Evaluating User Satisfaction with ERP System at Dead-Sea Works

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Abstract

This research examined User Satisfaction (US) with an ERP system at Dead-Sea Works (DSW). The first phase of the project reviewed prior research in this area and identified two variables that possibly influencing US, Perceived Usefulness (PU) and User Attitude (UA), as well as relevant user characteristics, such as department, seniority, age, position, education level, computer experience, training level, and frequency of use of the ERP system. In the second phase of the research, a sample of ERP users at DSW were surveyed, using a questionnaire for data gathering regarding US and the other variables. The statistical data analysis included: a parametric one-way analysis of variance (ANOVA), Kruskal - Wallis for a nonparametric one-way analysis of variance, Least Significant Difference (LSD) for homogeneity, Pearson, and linear regression. On a scale of 0 to 100, the analysis revealed that the general level of US stands at 76.6, the level of PU at 80.3, and the level of UA at 86.7. The variables found to influence US were the department to which the ERP user belongs, education level, and frequency of use of the ERP system. For example, the higher the frequency of ERP use the higher the level of US. The results revealed that the frequency of use of the ERP system affects PU and UA. The department affects UA as well. We also found a positive correlation between PU and US (R=0.806) and between UA and US (R=0.689). In sum, the level of US among DSW employees is influenced by PU and UA, although there are no significant differences between users with different characteristics. It can be assumed that the main reasons for that are: 1. management support; 2. successful implementation of the ERP system; and 3. lack of fit between the questionnaire and the characteristics of the organization and the ERP system.

1. Introduction

Dead Sea Works (DSW), a business unit of ICL Fertilizers, is the world's fourth largest producer and supplier of potash products, as well as a broad range of chemical products, including magnesium chloride, anhydrous aluminum chloride, industrial salts, de-icers, Pliskin N. Ben Gurion University of The Negev Beer-Sheva, Isarel <u>pliskinn@bgu.ac.il</u>

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bath salts, table salt and raw materials for the cosmetic industry.

In 1998, DSW implemented Version 3.1 of SAP's R/3 ERP system [1,2] was implemented in the organization and in 2003 DSW upgraded the ERP system to Version 4.6. This study is focused on examining User Satisfaction (US) with the ERP system at DSW.

2. Literature Review and Research Question

Somers, Nelson and Karimi [3] defined US as "The affective attitude towards a specific computer application by someone who interacts with the application directly". Cyert and March [4] were the first to offer measuring US as a substitute for measuring the success of systems, claiming that a system that answers user's needs, strengthens his or her level of US. Furthermore, we identified two variables that possibly influence US, Perceived Usefulness (PU) and User Attitude (UA). According to Davis, Bagozzi and Warshaw [5], PU is "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context", meaning, that once the information system is perceived as being sufficient, useful and valuable, it is then more likely that the user finds satisfaction with it. According to Ajzen and Fishbein [6], UA is an "individual's positive or negative feelings (evaluative affect) about performing the target behavior". It is safe to say, that in a given situation in the field of information systems, US includes an idividual's positive or negative feeling or attitude towards it. Zviran [7] claims that in order to better understand the success of implementing an ERP system and level of US, the connection between user characteristics and US must be examined. There are a few user characteristics that might influence US, PU and UA, such as department, position, education level, age, computer experience, training level, seniority, and frequency of use of the ERP system. Based on prior research, done by Zviran [7] and Zviran, Pliskin and Levin [8], we decided to investigate and present the connection between the user characteristics mentioned above and US, PU and UA: 1. Department - "several studies have found significant differences between

different user groups in terms of user satisfaction and in terms of perceived usefulness",[8]; 2. Position - "several studies have examined organizational level as a variable affecting US. The results are contradictory. Some studies show no correlation between organizational level and user satisfaction. Other studies report satisfied low-level employees as opposed to very unsatisfied managers", [7]; 3. Education level - Zhang, Zhang and Banerjee [9] claim that an individual with a higher level of education tends to use the computer more than an individual with a low level of education and therefore will have greater satisfaction; 4. Age - "older people, who were generally educated and trained without the benefit of computer technology, are more likely to have a fear of technology. By contrast, younger generations, many of whom were often introduced to computer technology in their high school years or even

