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A Review on Prediction of ERP Outcome Measurement and User Satisfaction by Use of AI (Fuzzy Logic and Neural Networks)

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Abstract— ERP (Enterprise Resource Planning Systems) comprises of a commercial software package that promises the seamless integration of all the information flowing through the company- accounting, human resource supply chain and the consumer information. Enterprise Resources Planning systems are computer depended systems designed to process an organization's transaction and facilitate integrated and real time planning, production and customer response. Fuzzy logic has emerged as a profitable tool for the controlling and steering of systems and many critical organizational procedures, like for household and entertainment electronics, as well as other expert systems and uses. In this research work we try to investigates the factors that impact user satisfaction in ERP implementations, a conceptual framework that determine the critical factors which influence user's satisfaction in the ERP implementation will be developed. Although ERP implementation is costly and time consuming and it can also lead to loss of many valuable resources of the organizations in case of wrong methods and not efficient way of implementation. Hence it is critically important for the organizations to understand and clearly realize all the values achieved from ERP initiatives.

Keywords— Artificial Intelligence, ERP Systems, Fuzzy Logic, Artificial Neural Networks.

INTRODUCTION

ERP Systems:

The unrivaled growth of Information and Communication Technologies (ICT) driven by electronics, computer hardware and software systems has inveigled all facets of computing applications beyond institutions or organizations. Concurrently the business environment is becoming progressively complex with functional units requiring more and more inter-functional data flow for decision making, timely and adequate acquisition of product parts, management of supply, auditing, human resources and dissemination of goods and services. In this ambience, management of institutions needs effective Information Systems (IS) to promote competitiveness by the reduction of cost and better logistics use. It is astronomically identified by large and Small to Medium size

Enterprises (SME) that the capacity of giving the exact information at the exact time brings astounding rewards to institutions in a global competitive world of complex business tradition. [i] Enterprise Resource Planning (ERP) is a kind of information technology outsourcing and its concept originated from MRP (Material Requirement Planning) in manufacturing firms implementing IS in stock control, Supply Chain Management (SCM) and co-ordination between economics, sales and manufacturing processes. Hence, Enterprise Resource Planning (ERP) is viewed as a large set of activities supported by multi-module application software that help a manufacturer or other business manage the important parts of its business. [ii, iii]

ERP System's Predictors and Consequences:

ERP systems used at very large organizations and the success of ERP system are also critical and depending on various predictors like time, vendors, processes, cost, modules, maintenance and complexity etc. The maintenance of ERP systems is a large scale, unstructured and highly complex undertaking. In many cases it requires the use of unfamiliar tools and technologies. Risk management is also a crucial process to ensure ERP adoption success. This involves treating, evaluating, monitoring, identifying and controlling the existing factors. The failure of ERP systems severally impacts company stability.

ARTIFICIAL INTELLIGENCE:
Artificial Intelligence:

Artificial intelligence is the type of intelligence advertised by software or machines. It is also the name of the academic field of study which learn us how to create computer software and computers that are capable of behaving like as computer. Many researchers and textbooks defines Artificial Intelligence (AI) as "the study and design of intelligent agents" in which an intelligent agent is a type of system that perceives its environment and takes the actions that extends its cases of success. John McCarthy coined this term in 1955 and defines it as "the science and engineering of making intelligent machines". [iv]

Fuzzy Logic:

Fuzzy logic was invented in 1965 [v, vi] by Lotifi A. Zadeh. Basically Fuzzy Logic (FL) is a multivalued logic that allows many intermediate values within conventional evaluations like true/false, yes/no, high/low etc. Fuzzy logic has emerged as a profitable tool uses for the steering and controlling of systems and critical organizational procedures.

Artificial Neural Networks:

Neural networks are an extremely simplified model of the brain. [vii] An Introduction to Neural Networks by Vincent Cheung Kevin Cannons,. Researchers from many scientific fields are designing Artificial Neural Networks (ANNs) to solve many types of problems in prediction, optimization, pattern recognition, associative memory and control. [viii] Artificial neural networks are essentially a function approximator that transforms inputs into outputs to the best of its ability. These are used because ANNs provides the ability to learn and generalize.

