al Shibly, 2011; Aras & Bayraktaroğlu, 2013; Bal et al., 2012; Haines & Petit, 1997; Ramezan, 2009; Winkler, et al., 2013; Uluköy & Izci, 2014).

With the emergence of technological developments in the field of HRM, HRIS success should be discussed as well. Current study purpose is to understand and examine how content HRIS and use of HRIS is related to organizational performance. With the help of the Delone & McLean IS success model's measurement criteria, HRIS success impacts on organizational performance investigated.

2. Conceptual Framework and Research Questions

HRIS is one of the most important types of information systems that contribute to an organization's HRM functions (Nagendra & Deshpande, 2013; Stone et al., 2006). Because while HRIS enables to carry out human resources activities in the which focuses on system and technology, it is also capable of presenting a single picture of integrated information. With the use of these systems, HR units gain speed in doing routine work that takes a lot of time and can undertake more complex, transformational and value-added activities (Kavanagh et al., 2013). According to recent research, HRIS is now used in almost all large companies to support core functions, processes and decisions. Likewise, the number of small companies that prefer HRIS is increasing recently. It has been claimed that, once HRIS is implemented correctly and successfully in the organization, in addition to making the HRM process simpler and more affordable, it also speeds up managers' adoption of HRM practices, reduces their workload, aids in decision-making (Akman, 2010; Lukaszewski, 2002; Öztürk, 2008) and positive impact on the organizational performance as well.

HRIS can increase its importance and affect performance as much as it can provide benefits to organizations. One of the most agreed benefits of HRIS among researchers is that; it is possible to access more accurate information in a timely, fast and ease of transaction in economical way. This situation is very important in terms of operation, control and planning activities in HR. Current literature indicated that researchers use HRIS because of increasing competitiveness by improving HR practices, moving HR's focus from operational to strategic view, increasing the variety and number of transactions. Moreover, making employees a part of HRIS, restructuring the entire HR function with emphasized by many studies (Beckers & Bsat, 2002; Kovach, 2002; Ankrah & Sokro, 2012). The benefits provided by HRIS are divided into three categories from the standpoint of the business: contributing to the decisions required to carry out personnel activities; analyzing the differences between planned and actual performances; and providing a useful system for the company in structuring the wage, training, benefits, and personnel goals (Davis & Olson, 1985).

Studies on the success of HRIS have shown that organizations should give importance to concepts such as information quality, system benefit and quality, service quality, ease of use and user satisfaction in order to increase HRIS success. As the perceived benefit increased with the improvement of these factors, it is observed that satisfaction with HRIS and then the success of HRIS is increased (Al Shibly, 2011; Aras & Bayraktaroğlu, 2013; Bal et al., 2012; Haines & Petit, 1997; Ramezan, 2009; Winkler, et al., 2013; Uluköy & Izci, 2014).

2.1. Delone& McLean IT Success Model and HRIS Success

The IS success model, which is introduced by Delone & McLean in 1992 and updated in 2003, is one of the most used ones for measuring the success of IS (e.g Irawan & Syah, 2017). The Delone & McLean model is a multidimensional and interconnected construct that serves to provide a clearer picture of what constitutes the success of IS by examining the interactions between its dimensions. The model expresses three levels with following criteria: first layer that constitutes the infrastructure of the system is information, system and service quality; the second layer includes user-based criteria such as intention to use and user satisfaction; at the last level, there are outputs that reveal the net benefits of the system (Amorim, 2014).

According to the original model, the factors that measure success can be listed as system quality, information quality, use, user satisfaction, individual impact and organizational impact (Seddon et al., 1999). In the updated model, "quality of service" is added to the original success factors, and individual and organizational effects are combined under a single roof as "net benefits". Therefore, "net benefits" is considered as the most accurate descriptor of the final success variable (Delone and McLean, 2003) which can be considered as organizational performance. Information quality is related to the outputs to be obtained from the information system (Ojo, 2017) with the increase in the amount of information produced, the quality of the same information becomes more important. Information quality is a concept that has been examined in the fields of information science and IS (Arazy & Kopak, 2011; Rammutloa, 2017). The components of information quality are that the information is compatible with the purposes to be achieved, up-to-date, relevant, consistent, complete, precise, personalized, and secure (Petter et al., 2008). Since information quality directly affects

users' interaction with the system, it is also a factor that affects the intention to use the system and user satisfaction.

