

## The impact of organizational and human factors on the successful implementation of ERP system in water authority of Jordan

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**Abstract.** The implementation process of the Enterprise resource planning (ERP) systems is complex, costly and influenced by several critical factors. Organizational and human factors are the most critical success or failure factor for Enterprise Resource Planning (ERP) systems implementation. This paper aims to study the impact of these factors on the successful implementation of ERP system in Water Authority of Jordan; which is a governmental institute responsible of distributing water to participants in Jordan. The methodology of this paper is based on deductive and quantitative method; a questionnaire is designed with (43) questions. The population consists of (77) employees working on the ERP system in the Water Authority of Jordan. Intentional sample of (58) employees working at the main center in Amman was taken. Fifty-seven questionnaires were distributed and (51) were returned. Statistical Package for the Social Sciences (SPSS) program version (12) is used to analyze every item in the questionnaire. While the statistical analysis consists of Cronbach's Alpha, its value is (0.897), Mean and Standard Deviation, Pearson Correlation, and Linear Regression. The results show that there is statistically significant impact of Organizational and Human factors on the successful implementation of the ERP system in the Water Authority of Jordan.

### 1. Introduction

ERP system is a major and sensitive tools that helps organizations to enhance their functional abilities, improve their performance, develop their decision-

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making processes and gain competitive advantages [4]. An ERP system is an integrated software package composed by a set of standard functional modules such as: Finance, Human resources, Production Planning, Material Management, Marketing and Sales [3]. These modules integrate and interact to achieve the organizations' goals. ERP system typically attempts to cover all basic functions of business, regardless of the organizations business or charter. Business, Non- profit Organization, Non- Governmental Organization, Governments and other large entities utilize ERP system [5]. ERP have come a long way evolving from the early 1960s to the present time, as illustrated in Figure (1).



Figure 1: The Evolution of ERP System

In 1960's, Most of the software packages were designed to handle inventory based on traditional inventory concepts. Then in 1970's the focus shifted to MRP (Material Requirement Planning) systems which is simply about ensuring the materials are available to manufacture a specific part in a specific volume. After that, in 1980's, the concept of MRP-II systems evolved, and it takes care of all other aspects of a job including ordering, tracking inventory and ensuring capacity. In 1990's the ERP is defined as an integrated information system that serves all departments within an enterprise like engineering, finance, human resources, project management [19].

While in 2000's the ERP II software provides an integral coordination of activities, which are carried out at every department of the enterprise. And in 2010's Alternate ERP Solutions begin implemented like Open Source and On-Demand ERP Applications [12]. And recently in 2015, the cloud ERP starts to be implemented [10]. The Implementation of Enterprise Resource Planning System (ERP) is an advanced, complex and requires a lot of preparation and

readiness in addition to its costly to organizations. As it's known, Jordan is a small country and its resources are few and greatly influenced by the circumstances of the global economic. Also, Water Authority of Jordan (WAJ) is a government establishment that regulates administers and oversees activities in the water sector of Jordan for participants. Through its main subsidiaries; it provides waste water treatment and desalination services; distribution of water. WAJ has implemented ERP system for Finance and Human Resources, this paper aims to determine the impact of the Critical Success Factors of Organizational and Human on the successful implementation of ERP system.