LITERATURE REVIEW

The researchers have done many work in this field and invented their own ideas and methods for measurement outcome prediction of ERP systems. Botta-Genoulaz et al. [ix] provided a survey to investigate the research activities related to ERP in recent days and found that the research on ERP systems has experienced an efficient development in recent years. The researchers on ERP systems cover some topics that are important like as the implementation of ERP, the management of ERP and the ERP optimization. Although, little research has focused on ERP systems and user performance which confirms the necessity for the research and inventions in this field. The various researches models use many types of information systems, but not developed a model which is especially for ERP systems. Although they provided basic general principles that could be useful for further researches. [x,xi,xii]

Chien and TSAUR [xiii] given the model of DeLone and Mclean to describe the model's success in ERP systems and to identify the factors contributing to the high quality of ERP systems, the benefits of the use and the individual performance. The results predicted that system quality and information quality are very important factors that affect the benefits of using. Although, the system quality factors play a more important role than the information quality from the use of ERP and user satisfaction. In this manner, Ifinedo and Nahar [xiv] get that the system quality and information quality are accepted as two main factors in the success rate and prediction of ERP systems. McAfee [xv] depicted the effect of ERP on the institution' operational performance outcome. The survey describes the high returns of the implementation of ERP for a individual and for institutions, showing that the ERP systems must be depicted from various perspectives in a way to identify the real meaning of these type of systems. Hence, to gives the real values of Enterprise Resources Planning systems is not so easy because they are the annoying projects. Hence, the calibration of the Enterprise Resource Planning (ERP) standard methods with the institutional procedures of the company has been considered a vital step in the procedure of exertion and acquires the attention of many scientists. [xvi, xvii] Hence, some of the researchers have depicted studies to compare ERP systems in various references with many users in a way to make a new theory to give the investigation of ERP in various organizations. Kositanurit et al. [xviii] depicted a comparison based study within the ERP users and the non-users in the United States and Thailand to describes the most important factors that affects the performance outcome of the ERP system user, by using the procedure of Task Technology Fit (TTF) and of the user satisfaction to pretend the individual performance outcome and institutional performance results.

This review shows that the quality of system and use are very essential factors affecting performance of individual when Enterprise Resources Planning systems are used. Therefore, this literature review has made important benefits, like as the approval of the part of system quality, many important factors significantly affecting the users' performance outcome like the quality of information, characteristics of user and the utility were not considered. Gelderman [xix] described the relationship between the user satisfaction, Enterprise Resources Planning use and performance outcome. The performance gives that, in an Enterprise Resources Planning system environment, satisfaction is significantly related to the performance measures.

Perez-Bernal and Garcia-Sanche [xx] described that involvement of the user, training and the managerial support are the tedious

factors for Enterprise Resources Planning systems that connect direct to the users and customers, giving that these type of factors of issues, like as others depicts such as a infrastructures for implementing ERP systems. In advances to these factors, Lo and Ramayah [xxi] studied the effects of shared beliefs on the advantages of Enterprises Resources Planning within various users, containing engineers and managers. The survey found that when the information systems are recognized as easy to use, they are grasped as being more useful from the perspective of the end user.

Recently, Chan et al. [xxii] depicted a survey for good understand the approval of ERP systems in an individual manner. This literature review of study provided a conceptual procedure to analyses the effects of the factors like as compatibility, social impacts, and the short-term consequences and their impacts on the ERP use as outcome. The performance outcomes showed that the social factors were the most important factors affecting the use of Enterprise Resources Planning systems. Sun et al. [xxiii], more recently studied the role of Enterprise Resources Planning several perspective, namely the compatibility of work, identified usefulness, easily use, performance outcome measures and intended use on the performance of Enterprise Resources Planning users and how these factors are shaping the use of ERP. The survey showed that these factors were considered important for the users' performance, giving a most significant effect on institutional outcomes and performance. The outcome results also showed that the usefulness of the integration of some models in information systems, containing the TTF model and Technology Acceptance Model (TAM model), to search on the Enterprise Resource Planning systems, as the models of individual information systems have been criticized for being too simple.

CONCLUSION

This research investigates the factors that impact user satisfaction in ERP implementations, a conceptual framework that determine the critical factors which influence user's satisfaction in the ERP implementation will be developed. The proposed framework can be used as a decision making tool to support management of the organizations when taking decisions regarding the implementation of ERP. Our Proposed Work Will include one or more from the following

1. Development of a comprehensive software tool to predict outcome of ERP system implemented by agency x for organization y.

2. We will try to develop GUI based system for ease of parameter entry and analysis for data collection for prediction system.

3. Feasible improvements in existing ANN (Artificial Neural Networks) of fuzzy logic approach by using adaptive algorithms or additional methods to improve the prediction results of existing algorithm.

