CHAPTER (4)

DATA ANALYSIS

4.0. Introduction

This chapter explains the process of data analysis and statistical outcomes. First, collected data are arranged for analysis by categorizing, coding, and entering the data into the software. After that, a variety of descriptive statistics including frequency distribution, measures of central tendencies and dispersion of variables is offered. Then, multivariate assumptions including normality, outliers, linearity, homoscedasticity and multicollinearity are examined. The structural equation modeling technique is employed to analyze the data. The measurement model is assessed using a number of goodness-of-fit measures. The outcomes of discriminant validity are demonstrated in the next section. In addition, convergent validity is evaluated using three measures: factor loading, composite construct reliability, and average variance extracted. Confirmatory factor analysis (CFA) is conducted using common model fit measures: normed $\chi2$, comparative fit index (CFI), and root mean square error of approximation (RMSEA). The SEM package AMOS 16.0 is used to test the relationships hypothesized by the research model. The fit indices from the structural model analysis are reported in this section. Finally, the hypothesized relationships are tested based on the structural model specified earlier.

4.1. Data Preparation for Data Analysis

After data was obtained via the questionnaires, it needed to be made ready for data analysis. A categorization scheme was set up and the data was then coded. Next, the blank responses were handled. After that, the data was keyed into the software program. Each of these stages of data preparation is discussed in the following paragraphs.

A coding sheet was used to transcribe the data from the questionnaire as suggested by Sekaran and Bougie (2010). As mentioned in the previous chapter, the questionnaire consisted of demographic items and also questions which measured variables. The responses to all items were coded as illustrated in Table (4.1).

Table (4.1) Codes Used for Transcription of Data from the Questionnaire

Item	Categories	Code	Item	Categories	Code
Sex	Male	1	Involvement in ERP project	Fully involved	1
	Female	2		Partially involved	2
Age	Below 30 years old	1		Not involved	3
	41-50 years old	3	ERP use period	About 1 year	1
	Over 50 years old	4		2 years	2
Education	Undergraduate	1		3 years	3
	Graduate	2		More than 3 years	4
	Postgraduate (MS)	3	ERP use frequency	About once a day	1
	Postgraduate (PhD)	4		Several times a day	2
Employment with this company	Less than 3 years	1		About once a week	3
	3-5 years	2		Several times a week	4
	6-10 years	3	All variables	Strongly disagree	1
	More than 10 years	4		Moderately disagree	2
ERP module used	Manufacturing & Logistics	1		Slightly disagree	3
				Neither agree nor disagree	4
	Finance	2		Slightly agree	5
	Human resources	3		Moderately agree	6
	Others	4		Strongly agree	7

Moreover, responses to some of the negatively worded questions were reversed so that all answers were in the same direction. For instance, a response of 7 on a seven-point Likert scale, which indicates ‘strongly agree’, really means ‘strongly disagree’ which is actually a 1 on the seven-point scale. Thus, all the negatively worded items of the questionnaire were reversed to positively worded questions. This was done by the SPSS Statistics 16.0 software through the ‘Recode’ function. So, the scores of 7 were read as 1; 6 as 2; 5 as 3; 3 as 5; 2 as 6; and 1 as 7. Furthermore, all questionnaires were reviewed to find the likely blank items. After examining all 411 received questionnaires, 27 questionnaires were ignored due to the existence of a lot of unanswered questions as advised by Sekaran and Bougie (2010). Also, there were 33 questionnaires which contained a few blank items. For these cases, ‘Replace missing value’ of the SPSS Statistics 16.0 software was employed which uses linear interpolation from adjacent points as a linear trend to replace the missing data. Finally, the questionnaire included an open-ended question at the end to allow respondents to comment on topics that might not have been completely or adequately covered. However, none of the respondents offered any significant answer.

4.2. Descriptive Statistics

Frequency distributions were obtained for all the personal data or classification variables. The characteristics of the respondents are presented in Table (4.2). As can be seen, the gender of respondents consisted of much more male respondents (85.4%) as compared to female respondents (14.6%). This percentage of male and females is representative of the current number of managers in Iranian companies most of whom are males. Age-wise, more than two-thirds (68%) of the respondents were between 31-50 years old. The age group of 41-50 years old was most in terms of proportion with 39.1 percent of the total respondents while the age group below 30 years old was the least. The statistics

Table (4.2) Characteristics of the Respondents

Measure	Categories	Frequency	Percent	Cumulative Percent
Sex	Male	328	85.4	85.4
	Female	56	14.6	100
Age	Below 30 years old	43	11.2	11.2
	31-40 years old	111	28.9	40.1
	41-50 years old	150	39.1	79.2
	Over 50 years old	80	20.8	100
Education	Undergraduate	88	22.9	22.9
	Graduate	184	47.9	70.8
	Postgraduate (MS)	97	25.3	96.1
	Postgraduate (PhD)	15	3.9	100
Employment with this company	Less than 3 years	36	9.4	9.4
	3-5 years	61	15.8	25.2
	6-10 years	112	29.2	54.4
	More than 10 years	175	45.6	100
Involvement in ERP implementation project	Fully involved	189	49.2	49.2
	Partly involved	162	42.2	91.4
	Not involved	33	8.6	100
ERP module used	Manufacturing & Logistics	112	29.2	29.2
	Finance	131	34.1	63.3
	Human resources	89	23.2	86.5
	Others	52	13.5	100
ERP use period	About 1 year	63	16.4	16.4
	2 years	160	41.7	58.1
	3 years	90	23.4	81.5
	More than 3 years	71	18.5	100
ERP use frequency	About once a day	78	20.3	20.3
	Several times a day	190	49.5	69.8
	About once a week	64	16.7	86.5
	Several times a week	52	13.5	100

show that most (59.9%) of the respondents are more than 41 years old. It was expected that the percentage of 41-50 would be higher as the respondents chosen belong to a certain category of organizations.

With respect to education level, more than three-quarters (77.1%) of the respondents held university degrees, while more than one-quarter (29.2%) of respondents held postgraduate degrees. About half (47.9%) of the respondents had bachelor's degrees. This indicates that the respondents were highly educated which is reflective of the positions held by them.

An examination of the respondents' years of employment with their present company resulted in one-quarter (25.2%) of respondents having less than 5 years of experience in the current company. A larger proportion (29.2%) of respondents was under the category of 6-10 years of experience. Also, less than half (45.6%) of the respondents had more than 10 years of experience. In summary, about three-quarters (74.8%) of the respondents had more than 6 years of experiences in their companies. These figures demonstrate that the respondents are familiar with the company's processes and business environment. Hence, they have the relevant knowledge to answer the questionnaire which results later in a more reliable analysis.

The activity profile of the respondents shows that around half (49.2%) of the respondents were fully involved in an ERP implementation project. Those who were involved partially in an ERP implementation project were more than two-fifths (42.2%) of the respondents while those who were not involved were 8.6 percent of all respondents. So, the majority (91.4%) of the respondents were involved in an ERP implementation project. Therefore, the respondents were the best informants to answer the survey.

The ERP usage profile of the respondents illustrates that more than one-third (34.1%) of the respondents used the Finance module of the ERP system, while the Manufacturing and

Logistics module was employed by more than one-quarter (29.2%) of the respondents. In addition, the Human Resources module was the next most used module by less than one-quarter (23.2%) the respondents. Finally, 16.2 percent of the respondents utilized other ERP modules such as module on Sales and so on.

Regarding the ERP usage period, 41.7 percent of the respondents had used ERP systems for 2 years, while 41.9 percent of respondents had utilized ERP systems for more than 2 years. This shows that the majority (83.6%) of the respondents are completely familiar with ERP systems and their capabilities and outcomes. With respect to ERP usage frequency, around half (49.5%) of the respondents used ERP systems several times a day. Slightly more than onefifth (20.3%) of the respondents employed ERP systems once a day, while less than one-third (30.2%) of the respondents applied ERP systems at least once a week. Also, more than two-thirds (69.8%) of respondents utilized ERP systems at least once a day. The length and duration usage illustrates that the respondents are familiar with ERP systems, therefore the result of the research would be more likely to identify actual CSFs affecting ERP implementation.

4.3. Multivariate Assumptions

Multivariate analysis requires several assumptions to be met. Violations of assumption can lead to a number of problems which ranges from inaccurate results of significant coefficients to biased and wrong predications of the hypothesized relationships (Hair et al., 2006).

4.3.1. Normality, Outliers, Linearity and Homoscedasticity

Normality is used to describe a curve that is symmetrical and bell-shaped. The highest score frequency is depicted in the middle with lower frequencies towards the extremes.

