CHAPTER IV
FINDINGS AND DISCUSSION

4.0 Introduction

This chapter reports and discusses the findings of the study. Therefore, Based on the data that was collected from sample of Yemeni industrial companies by perception of top management and quality managers, this study analyzes the relationship of the variables of study which can lead to answer the four research questions and investigate the four objectives of this study that mentioned earlier.

The analysis began with factor analysis and reliability analysis, followed by descriptive of study, next correlation analysis was carried out to investigate the relationship between the variables of study; firstly, it examined the relationship of human factors of quality management and organization performance. Secondly, the relationship of human factors of quality management and quality improvement practices. Third, it evaluated the relationship of quality improvement practices and organization performance.

Structure Equation Modeling was also carried out to examine the hypotheses of this study. The results of Structure Equation Modeling were provided through four structure models, The full structure model examined the impact of human factors of quality management on both quality improvement practices and organization performance, while the other three structure models examined each hypothesis separately; the first model evaluated the direct impact of human factors of quality management on organization performance, the second model assessed the direct impact of human factors of quality management on quality improvement practices, the third model examine the direct impact of quality improvement practices on organization performance.

4.1 Demographic information

This section shows the background of the demographic data of the respondents who participated in the current study, which is an essential and useful aspect to understand the data segmentation. A questionnaire was sent to 87 industrial companies in Yemen. A total of 210 completed surveys were returned out of 261 surveys questionnaire, for a response rate of 80 % which considered acceptable. The questionnaire was answered by three quality managers from each company. The following shows sample characteristics in terms of the respondents (gender, age, experience, and qualification).

In the sample, there were 74.3% male while 25.7% female. Table 4.1 shows demographic information of the gender. Actually this percent of respondents is revealing the Yemeni culture that prefers men to work rather than women. The age of the respondents ranged respectively 11.9% under 25 years, and 29% from 26-35, while 29% from 36-45, and 6.7% for 56 years and above. Demographic information of the age is shown in Table 4.1.

The experience of respondents ranged respectively 14.8% under 5 years, and 23.3% were from 6-10 years, 29% from 11-15, 17.1% were between 16 to 20, finally 15.7% have 21 years and above. This statistics clearly shows that most of the respondents are well experienced and have been working in their organizations for many years. Table 4.1 reveals the demographic information of the experience.

Regarding the qualification, the respondents were divided into five categories; 6.2% of whom have high school, 31.4% have higher diploma, 34% have bachelor, 26.2% have master, and 1.4% have doctorate. The qualification information of the age is provided in Table 4.1.

Table 4.1: Demographic information

Gender		
	Frequency	Percent
Male	156	74.3%
Female	54	25.7%
Total	210	100.0%
Age		
	Frequency	Percent
under 25 years	25	11.9%
26-35 years	61	29.0%
36- 45	61	29.0%
46-55	49	23.3%
56 years and above	14	6.7%
Total	210	100.0%
Experience		
	Frequency	Percent
under 5 years	31	14.8%
6-10	49	23.3%
11-15	61	29.0%
16-20	36	17.1%
21 years and above	33	15.7%
Total	210	100.0%
Qualification		
	Frequency	Percent
high school	13	6.2%
higher diploma	66	31,4%
Bachelor	73	34,8%
Master	55	26.2%
Doctorate	2	1.4%
Total	210	100.0%

4.2 Descriptive statistics

The mean and standard deviations for each variable of study have been calculated. A summary of descriptive statistics of information of variables of human factors of quality management, quality improvement practices and organization performance were provided below. Table 4.2 reveals the descriptive statistics of human factors of quality management variables (leadership, customer focus, employee involvement, supplier relations, training and education, and reward and recognition).

Table 4.2: Descriptive statistics for human factors of quality management variables

Statistics								
Human factors	**Mean**	**Median**	**Mode**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Minimum**	**Maximum**
Leadership	35.17	35.00	33.00	3.31	-1.20	5.23	17.00	40.00
Customer focus	25.58	26.00	26.00	2.61	-.55	1.61	14.00	30.00
Supplier relation	22.30	22.00	19.00	3.63	.59	-.54	16.00	30.00
Employee involvement	33.41	34.00	34.00	3.56	-.57	2.62	16.00	45.00
Training & education	25.25	25.00	24.00	2.93	-1.48	8.22	6.00	30.00
Reward & recognition	24.40	25.00	24.00	3.28	-1.55	5.83	9.00	30.00

Table 4.3 shows the descriptive statistics of quality improvement practices variables (top management support, teamwork, customer involvement, process control and improvement, product design, and quality system improvement).

