

Behavioural Aspects of ERP System of an Indian Steel Manufacturing Industry

Dr. Shyam Prasad*

Interaction between people, processes, data and technology is broadly referred to as Information System (IS). Enterprise Resource Planning (ERP) systems integrates several business functions of an organization like customer relationship management, projects, human resources, manufacturing, data warehouse, financials and supply chain management into one single configurable information system. ERP user's satisfaction plays a greater role in the success of an ERP project. This paper examines the behavioral aspects of the ERP System of an Indian Steel Manufacturing Industry by examining the deviation in satisfaction level among ERP users with different personal aspects of an employee namely age, education, IT experience and department of employment. The study also measures ERP user's satisfaction using a few satisfaction measure items and gives insights for managers who run ERP projects at a steel manufacturing company or enterprises that intend to acquire an ERP system similar to it, about the major factors determining ERP users' satisfaction and consequently contributing to an ERP system's success. More specific, from a managerial standpoint, the results of this study can inform managers about the multidimensional feature of ERP users' satisfaction and assist them to develop appropriate intervention practices and processes aiming to increase their users' satisfaction during and after the implementation process.

INTRODUCTION

Enterprise resource planning systems integrate several business functions of an organization into one single configurable information system (IS). An ideal ERP system is when a single database is utilized and contains all data for various software modules like Manufacturing, Financials, Supply Chain Management, Projects, Human Resources, Customer Relationship

* Dr. Shyam Sundar Prasad is an Asst. Professor with National Institute of Technology, Jamshedpur with 14 papers to his credit published in various International, National Journals and conference proceedings of repute and another 7 papers have been published in various IEEE proceedings. He has written 4 articles/chapters for books. He is Senior Member of IEEE (USA), Life member ISTE; he is branch counselor for IEEE student branch of NIT Jamshedpur, Jharkhand, India. Presently he is FPM Scholar at XLRI, Jamshedpur, India.

Management and Data Warehouse (Markus et al. 2000). ERP user's satisfaction plays a greater role in the success of an ERP project.

Available literatures reveal that the focus of most of the study about ERP user's satisfaction is centered on the following two factors:

The Importance of User's Satisfaction in ERP System Success

ERP users attitude (Abdinnour-Helm et al., 2003), behavioral factors influence (Amoako-Gyampah, 2007; Chang et al., 2008), user satisfaction (Powers and Dickson, 1973; Zmud 1978), IS success and user satisfaction (DeLone and McLean, 1992) ERP users' satisfaction (Somers et al., 2003; Calisir and Calisir, 2004; Zviran et al., 2005; Holsapple et al., 2006; Wu and Wang, 2006, 2007).

Information System User's Satisfaction Definition and Measurement

Computer user's satisfaction (Bailey and Pearson 1983; Doll and Torkzadeh, 1988), information system satisfaction (Ives et al., 1983). End-user computer satisfaction (EUCS) (Somers et al., 2003; Doll and Torkzadeh's, 1988), factors influencing ERP end-user satisfaction (Calisir and Calisir, 2004), relations between user satisfaction and perceived usefulness (Zviran et al., 2005), user characteristics (Holsapple et al., 2006) instrument for ERP ultimate-user satisfaction measurement (Wu and Wang, 2006).

This paper focuses on the issues related to ERP user's satisfaction of Indian steel manufacturing industry; it tries to identify those factors affecting satisfaction level of ERP users and suggests a suitable remedy for the same.

RESEARCH METHODOLOGY

Research Method

A case study strategy was chosen to study the key factors that constitute ERP Users satisfaction and to explore whether ERP users satisfaction varies among different users profiles of Indian Steel manufacturing employees. Case study strategy is particularly well-suited since the interest has shifted to organizational rather than technical issues. Case study research has been suggested as an effective method in testing theory within IS research (Lee, 1989), single organization and single technology studies have become common in IS research (Amoako-Gyampah, 2004; Longinidis-Gotzamani 2009).

Steel manufacturing organization is selected as our research company because it has some unique attributes. First, it is a large organization, with various departments and users who utilize different modules of the ERP system. This fact enabled the collection of quantitative data through questionnaires. Second, before and after the introduction of the ERP system a lot of other, specific purposed and non-integrated, IS were used by users. Thus, they had adequate experience and knowledge to express their satisfaction attitudes and to evaluate ERP system's success. The time frame between ERP's full implementation and this study is ideal for users to form opinions about ERP, since the company is expanding through

acquisition and organic growth fed by global expansion of its operations all these need to be integrated through an ERP solution.

Research Model and Hypothesis

Even though ERP Systems enable companies to gain lot of advantages, but it is not a medium guaranteeing success. The success obtained from ERP depends mainly upon successful implementation of ERP which in turn depends greatly on its user's satisfaction. It has been observed that still lots of activities are done manually and workforce at times resist working on ERP. The implementation is successful only when the ERP users are satisfied, thus the research aims to examine the key factors that constitutes ERP users satisfaction and at the same time to explore whether ERP users satisfaction varies over different users profiles.