Normality can be determined by assessing the variables levels of skew ness or kurtosis. According to Hair et al. (2006), if the value of skew or kurtosis (ignoring any minus sign) is greater than twice the standard error, then the distribution significantly differs from a normal distribution. However, issues of non-normality should not be a concerned here because of the study's large sample size (n=384). Hair et al. (2006) highlighted that for sample sizes of 200 or more, the "detrimental effect of non-normality" is negligible (p. 80). Nevertheless, for purpose of understanding the extent to which normality distribution is assumed in the sample, results of graphical plots are analyzed.

Descriptive statistics such as minimum, maximum, means, standard deviation, variance, skewness and kurtosis were obtained for the interval-scaled dependent and independent variables. The software of SPSS Statistics 16.0 was employed for this purpose. All variables were tapped on a seven-point scale.

From the Figure (4.1), it may be seen that the variable 'Enterprise-Wide Communication' has a mean value of 4.69, while the standard deviation is 0.903 and variance is 0.815. The variance is small and shows that responses points are clustered around the mean. The mean is higher than the average on a seven-point scale and indicates that most of the respondents somewhat agree with the existence of effective communication and cooperation between stakeholders during the ERP implementation projects. The minimum value of 2.5 shows that there are some who disagree, and also the maximum value of 6.33 indicates that some strongly agreed with the presence of effective communication during the ERP implementation project. In general, a skewness value greater than one indicates a distribution that differs significantly from a normal, symmetric distribution (Sekaran & Bougie, 2010). So, the distribution is somewhat skewed to the left (Skewness value = -0.500). The kurtosis of normal distribution is zero. If the kurtosis is positive, then the distribution is more peaked than normal distribution. A negative value means that the distribution is flatter than a normal distribution (Sekaran & Bougie, 2010). Thus, the distribution is slightly flatter than the normal distribution (Kurtosis value=-.419). With these values, one may conclude that response distribution is fairly normal.

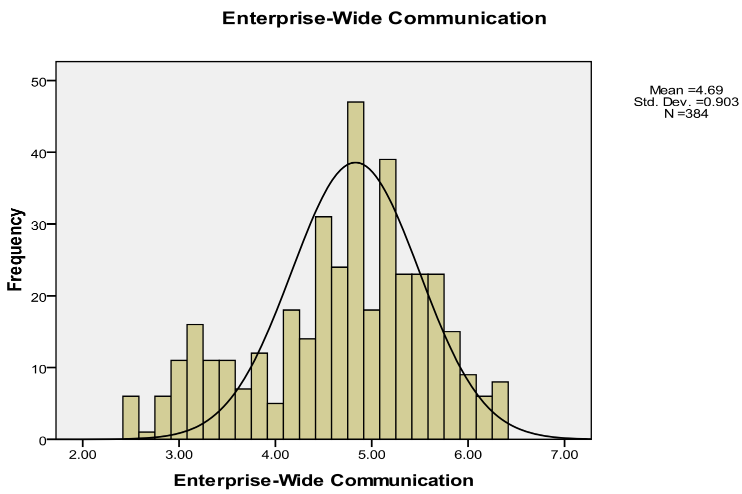

Figure (4.1) Descriptive Statistics of Enterprise-Wide Communication

The average score for the variable 'Business Processes Reengineering' turned out to be 4.70 (Figure 4.2), meaning most respondents were above average in BPR; while the standard deviation is 0.943 and variance is 0.890. The minimum value of 2.33 shows that there are some who disagree and the maximum value of 6.83 indicates that some strongly agree with the occurrence of reengineering the business processes. The skewness value (-.151) shows a slight negative skew and the kurtosis value (-0.390) indicates a curve that is slightly flatter than the normal curve. So, it can be concluded that distribution is reasonably normal.

From the Figure (4.3), it can be seen that the variable 'Project Management' shows a higher variation of 1.072, while the mean is 4.48 with a standard deviation of 1.035. The minimum value of 2.14 indicates that there are a number of people who slightly disagree, and also the maximum value of 6.71 points to the fact that some strongly agreed with the attendance of valuable project management efforts for the ERP implementation project. The distribution is skewed (-0.255) a little to the left and it is also slightly flatter than the normal distribution (Kurtosis value = -0.438). As a result, the distribution is rather normal.

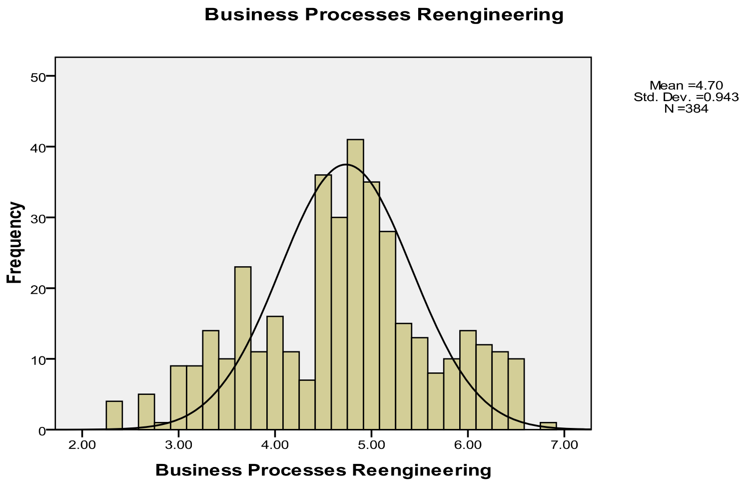

Figure (4.2) Descriptive Statistics of Business Processes Reengineering

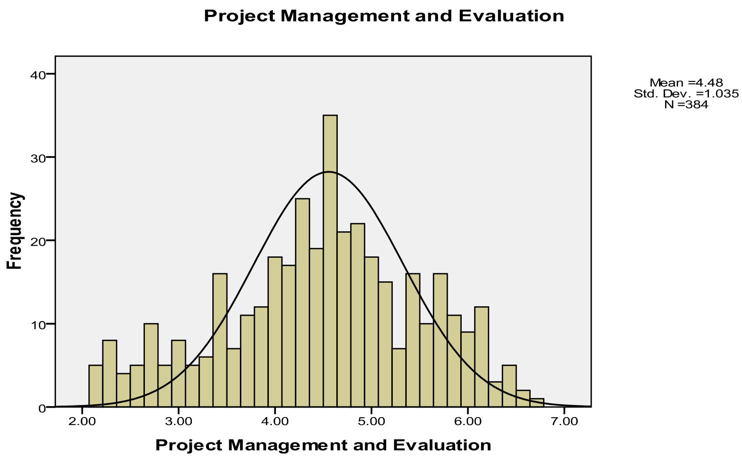

Figure (4.3) Descriptive Statistics of Project Management

The average score for the variable 'Team Composition and Competence' is 4.49 (Figure 4.4) which means most respondents perceived that the composition and competence of the ERP team was above average. The standard deviation is 0.811 and variance is 0.657 which indicates that responses points are gathered around the mean. The minimum value of 1.83 explains that there are some respondents who moderately disagree and the maximum value of 6.50 shows that some strongly agree with the composition and competence of the ERP team. The skewness value of -0.178 confirms a minor negative skew and the kurtosis value of 0.494 indicates a curve that is more peaked than the normal distribution. Consequently, it can be concluded that distribution is rationally normal.

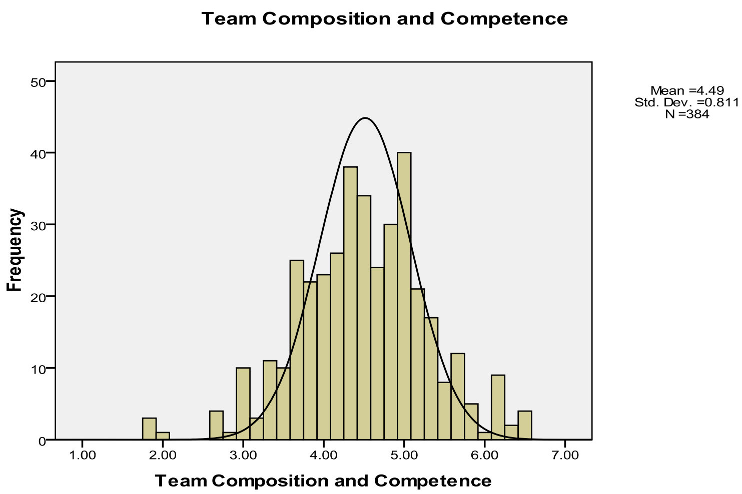

Figure (4.4) Descriptive Statistics of Team Composition and Competence

The variable 'ERP System Quality' has an average score of 4.95 (Figure 4.5) that indicates that most of the respondents believed the quality of ERP systems was above average, while the standard deviation is 0.943 and variance is 0.888. The minimum value of 3.00 explains that no respondent disagreed or strongly disagreed to the quality of ERP systems. Also, the maximum value of 6.83 indicates that some of respondents strongly agreed with the quality of ERP systems. The skewness value of -0.178 proves a little negative skew to the left and the kurtosis value of -0.871 indicates a curve that is flatter than the normal distribution. Thus, the distribution is reasonably normal.