## 2. Related work

ERP systems support the organizations' functionality, sharing data, performance and enhance the process of decision-making in addition to improve the organizations' management of the processes [4,8]. Many factors play a critical role in implementation success or failure for the ERP systems including Organizational, technological and human factors [1,2]. Afaneh et al. [1] studied the influence of the technological and the organizational factors during the ERP system implementation at the Greater Amman Municipality (GAM). The authors found that there is a correlation between the availability of the organizational factors and the success on ERP System Implementation. Also, Afaneh et al. [1] stated that the availability of the advanced technological infrastructure is a major to guarantee the success of ERP implementation. AlHadid et al. [2] investigated the relationship between the human factors and the ERP system implantation, the authors stated that the success of ERP system implementation depends on delivering an effective systems training, in addition to the top management and staff awareness about the importance of the ERP system. AlHadid et al. [2] argued that the human factors are critical and might leads to system failure. Hasan et al. [11] studied the factors that influence the ERP systems implementation by investigating the literature studies between the 2011 and 2016. The research provides a deep understanding related to the success factors that influence ERP implantation which can be adopted to develop a strategic plan to ensure the successful implementation of ERP system. Desalegn and Pettersson [8] investigated the critical success factors of an ERP implementation from a user perspective. Researchers argue that more users should be involved in the ERP implementation in addition to provide users' with the required education and training. Fadelelmoula [9] discussed the effects of the key critical success factors for ERP implementation in the higher education sector. Researcher claimed that organizations should pay more attention to the top management support, tanning, project management, technical resources, business process reengineering and consultant support factors. Researchers stated that the mentioned factors have a positive relationship with adopting ERP in the organization. Gupta et al. [10] and Baskaran [6] inspected the organizational and technological factors that affect the successful implementation of cloud ERP implementation. Re-

searchers also study other factors that influence the cloud ERP implementation such as security, compliance and network. Reitsma et al. [15] stated that the top management should prioritize the following critical success factors when implementing an ERP system. The factors include the users training and education, business process reengineering and communication across organizational levels and teams. Yildirim and Kuşakci [20] studied the critical success factors of ERP selection and implementation in logistics sector. Researchers found that the factors that affect the success of ERP implementation in an organization are the continuous support of top management and the ERP system compatibility with the fundamental business processes in addition to the reengineering of the business processes in the organization. from the previous studies, we find the factors that influence the success or failure of the ERP system implementation are organizational and human factors including the lack or inadequate training for end users, incompatible business process reengineering or lack of management commitment and support in addition to the availability of the technological factors [1,2,7,9,13,14].

### **3. The paper model**

The researchers depended in building the paper model on previous studies that are related to the subject of the research, and then chose the common factors among these studies, which explained the critical factors affecting the application of ERP system. After that the researchers relied on the above mentioned according to what was consistent with Jordan Environment and the objectives of the paper to build a model with the proposed independent factors affecting ERP system implementation, which is described in Figure (2).

#### **3.1 Hypothesis**

(H1): There is no statistically significant Impact of Organizational Factors on the successful implementation of ERP System in Water Authority of Jordan. Organizational Factors in the following studies were adopted as factors for the successful implementation of the ERP system [6,9,10,14,15].

(H2): There is no statistically significant Impact of Human Factors on the successful implementation of ERP System in Water Authority of Jordan.

(H2:a) - There is no statistically significant Impact of Top Management Support on the successful implementation of ERP System in Water Authority of Jordan.

(H2:b) - There is no statistically significant Impact of Staff Training on the successful implementation of ERP System in Water Authority of Jordan.

These studies used the Top Management Support and the Staff Training as a Critical Success Factor on the implementation of ERP [6,9,11,13,14,15].