The present study investigates ERP users' satisfaction using 19 satisfaction measure items that were extracted from various literature reviews and was also used by (Longinidis-Gotzamani 2009) to carry out a similar study for a different location and organization. The study also investigates the existence of deviation in satisfaction levels among ERP users with different characteristics, namely: department of employment, age, education, and IT experience of various ERP users of steel industry.

More specifically the hypotheses under investigation are:

H1. ERP users among different departments have different levels of satisfaction with the ERP system.

H2. ERP users with different age have different levels of satisfaction with the ERP system.

H3. ERP users with different level of educational background have different levels of satisfaction with the ERP system.

H4. ERP users with different work experience in the use of IT have different levels of satisfaction with the ERP system.

Data Collection Procedure

The data for this study was collected through a structured questionnaire which was earlier used by Longinidis and Gotzamani (2009) and modified suitably for ERP users of Indian Steel Industry. The questionnaire had three parts. The first part included demographic information, the second part contained 19 scale questions based on previous empirical studies in the field of IS user satisfaction measurement (Bailey and Pearson, 1983; Ives et al., 1983; Doll and Torkzadeh, 1988; Calisir and Calisir, 2004; Zviran et al., 2005; Wu and Wang, 2006), and the last part involved questions about overall satisfaction with the ERP system.

Questionnaire description

The covering letter attached to the questionnaire described the study and assured respondents of anonymity. The questionnaire contained three parts. The first part included demographic

information which included users profile having characteristics like Department, Age, Education background and IT work experience, the second part contained 19 scale questions which gave the user a chance to rate ERP satisfaction on a scale of 1-7 (absolute disagreement, strong disagreement, disagreement, neutral, agreement, strong agreement and absolute agreement) and the last part involved questions about overall satisfaction with the ERP system.

Sampling method

A multistage quota sampling was used. Accordingly, a total of 150 end respondents were contacted comprising of respondents varying in Age, Department, Education background and IT work experiences. Care was taken to ensure that within each category equal number of representation of respondents were there. Such a type of sampling technique was necessary owing to exploratory nature of the study. After data collection, it was found that 17 respondents' questionnaire were incomplete. Thus the analysis was carried out on 133 responses.

ANALYSIS AND ANALYTICAL RESULTS

In order to reduce the initial number of 19 satisfaction measure-items and to identify a smaller set of factors, exploratory factor analysis was employed. They were validated by the Bartlett Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of the sampling adequacy. The regression method was employed for estimating factor score coefficients. Finally, the hypotheses were examined through parametric and non-parametric statistical inference tests with the statistical software SPSS[®] version 17.0.

An initial set of 19 items for measuring satisfaction was reduced to 13 items comprising of 3 main factors, "Performance and Scope of ERP", "ERP utility and flexibility" and "Interaction with IT department" explaining 47.517%, 9.060% and 7.559% of the variance explained. Thus the total variance explained cumulated to 64.136%.

The reliability of the instrument was verified through the Cronbach's coefficient and Pearson correlation. The instrument had a Cronbach's coefficient of 0.902, confirming its high reliability. The Pearson correlation between sum of items and overall satisfaction item was 0.745 assuring adequate criteria related reliability.

Simultaneous multiple regression analysis was employed in order to determine with certainty whether the three factors extracted, were significant predictors of the ERP users' satisfaction. The combination of the 3 factors, "Performance and Scope of ERP", "ERP utility and flexibility" and "Interaction with IT department", predicted user satisfaction, based on the F-statistic test. From the R² value, almost 56% percent of the variance was explained by the model.

MANAGERIAL IMPLICATION

From the study, it has been observed that there was a statistically significant difference in the satisfaction levels between the two departments' users. On the other hand, there was no

significant difference between the users with different age, education, department or IT experience.

This study found that the three main factors constituting the level of ERP users' satisfaction are "Performance and Scope of ERP", "ERP utility and flexibility" and "Interaction with IT department". As "Performance and Scope of ERP" explained maximum variance among the three factors, it was observed to be the strongest factor affecting ERP satisfaction. Thus it is suggested that ERP scope issue, if any, arising with restructuring of processes, be resolved at the earliest, along with the reconfiguration requirement, to maintain the level of satisfaction among users.

The study also indicated "ERP utility and flexibility" as one of the factors. The ERP may require specific changes to suit the utility of the particular department and to provide greater flexibility for adaptation of ERP. Since the service and support requirement varies with change in technology, the factor "Interaction with IT department" also affects ERP user satisfaction.