Table 4-3: Descriptive statistics for quality improvement practices variables

Statistics								
Quality improvement practices	**Mean**	**Median**	**Mode**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Minimum**	**Maximum**
top management	21.87	22.00	25.00	2.55	-.86	1.46	11.00	25.00
teamwork	29.48	30.00	30.00	3.36	-.72	1.50	16.00	35.00
customer involvement	20.58	20.00	20.00	2.46	-.15	.81	12.00	25.00
process control & improvement	31.81	32.00	32.00	2.89	-.47	.44	22.00	39.00
product design	33.40	33.00	33.00	2.64	.17	.13	26.00	39.00
quality system improvement	21.64	21.00	20.00	2.23	.32	.44	13.00	25.00

Furthermore, Table 4.4 presents the descriptive statistics of organization performance (customer satisfaction, employee morale, productivity, defects, and delivery in full).

Table 4-4: Descriptive statistics for organization performance

Statistics								
Organization performance	**Mean**	**Median**	**Mode**	**Std. Deviation**	**Skewness**	**Kurtosis**	**Minimum**	**Maximum**
customer satisfaction	3.31	3.00	4.00	.84	-.953	.60	1.00	5.00
employee morale	3.61	4.00	4.00	.69	-1.43	3.21	1.00	5.00
productivity	3.62	4.00	4.00	.72	-1.84	3.53	1.00	5.00
defects	3.66	4.00	4.00	.97	-.92	.82	1.00	5.00
delivery in full	3.44	4.00	4.00	1.04	-1.14	.79	1.00	5.00

In other words, the results that provided above reveal the mean, median, mode and standard deviation for each variable of human factors of quality management, quality improvement practices and, organization performance.

Furthermore, skewness and kurtosis, and minimum and maximum of each variable of human factors of quality management, quality improvement practices and organization performance also provided in Tables 4.2, 4.3 and 4.4.

4.3 Factor analysis

To measure the direct and indirect impact of human factors of quality management the instrument was divided into three sections, each section includes several factors and each factor includes several items. First section includes 40 items of human factors of quality management divided into six human factors; they are leadership, customer focus, employee involvement, supplier relations, training and education, and reward and recognition, which represent the independent variables of this study.

Second section represents the mediator variable of this study which includes 38 items divided into six quality improvement practices factors; they are top management support, teamwork, customer involvement, process control and improvement, product design, and quality system improvement.

Third section includes seven dimensions of organization performance as dependent variable; they are employee morale, productivity, defects, delivery in full time, cost of quality, and warranty claims cost. There were 83 items in the questionnaire were used to determine the direct and indirect relationship of this study.

The exploratory factor analysis was carried out to evaluate the assignment of items to scale in developing the instrument of this study. The results that were shown in Tables 4.5, 4.6, and 4.7 present respectively factors loading of human factors of quality management, quality improvement practices and organization performance, after removing the items with low factor loading or double loading.

Regarding the variables of human factors of quality management, there were 4 out of 40 items removed after factor analysis; one of whom was belonging to leadership factor, thus, seven items of leadership factor remained. Another two items were removed from employee involvement factors; thus, six items of employee involvement only were survived. The fourth item was removed out of

the six items of reward and recognition factor. The findings of this technique show that the loading of remaining items ranged from .510 to .904.

The relative explanatory power (Eigen values) for each factor of human factors of quality improvement is 3.550 for leadership, 3.210 for customer focus, 3.193 for supplier relationship, 3.234 for employee involvement, 3.586 for training and education, and 3.266 for reward and recognition. The value of KMO for each factor of human factors of quality management is respectively .814 for leadership, .822 for customer focus, .685 for supplier relationship, .707 for employee involvement, .799 for training and education and .817 for reward and recognition. Actually, these results indicate that sampling adequacy for factor analysis was appropriate. Bartlett's Test of sphericity for each variable significantly supports the factorability of correlation matrix.

Table 4.5 reveals factor analysis for human factors of quality management.