System quality is related to the features expected from the system in terms of creating information to be used by users and decision makers, and it is obtained by measuring these features (Ojo, 2017; Rammutloa, 2017). Information system quality have measured by criteria such as system accessibility, data accuracy, ease of use, response time, reliability and flexibility (Delone & McLean, 2003). System quality is also associated with the consistency of the user interface, the quality of the documentation, and sometimes the quality and maintenance of the program code (Seddon, 1997). Apart from this, whether the system works in harmony with other systems is also considered an important criterion in quality outputs. The dimensions of system quality will provide strategic benefits to the organization which plays important roles in internal efficiency. As stated, before service quality dimesons added to original model later. At the initial process focusing on measuring products and efficiency of IS was seen to be enough but it is understood that ignoring service quality may cause some under-calculations, so the service quality dimension has been given importance, albeit later (Delone & McLean, 2003). This dimension is measured by the quality of the support provided by the designer of the IS or by the support staff, and is most often judged by assurance, sensitivity, empathy, and reliability. Assurance is about how a user puts their knowledge of solving their own problems into practice. Responsiveness reflects the quick responses the system provides when requested. An empathetic system serves the user's needs, and a reliable system is always reliable (Petter et al., 2008).

System usage dimension includes three elements: user, system, and a task (Burton-Jones & Straub, 2006) and is intended to evaluate the way the IS is used. Visiting a website, navigating within the site, obtaining information, executing a transaction, can be measured by the mentioned activity (Delone & McLean, 2003). Various studies include system usage, measured by the use itself and the frequency of use (Urbach & Muller, 2012). Factors such as frequency of use, voluntariness, indispensability, lack of alternatives and the system being used out of necessity may be factors at this stage (Wang et al., 2007). Other than that, according to the Delone& McLean (2003) model, the factors that serve to measure the intention to use; it can be evaluated by the number of site visits, the number of transactions performed, the number of usages, the nature of the usage, and the navigation styles.

User satisfaction is considered one of the most important and widely used measures of system success. It is usually measured by overall user satisfaction (Delone & McLean, 2003; Urbach & Muller, 2012) and refers to the user's attitude towards an information system. Satisfaction in any condition indicates how the individual feels or behaves towards various factors affecting that particular situation or event (Özkan et al., 2007). The structure of user satisfaction, which is an important tool for measuring users' opinions about a system, should cover the entire user experience cycle; from obtaining information through purchase, payment, receipt and service. Researchers have suggested many different measurement tools and indicators such as; user surveys, repeat business, and customer visits (Baroudi & Orlikowski, 1988; Delone & McLean, 2003).

Net benefits are the benefits obtained after the use of IS by both individuals and organizations (Irawan & Syah, 2017; Delone & McLean, 2003). It can be described as the most important success dimension because it involves a balance of positive and negative impacts on customers, suppliers, employees, organizations, markets, industries, economies and even society. Measuring user satisfaction and intention to use the system alone is not enough to determine net benefits. Since there is an important link among the system quality and information quality and net benefit measures, the dimensions of system quality and information quality should also be considered (Yuthas & Young, 1998). According to the Delone & McLean 2003 model, the criteria that can be used to measure net benefits can be listed as: cost and time savings, expanded markets, increased additional sales, and reduced search costs.

HRIS improves organizational performance; increases efficiency, customer satisfaction, data accuracy and processing speed; facilitates planning; reduces transaction costs. It is thought that it provides forecasting of future investments. Current study assumes that organizational performance (net benefits) is affected by HRIS. It is aimed to obtain net benefits by measuring the effects of the use of HRIS on organizational performance.