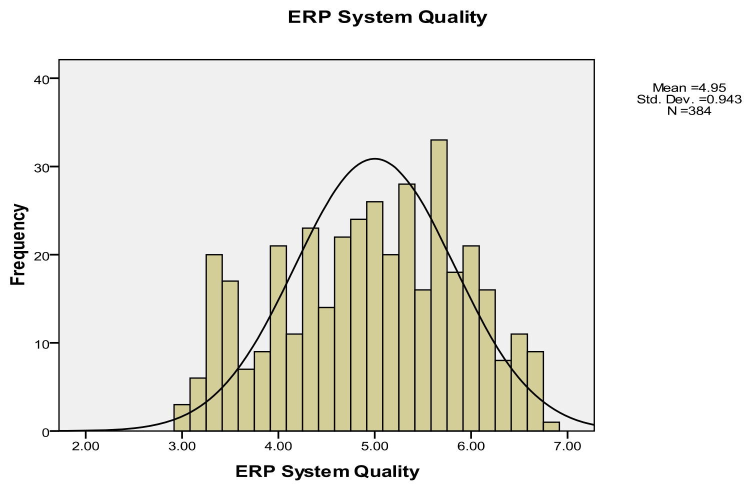

Figure (4.5) Descriptive Statistics of ERP System Quality

From the Figure (4.6), it may be seen that the variable 'ERP Vendor Support' indicates a high variation of 1.405 while the mean is 4.24 with a standard deviation of 1.185. However, most of the respondents supposed the vendor support services were greater than average. The minimum value of the variable (1.17) points out that some of respondents strongly disagree with the vendor support activities. Besides, the maximum value of 6.17 shows that some respondents strongly agreed with the ERP vendor support services. The distribution is skewed (-0.590) to the left. Moreover the distribution is a little flatter than the normal distribution (Kurtosis value = -0.438). Hence, the distribution can be considered as somewhat normal.

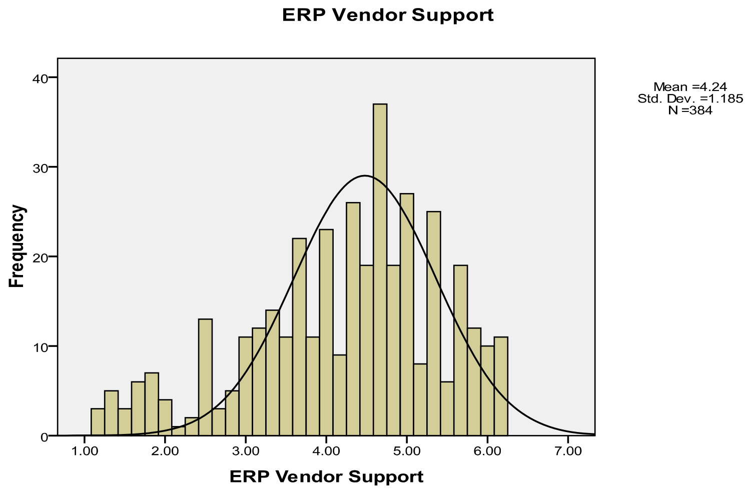

Figure (4.6): Descriptive Statistics of ERP Vendor Support

The mean value for the variable 'Organizational Culture' is 4.60 (Figure 4.7) which indicates that the majority of respondents perceived the organizational culture was above average, while the standard deviation is 0.869 and variance is 0.755. The maximum value of 6.88 shows that there are some respondents who strongly agree with the positive culture of the organization. In addition, the minimum value of 2.38 indicates that there are a number of people who somewhat disagree to the characteristics of organizational culture in the ERP implementation project. The positive value of skewness (0.045) shows a negligible skew of distribution to the right. In addition, the positive value of kurtosis (0.186) is a sign of a curve that is faintly more peaked than the normal distribution. Therefore, it can be concluded that distribution is logically normal.

From the Figure (4.8), it can be seen that the dimension of 'ERP User Satisfaction' shows a high mean of 5.08 while variation is 1.195 and standard deviation is 1.093. The mean value illustrates that a greater part of the respondents were satisfied with the ERP systems. The minimum value of 2.29 explains that there are some respondents who felt moderately dissatisfied with the usage of ERP systems. Moreover, the maximum value of

7.00 explains that there are some respondents who strongly agreed that they were satisfied with the usage of ERP systems. The distribution is skewed (-0.586) to the left and it is also somewhat flatter than the normal distribution (Kurtosis value = -0.287). Consequently, the distribution is relatively normal.

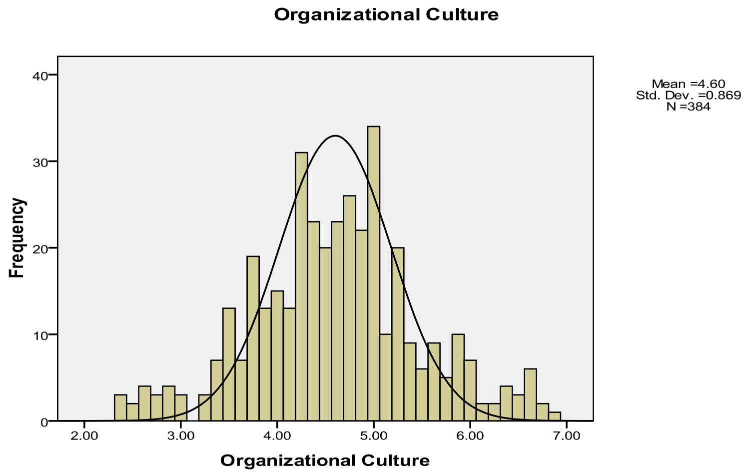

Figure (4.7) Descriptive Statistics of Organizational Culture

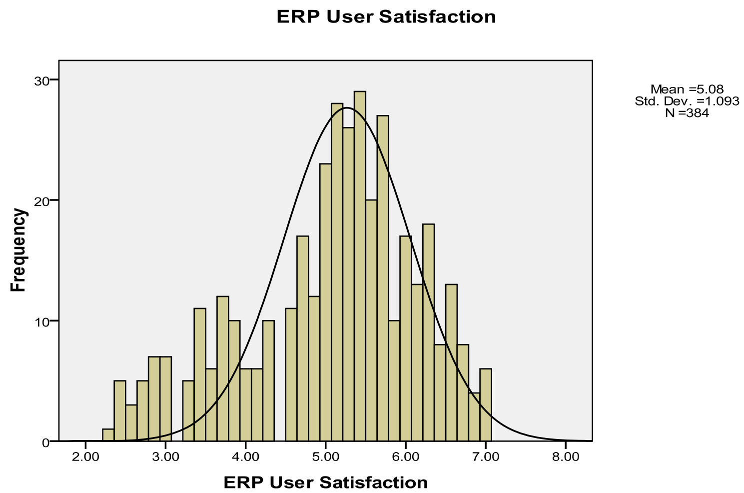

Figure (4.8): Descriptive Statistics of User Satisfaction

The average value for the dimension of 'Organizational Impact' is 4.91 (Figure 4.9), while the variation is 0.987 and standard deviation is 0.973. It shows that the common respondents' perception about the organizational impact of ERP systems was above average. The minimum value of 2.00 explains that there are some respondents who somewhat disagree with the organizational impact of ERP systems, while the maximum value of 6.88 indicates that some of the respondents strongly agree with the positive impact of ERP implementation on the organization. The skewness value of -0.808 proves a negative skew of distribution to the left. Furthermore, the positive kurtosis value of 0.928 points to a curve that is more peaked than the normal distribution. Accordingly, it can be concluded that distribution is reasonably normal.