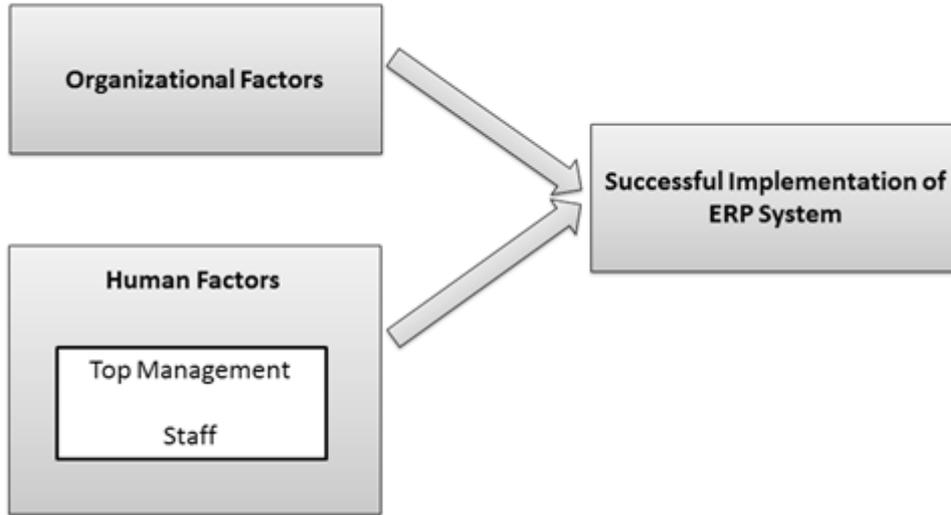


Figure 2: The Model

### 3.2 The methodology

The methodology of this paper is based on deductive and quantitative method, thus, a questionnaire is designed to measure the impact of the independent and dependent Organizational and Human Factors on WAJ. The questionnaire consists of (43) questions, (23) questions for the Organizational Factors, and (20) questions for the Human Factors.

### 3.3 The population and sample

The population consists of (77) employees working on the ERP system in the Water Authority of Jordan. Intentional sample of (58) employees working at the main center in Amman was taken. Fifty-seven questionnaires were distributed and (51) were returned. After examination all the questionnaires were valid, and the sample size is acceptable for analysis according to Sekaran [16].

### 3.4 The statistical analysis

The statistical analysis that is used the following statistical ways by using Statistical Package for the Social Sciences (SPSS) program version (12) to analyze every item in the questionnaire:

- Means and Standard deviation: to examine the hypothesis, and to identify the relative importance.
- Cronbach's Alpha: to verify the reliability of the used questionnaire [17] in this paper, Cronbach's Alpha value is (0. 897).

- **Correlation:** is a term that refers to the strength of a relationship between two variables. A strong, or high, correlation means that two or more variables have a strong relationship with each other while a weak, or low, correlation means that the variables are hardly related. Correlation coefficients can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation while a value of +1.00 represents a perfect positive correlation. A value of (0.00) means that there is no relationship between the variables being tested. In this paper the researchers used Pearson correlation test to find a correlation between the dependent and independent variables.
- **- Linear regression:** Regression analysis is used to determine the impact of the independent factor on the dependent factor. In other words, is there an impact for the independent factor on the dependent variable or not? If the sig value in the test is less than 5% It means no effect, If it is greater than 5%, then there is an effect of the independent variable on the child [18].

Each item in the questionnaire was divided into 5-points according to Likert-type scale, and was determined in five levels as the follows: strongly agree given (5) degrees, agree given (4) degrees, neutral given (3) degrees, disagree given (2) degrees, and strongly disagree given (1) one degree. In addition, to use judge scale for the responses, in this paper the level of significance of the measures was distributed according to Table (1).

Table 1: Measures Significance Levels

<b>Likert Scale Levels</b>	<b>Range</b>
Strongly Disagree	1-1.80
Disagree	1.81-2.61
Neutral	2.62-3.42
Agree	3.43-4.23
Strongly Agree	4.24-5

The level of the significance was used to analyze and study the arithmetic Mean for the sample, whether it is agree or disagree for each question. So if the Mean from (1) to (2.61) degree, that means disagree, or the range between (2.62) to (3.42) degree it means neutral, and if Mean between (3.43) to (5) degree, that means agree.

#### 4. Results and analysis

The researcher calculated Cronbach's Alpha for all the areas of the questionnaire (with 43 questions) to test the reliability of each section; Cronbach's Alpha value is (0.897) which is accepted, because the value is above or more than (0.6) which

is the minimum acceptable value. If the same test is returned to another sample of the same population, the results will be close to (89%).

#### 4.1 Demographic characteristics of the research sample

Figure (3) shows that the number of females in the sample is (18) by (35.3%), and that the number of males is (33) by (64.7%).