There are some studies assessing IS with Delone and McLean model in the literature; however, they are limited, and studies examining the model's integration with HRIS are scarce. For instance, Halonen et al., (2009) used the updated version of the Delone & McLean model as a descriptive tool in the evaluation of a virtual learning environment. Roky and Al Meriouh (2015) demonstrated an empirical validation of the IS success model developed by DeLone & McLean and the managerial consequences of using such a model in the automotive industry. Study showed that the impact of information quality on user satisfaction, intention to use, individual impact, and organizational impact of industrial IS is great. Wang (2007), used six dimensions of the Delone & McLean structure to evaluate the success of e-commerce systems, indicated that the intention to use the system is affected by information, system, service quality and user satisfaction. Yu and Qian (2018) used to evaluate the success of electronic health records in routine use for nursing staff in aged care operations and validated the effects of system quality and information quality on net benefits. Ojo (2017) evaluated five Nigerian teaching hospitals using the DeLone & McLean information system success model on hospital IS in a developing country and the model is validated. According to the results of the study; system quality and usage are evaluated as important behaviors in the success of the hospital information system.

Although the Delone & McLean IS success model has been tested in many studies, its application in the field of HR is limited. Al-Khowaiter et al., (2013) have discussed proposing a conceptual model to identify the factors affecting the adoption and success of HRIS in public sector organizations in Saudi Arabia. In general, and in the case of HRIS adoption and success in particular, the study analyzed empirical assessments of user-level IS use. Study found that Delone & McLean IS success model it is ultimately successful and considered important in predicting the adoption and success of HRIS. Davarpanah and Mohamed (2013) demonstrated the integration of the Delone & McLean success model with the trust model. They discussed to what extent information, system, service quality and trust primarily affect user satisfaction and ultimately the benefits obtained by HRIS. Al Shibly (2011)

investigated a strong relationship between perceived HRIS information quality and HRIS satisfaction, and it is shown that factors such as system quality, ease of use and usability significantly affect primarily user satisfaction and thus HRIS success. The results supported the possible effect of user satisfaction on IS success, as suggested in the DeLone & McLean (2003) models.

Within the scope of the above-mentioned results, the major questions of this study are as follows:

Research Question (1): Based on Delone & McLean Information Systems success model how models' dimensions will be influential on organizational performance?

Research Question (2): Do manager's perceived HRIS success influenced on perceived organizational performance?

3. Methodology and Findings

The questionnaire is practiced in the study. The sample consists of the experts and unit managers whose working in HR units, or more generally, employees working in managerial positions, regarding the HRIS used or "HR Specialist" working in a "managerial position" and using HRIS. In the study, people working in managerial positions other than HR specialists, who are evaluated under the title of HR Specialist, are gathered under the title of managers. Managers, directors, business owners, coordinators, supervisors, team leaders, factory managers, chairman of the board of directors, supervisor nurses, and responsible technicians are among those who hold this position. 229 people participated to the study and for the data collection process; face-to-face meeting at the institution, by e-mail and sending link of the online questionnaire re followed. First of all, the interviewees are told about the study and the purpose of the study, and a commitment is made that the names of the participants or the names of the institutions would not be mentioned in the study.

In the first part of the questionnaire, demographic and social characteristics of managers or HR specialists are included. Data on gender, age, education level, tenure, profession, and status are collected at this point. Descriptive statistics indicated that, 54% of the participants are men and 46% are women. 65% of the participant's status defined as manager, 35% of them HR specialist as well.

In the second part, based on the Delone and Mclean's success model dimensions' Alshibly (2011), Ojo (2017), Tilahun & Fritz (2015), Cho, et al., (2015), Pai, Huang (2011) scales used to compose questionnaire which are previously used to measure success of information systems. Statements to measure how HRIS success is perceived are also revealed by using the Roky & Al Meriouh (2015) study. Respondents' evaluations about Delone and Mclean's success model dimensions' indicated the extent of agreement with each statement on a five-point Likert-type scale (1 = strongly disagree, and 5 = strongly agree) and perceived HRIS success (ranging from 1 = 'never' to 5 = 'always') respectively.