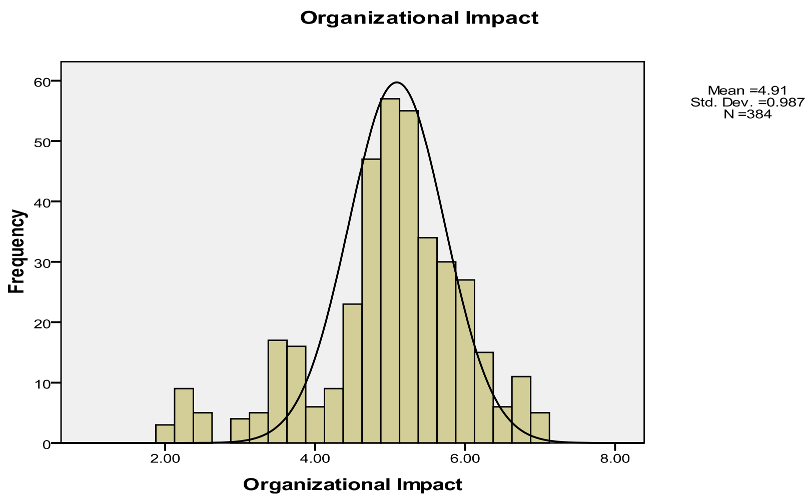

Figure (4.9) Descriptive Statistics of Organizational Impact

4.3.2. Outliers

Outliers are cases that have out-of-rang values as compared to the majority of other cases. The presence of outliers in the data may distort statistical test result. Outliers can be detected from the residual scatter plot. According to Hair et al. (2006), cases that have a standardized residual of more than 3.3 or less than -3.3 as displayed in the scatter plot are considered as outliers. However, a few outliers in large samples are common and most of the time, taking any action is not necessary.

As presented in Appendix (E), visual inspections of the graphical plots do not indicate any pattern of non-linearity (e.g., the dots are far from a straight-line relationship) and heteroscedasticity (the dots are not concentrated in the center but spread out across the scatter plot graph) and no extreme outliers are found as all cases are generally located at the specified residual range (between 3.3 and -3.3). These results show that there is no serious case of outliers in the data and as such, evidence of linearity and homoscedasticity are obtained in the relationship between independent and dependent variables of this study. In short, based on the graphical plots, the variables in the samples reasonably exhibit univariate normality.

Another important assumption is that the relation between independent and dependent variables is linear and should exhibit homoscedasticity. The violation of these assumptions will underestimate the extent of the correlation between the variables and this will result a degradation of analysis. Linearity is assumed when a straight-line relationship is presence between the two variables (independent and dependent variables) (Hair et al., 2006). The fulfillment of this assumption leads to the existence of homoscedastcity, a desirable condition where dependent variables exhibit equal levels of variance across the range of predictor variables. The examination of these assumptions can be performed by conducting partial regression plots and regression standardized residuals.

4.3.3. Multicollinearity

Multicollinearity mean there is high intercorrelations among the independent variables. In investigating relationships between independent and dependent variables, the presence of Multicollinearity can cause several problems including inaccurate results of regression coefficient estimation. One of the ways to check for the presence of multicollinearty in the data is by assessing the tolerance and the variable inflation factor. Tolerance is a value that measures the degree of the independent variables variability that is not explained by the other independent in the model. Variance inflation factor (VIF) is the inverse of Tolerance and is calculated simply by inverting the tolerance value. An indication of multicollinearty is when the value of Tolerance is less than 0.10 and VIF is more than 10 (Hair et al., 2006).

As suggested by Hair et al. (2006), multicollinearity among independent variables can be examined by the tolerance and VIF values resulted from the analysis of standard multiple regression between the independent and dependent variables. Remedies for multicollinearity problems should be considered to be taken if the tolerance value shows less than 0.10 and VIF more than 10. In this study, the results of the standard multiple regression pertaining to the multicollinearity issue as displayed in Table (4.3) indicates that all tolerance and VIF values are above the cut-off values. As such, there are no detrimental correlations among the independent variables of the study.

4.4. Test of Common Method Bias

In order to control for the potential for common method bias, based on the recommendation of Williams, Edwards, and Vandenberg (2003), Harman's single factor test was used to test for common method bias. This test involved performing exploratory factor analysis on all indicator variables using unrotated principal components factor analysis and principal component analysis with varimax rotation to determine the number

Table (4.3) Test of Common Method Bias

Model		Collinearity Statistics	
		Tolerance	VIF
	(constant)		
	Enterprise-wide communication	0.520	1.474
	Business process reengineering	0.841	1.441
	Project management	0.680	1.868
	Team composition and competence	0.871	1.130
	ERP system quality	0.752	1.338
	ERP vendor support	0.634	1.595

Dependent Variable: ERP Implementation Success

of factors that are necessary to account for the variance in the variables. If a substantial amount of common method variance is present, either a single factor will emerge from factor analysis or one general factor will account for a majority of the covariance among variables. The unrotated principal component analysis and principal component with varimax rotation revealed the presence of six distinct factors with eigenvalue greater than1.0, rather than a single factor which is consistent with the research model. The six factors together represented eighty eight percent of the total variance and the variance explained for each of the six factors was 13.19, 12.33, 12.41, 14.58, 13.72, and 15.83 percent (unrotated) and 12.27, 13.20, 13.26, 15.06, 12.34 and 14.43 percent (rotated). Moreover, the confirmatory factor analysis showed that the single-factor model did not fit the data well (RMSEA=0.362, CFI=0.450, NNFI=0.330, and AGFI=0.200). Following, Williams et al. (2003), a method factor latent variable was added to the model. Comparing the results of the proposed model with and without the method factor loading variable using a chi-square difference test reveal no significant difference between the two models. While the results of these analyses do not preclude the possibility of common method bias, they do suggest that common method variance is not of great concern and thus unlikely to confound the interpretations of the results.

4.5. Test of Non-Response Bias

One concern of the survey is that information collected from respondents might have a non-response bias. So, non-response bias was assessed by comparing the responses of early and late respondents, defined as the first and last 40 questionnaires received (Karahanna, Straub, & Chervany, 1999). To test for response bias, a comparison of means on all measured variables was performed. The assumption for test is that the late respondents will have similar characteristics as the early respondents. So, the means of the measured variables for the two groups were compared using a t-test. The results of the t-test for each measured variable show that there were no significant differences between the means for these two groups (Table 4.4), suggesting that non-response bias was low.

Table (4.4) Analysis of Non-response Bias

Measure	Early respondents (n=40)	Late respondents (n=40)	Significance (P)
Enterprise-wide communication	4.75	4.64	0.34
Business process reengineering	4.62	4.86	0.18
Project management	4.61	4.40	0.23
Team composition and competence	4.53	4.48	0.44
ERP system quality	4.90	5.01	0.35
ERP vendor support	4.16	4.38	0.21
Organizational culture	4.71	4.53	0.27
User satisfaction	5.05	5.13	0.39
Organizational impact	5.00	4.85	0.28

4.6. Structural Equation Modeling Analysis

4.6.1. Measurement Model Assessment

In this step, the items were submitted to a measurement model analysis to check model fit indexes for each construct. The summary of results has been shown in Table (4.5). In addition, the complete outcomes of the measurement model assessment were illustrated in Appendix (E). As can be seen in Table (4.5), some of the initial model fit indexes showed nowhere near a reasonable fit; therefore, further model modification was arranged based on the modification index. The AMOS program provides a modification index that suggests possible ways of improving model fit. In line with Hair et al. (2006), some items were dropped to approach a reasonable model fit.

The initial model fit indexes for Enterprise-Wide Communication show unreasonable fit in the items CMIN/DF = 8.867 and RMSEA = 0.142. So, model modification was conducted to attain a perfect fit. The concept of item W6 (Stakeholders and team members willingly kept each other informed) was dropped because the concept was already covered in W1 (Effective communication between project team members and Users) and also W5 (Communicate ERP project's progress among stakeholders). So, the new model fit indexes improved significantly to CMIN/DF = 2.801, CFI = 0.992, and RMSEA = 0.069.

Moreover, the primary model fit indexes for 'Project Management' demonstrate unreasonable fit in the items CMIN/DF = 3.674 and RMSEA = 0.084. Therefore, further model modification was conducted to achieve a perfect fit. Based on the modification indexes, item P5 (Monitor the ERP vendor's activities) was dropped because the concept was already covered in P6 (Review the ERP project progress on a periodic basis). The new model fit indexes were enhanced notably to CMIN/DF = 2.161, CFI = 0.996, and RMSEA = 0.055.