Table 4.5 Summary of factor analysis on human factors of quality management

Factors	Items	Factors Loading
Leadership	(1) Top management actively participates in quality management and improvement process.	0.770
	(2) Top management learns quality-related concepts and skills.	0.756
	(3) Top management strongly encourages employee involvement in quality management and improvement activities.	0.739
	(4) Top management empowers employees to solve quality problems.	0.820
	(5) Top management arranges adequate resources for employee education and training.	0.720
	(6) Top management discusses many quality-related issues in top management meetings.	0.510
	(7) Top management focuses on product quality rather than yields.	0.623
Customer focus.	(1) Our company collects extensive complaint information from customers.	0.772
	(2) Quality-related customer complaints are treated with top priority.	0.705
	(3) Our company conducts a customer satisfaction survey every year.	0.655
	(4) Our company always conducts market research in order to collect suggestions for improving our products.	0.857
	(5) Our company provides warranty on our sold products to customers.	0.663
	(6) Our company has been customer focused for a long time.	0.717

Table 4.5… Continued

Factors	Items	Factors Loading
Supplier relations	(1) Our company has established long-term co-operative relations with suppliers.	0.745
	(2) Our company regards product quality as the most important factor for selecting suppliers.	0.789
	(3) Our company always participates in supplier activities related to quality.	0.733
	(4) Our company always gives feedback on the performance of suppliers' products.	0.657
	(5) Our company has detailed information about supplier performance.	0.798
	(6) Our company regularly conducts supplier quality audit.	0.639
Employee involvement	1) Our company has cross-functional teams.	0.761
	(2) Our company has several QC circles (within one function).	0.692
	(3) Employees are actively involved in quality-related activities.	0.722
	(4) Our company implements suggestion activities extensively.	0.748
	(5) Employees are encouraged to fix problems they find.	0.684
	(6) Reporting work problems is encouraged in our company	0.792

Table 4.5… Continued

Factors	Items	Factors Loading
Training and education	1) Employees are encouraged to accept education and training in our company.	0.729
	(2) Resources are available for employee education and training in our company.	0.759
	(3) Most employees in our company are trained on how to use quality management methods (tools).	0.844
	(4) Quality awareness education is given to employees.	0.751
	(5) Specific work-skills training are given to all employees.	0.787
	(6) Employees are regarded as valuable, long-term resources worthy of receiving education and training throughout their career	0.736
Reward and recognition	(1) Our company improves working conditions in order to recognize employee quality improvement efforts.	0.732
	(2) Position promotions are based on work quality in our company.	0.703
	(3) Excellent suggestions are financially rewarded.	0.904
	(4) Employees' rewards and penalties are clear.	0.829
	(5) Recognition and reward activities effectively stimulate employee commitment to quality improvement	0.856

For the variables of quality improvement practices, three items related to product design out of 38 items were removed after factor analysis; they were removed due to the reason that two of them were double loaded and one was law loaded (443). Thus, the findings of this technique show that the loading of the remained items was ranging from .543 to .922.

The relative explanatory power (Eigen values) for each factor of quality improvement practices is 3.127 for top management support, 3.967 for teamwork, 2.902 for customer involvement, 5.126 for process control and improvement, 2.771 for product design, and 3.097 for quality system improvement.

The values of KMO for each factor of human factors of quality management were 784 for top management support, .811 for teamwork, .731 for customer involvement, .828 for process control and improvement, .768 for product design, and .791 for quality system improvement; that shows the appropriateness of sampling adequacy for factor analysis. Bartlett's Test of sphericity for each variable significantly supports factorability of correlation matrix.

Table 4.6 shows factor analysis for quality improvement practices.

Table 4.6 Summary of factor analysis on quality improvement practices

Factors	Items	Factors Loading
Top Management Support	1) All major department heads within our plant accept their responsibility for quality.	0.843
	2) Plant management provides personal leadership for quality products and quality improvement,	0.848
	3) The top priority is evaluating plant management in quality performance.	0.741
	4) All major department heads within our plant work towards encouraging just in time production.	0.811
	5) Our top management strongly encourages employee involvement in the production process.	0.701
Teamwork	1) Our plant is organized into permanent production teams.	0.715
	2) During problem solving sessions, we make an effort to get all team members' opinions and ideas before making a decision.	0.843
	3) Our plant forms teams to solve problems.	0.738
	4) In the past three years, many problems have been solved through small group sessions.	0.846
	5) When I have a problem with my job, my supervisor tries to solve it.	0.782
	6) Problems are usually solved by supervisors.	0.664
	7) When I have a problem on the job, I try to solve it myself.	0.658

Table 4.6… Continued

Factors	Items	Factors Loading
Customer Involvement	1) We frequently are in close contact with our customers.	0.655
	2) Our customers seldom visit our plant.	0.691
	3) Our customers give us feedback on quality and delivery performance.	0.914
	4) A very important objective is to obtain satisfied customers.	0.637
	5) Our customers buy from us just-in-time to meet their needs.	0.868
Process control and improvement	(1) Our company is kept neat and clean at all times.	0.543
	(2) Process capability can meet production requirements.	0.879
	(3) Production equipment is maintained well according to maintenance plan.	0.758
	(4) Our company implements various inspections effectively (e.g., incoming, process, final products).	0.666
	(5) Our processes are designed to be "fool proof" in order to minimize the chance of employee error.	0.920
	(6) Our company uses the Seven QC tools extensively for process control and improvement.	0.839
	(7) Our company uses SPC extensively for process control and improvement.	0.913
	(8) Our company uses PDCA cycle extensively for process control and improvement.	0.812