With the purpose of verifying the convergent and discriminant validity of the scale items, factor analysis was performed on the variables used for the study's research model. Exploratory factor analysis using principal component with varimax

rotation was applied to all the five-point Likert-type questions to check the unidimensionality of all measures separately. Factors with eigenvalues greater than 1.0 were identified. All the scale items were satisfactorily summed up under the study variables scales as one factor. The constructs, which are found to have unidimensionality, were subjected to a correlation analysis.

*Table 1. Reliabilities and Inter-Correlations of The Variables*

	1	2	3	4	5	6	7
System Quality	(.86)						
Information Quality	,70***	(.91)					
Service Quality	,86***	,86***	(.89)				
Intention to Use/Use	,64***	,72***	,69**	(.93)			
User Satisfaction	,87***	,74***	,74***	,90***	(.89)		
Organizational Performance	,60**	,80***	,65**	,76***	,73***	(.91)	
HRIS Success	,67***	,68**	,74***	,87***	,87***	,72***	(.83)

**p<0,01; ***p<0,001

Table 1 shows the internal consistency coefficients (Cronbach Alpha) and intercorrelations of the variables. As a result of the Pearson correlation analysis, it is seen that there is a positive and statistically significant relationship between all the variables in the research model with each other.

Structural Equation Model (SEM) analysis is used to test the effects of variables on each other within the scope of the research model (see Figure1).

Figure 1. Structural Equation Model of the Research
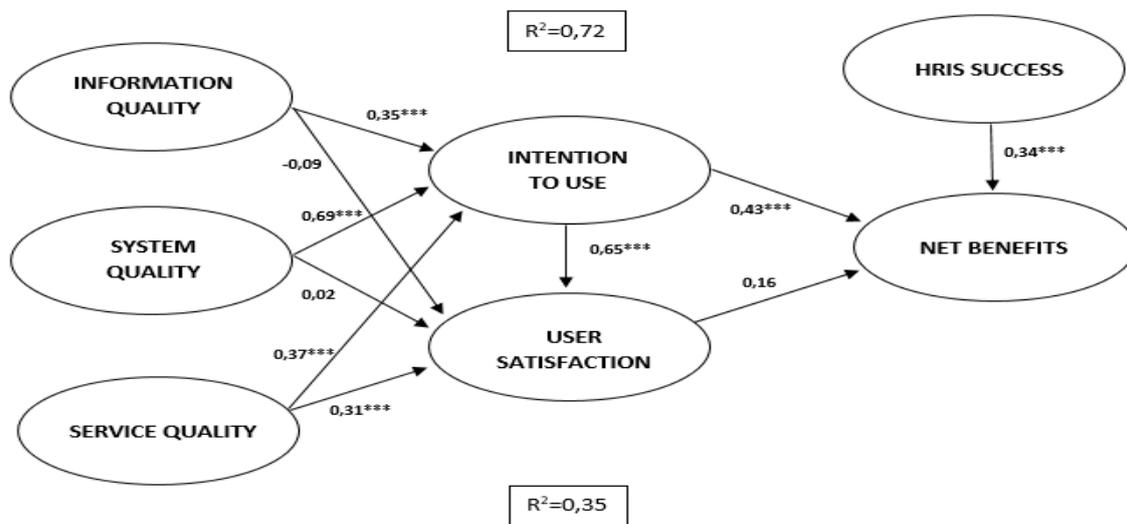
SEM results indicated that the system quality has a positive and significant effect on the intention to use/usage (β=0.35, p<0.01), but there is no significant effect on user satisfaction. Similarly, while the quality of information has a positive and significant effect on usage (β=0.69, p<0.001), it does not seem to have a significant effect on user satisfaction. Service quality has a positive and significant effect on usage (β=0.37, p<0.001) and user satisfaction (β=0.31, p<0.001).