Table (4.5) Model Fit Indexes for Constructs

Code	Construct/Item	Initial Model Fit	Final Model Fit
EWC	***Enterprise-Wide Communication***	CMIN/DF= 8.867 CFI= .953 RMSEA = .142	CMIN/DF= 2.801 CFI= .992 RMSEA = .069
W1	Effective communication between project team members and Users.		
W2	Effective communication among functional departments.		
W3	Effective communication to get the users' requirements.		
W4	Enough communication channels to inform the objectives to users.		
W5	Communicate ERP project's progress among stakeholders.		
W6*	Stakeholders and team members willingly kept each other informed.		
BPR	***Business Processes Reengineering***	CMIN/DF= 1.637 CFI= .998 RMSEA = .041	
B1	Reengineer the organizational business processes to fit ERP systems.		
B2	Identify and document the existing business processes.		
B3	Analyze and Integrate redundant and inconsistent organizational processes.		
B4	Modify existing processes to the extent possible to align with the ERP.		
B5	Develop new organizational processes to align with the ERP.		
PRM	***Project Management***	CMIN/DF= 3.674 CFI= .986 RMSEA = .084	CMIN/DF= 2.161 CFI= .996 RMSEA = .055
P1	Establish the ERP project scope clearly.		
P2	Provide a detailed project plan with measurable results.		
P3	Assign the responsibility for all parts of the ERP.		
P4	Coordinate the activities across all affected parties.		
P5*	Monitor the ERP vendor's activities.		
P6	Review the ERP project progress on a periodic basis.		
TCC	***Team Composition and Competence***	CMIN/DF= 1.597 CFI= .998 RMSEA = .039	
T1	Presence of a well experienced project manager.		
T2	Select a variety of cross-functional team members for ERP implementation.		
T3	Select the best business and technical knowledge people.		
T4	Empower the ERP team to make decisions.		
T5	Assign the ERP team on the project full-time as their only priority.		
SYQ	***ERP System Quality***	CMIN/DF= 2.161 CFI= .996 RMSEA = .055	
Q1	ERP system provides dependable and consistent information.		
Q2	ERP system has ability to communicate data with other systems.		
Q3	ERP system has flexibility to adapt to new conditions.		
Q4	The ERP system has good features and functions.		
Q5	The ERP system is easy to use.		

Table (4.5) Model Fit Indexes for Constructs (continued)

Code	Construct/Dimension/Item	Initial Model Fit	Final Model Fit
VES	***ERP Vendor Support***	CMIN/DF= 1.364 CFI= .998 RMSEA = .031	
V1	ERP vendor communicated well with our organization.		
V2	ERP vendor personnel had enough experience for implementing.		
V3	ERP vendor provided quality services.		
V4	ERP vendor provided services in an adequate response time.		
V5	ERP vendor offered adequate training to users.		
V6	ERP vendor provided suitable document required for using ERP.		
ORC	***Organizational Culture***	CMIN/DF= 2.770 CFI= .989 RMSEA = .068	
C1	In my organization, employees are encouraged to analyze mistakes and learn from them.		
C2	In my organization, each day brings new challenges.		
C3	In my organization, employees are encouraged to express their opinions and ideas regarding work.		
C4	In my organization, management freely shares information.		
C5	In my organization, people are supportive and helpful.		
C6	In my organization, there is willingness to collaborate across organizational units.		
UST	***ERP User Satisfaction***	CMIN/DF= 4.164 CFI= .977 RMSEA = .091	CMIN/DF= 2.852 CFI= .989 RMSEA = .070
S1	ERP system provides outputs which I need.		
S2	ERP system provides precise information.		
S3	ERP system presents reports in a useful format.		
S4	The output content provided by the ERP system is comprehensive.		
S5	The information provided by the ERP system is up to date.		
S6	ERP system improves my work efficiency.		
S7*	Overall, There is a satisfaction with the ERP system.		
ORI	***ERP Organizational Impact***	CMIN/DF= 2.042 CFI= .993 RMSEA = .052	
S8	ERP system enhances the quality of decision making.		
S9	ERP system improves communication between departments.		
S10	ERP system rationalizes business processes and tasks.		
S11	ERP system increases internal/external customer satisfaction.		
S12	ERP system reduces organizational cost.		
S13	ERP system improves the managerial efficiency.		
S14	ERP system improves the firm's overall business productivity.		

* Items were dropped from the initial model.

Furthermore, the initial model fit indexes for ‘ERP User Satisfaction’ prove unreasonable fit in the items CMIN/DF = 4.164 and RMSEA = 0.091. Consequently, additional model modification was carried out to improve model fit indexes. Based on the modification indexes, one item (SUC7) was dropped. The concept of SUC7 (Overall satisfaction with the ERP system) has been already covered in items SUC1 to SUC6 and consequently was dropped in the next stage. So, the new model fit indexes improved considerably to CMIN/DF = 2.852, CFI = 0.989, and RMSEA = 0.070.

Schumacker and Lomax (2004) confirmed that validation of the measurement model addresses both discriminant validity and convergent validity. However, further following analyses were conducted to assess the construct validity.

4.6.2. Discriminant validity

In this study, the construct ‘ERP Implementation Success’ was measured by two dimensions of ‘ERP User Satisfaction’ and ‘Organizational Impact’ and each of these dimensions was measured by several indicators. So, it should be checked first whether these two dimensions form a high order construct (ERP Implementation Success). According to Hair et al. (2006), T coefficient can be employed to test for the existence of the single second-order construct that accounts for the variations in all of its dimensions. Table (4.6) shows the calculated T coefficient between the first-order model and the second-order model for the construct ‘ERP Implementation Success’.

The T coefficient value (T=1.0) is equal to the theoretical higher limit of 1, indicating that the second-order factor accounted for 100 percent of the relations among the first-order factors. The value of T coefficient suggests that the second-order model represents a more parsimonious representation of observed covariances and it should be accepted over the first-order model as a truer representation of model structure (Hair et al., 2006). The result proved that the second-order construct really exists as illustrated in the research framework. The complete outcomes of discriminant validity are demonstrated in Appendix (E).

Table (4.6) Goodness of Fit Indexes for First and Second Order Model

Construct	Model	Chi-Square (df)	CFI	RMSEA	T Coefficient
ERP Implementation Success	First-Order	171.382 (64)	0.976	0.066	1.0
	Second-Order	171.382 (64)	0.976	0.066	

In addition, to confirm discriminant validity for all the constructs in the research framework, the average variance shared between the construct and its indicators should be larger than the variance shared between the construct and other constructs (Hair et al., 2006). The outcomes of the discriminant validity test (Table 4.7) showed that all constructs share more variances with their indicators than with other constructs. Hence, the constructs were discriminated enough as suggested by Hair et al. (2006).

Table (4.7) Discriminant Validity Test

Construct	EWC	BPR	PRM	TCC	SYQ	VES	ORC	SUC
EWC	**.806**							
BPR	0.34	**.831**						
PRM	0.39	0.36	**.841**					
TCC	0.34	0.37	0.40	**.825**				
SYQ	0.25	0.42	0.26	0.23	**.840**			
VES	0.28	0.31	0.39	0.35	0.41	**.828**		
ORC	0.56	-0.39	0.51	0.46	0.65	0.60	**.799**	
SUC	0.54	-0.35	0.73	0.69	0.64	0.58	0.52	**.820**

Note: Off diagonal figures are correlations among constructs, while diagonal figures indicate the square root of the average variance extracted between the constructs and their measures.

4.6.3. Convergent Validity

Convergent validity was evaluated with three measures: factor loading, composite construct reliability, and average variance extracted. The outcomes of the convergent validity test are offered in Table (4.8). First, the entire factor loadings of the items in the measurement model were greater than 0.70 and each item loaded significantly on its original construct ($p < 0.01$ in all cases). Second, the composite construct reliabilities were within the generally recommended range of greater than 0.70. Finally, the average variances extracted were all higher than the accepted level of 0.50. Therefore, all constructs had adequate convergent validity as recommended by Hair et al. (2006).

4.6.4. Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted using AMOS 16.0. The overall effectiveness of the measurement model was studied employing common model fit measures: normed $\chi2$, comparative fit index (CFI), and root mean square error of approximation (RMSEA). Table (4.9) provides the results of the CFA. The results indicated a ratio of CMIN/DF to be 2.659. In addition, the CFI reported for the measurement model was 0.919. Besides, the RMSEA reported for the measurement model was 0.066. All of the fit indices met the acceptable thresholds for a reasonable fitting model, thus suggesting that the measurement model possesses an acceptable fit as proposed by Hair et al. (2006). The full results of CFA are depicted in Appendix (E).