Table 4.6… Continued

Factors	Items	Factors Loading
Product Design	(1) The design engineers are required to have some shopfloor experiences.	0.745
	(2) The design engineers are required to have some marketing experiences.	0.778
	(3) The customer requirements are thoroughly considered in new product design.	0.642
	(4) Various departments participate in new product development.	0.766
	(5) New product designs are thoroughly reviewed before production.	0.645
Quality system improvement	(1) The quality system in our company is continuously improved.	0.546
	(2) Our company uses ISO 9000 as a guideline for establishing our quality system.	0.683
	(3) Our company has a clear quality manual.	0.889
	(4) Our company has clear procedure documents.	0.922
	(5) Our company has clear working instructions.	0.831

For organization performance there were two of seven items removed after factor analysis. The findings of this technique show that the loading of remaining items ranged from .587 to .844.

The relative explanatory power (Eigen values) for the factor of organization performance was 3.004. The value of KMO for organization performance was .781, which presents that sampling adequacy for factor analysis was appropriate. Bartlett's Test of sphericity for each variable is significantly supporting the factorability of correlation matrix. Table 4.7 below presents the factor analysis for organization performance.

Table 4.7 Summary of factor analysis on organization performance

Factors	Items	Factors Loading
Organization performance	1) Customer satisfaction.	0.844
	2) Employee morale.	0.836
	3) Productivity.	0.782
	4) Defects as a percentage of production volume.	0.587
	5) Delivery in full on time to customer.	0.798

Table 4.8 reveals the factors before and after removing items during the processing of factor analysis. As well as, it shows the number of the deleted items and the reason behind their removing.

Table 4.8: The factors before and after removing items

factors	No. of items Before	Items Deleted	No. of items After	Reason for Deleted
Leadership	8	1	7	Double loaded
Customer focus	6	0	6	None
Supplier relations	6	0	6	None
Employee involvement	8	2	6	Double loaded
Training and education	6	0	6	None
Reward and recognition	6	1	5	Double loaded
Top management support	5	0	5	None
Teamwork	7	0	7	None
Customer involvement	5	0	5	None
Process control and improvement	8	0	8	None
Product design	8	3	5	Double and low loaded
Quality system improvement	5	0	5	None
Organization performance	7	2	5	Double loaded

4.4 Reliability analysis

The reliability analysis was conducted to provide information about the relationship between individual items in the scale and their internal consistency, in addition to examine the properties of measurement scale and the questions that made it. Wuest et al. (2006), however, considered the calculating estimates of reliability as an essential prerequisite for the instrument's validation.

In this research, internal consistency was adopted to estimate the reliability of instrument. Internal consistency was measured by Cronbach's coefficient alpha, and the higher the Alpha value or the closer reliability coefficient to 1.0 was considered the higher of the measurement items. Therefore, in this study, Cronphach's Alpha values exceed 0.7 represent acceptable reliability, while any Alpha values over 0.8 considered as entirely good (Nunnally, 1978; Cronbach, 1951).

The results of Cronbach's coefficient alpha of the six human factors of quality management are shown in Table 4.9. Measures of human factors were carried out based on five point Lekirt scale from 1= strongly disagree to 5= strongly agree. The instrument has an acceptable reliability for human factors of quality management, the Cronbach alpha ranged between 0.727 for employee involvement to 0.871 for reward and recognition.

Table 4.9: Cronbach's Alpha for human factors of quality management

No	Factor	No of items	Alpha
1.	Leadership	7	0.824
2.	Customer focus	6	0.817
3.	Supplier relations	6	0.777
4.	Employee involvement	6	0.727
5.	Training and education	6	0.860
6.	Reward and recognition	5	0.871

Table 4.10 below shows Cronbach's coefficient alpha of the six quality improvement practices (top management support, teamwork, customer involvement, process control and improvement, product design, and quality system improvement). Measures of this factors were carried out based on five point Lekirt scales from 1= strongly disagree to 5= strongly agree.

The instrument has an acceptable reliability for quality improvement practices, and the Cronbach alpha ranged between 0.700 for product design to 0.860 for teamwork.