It has been observed that usage has a positive and significant effect on user satisfaction (β=0.65, p<0.001) and net benefits which is considered as organizational performance for this study (β=0.43, p<0.001). Similarly, HRIS Success is found to have a

positive and significant effect on organizational performance ($\beta=0.34$, $p<0.001$). However, it is seen that user satisfaction does not have a significant effect on organizational performance. To note that, system, information and service quality explains 72% of the variance in intention to use and about 35% of the user satisfaction.

4. Conclusion

Main purpose of this study is to further increase our knowledge and understanding of IS success for the HRIS. Results of this study indicated that system, information, and service quality significant and positive impacts on intention to use are observed. In addition, among these independent variables, a significant effect of system and information quality on user satisfaction could not be determined but on the other hand significant and positive effects of service quality on user satisfaction are observed. In addition, significant and positive effects of use on user satisfaction and organizational performance are observed, but no significant effect is investigated about the effects of user satisfaction on organizational performance. Finally, the effects of HRIS success, which is one of the independent variables, on organizational performance are observed to be significant and positive.

Based on the conclusion that information quality is the most influential on usage, it can be said that taking care that the information is compatible with the aims to be achieved, up-to-date, relevance, consistency, completeness, precision, personalized and secure will encourage the use of HRIS in organizations. This becomes especially important considering that usage has a more significant impact on organizational performance than user satisfaction. Although the findings of this study show similar results with previous studies in the literature, there are also some different results. For example, Ojo (2017), did not confirm the hypothesis that intention to use has significant and positive effects on user satisfaction. However, according to the findings of current study, there are significant and positive effects of use on user satisfaction. Apart from this, the significant and positive effects of system use on organizational performance, as well as the absence of significant and positive effects of user satisfaction on organizational performance, showed similarities with the Ojo (2017). Alshibly (2011) drew attention to the importance of information quality in the use of HRIS satisfaction. Current study results supported that quality of information has a significant, positive and very strong relationship with intention to use but not on user satisfaction yet. Although the findings of this study are not the same as the Alshibly (2011), the relationship between information quality and user satisfaction, it also emphasizes the importance of information quality in the use of HRIS, as it concludes that information quality is the independent variable that most affects system use.

The Delone & McLean IS success model has been the subject of different studies in different ways, but applying the model often serves basically the same purpose. The focus of practitioners of this model is on increasing efficiency, productivity, job satisfaction, and quality; providing a competitive advantage; and, ultimately, contributing to increased net benefits. In this direction, this study examined the relationships between variables and evaluated the benefits of variables such as knowledge, system, service quality, usage, user satisfaction, and HRIS success on organizational performance. As a result of the evaluations, it is observed that the positive effects of the use of IS and the perceived success of HRIS on organizational

performance. Managers and researchers can also reveal their own objective evaluations by considering the current conditions and by making use of the model to determine the success variables of the systems used with the contingency approach and the relations between these variables. With these assessments, they can measure the criteria and can define, develop, and manage what they measure.

As in the case with any research, there are several limitations of this study that should be addressed. Any generalization from the findings of this study should be done with caution because of the limitations imposed by the nature of the sampled subjects and country. Moreover, future research should extend our efforts by considering more specific areas of HRIS with other causal variables, additional populations, and additional methods of measuring information system success. In addition, multi method probes that include surveys, personal interviews, direct observation, and experiments are needed to provide further validation of the Delone & McLean IS success model.

Research and Publication Ethics Statement

The authors declare that ethical rules are followed in all preparation processes of this study. In case of detection of a contrary situation, Journal of Commercial Sciences has no responsibility and all responsibility belongs to the authors of the study.

Author Contributions

1st Author Didem KALE's contribution rate: %60, 2nd Author İpek KALEMCİ TÜZÜN's contribution rate: %40.

Conflict of Interest

There is no conflict of interest between the authors.