Table (4.8) Convergent Validity Test

Construct	Items	Factor Loading	Composite Reliability	Average Variance Extracted
Enterprise-wide communication (EWC)	W1	.826	**.726**	**.649**
	W2	.789		
	W3	.837		
	W4	.753		
	W5	.819		
Business process reengineering (BPR)	B1	.829	**.754**	**.691**
	B2	.846		
	B3	.831		
	B4	.840		
	B5	.811		
Project management (PRM)	P1	.822	**.777**	**.708**
	P2	.831		
	P3	.850		
	P4	.849		
	P6	.857		
Team composition and competence (TCC)	T1	.825	**.761**	**.681**
	T2	.824		
	T3	.833		
	T4	.819		
	T5	.826		
ERP system quality (SYQ)	Q1	.776	**.782**	**.707**
	Q2	.849		
	Q3	.863		
	Q4	.861		
	Q5	.852		
ERP vendor support (VES)	V1	.829	**.801**	**.686**
	V2	.813		
	V3	.820		
	V4	.837		
	V5	.834		
	V6	.836		
Organizational culture (ORC)	C1	.766	**.817**	**.639**
	C2	.856		
	C3	.712		
	C4	.735		
	C5	.867		
	C6	.844		
ERP implementation success (SUC)	S1	.837	**.887**	**.673**
	S2	.815		
	S3	.813		
	S4	.780		
	S5	.823		
	S6	.808		
	S8	.813		
	S9	.844		
	S10	.846		
	S11	.814		
	S12	.811		
	S13	.820		
	S14	.839		

Table (4.9) Result of Confirmatory Factor Analysis

	Measurement Model	**Acceptable Fit Standard**
Statistical Test		
CMIN (Chi-Square)	2342.971	
DF	881	
CMIN/DF	2.659	Less than 3 and $p < 0.01$
Fit Indices		
CFI	0.919	0.90 or larger
RMSEA	0.066	Less than 0.08

4.6.5. Structural Model Assessment

This stage of the SEM process involved testing the structural model prior to testing the hypotheses. The proposed structural model (Figure 4.10) was examined using SEM package AMOS 16.0. The fit indices from the structural model analysis are reported in Table (4.10). Based on the results of the SEM fit indices, the proposed model presented an acceptable fit. The RMSEA was lower than the accepted cut off of 0.08 and the CFI was greater than the recommended level of 0.90. Overall, the hypothesized structural model provided a good fit for the data. The full results of the structural model analysis were shown in Appendix (E).

Table (4.10) Summary of Overall Fit Statistics – Structural Model

	Structural Model	**Acceptable Fit Standard**
Statistical Test		
CMIN (Chi-Square)	2342.971	
DF	881	
CMIN/DF	2.659	Less than 3 and $p < 0.01$
Fit Indices		
CFI	0.919	0.90 or larger
RMSEA	0.066	Less than 0.08

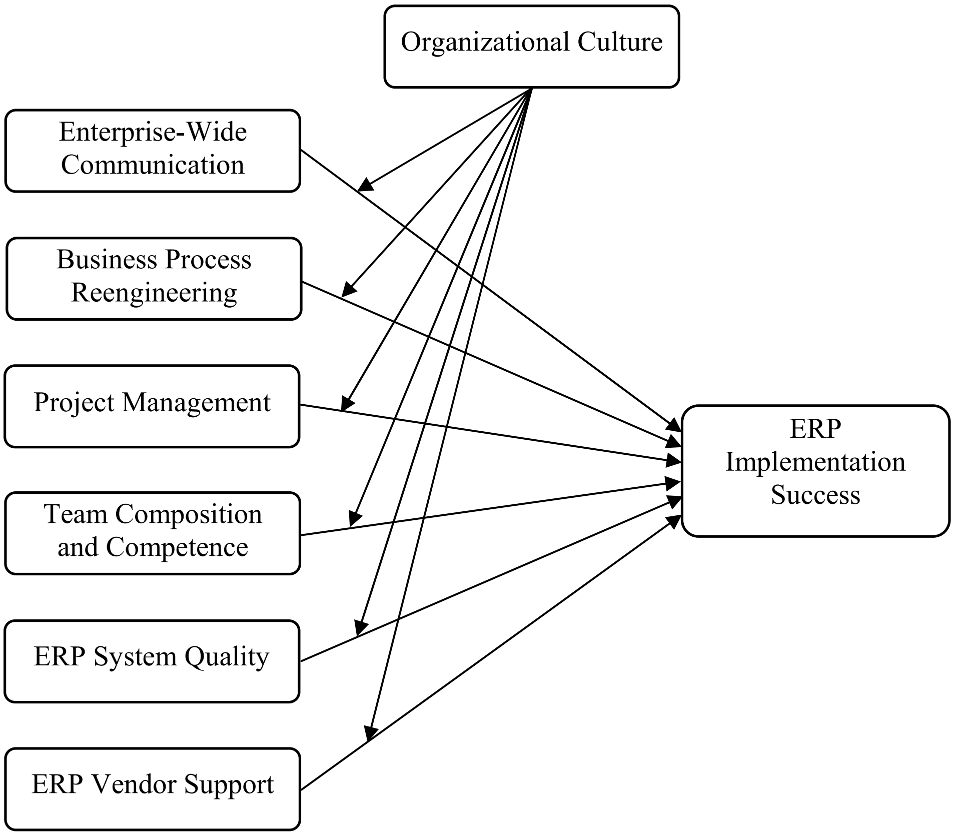

Figure (4.10) Structural Model – ERP Implementation Success

4.7. Hypotheses Testing

The purpose of this study is to investigate the impact of six critical success factors on ERP implementation success. The hypothesized relationships are now ready to be tested based on the structural model specified previously. The six hypotheses are represented by the six relationships in the model. Hypothesis (1) is represented by the relationship EWC → SUC; Hypothesis (2) is represented by the relationship BPR → SUC; Hypothesis (3) is represented by the relationship PRM → SUC; Hypothesis (4) is represented by the relationship TCC → SUC; Hypothesis (5) is represented by the relationship SYQ → SUC; Hypothesis (6) is represented by the relationship VES → SUC.

In addition, this study was designed to incorporate the interacting effects or moderating roles of organizational culture to provide more insight into ERP implementation projects. So, there are also six hypotheses which examine the moderating effect of organizational culture on the relationships between the six critical success factors and ERP implementation success. Hypothesis (7) is represented by the relationship EWC*ORC → SUC; Hypothesis (8) is represented by the relationship BPR*ORC → SUC; Hypothesis (9) is represented by the relationship PRM*ORC → SUC; Hypothesis (10) is represented by the relationship TCC*ORC → SUC; Hypothesis (11) is represented by the relationship SYQ*ORC → SUC; Hypothesis (12) is represented by the relationship VES*ORC → SUC.

The standardized path coefficients and t-values of all the hypothesized relationships of the research model were presented in Table (4.11). According to Hair et al. (2006), the standardized coefficient illustrates the consequential change in an endogenous variable from a unit change in an exogenous variable, with all other exogenous variables being held constant. In this method, their comparative contributions can be recognized much more clearly. The sign of the coefficient signifies that the two variables are moving in similar or dissimilar directions. The t-value indicates whether the corresponding path coefficient is significantly different from zero. Coefficients with t-values of between 2.00 and 2.00 show they are not significantly different from zero at the 5% significance level. It means that there is a high probability of obtaining a relationship of this magnitude simply by sampling error.

Table (4.11) AMOS Structural Modeling and Path Analysis Results

Hypotheses	Relationship	Standardized Coefficients	t-value	p-value	Support
H1	EWC → SUC	0.178	2.026	0.043 *	Yes
H2	BPR → SUC	-0.178	-1.243	0.214	No
H3	PRM → SUC	0.312	3.425	***	Yes
H4	TCC → SUC	0.298	2.839	0.005 **	Yes
H5	SYQ → SUC	0.179	2.779	0.005 **	Yes
H6	VES → SUC	0.234	2.537	0.011 *	Yes
H7	EWC * ORC → SUC	0.239	2.541	0.011*	Yes
H8	BPR * ORC → SUC	-0.252	-1.448	0.148	No
H9	PRM * ORC → SUC	0.277	2.210	0.027*	Yes
H10	TCC * ORC → SUC	0.296	2.192	0.028*	Yes
H11	SYQ * ORC → SUC	0.236	2.578	0.010*	Yes
H12	VES * ORC → SUC	0.174	2.558	0.011*	Yes

*** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$

In addition, the SEM path analysis results are shown in Figure (4.11). The significant relationships (paths) are illustrated in bold lines, while insignificant relationships are shown by dashed line in this Figure. The first number in parenthesis shows the standardized coefficient and second number indicates the t-value of each hypothesized relationship.

Hypothesis (1) proposes that high levels of communication among the enterprise will positively influence ERP implementation success. The coefficient for the path from EWC to SUC is positive and significant (β=0.178, $p<0.05$) which supports hypothesis (1).

Hypothesis (2) recommends that reengineering the current business processes to align with ERP systems will positively influence ERP implementation success. The coefficient for the path from BPR to SUC is negative and non-significant (β=-0.178, p=0.214) which does not support hypothesis (2).