earlier, generally feel more comfortable with it", [7]; 5. Computer experience - "computer skills, often measured by years of computer experience, have been thoroughly examined as a variable in computing studies. It is intuitively evident that higher levels of the computer skills (measured by years of computer experience) will lead to greater use of computers and greater IT satisfaction" [7] and [10] . 6. Training level - a research that was conducted in 2003 at Griffith University, Australia, examined US with ERP users. It was found that 78% of the participants thought that the training given to them after the implementation of the ERP system, was the main factor influencing their work performance and therefore, their US with the system- [11] and [9]; 7. Seniority - according to Somers, Nelson and Karimi [3], in a survey done to measure US, a question was asked - how long does the employee work in the organization? The data received was not examined as influencing US, but we believed that this characteristic might influence US; 8. Frequency of use of the ERP system - this characteristic was not investigated in prior research, but we suppose that a frequent ERP user will be more satisfied with the system. Based on the above, we introduce the following hypotheses: 1. Define the connection between PU and US and between UA and US (US being the dependent variable); 2. Examine the connection between the aforementioned user characteristics and PU, UA and US.

3. Research Method

The research method selected was quantitive survey conducted in the DEAD SEA WORKS Company. Pilot questionnaire was composed and distributed among a small sample of ERP users and information systems experts. The pilot was conducted twice, and given the remarks and suggestions, a final questionnaire was written.

In the final questionnaire we used the Likert scale, presented first in 1932. The scale is simple, all items are presented as claims in short sentences, which conduct a view or claim on selected subject. Therefore the format of the final questionnaire is mainly scaled questions, with the scale of 1-5, that the examinee has to mark his agreement level with the statement. The first (and minor) part of the

questionnaire is general questions about demographic variables identified (as explained in the above section) and few details about the department and company.

4. The Research

A sample of 120 ERP users at DSW was surveyed, using the final questionnaire for data gathering regarding US and the other variables. The cooperation with company was remarkable, and the selection of users was done by the research team. We must emphasize that the company is using SAP R/3 System since 1998, and in 2003 performed an upgrade of R/3 system. All personnel are working with the ERP system for several years now and are well qualified on it.

For the statistical analysis we used SPSS software. The statistical data analysis included: a parametric one-way analysis of variance (ANOVA), Kruskal – Wallis for a nonparametric one-way analysis of variance, Least Significant Difference (LSD) for homogeneity, Pearson, Spearman, and linear regression

5. Main Finding

The analysis revealed that the general level of US stands at 76.6%, the level of PU at 80.3%, and the level of UA at 86.7% (scale transformation to 1-100). Those findings are summarized in Table no. 1.

Table No. 1: Findings Summary

Satisfied population	Average percentage	SDV	Average	Vari able
36.8 %	76.59 %	0.565572	3.829802	US
62.2 %	80.27 %	0.531957	4.013725	PU
86.8 %	86.76 %	0.506767	4.338	UA

A number of user characteristics were found to influence US, PU and UA. The variables influencing US are: 1. department to which the ERP user belongs - the departments found to have high US were maintenance and service, human resource, marketing, information systems, accounting, and acquisitions. This result could stem from the fact that the ERP system is essential to the employees' work in the above departments; 2. Education level - users with a higher educational level are less satisfied than users with a lower educational level. The reason for this, is that most highly educated employees are managers who do not use the ERP system frequently; 3. Frequency of use of the ERP system - the higher the frequency of ERP use the higher the level of US; 4. Level of training. The results also revealed that a high or medium frequency of use of the ERP system indicates a high level of PU. UA is also influenced by the frequency of use and the level of training. It seems that the most frequent users have positive attitudes towards the ERP system. We also found a high positive correlation between PU and US (R=0.806) as

demonstrated in figure no. 1. We found medium positive correlation between UA and US (R=0.689), as demonstrated in Figure no. 2.



Figure no. 1 : The correlation found between US and PU



Figure no. 2 : The correlation found between US and UA

6. Conclusions

We can refer to our initial hypothesis and conclude that we shoed that the variables influencing on US (User satisfaction) are – department, education, frequency of use and training level. The variables influencing on PU (Preserved Usefulness) and on UA (User Attitude) are frequency of use and training level.

We found a high positive correlation between PU and US (R=0.806). We found medium positive correlation between UA and US (R=0.689).

In conclusion, the level of US among the employees at DEAD SEA WORKS (DSW) is influenced by PU and UA, although there are no significant differences between users with different categories of the mentioned characteristics. It can be assumed that the main reasons for that are: 1. management support; 2. successful implementation of the ERP system; 3. lack of fit between the questionnaire and the characteristics of the organization and the ERP system.

7. Further Research

The issues that are open to research are if the other variables, that literature showed clear influence and in this research we could not prove this influence, can be affecting variables on other companies or in bigger sample size. More open issues are is the size of the company is an affecting variable (research in SMB's) or if culture is affecting (comparative research is other countries as well).

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