References

Akman, V. (2010). *İnsan kaynakları bilgi sistemi ve Sakarya ilinde uygulama* (Yayınlanmamış Yüksek Lisans Tezi). Sakarya Üniversitesi Sosyal Bilimler Enstitüsü, Sakarya, pp. 44-47.

Alshibly, H. (2011). Human resources information systems success assessment: An integrative model. *Australian journal of basic and applied sciences, 5*(5), pp. 157-169.

Al-Khowaiter, W., Dwivedi, Y. and Williams, M. (2013). Conceptual Model For Examining The Adoption And Success Of Human Resource Information Systems In Public Sector Organisations In Saudi Arabia. *Proceedings of UK Academy For Information Systems Conference.*

Amorim, E. V. (2014). Energy related information systems and user expectations. *Procedia technology*, vol. 16, pp. 775-779.

Ankrah, E. & Sokro E. (2012). Human resource information system as a strategic tool in human resource management. *Problems of management in the 21 st century*,vol. 5, pp. 6 -15.

Aras, M. & Bayraktaroğlu, S. (2013). İnsan kaynakları bilgi sistemlerinde kullanıcı bilgi tatmini: sistemsel değişkenlerin etkisi. *Sakarya iktisat dergisi, 2*(5), pp. 1-21.

Arazy, O. and Kopak, R. (2011). On the measurability of information quality. *Journal of the American society for information science and technology, 62*(1), pp. 89-99.

Bal, Y. & Bozkurt, S. & Ertemsir, E. (2012). The importance of using human resources information systems (HRIS) and a research on determınıng the success of HRIS. *Management, Knowledge and Learning International Conference*, pp. 53-62.

Baroudi, J. & Orlikowski, W., (1988). A short-form measure of user information satisfaction: a psychometric evaluation and notes on use. Journal of management information systems, vol. 4, pp. 44-59.

Beckers, A.M. & Bsat, M.Z. (2002). A DSS classification model for research in human resource information systems. *Information systems management, 19*(3), pp. 41-50.

Burton-Jones, A. & Straub, D. (2006). Reconceptualizing system usage: an approach and empirical test. *Information systems research, 17*(3), pp. 228-246.

Cho K. W., Bae S. K., Ryu J. H., Kim K. N., An C. H., Chae Y. M. (2015). Performance evaluation of public hospital information systems by the information system success model. *Health inform res, 21*(1), pp. 43-8.

Davarpanah, A. and Mohamed, N. (2013). Human Resource Information Systems (HRIS) Success Factors In A Public Higher Education Institution Context. *Proceedings of 3 rd International Conference on Research and Innovation in Information Systems.*

Davis, G. B. & Olson, M. H. (1985). *Management Informatıon Systems, Conceptual Foundations, Structure And Development*, 2nd ed. McGraw-Hill.

Delone, W. & McLean, E. (2003). The DeLone& McLean Model of information systems success: A ten- year update. *Journal of management information systems, 19*(4), pp. 9-30.

Haines, Y. V. & Petit, A. (1997). Condıtıons for successful, human resource informatıon systems. *Human resource management, 36*(2), pp. 261–275.

Halonen R., Acton T., Golden W., Conboy K. (2009). DeLone & McLean success model as a descriptive tool in evaluating the use of a virtual learning environment. Paper presented at International Conference on Organizational Learning, Knowledge and Capabilities (OLKC 2009), Amsterdam, the Netherlands.

Irawan, H. & Syah, I. (2017). Evaluation of Implementation of Enterprise Resource Planning Information System with DeLone& McLean Model Approach. *Fifth International Conference on Information and Communication Technology.*

Kavanagh, J. M. & Thite, M. & Johnson, R. (2013). *Human Resources Information Systems,* 3rd ed. Thousand Oaks, United States of America, Sage.

Kovach, K. A. (2002). Administrative and strategic advantages of HRIS. *Employment relations, 29*(2), pp. 43-48.

Lukassewski, M. K. (2002). The effects of the ability to choose a method of disclosing data and the type of data on reactions to HRIS, School of Business Organizational Studies, University of Albany, State University of Newyork, pp. 34-97.