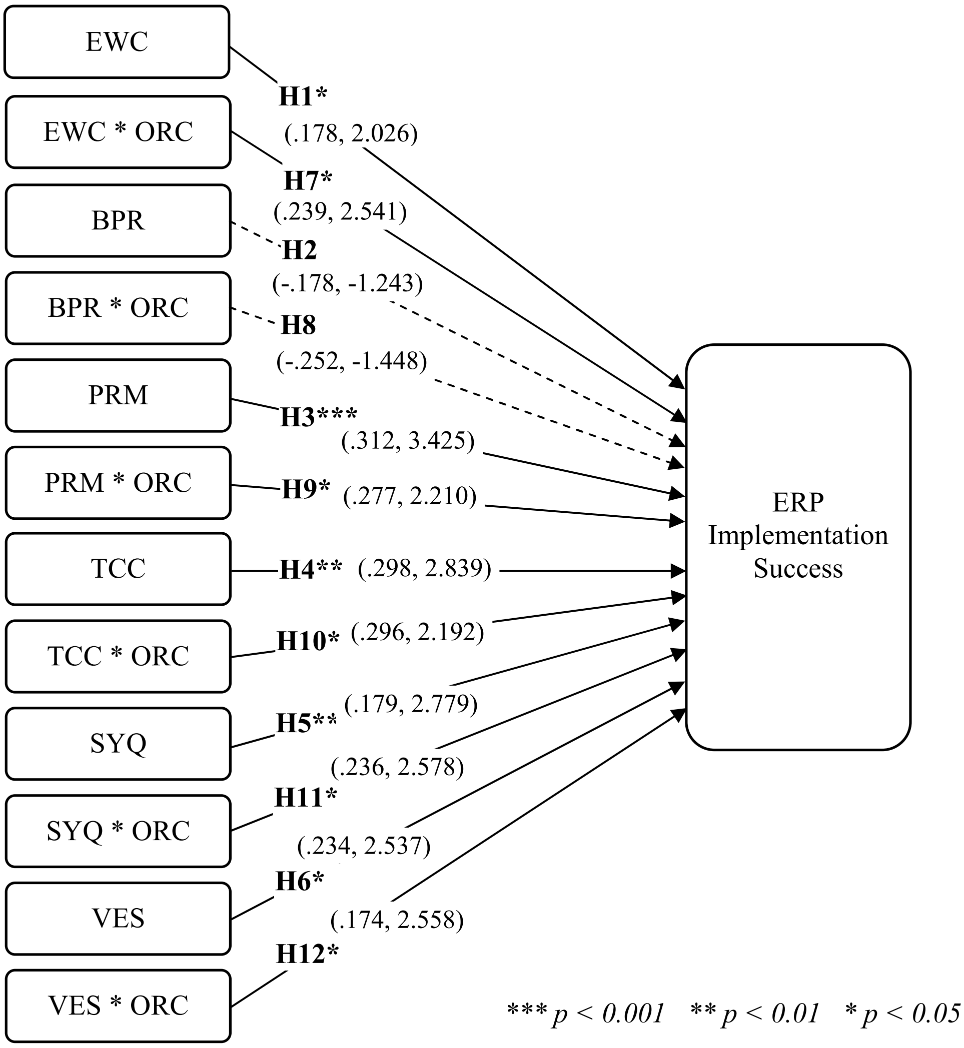

Figure (4.11) Path Analysis Results for ERP Implementation Success Model

In Hypothesis (3), it is posited that effective project management and evaluation of the ERP implementation project would have a significant effect on its success. The results of SEM analysis support this hypothesis ($\beta=0.312$, $p<0.001$).

Hypothesis (4) proposes that the composition and competence of the ERP project team will positively influence the ERP implementation success. The coefficient for the path from TCC to SUC is positive and significant ($\beta=0.298$, $p<0.01$) which supports hypothesis H4.

In Hypothesis (5), it is hypothesized that the quality of ERP systems would have a significant effect on ERP implementation success. The results shows that this hypothesis is supported (β=0.179, $p<0.01$).

Hypothesis (6) recommends that the extent of support by the ERP vendor will have a significant effect on ERP implementation success. The coefficient for the path from VES to SUC is positive and significant (β=0.234, $p<0.05$) supporting hypothesis (6).

Hypothesis (7) proposes that organizational culture moderates the relationship between enterprise-wide communication and ERP implementation success. The coefficient for the path from EWC*ORC to SUC is positive and significant (β=0.239, $p<0.05$) which supports hypothesis (7).

Hypothesis (8) recommends that organizational culture moderates the relationship between business processes reengineering and ERP implementation success. The coefficient for the path from BPR*ORC to SUC is negative and non-significant (β=-0.252, p=0.027) which does not support hypothesis (8).

In Hypothesis (9), it is posited that organizational culture moderates the relationship between project management and ERP implementation success. The coefficient for the path from PRM*ORC to SUC is positive and significant (β=0.277, $p<0.05$) which supports this hypothesis.

Hypothesis (10) proposes that organizational culture moderates the relationship between composition and competence of ERP project team and success of ERP implementation. The coefficient for the path from TCC*ORC to SUC is positive and significant (β=0.296, $p<0.05$) which supports hypothesis (10).

In Hypothesis (11), it is hypothesized that organizational culture moderates the relationship between the quality of ERP systems and ERP implementation success. The coefficient for the path from SYQ*ORC to SUC is positive and significant (β=0.236, $p<0.05$) which shows this hypothesis is supported.

Finally, Hypothesis (12) recommends that organizational culture moderates the relationship between ERP vendor support and ERP implementation success. The coefficient for the path from VES*ORC to SUC is positive and significant (β=0.174, $p<0.05$) supporting hypothesis (12).

The R-square value of the research model is 0.543 when no moderating effect is considered. However, the R-square value increases to 0.655 when organizational culture is taken into account as the interaction term. The model with organizational culture as a moderator accounts for 65.5% of the variance of ERP implementation success. The increased R-square recommends that organizational culture is a moderator in the proposed research model.

For estimating the effect size of organizational culture, the guidelines provided by Cohen (1988) were employed. In sum, the effect size of 0.371 or above is considered large, the effect size between 0.100 and 0.371 is considered medium, and the effect size of 0.1 or below is considered small. So, the result of the effect size ($f2$) in this study indicated that the organizational culture's interacting effect is medium, i.e. $f2$ is 0.254.

To sum up, out of the 12 hypothesized relationships, 10 were found to be significantly supported. Hypotheses 1, 3, 4, 5, 6, 7, 9, 10, 11 and 12 all had a t-value of greater than 1.96, indicating the relationships were significant at the 0.05 level. The t-value for Hypothesis 2 and Hypothesis 8 were -1.243 and -1.448 respectively, which were not significant at the 0.05 level. Therefore, all research hypotheses except Hypotheses (2) and (8) were supported by the AMOS structural modeling results.

4.8. General Level of ERP Implementation Success and CSFs

To understand the level of ERP implementation success and critical success factors in the Iranian ERP user companies, analyses of functional/ operational/ unit managers' responses in terms of mean and standard deviation were carried out. To further ensure that the mean values of all responses were significantly different from the midpoint or neutral state (i.e. 4), a one-sample t-test was conducted for all statements. The outcomes demonstrated that they were all significant at a 99 percent level of confidence.

4.8.1. Enterprise-Wide Communication

Enterprise-wide communication was measured by six items (Table 4.12). The mean scores for enterprise-wide communication range from 4.29 to 5.00. The highest rating is for 'effective communication between project team members and users', followed by 'effective communication among functional departments'. The lowest rating is for 'enough communication channels to inform the objectives to users' and 'communicate ERP project's progress among stakeholders'. These data indicated that ERP adopting companies could not set up communication channels to describe the objectives of ERP implementation project and also inform the progress status of ERP project to all stakeholders.

4.8.2. Business Process Reengineering

Business process reengineering is evaluated by five items. As can be seen in Table (4.13) the mean values for business process reengineering vary from 4.42 to 4.75. The maximum rating is for 'developing new organizational processes to align with the ERP system'. The minimum ratings are for 'reengineering the organizational business processes to fit ERP system' and 'modifying the existence processes to the extent possible to align with the ERP system'. These figures explain that although ERP implementing firms tried to build up some new business processes to line up with the ERP system features, they were not successful in fully reengineering the organizational processes to fit ERP system processes.

Table (4.12) Indicators of Enterprise-Wide Communication

Code	Item	Mean	Standard Deviation
W1	Effective communication between project team members and users.	5.00	0.94
W2	Effective communication among functional departments.	4.83	1.13
W3	Effective communication to get the users' requirements.	4.75	1.07
W4	Enough communication channels to inform the objectives to users.	4.29	1.18
W5	Communicate ERP project's progress among stakeholders.	4.29	0.91
W6	Stakeholders and team members willingly kept each other informed.	4.58	1.23

Table (4.13) Indicators of Business Processes Reengineering

Code	Item	Mean	Standard Deviation
B1	Reengineer the organizational business processes to fit ERP systems.	4.38	1.14
B2	Identify and document the existing business processes.	4.63	1.08
B3	Analyze and integrate redundant and inconsistent organizational processes.	4.46	0.86
B4	Modify existing processes to the extent possible to align with the ERP.	4.42	1.10
B5	Develop new organizational processes to align with the ERP.	4.75	1.03

4.8.3. Project Management

Project management was assessed by six indicators (Table 4.14). The mean values for project management vary from 4.0 to 4.67. The maximum rating is for 'reviewing the ERP project progress on a periodic basis'. The second highest mean value is 4.42 for 'providing a detailed project plan with measurable results'. The minimum ratings are for 'coordinating the activities across all affected parties' and 'assigning the responsibility for all parts of the ERP project'. These results indicate that the project management of the ERP implementation project faced the lack of matching all stakeholders together and allocating the tasks of all parts involved in the ERP project.