Table 4.10: Cronbach's Alpha for quality improvement practices

No	Factor	No of items	Alpha
1.	Top management support	5	0.839
2.	Teamwork	7	0.860
3.	Customer involvement	5	0.793
4.	Process control and improvement	8	0.702
5.	Product design	5	0.700
6.	Quality system improvement	5	0.829

Table 4.11 shows Cronbach's coefficient alpha of five dimensions of organization performance (customer satisfaction, employee morale, productivity, defects, delivery in full) of interest in this study.

The instrument has an acceptable reliability for organization performance, and the Cronbach alpha was 0.827.

Table 4.11: Cronbach's Alpha for organization performance

No	Factor	No of items	Alpha score
1.	Organization performance	5	0.827

4.5 Major findings

The current section focuses on the parameters of the structural models that were organized according to the research questions and hypotheses of present study; the results explained the relationship between the variables of this study as follow:

1. The direct impact of human factors of quality management on organization performance.

2. The direct impact of human factors of quality management on quality improvement practices.

3. The direct impact of quality improvement practices on organization performance.

4. Indirect impact of human factors of quality management on organization performance through their direct impact on quality improvement practices.

In order to investigate the hypotheses and answer the research questions, the following procedures took place: firstly, the direct impact of human factors of quality management on organization performance was analyzed, then the direct impact of human factors of quality management on quality improvement practices followed by the direct impact of quality improvement practices on organization performance were examined respectively. After that, the full structural model that examined direct and indirect impact of human factors of quality management on quality improvement practices and organization performance was discussed. Finally, the mediation role of quality improvement practices for the relationship of human factors of quality management and organization performance was evaluated.

In this study, the correlation analysis was used to determine the strength of linear relationship between the variables of study, which led to examine the relationship between human factors of quality management and quality improvement practices and organization performance, in addition to the relationship of quality improvement practices and organization performance.

According to Bolboaca and Jantschi (2006), the value of this test ranges between (-1 to +1). In other words, the value of +1 reveals that the variables are strongly linear related by an increasing relationship, and the value of -1 reveals that the variables are strongly linear related by an decreasing relationship, while the value of 0 shows that the variables are not linear related at all. There is consideration that if the correlation coefficient is more than 0.8, it refers to the existence of a strong correlation; while if the correlation is less than 0.5, it means that the correlation is very weak.

Structural Equation Model (SEM) includes measurement model and structural model. Measurement model refers to the relationships between latent and observable variable, while structural model specifies linkages between different latent variables (Bollen, 1989). Structural equation model was used in this study to evaluate the structural model and hypotheses of study. There are a variety of tools to Structure Equation Model such as LISREL, AMOS, OR

MPLUS (freeware). In this study AMOS 16.0 was chosen due to its powerful graphic representations and easy-to- use interfaces.

There two steps to estimate structural model (Anderson and Gerbing, 1988). The first step acts to assess the fit of the proposed model to observed data and the goodness of fit tests determine since the tested model can be accepted or rejected. Second step examines the statistical significant and magnitude of the structural parameters together with the reliability of the structural equations.

The current research considered the goodness of fit tested for the proposed model with various statistics such as $\chi 2$, P-value for $\chi 2$, Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA).

4.5.1 Direct impact of human factors on organization performance

The correlation between the six human factors of quality management (leadership, customer focus, supplier relation, employee involvement, training and education, and reward and recognition) and the five dimensions of organization performance (customer satisfaction, employee morale, productivity, delivery to customer, and defect) are shown in Table 4.12. The correlation results show that five out of six human factors of quality management are significantly related to organization performance; they are leadership, customer focus, employee involvement, training and education, and reward and recognition, while supplier relationship does not have any relation with any dimension of organization performance.

The results reveal that leadership is significantly related to four dimensions of organization performance; they are customer satisfaction ($r = .206$, $p = .003$), employee morale ($r = .303$, $p = .000$), productivity ($r = .334$, $p = .000$), and delivery to customer ($r = .139$, $p = .044$). The results also show that the customer focus is significantly related to four dimensions of organization performance; they are customer satisfaction ($r = .224$, $p = .001$), employee

morale (r = .249, p = .000), productivity (r = .345, p = .000), and delivery to customer (r = .199, p = .004). Employee involvement also significantly related to four dimensions of organization performance; they are customer satisfaction (r = .222, p = .001), employee morale (r = .415, p = .000), productivity (r = .469, p = .000), and delivery to customer (r = .216, p = .002).

Furthermore, training and education are significantly related to four dimensions of organization performance; they are customer satisfaction (r = .236, p = .001), employee morale (r = .332, p = .000), productivity (r = .423, p = .000), and delivery to customer (r = .198, p = .004). Also, reward and recognition are significantly related to customer satisfaction (r = .233, p = .001), employee morale (r = .405, p = .000), productivity (r = .473, p = .000), and delivery to customer (r = .178, p = .010).