Matthews, M. W. (2011). A current review of empirical procedures of remote sensing in Inland and near-coastal transitional waters. *Internation journal of remote sensing, 32*(21), pp. 1-45.

Nagendra, A. & Deshpande, M. (2013). Human Resource Information Systems (HRIS) in HR planning and development in mid to large sized organizations. *Social and behavioral sciences*, vol. 133, pp. 61-67.

Ojo, A. (2017). Validation of the DeLone and McLean information systems success model. *Healthcare informatics research, 23*(1), pp. 60-66.

Özkan, S. & Hackney, R. & Bilgen, S. (2007). Process based information systems for International business evaluation. *Journal of enterprise information management, 20*(6), pp. 700-725.

Öztürk, Ü. (2008). İnsan kaynakları bilgi sistemleri (ikbs) ile performans değerlemesi arasındaki ilişkinin incelenmesi - bir uygulama (tez).

Pai F. Y., Huang K. I. (2011). Applying the technology acceptance model to the introduction of healthcare information systems. *Technol forecast soc change, 78*(4), pp. 650-60.

Petter, S. & Delone, H. W. & McLean, E. R. (2013). Information systems success: the quest for the independent variables. *Journal of management information systems, 29*(4), pp. 7-62.

Ramezan, M. (2009). Measuring the effectiveness of human resource information systems in national iranian oil company an empirical assessment. *Iranian journal of management studies, 2*(2), pp. 129-145.

Rammutloa, W. M. (2017). *Application of the Delone and McLean's Model to Assess The Effectiveness of an Intranet in an Open Distance Learning Library.* Faculty of Arts and Social Sciences, Stellenbosch University.

Roky, H. & Al Meriouh, Y. (2015). Evaluation by users of an industrial information system (xpps) based on the delone and mclean model for is success. Procedia economics and finance, vol. 26.

Seddon, P. (1997). A respecification and extension of the delone and mclean model of is succes. *Information systems research, 8*(3), pp. 240-253.

Seddon, P. B., Staples, D. S., Patnayakuni, R. & Bowtell. M. J. (1999). The dimensions of information systems success. *Communications of the a.ssociation for information systems, 2*(20).

Stone D. L. & Stone-Romero, E. F. & Lukaszewski K. (2006). Factors affecting the acceptance and effectiveness of electronic human resource systems. *Human resource management review*, vol. 16, pp. 229-244.

Tilahun, B, Fritz, F. (2015). Modeling antecedents of electronic medical record system implementation success in lowresource setting hospitals. *BMC med inform decis mak*, vol. 15, pp. 61.

Ulrich, D. (1997). *Human Resource Champions*. Harvard Business School Press, Boston, MA.

Uluköy, M. and İzci, Ç. (2014). İnsan kaynakları bilgi sistemlerine ilişkin başarı değerlendirmesi: Hizmet sektörü uygulaması. *Dumlupınar Üniversitesi sosyal bilimler dergisi*, vol. 40.

Urbach, N. & Muller, B. (2012). *The Updated Delone And Mclean Model Of Information Systems Success. In: Dwivedi YK, Wade MR, Schneberger SL, Editors. Information Systems Theory: Explaining And Predicting Our Digital Society.* Springer, New York, pp. 1-18.

Wang, Y. & Wang, H. & Shee, D. (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. *Computers in human behavior.*

Winkler, A., Dörsing, B., Rief, W. and Shen, Y. (2013). Treatmen of internet addiction: A meta-analysis. *Clinical psychology review, 33*(2), pp. 317-329.

Yu, P., Qian, S. (2018). Developing a theoretical model and questionnaire survey instrument to measure the success of electronic health records in residential aged care. *PLoS one, 13*(1): e0190749. https://doi.org/10.1371/journal.pone.0190749.

Yuthas, K., Young S. T. (1998). Materials matters: assessing the effectiveness of materials management is. *Information and management, 33*(3), pp. 115-124.