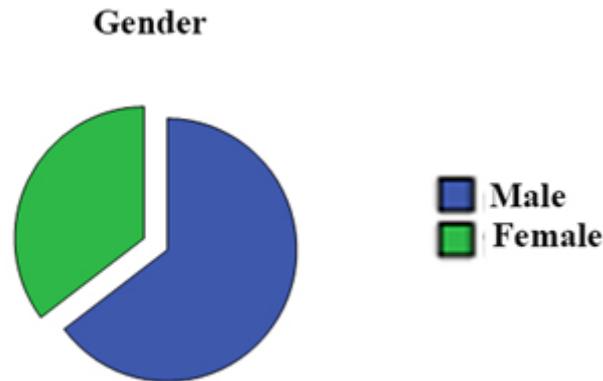


Figure 3: Gender characteristics of the research sample

Figure (4) illustrates the distribution of the sample of Positions, where it is clear that the number of Employees is (36) by (70.5%), Heads of Departments is (12) by (23.5%) and the number of Managers is (3) by (6%).



Figure 4: Position characteristics of the research sample

Figure (5) shows the sample distribution on the number of years of experience in WAJ, where more than (54%) of the sample has more than (10) years' experience.

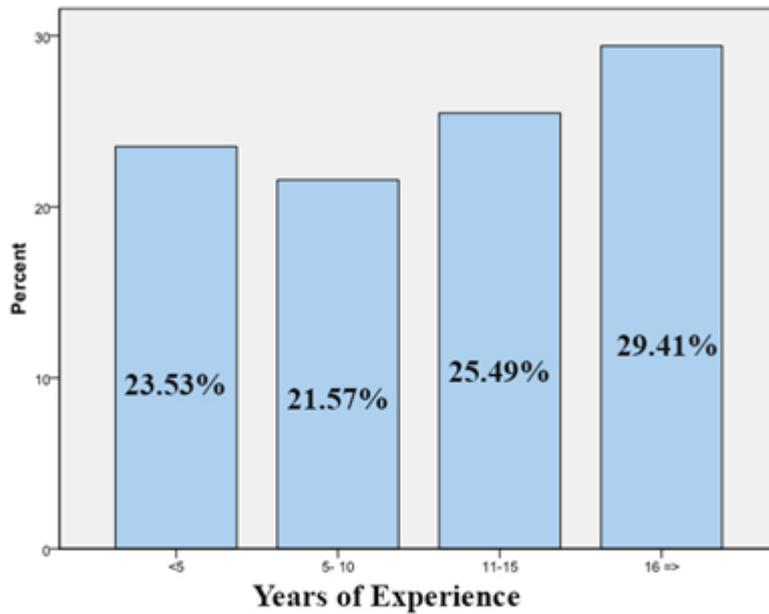


Figure 5: years of experience in WAJ

#### 4.2 Hypotheses testing

(H1): There is **no** statistically significant impact of Organizational factors on the successful implementation of the ERP system in Water Authority of Jordan.

To examining this Hypothesis the researchers first: calculates Mean and Standard deviation for each item for the Organizational Factors in WAJ in Tables (2) and (3). Second calculates Pearson Correlation to examine whether there is a relationship between the Organizational Factors and the successful implementation of the ERP system in Table (4), and then the Linear Regression test is calculated to see if there is an impact of these factors on the implementation of the ERP system in Table (5).

Table (2) shows the descriptive analysis of the questions related to the Organizational factors, from which it can be observed that all the Mean values fall within the acceptance area according to the significance of the measures of the five-dimensional Likert scale, as well as all the standard deviations are less than 1, which means the acceptance of the values of Mean. So, the sample agrees with the availability of Organizational factors in WAJ.