Table 4.12: Correlations of human factors of quality management and organization performance

HFQM \ OP		Customer satisfaction	Employee moral	Productivity	Defects	Delivery customer
Leadership	*r*	.206**	.303**	.334**	-.013-	.139*
	p	.003	.000	.000	.847	.044
Customer focus	*r*	.224**	.249**	.345**	.014	.199**
	p	.001	.000	.000	.837	.004
Supplier rela tions	*r*	-.038-	-.063-	-.027-	-.116-	-.074-
	p	.582	.365	.692	.093	.283
Employee involvement	*r*	.222**	.415**	.469**	.004	.216**
	p	.001	.000	.000	.955	.002
Training and education	*r*	.236**	.332**	.423**	.000	.198**
	p	.001	.000	.000	1.000	.004
Reward and education	*r*	.233**	.405**	.473**	.020	.178**
	p	.001	.000	.000	.770	.010

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

As previously discussed there is a positive relationship between human factors of quality management and organization performance, which human factors of quality management directly impact organization performance. The discussion that was provided earlier led to formulate the following hypotheses:-

***H1o*:** Human factors of quality management have no direct impact on organization performance.

H1a: Human factors of quality management have direct impact on organization performance.

Analytically, structural model establishes the existence of the causal relationship between human factors of quality management and organization performance. A significant y coefficient would reveal the existed relationship between the variables, and the magnitude of this relationship can be observed from the value of this coefficient.

The estimated model fit shows a good fit as shown in Table 4.13 and Figure 4.1. As results of the goodness of fit test, the value of chi-square was (94.118), degree of freedom d,f was (36), CFI was (.955), RMSEA (.088), and P- value (.000) were significant.