Table (4.14) Indicators of Project Management

Code	Item	Mean	Standard Deviation
P1	Establish the ERP project scope clearly.	4.29	1.20
P2	Provide a detailed project plan with measurable results.	4.42	0.90
P3	Assign the responsibility for all parts of the ERP.	4.17	1.16
P4	Coordinate the activities across all affected parties.	4.00	0.88
P5	Monitor the ERP vendor's activities.	4.29	1.15
P6	Review the ERP project progress on a periodic basis.	4.67	0.93

4.8.4. Team Composition and Competence

ERP team composition and competence was evaluated by five items. As can be seen in Table (4.15) the mean values for team composition and competence range from 4.08 to 5.0. The maximum rating is for 'selecting a variety of cross-functional team members for ERP implementation'. The minimum ratings are for 'empowering the ERP team to make decisions' and 'assigning the ERP team on the project full-time as their only priority'. This shows that the ERP adopting companies established ERP implementation teams from diverse departments and with adequate business and technical knowledge, but the ERP teams were not given enough power to make necessary decisions.

Table (4.15) Indicators of Team Composition and Competence

Code	Item	Mean	Standard Deviation
T1	Presence of a well experienced project manager.	4.71	0.87
T2	Select a variety of cross-functional team members for ERP implementation.	5.00	1.19
T3	Select the best business and technical knowledge people.	4.88	1.25
T4	Empower the ERP team to make decisions.	4.08	0.91
T5	Assign the ERP team on the project full-time as their only priority.	4.38	1.14

4.8.5. ERP System Quality

ERP system quality was assessed using five indicators (Table 4.16). The maximum rating is 5.25 for 'the ERP system is easy to use'. The second highest mean value is 5.13 for 'ERP system has ability to communicate data with other systems'. The minimum rating is 4.71 for 'ERP system has flexibility to adapt to new conditions'. These results imply that although ERP systems were easy to use and they can communicate data with other systems, the systems lack sufficient flexibility to adapt to new conditions.

4.8.6. ERP Vendor Support

ERP vendor support was evaluated by six items. As can be seen in Table (4.17) the mean values for ERP vendor support range from 3.83 to 4.58. The maximum ratings are for 'ERP vendor communicated well with our organization' and 'ERP vendor personnel had enough experience for implementing'. The minimum ratings are for 'ERP vendor provided quality services' and 'ERP vendor provided services in an adequate response time'. It looks as though ERP system users are very concerned with the inadequate response time of services provided by ERP vendors.

Table (4.16) Indicators of ERP System Quality

Code	Item	Mean	Standard Deviation
Q1	ERP system provides dependable and consistent information.	4.75	1.11
Q2	ERP system has ability to communicate data with other systems.	5.13	1.18
Q3	ERP system has flexibility to adapt to new conditions.	4.71	0.99
Q4	The ERP system has good features and functions.	4.83	1.07
Q5	The ERP system is easy to use.	5.25	0.92

Table (4.17) Indicators of ERP Vendor Support

Code	Item	Mean	Standard Deviation
V1	ERP vendor communicated well with our organization.	4.58	1.27
V2	ERP vendor personnel had enough experience for implementing.	4.58	0.95
V3	ERP vendor provided quality services.	3.83	0.89
V4	ERP vendor provided services in an adequate response time.	3.93	1.14
V5	ERP vendor offered adequate training to users.	4.04	0.94
V6	ERP vendor provided suitable document required for using ERP.	4.08	1.23

4.8.7. Organizational Culture

Organizational culture was assessed using six indicators (Table 4.18). The maximum rating is 4.79 for 'in my organization, management freely shares information'. The second highest mean value is 4.71 for 'people in my organization are supportive and helpful'. The minimum ratings are 4.04 for 'in my organization, employees are encouraged to express their opinions and ideas regarding work' and 4.29 for 'in my organization, each day brings new challenges'. These statistics illustrate that ERP implementing firms provided an open system environment and followed an employee oriented culture. Nevertheless, it seems that the ERP implementing companies were more process oriented than result oriented.

Table (4.18) Indicators of Organizational Culture

Code	Item	Mean	Standard Deviation
C1	In my organization, employees are encouraged to analyze mistakes and learn from them.	4.46	1.22
C2	In my organization, each day brings new challenges.	4.29	1.06
C3	In my organization, employees are encouraged to express their opinions and ideas regarding work.	4.04	1.17
C4	In my organization, management freely shares information.	4.79	0.95
C5	In my organization, people are supportive and helpful.	4.71	1.24
C6	In my organization, there is willingness to collaborate across organizational units.	4.42	0.89

4.8.8. ERP User Satisfaction

ERP user satisfaction was evaluated by seven items. As can be seen in Table (4.19) the mean values for ERP user satisfaction range from 4.91 to 5.21. The maximum ratings are for 'The information provided by the ERP system is up to date' and 'ERP system presents reports in a useful format'. The minimum ratings are for 'ERP system improves my work efficiency' and 'Overall, there is a satisfaction with the ERP system'. It appears that ERP users are satisfied with the up to date information, the output and reports format, and the comprehensiveness of the output contents which provided by ERP systems.

Table (4.19) Indicators of User Satisfaction

Code	Item	Mean	Standard Deviation
S1	ERP system provides outputs which I need.	5.04	0.76
S2	ERP system provides precise information.	4.96	1.24
S3	ERP system presents reports in a useful format.	5.08	1.10
S4	The output content provided by the ERP system is comprehensive.	5.00	0.92
S5	The information provided by the ERP system is up to date.	5.21	1.15
S6	ERP system improves my work efficiency.	4.92	0.86
S7	Overall, there is a satisfaction with the ERP system.	4.91	1.31

4.8.9. Organizational Impact

Organizational impact was assessed using seven indicators (Table 4.20). The maximum rating is 5.21 for 'ERP system rationalizes business processes and tasks'. The second highest mean value is 5.08 for 'ERP system improves communication between departments'. The minimum ratings are 4.50 for 'ERP system reduces organizational cost' and 4.67 for 'ERP system increases internal/external customer satisfaction'. This data demonstrates that the implemented ERP systems could rationalize the organizational procedures and that they increased the contacts among organizational divisions. However, the implemented ERP systems had just a slight impact on the reduction of organizational cost.

Table (4.20) Indicators of Organizational Impact

Code	Item	Mean	Standard Deviation
S8	ERP system enhances the quality of decision making.	5.00	1.13
S9	ERP system improves communication between departments.	5.08	0.97
S10	ERP system rationalizes business processes and tasks.	5.21	1.22
S11	ERP system increases internal/external customer satisfaction.	4.67	1.16
S12	ERP system reduces organizational cost.	4.50	0.84
S13	ERP system improves the managerial efficiency.	4.79	0.92
S14	ERP system improves the firm's overall business productivity.	4.88	1.11

4.9. Summary

This chapter explained the process of data analysis. First, collected data were prepared for analysis. Next, descriptive statistics such as frequency distribution, measures of central tendencies and dispersion of variables were examined. Then, the structural equation modeling (SEM) technique was used for data analysis, using two steps: the measurement model and the structural model. After that, a number of goodness-of-fit measures were employed to evaluate the results. Moreover, dicriminant validity, convergent validity and confirmatory factor analysis were inspected. Lastly, the hypotheses were tested. The SEM package AMOS 16.0 was used to test the relationships hypothesized by the research model. Based on the results of the SEM fit indices, the proposed model provided an acceptable fit for the data. Using structural equation modeling and hypotheses testing on the proposed model, it was found that 10 of the 12 hypothesized relationships (Hypotheses 1, 3, 4, 5, 6, 7, 9, 10, 11 and 12) were significant, while two hypotheses were not significantly supported (Hypotheses 2 and 8).

In the next chapter, the key findings of the study are discussed. The findings are compared with the results of similar previous research. Then, the potential theoretical and managerial contributions are offered. Some of the limitations of the research are also discussed. After that, several recommendations are outlined based on the research findings. Lastly, a number of additional areas of study that may be valuable are recommended.