Table 2: Descriptive Statistics of the Organizational Factor

Section	Max.	Min.	Mean	Std.
<b>Group1</b>				
1. The objectives in our organization are obvious for managers.	5	1	3.82	.910
2. The objectives in our organization are obvious for employees.	5	1	3.71	0.923
3. The procedures are clear for managers.	5	1	3.90	0.806
4. The procedures are clear for employees.	5	1	3.88	.765
5. The daily operations and plans are understood by the employees.	5	1	3.94	0.835
6. The control standards in the organization are obvious and specific.	5	1	3.63	0.937
7. The managerial level in the organization is task and duty specified.	5	1	3.82	0.842
8. All the Systems in the organization are integrated & facilitate the communication with the outside.	5	1	3.67	0.792
9. All the Systems in the organization are integrated & facilitate the communication between the organization's departments.	5	1	3.59	0.920
16. The employees in the IT department are experienced with efficient.	5	3	3.98	0.648
17. There is a maintenance staff in the IT department.	5	3	4.02	0.616
18. The role for communication in the organization is clear.	5	1	3.80	0.849
19. The LAN in the organization increases the efficiency of exchanging information between the employees.	5	2	3.78	0.783
23. ERP system provides the suitable Security mechanism.	5	1	3.88	0.864
<b>Total</b>			3.82	0.82

Table (3) shows the descriptive analysis of the questions that are related to the implementation of the ERP system in WAJ. The table shows that all questions have Mean values in the acceptance area according to the statistical significance levels of the five-dimensional Likert scale and that all standard deviations are less than 1. Except the question (13); ERP System contributes in

enhancing the exchange of ideas and experiences between the employees in the organization. The Mean is (3.55) but the standard deviation is (1.006), i.e., more than 1. This indicates that there is a different view of the sample members on the extent to which the ERP system can help to exchange ideas among workers within the authority.

Table 3: Descriptive Statistics of the ERP System

Section	Max.	Min.	Mean	Std.
<b>Group2</b>				
10. ERP System supports and achieves our objectives.	5	1	3.82	0.817
11. ERP System improves the operations and services.	5	1	3.80	0.825
12. ERP System supports the decision making processes.	5	1	3.84	0.857
13. ERP System contributes in enhancing the exchange of ideas and experiences between the employees in the organization.	5	1	3.55	1.006
14. The new (ERP) system will minimize the time of the operation.	5	1	3.98	0.905
15. ERP System contributes in facilitating exchange of ideas and experiences with the rest of the governmental institutions' work.	5	1	3.67	0.909
20. The ERP system helps in facilitating the exchange of information via communication channels.	5	1	3.69	0.905
21. ERP system helps to optimize the utilization of Hardware (HW) in WAJ.	5	1	3.67	0.841
22. ERP system helps to optimize the use of available Software (SW) in WAJ.	5	1	3.78	0.832
<b>Total</b>			3.76	0.877

The other side for testing this hypothesis is to use Pearson Correlation test between group1 (q1,q2,q3,q4,q5,q6,q7,q8,q9,q16,q17,q18,q19,q23) and group2 (q10,q11,q12,q13,q14,q15,q20,q21,q22). The table (4) explains there is a positive correlation between group (1) and group (2). The value for Pearson Cor-

relation is (0.799) this Correlation is significant at the 0.01 level (1-tailed). The results in table (4) indicate that there is a significant correlation of Organizational Factors on ERP System implementation, with an error rate of not more than 1%. So there is availability of the Organizational Factors for Success ERP System implementation in WAJ.

Table 4: Correlation between Organizational Factor and ERP System

		Group1	Group2
Group1	Pearson Correlation	1	.799 (**)
	Sig. (1-tailed)	.	0.000
	N	51	51
Group2	Pearson Correlation	.799 (**)	1
	Sig. (1-tailed)	0.000	.
	N	51	51

\*\*\* Correlation is significant at the 0.01 level (1-tailed).