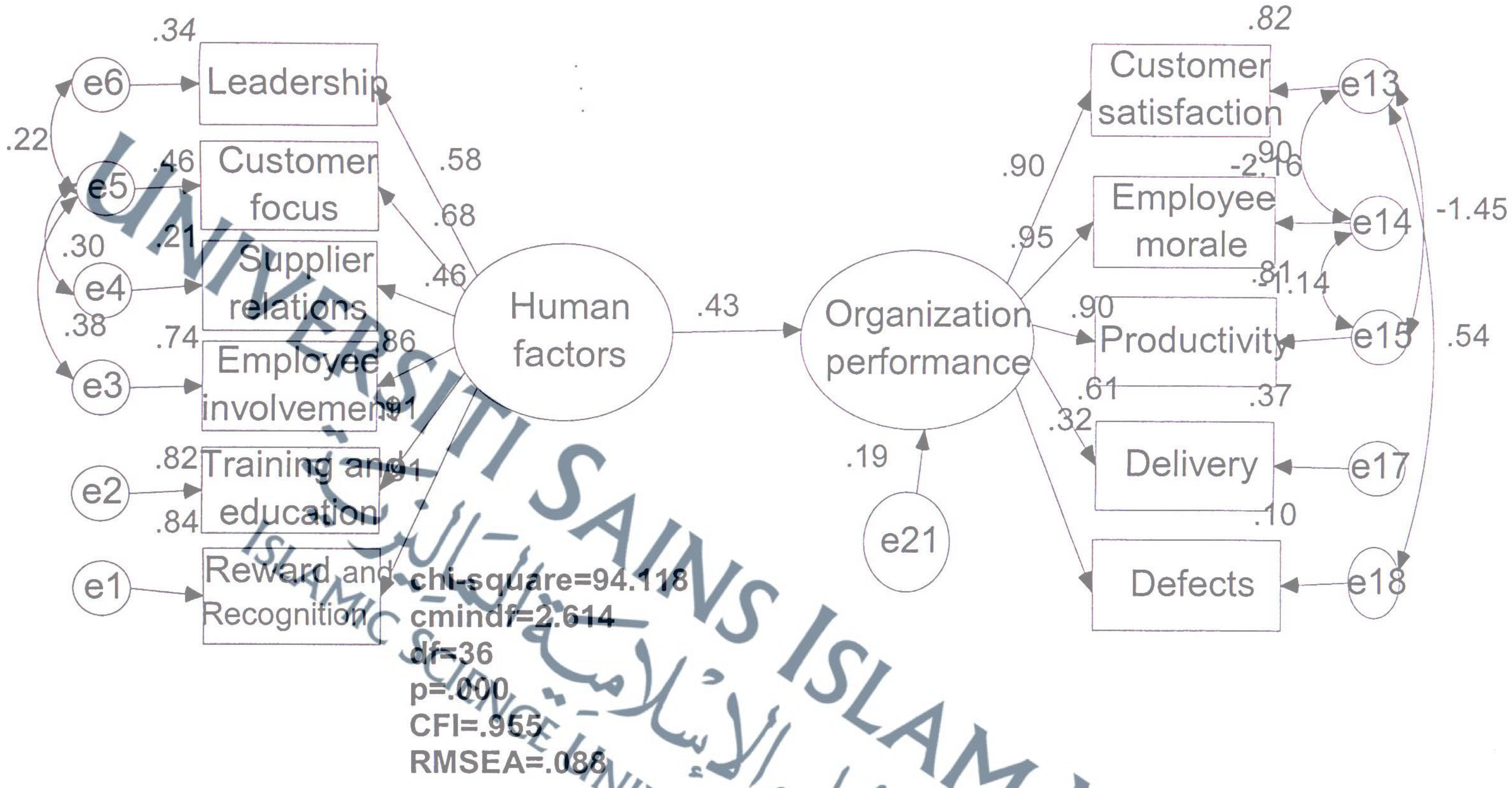

Figure 4.1: Structural model of relationship between human factors and organization performance

Table 4.13: Fit indices for the structural models of the relationship of human factors and organization performance

Model	Chi-square χ^2	df	P	CFI	RMSEA
Human factors----> Organization performance	94.118	36	000	.955	.088

As shown in Table 4.14 and Figure 4.1, it is clear that the human factors of quality management have positive relationship with organization performance and human factors of quality management directly impact organization performance; the standardized coefficient was .432, effect size (R2) was .186, and significant at .001 level (P = .000).

That means 19% of organization performance was explained by human factors of quality management; this percentage is considered as large effect size (Cohen, 2003). Thus, these results supported first hypothesis (H1a), which claimed a positive direct impact of human factors of quality management on organization performance, while failed to accept the first null hypothesis (H1o), which claimed no direct impact of human factors of quality management on organization performance.

Table 4.14: Structural parameters of the relationship between human factors and organization performance

			Unstandardized	Standardized	S.E.	C.R.	R^2	P
Performance	<---	Human factors	.108	.432	.017	6.527	.186	000
Reward and recognition		Human factors	1.000	.914			.836	
Training & education	<---	Human factors	.885	.907	.044	20.031	.822	000
Employee involvement	<---	Human factors	.949	.857	.053	17.885	.735	000
Supplier relation	<---	Human factors	.556	.459	.080	6.987	.211	000
Customer focus	<---	Human factors	.587	.678	.050	11.659	.460	000
Leadership	<---	Human factors	.635	.580	.068	9.381	.336	000
Customer satisfaction	<---	Performance	1.000	.903			.815	
Employee morale	<---	Performance	.877	.948	.091	9.620	.900	000
Productivity	<---	Performance	.869	.899	.095	9.164	.809	000
Delivery customer	<---	Performance	.850	.612	.145	5.870	.374	000
Defects	<---	Performance	.410	.316	.95	4.371	.100	000

The results clearly show that the human factors of quality management have an important role in the implementations of total quality management which directly impact organization performance (Motwani et al., 1994); hence, these factors must get enough attention when the companies reengineer their process to implement total quality program (Wilkinson et al., 1992).

In fact there are lacks of studies emphasize on human factors of quality management while many studies were carried out to contribute the design development and application of the total quality system (Lau and Idris, 2001). Furthermore, at the knowledge of the current researcher there is no research to date in Middle East countries interests on the human side of quality management and its contribution to the implementation of total quality management and organization performance. From the other side, in the implementation of total quality management there is insufficient attention for the human factors of quality management due to the production orientation of the gurus of total quality management (Hill, 1991; Wilkinson, 1992; Louise, 1996).

Lau and Idris (2001) suggested that it is necessary to study the critical soft factors (or human factors) of quality management due to their important role to the implementations of total quality management implementations in addition to their contribution in changing the thinking of managers and employees and permeating of total quality management throughout the whole organization. According to Tamimi and Sebastianelli (1998) 48 per cent was identified as barriers to total quality management due to human factors of quality. Motwani et al. (1994) considered that human factors of quality management such as leadership, organizational skills, and culture as a key player acting to achieve quality performance.

Previous studies brought evidence that the human factors of quality management have an important role in the implementation of total quality management (Flynn et al., 1994; Rahman and Bullock, 2005; and Abdullah et al., 2008). Following this same logic, the first hypothesis in this research established causal relationship between human factors of quality management

and organization performance and structural equation model was estimated to test this hypothesis.