CONCLUSION AND LIMITATIONS

This study concludes that ERP user satisfaction varies only across departments and not on the other demographic factors like age, education, IT experience. Successful implementation of ERP happens only when the ERP is customized to the need of each department. With the adaptation in latest technology, the processes and functionality changes with time, requiring the scope of ERP is to be reconfigured to match the varying requirement. It is found that the level of ERP user satisfaction varies with the time and change in scope across various departments of the company.

Hence, it is desired to have an ERP solution, which is flexible enough to reconfigure the scope of ERP with varying need of different departments, at the earliest. Moreover, steps may be taken to facilitate over-the-phone and online IT service so resolve ERP issues.

This study may have a potential limitation as it was conducted in one organization, with a unique organizational culture and some special characteristics; the results might not hold true in other organizations and environments.

References

- Abdinnour-Helm, S., Lengnick-Hall, M.L. and Lengnick-Hall, C.A. (2003), "Pre-implementation attitudes and organizational readiness for implementing an enterprise resource planning system", *European Journal of Operational Research*, Vol. 146 No. 2, pp. 258-73.
- Amoako-Gyampah, K. (2004), "ERP implementation factors: a comparison of managerial and end-user perspectives", *Business Process Management Journal*, Vol. 10 No. 2, pp. 171-83.
- Amoako-Gyampah, K. (2007), "Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation", *Computers in Human Behavior*, Vol. 23 No. 3, pp. 1232-48.
- Bailey, J.E. and Pearson, S.W. (1983), "Development of a tool for measuring and analyzing computer user satisfaction", *Management Science*, Vol. 29, No. 5, pp. 530-45.

Calisir, F. and Calisir, F. (2004), "The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end user satisfaction with enterprise resource planning (ERP) systems", *Computers in Human Behavior*, Vol. 20, No. 4, pp. 505-15.

Chang, M.-K., Cheung, W., Cheng, C.-H. and Yeung, J.H.Y. (2008), "Understanding ERP system adoption from the user's perspective", *International Journal of Production Economics*, Vol. 113 No. 2, pp. 928-42.

DeLone, W.H. and McLean, E.R. (1992), "Information systems success: the quest for the dependent variable", *Information Systems Research*, Vol. 3 No. 1, pp. 60-95.

Doll, W.J. and Torkzadeh, G. (1988), "The measurement of end-user computing satisfaction", *MIS Quarterly*, Vol. 12 No. 2, pp. 259-74.

Holsapple, C.W., Wang, Y.-M. and Wu, J.-H. (2006), "Empirically testing user characteristics and fitness factors in enterprise resource planning success", *International Journal of Human-Computer Interaction*, Vol. 19 No. 3, pp. 323-42.

Ives, B., Olson, M.H. and Baroudi, J.J. (1983), "The measurement of user information satisfaction", *Communications of the ACM*, Vol. 26 No. 10, pp. 785-93.

Lee, A.S. (1989), "A scientific methodology for MIS case studies", *MIS Quarterly*, Vol. 13 No. 1, pp. 33-50.

Longinidis, P. and Gotzamani, K. (2009), "ERP user satisfaction issues: insights from a Greek industrial giant", *Industrial Management and Data Systems*, Vol. 109 No. 5, pp. 628-645.

Markus, M.L., Tanis, C. and Fenema, P.C.V. (2000), "Multisite ERP implementations", *Communications of the ACM*, Vol. 43 No. 4, pp. 42-6.

Powers, R.F. and Dickson, G.W. (1973), "MIS project management: myths, opinions, and reality", *California Management Review*, Vol. 15 No. 3, pp. 147-56.

Somers, T.M., Nelson, K. and Karimi, J. (2003), "Confirmatory factor analysis of the end-user computing satisfaction instrument: replication within an ERP domain", *Decision Sciences*, Vol. 34 No. 3, pp. 595-621.

Wu, J.-H. and Wang, Y.-M. (2006), "Measuring ERP success: the ultimate users' view", *International Journal of Operations and Production Management*, Vol. 26 No. 8, pp. 882-903.

Wu, J.-H. and Wang, Y.-M. (2007), "Measuring ERP success: the key-users' viewpoint of the ERP to produce a viable IS in the organization", *Computers in Human Behavior*, Vol. 23 No. 3, pp. 1582-96.

Zmud, R.W. (1978), "An empirical investigation of the dimensionality of the concept of information", *Decision Sciences*, Vol. 9 No. 2, pp. 187-95.

Zmud, R.W. (1979), "Individual differences and MIS success: a review of the empirical literature", *Management Science*, Vol. 25 No. 10, pp. 966-79.

Zviran, M. (1992), "Evaluating user satisfaction in a hospital environment: an exploratory study", *Health Care Management Review*, Vol. 17 No. 3, pp. 51-62.

Zviran, M., Pliskin, N. and Levin, R. (2005), "Measuring user satisfaction and perceived usefulness in the ERP context", *Journal of Computer Information Systems*, Vol. 45 No. 3, pp. 43-52.