Table (5) shows the results of the Linear Regression test between the Group1 related to Organizational Factors and the Group2 related to the ERP system. It is noted that the value of sig = .002 is less than 5%, i.e., it is located in the rejection zone. This means rejecting the null hypothesis and accepting the alternative hypothesis that **there is a statistically significant impact of Organizational Factors on the successful implementation of the ERP system in Water Authority of Jordan.**

Table 5: ANOVA test of Group1 and Group2

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.132	1	14.132	46.845	0.002
	Residual	14.782	49	0.302		
	Total	28.914	50			

### 4.3 Second hypothesis

(H2): There is no statistically significant impact of Human factors on the successful implementation of the ERP system in Water Authority of Jordan.

For testing this hypothesis the researchers do the same steps as in testing the first hypothesis, the results are shown in Tables from (6) to (12). The questions which are related to the Human Factors are divided into 3 groups; Group3 (q24,q25,q26,q27,q28,q29,q30) for Top Management Support, Group4 (q31,q32,q33,q34,q35,q36,q37) for Training, Group5 (q38,q39, q40, q41, q42, q43) for Employees Satisfaction.

(H2-a): There is no statistically significant impact of Top Management Support on the successful implementation of the ERP system in Water Authority of Jordan.

(H2-b): There is no statistically significant impact of Training on the successful implementation of the ERP system in Water Authority of Jordan.

Table (6) shows descriptive analysis of the degree of Top Management Support for the successful implementation of the ERP system. However, the values of Mean are at the beginning of the acceptance range with close to the neutral period, and the standard deviations are less than 1, which means there is a need to increase the support provided by the Top Management to ensure the success of the application of the system. As an example, the statistical analysis of Question (27), shows that the value of Mean is (3.37), which is in the neutral area, not the acceptance, and the highest average value is (3.57) which is at the beginning of the acceptance period.

Table 6: Descriptive Statistics of Top Management

Section	Max.	Min.	Mean	Std.
<b>Group3</b>				
24. The Top Management provides specialized managers to supervise the new ERP System in the organization.	5	1	3.51	0.967
25. The Top Management supports the solutions provided by the system.	5	1	3.57	0.946
26. The Top Management provides sufficient support for the work team responsible for the ERP System.	5	1	3.51	0.966
27. Top Management presents sufficient money required for upgrading ERP System from time to time.	5	1	3.37	0.958
28. Top management presents full support to the maintenance operations needed to the system in our organization.	5	1	3.55	0.923
29. The Top Management support the ERP system in order to support the administrative decision making process.	5	1	3.47	0.946
30. Top Management presents support in order to employees' participation in applying ERP system.	5	1	3.45	0.986
<b>Total</b>			3.49	0.956

Table (7) shows the Descriptive Analysis of the questions that are related to the Training of the employees of WAJ on the ERP system. When studying the Mean values, they are all located in the rejection area according to the statistical significance of the five-dimensional Likert scale. That is, the employees are not satisfied with the training courses and they need to develop their skills to be able to deal with the system.

Table 7: Descriptive Statistics of the Training

Section	Max.	Min.	Mean	Std.
<b>Group4</b>				
31. A time table was set to train all the users of the new ERP system.	4	1	2.25	0.917
32. The training program of ERP System provides the users with all the needs to understand and use the system.	4	1	2.29	0.986
33. We have a comprehensive training plan to train the employees on using the new system.	4	1	2.41	0.904
34. The ERP System in the organization is simple and assesses the users in self-training through following the instructions.	4	1	2.35	0.836
35. The organization provides the qualified employees & the requirements needed to train the users on using the system.	4	1	2.24	0.950
36. Training the employees on the ERP System contributes in minimizing mistakes during using the system.	4	1	2.53	0.840
37. WAJ is providing continuous training for the employees.	4	1	2.18	0.990
<b>Total</b>			2.32	0.92

Table (8) shows the Descriptive Analysis of the questions regarding the Opinion of Employees on the ERP system after use and their satisfaction with the system in terms of facilitating and speeding up the business performance. The analysis of the questions shows a high degree of satisfaction with the system by the staff, All Mean values are in the acceptance area and all standard deviations are less than 1.