4. Optional features for an online data collection option form to feed the prediction system as a sort of online survey.

5. Also combining features of ANN (artificial neural networks) and fuzzy logic to enhance prediction accuracy.

REFERENCES:

1) E-Book-Enterprise Resource Planning: Global   Opportunities & Challenges by Liaquat Hossain, Jon David Patrick and M.A. Rashid, Year.

2) Aalders, R. *The IT Outsourcing Guide*. Chichester, England: John Wiley & Sons, 2001.

3) Trott, P., & Hoecht, A. Enterprise Resource Planning (ERP) and its Impact on the Innovative Capability of the Firm. *International Journal of Innovation Management,* vol. *8*(4), 381-398, 2004.

4) http://en.wikipedia.org/wiki/Artificial_intelligence.

5) L.A. Zadeh, Fuzzy Sets, Information and Control, 1965.

6) L.A. Zadeh "Fuzzy algorithms," Info. & Ctl, Vol. 12, pp. 94-102, 1968.

7) An Introduction to Neural Networks by Vincent Cheung Kevin Cannons, NeuralNetworks.CheungCannonNotes.pdf.

8) Artificial Neural Network: A tutorial by Ani1 K. Jain *Michigan State University* Jianchang Mao, K.M. Mohiuddin *ZBMAZmaden Research Center.*

9) Botta-Genoulaz, V., Millet, P., and Grobot, B. "A survey on the recent research literature on ERP Systems"*,* Computers in Industry, vol. 56(6), pp. 510-522, 2005.

10) Somers, T., and Nelson, K. "The impact of critical success factors across the stages of enterprise resource planning implementations"*,* Paper presented at the Proceedings of the 34th Hawaii International Conference on System Sciences, January, 2001.

11) Bradford, M., and Florin, J. "Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning Systems"*,* International Journal of Accounting Information Systems, vol. 4(3), pp. 205-225, 2003.

12) Hong, K., and Kim, Y. "The critical success factors for ERP implementation: an organizational fit perspective"*,* Information & Management, vol. 40, pp. 25-40, 2002

13) Chien, S., and Tsaur, S. "Investigating the success of ERP .Systems: Case studies in three Taiwanese high-tech industries"*,* Computers in Industry, vol. 58(8), pp. 783-793, 2007.

14) Ifinedo, P., Rapp, B., Ifinedo, A., and Sundberg, K. "Relationships among ERP post implementation success constructs: An analysis at the organizational level"*, Computers in Human Behavior, vol. 26(5), pp. 1136-1148, 2010.*

15) McAfee, A. "The impact of Enterprise technology adoption on operational performance: an empirical investigation"*, Production and Operations Management, vol. 77(1), pp. 33- 53 2002.*

16) Chiplunkar, C, Deshmukh, S., and Chattopadhyay, R. "Application of principles of event related open Systems to business process reengineering"*,* Computers & Industrial Engineering, vol. 45, pp. 347-374, 2003.

17) Van der Aalst, W. M. P., and Weijters, A. J. M. M. "Process mining: a research agenda"*,* Computers In Industry, vol. 53(3), pp. 231-244, 2004.

18) Kositanurit, B., Ngwenyama, O., and Osei-Bryson, K. "An exploration of factors that impact individual performance in an ERP environment: an analysis using multiple analytical techniques"*,* European Journal of information Systems, vol. 15, pp. 556-568, 2006.

19) Gelderman, M. "The relation between user satisfaction, usage of information Systems and performance"*,* Information & Management, vol. 34, pp. 11-18, 1998.

20) Garcia-Sanchez, N., and Perez-Bernal, L. "Determination of Critical Success Factors in Implementing an ERP System: A Field Study in Mexican Enterprises"*,* Information Technology for Development, vol. 73(3), pp. 293-309, 1998.

21) Ramayah, T., and Lo, M. "Impact of shared beliefs on "perceived usefulness" and "ease of use" in the implementation of an enterprise resource planning system", Management Research News, vol. 30(6), pp. 420-431, 2007.

22) Chan, H., Siau, K., and Wei, K. "The Effect of Data Model, System and Task Characteristics on User Query Performance - An Empirica! Study", the *DATA BASE for Advances in Information Systems vol. 29* (1), pp. 31-49, 1998.

23) SUN, Y., BHATTACHERJEE, A., AND MA, Q. "EXTENDING TECHNOLOGY USAGE TO WORK SETTINGS: THE ROLE OF PERCEIVED WORK COMPATIBILITY IN ERP IMPLEMENTATION. INFORMATION & MANAGEMENT, VOL. 46, PP. 351-356, 2009.