Table (9) shows a significant correlation with error rate not exceeding 1% between the third group (Top Management Support) and the fifth group (related to the ERP system). This means that the provision of Top Management Support leads to the successful implementation of the system.

Table (10) shows a significant correlation with error rate not exceeding 1% between the fourth group (Staff Training) and the fifth group (related to the ERP system). This means that good Training leads to successful application of the system. Table (11) shows the results of the linear regression test between the Group3 which is related to Top Management Support and the Group5 which

Table 8: Descriptive Statistics of the Employees Satisfaction

Section	Max.	Min.	Mean	Std.
<b>Group5</b>				
38. Our employees do not find difficulties in dealing with the ERP System.	5	1	3.45	0.879
39. ERP System in the organization is easily understood due to its capabilities and usage.	5	1	3.63	0.824
40. ERP System in the organization contributes in facilitating the work procedures.	5	1	3.84	0.758
41. The ERP System in the organization is easy to be reached and dealt with.	5	1	3.89	0.883
42. The ERP System in the organization helps in facilitating the tracking of the operations in any department at any time.	5	1	3.97	0.841
43. ERP System in the organization is easy to learn.	5	1	3.63	0.848
<b>Total</b>			3.74	0.839

Table 9: Correlation between Top Management and ERP System

		Group3	Group5
<b>Group3</b>	Pearson Correlation	1	0.721 (**)
	Sig. (1-tailed)	.	0.000
	N	51	51
<b>Group5</b>	Pearson Correlation	0.721 (**)	1
	Sig. (1-tailed)	0.000	.
	N	51	51

\*\*\* Correlation is significant at the 0.01 level (1-tailed).

is related to the ERP system. It is noted that the value of sig = .003 is less than 5%, i.e. it is located in the rejection zone. This means rejecting the null hypothesis and accepting the alternative hypothesis that there is a statistically significant impact of Top Management Support on the successful implementation of the ERP system in Water Authority of Jordan. Table (12) shows the results of the Linear Regression test between the Group4 which is related to the Staff Training and Group5 which is related to the ERP system. Note that the value of (.001), that is, less than 5%, that is located in the rejection area and this means rejecting the null hypothesis and accept the alternative hypothesis that there is a significant statistical impact to Staff Training on the successful implementation of the ERP system in Water Authority of Jordan.

From the previous tests it can be said that the second main null hypothesis is rejected There is **no** statistically significant impact of Human factors on the successful implementation of the ERP system in Water Authority of Jordan.

Table 10: Correlation between Training and ERP System

		Group4	Group5
<b>Group4</b>	Pearson Correlation	1	.758 (**)
	Sig. (1-tailed)	.	0.000
	N	51	51
<b>Group5</b>	Pearson Correlation	.758 (**)	1
	Sig. (1-tailed)	0.000	.
	N	51	51

\*\*\* Correlation is significant at the 0.01 level (1-tailed).

Table 11: ANOVA<sup>b</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.361	1	13.361	53.141	0.003
	Residual	12.320	49	0.251		
	Total	25.681	50			

## 5. Conclusions

As a conclusion thus, the aim of this paper is to study the organizational and human factors that impact the influence of the ERP system implementation success or failure. As a result, there is statistically significant impact of these factors in WAJ. And the Organizational Factors in WAJ are available. While using the ERP system facilitates the administrative Processes. There is a need to increase the support provided by the top management to ensure the success of the ERP system implementation. The employees are not satisfied with the provided training courses and they need to develop their skills to use the ERP system appropriately. However, there is a high degree of satisfaction with the ERP system by the staff.

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Table 12: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.740	1	14.740	66.014	0.001
	Residual	10.941	49	0.223	.223	
	Total	25.681	50			

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