The results of this study confirmed that there is significant relationship between human factors of quality management and organization performance which human factors of quality management directly impact organization performance. Moreover, Five out of the six human factors have a significant relationship with organization performance; these factors are leadership, customer focus, employee involvement, training and education, and reward and recognition which make this research consistent with previous studies such as Flynn et al. (1994), Ho et al. (2000), Rahman and Bullock (2005), and Abdullah et al. (2008).

On the other hand, the results of this study did not find any positive relationship between supplier relation and organization performance; these result agrees with the results obtained by Powel (1995) and Dow et al. (1999) who suggested that a factor such as supplier relations could only be context-dependent. However, this research confirmed previous suggestion that claimed the important role for human factors of quality management in the implementation of total quality management and organization performance.

4.5.2 Direct impact of human factors on quality improvement practices

The correlation results in Table 4.15 reveal a positive correlation between human factors of quality management and quality improvement practices. The results show that all six human factors of quality management (leadership, customer focus, suppler relation, employee involvement, training and education, and reward and recognition) are significantly related to the six factors of quality improvement practices (top management support, customer involvement, teamwork, process control, and improvement, product design and quality system improvement).

The results reveal that leadership significantly related to top management support (r = .535, p = .000), teamwork (r = .498, p = .000), customer involvement (r = .437, p = .000), process control and improvement (r = .354, p = .000), product design (r = .266, p = .000), and quality system improvement (r = .164, p = .017). Also, Customer focus related to all quality improvement practices; top management support (r = .505, p = .000), teamwork (r = .535, p = .000), customer involvement (r = .502, p = .000), process control and improvement (r = .512, p = .000), product design (r = .293, p = .000), and quality system improvement (r = .369, p = .000). Supplier relations are also related to all quality improvement practices; top management support (r = .339, p = .000), teamwork (r = .249, p = .000), customer involvement (r = .421, p = .000), process control and improvement (r = .217, p = .002), product design (r = .324, p = .000), and quality system improvement (r = .319, p = .000).

Moreover, employee involvement is related to all six factors of quality improvement practices; top management support (r = .532, p = .000), teamwork (r = .602, p = .000), customer involvement (r = .560, p = .000), process control and improvement (r = .598, p = .000), product design (r = .460, p = .000), and quality system improvement (r = .441, p = .000). Training and education is also related to all six factors of quality improvement practices; top management support (r = .520, p = .000), teamwork (r = .571, p = .000), customer involvement (r = .528, p = .000), process control and improvement (r = .478, p = .000), product design (r = .510, p = .000), and quality system improvement (r = .411, p = .000). Furthermore, reward and education are significantly related to all factors of quality improvement practices; top management support (r = .557, p = .000), teamwork (r = .611, p = .000), customer involvement (r = .612, p = .000), process control and improvement (r = .539, p = .000), product design (r = .526, p = .000) and quality system improvement (r = .371, p = .000).

Table 4.15: Correlations of human factors quality improvement practices

QIP / HFQM		Top management support	Teamwork	Customer involvement	Process control and improvement	Product design	Quality system improvement
Leadership	*r*	.535**	.498**	.437**	.354**	.266**	.164*
	p	.000	.000	.000	.000	.000	.017
Customer focus	*r*	.505**	.535**	.502**	.512**	.293**	.369**
	p	.000	.000	.000	.000	.000	.000
Supplier relations	*r*	.339**	.249**	.421**	.217**	.324**	.319**
	p	.000	.000	.000	.002	.000	.000
Employee involvement	*r*	.532**	.602**	.560**	.598**	.460**	.441**
	p	.000	.000	.000	.000	.000	.000
Training and education	*r*	.520**	.571**	.528**	.478**	.510**	.411**
	p	.000	.000	.000	.000	.000	.000
Reward and education	*r*	.557**	.611**	.612**	.539**	.526**	.371**
	p	.000	.000	.000	.000	.000	.000

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Literature of quality management discussed the relationship between human and technical factors of quality management and their role in the implementation of total quality management in addition to their contributions to the effort of quality improvement. Literature of quality management suggested that there is a positive relationship between human factors of quality management and quality improvement practices. Besides, literature also

claimed that human factors of quality management have direct impact on quality improvement practices. In short, to investigate this relationship in the current study, the following hypotheses were formulated:-

- ***H2o:*** *Human factors of quality management have no direct impact on quality improvement practices.*

- ***H2a:*** *Human factors of quality management have direct impact on quality improvement practices.*

Structural model was established to investigate the casual relationship between human factors of quality management and quality improvement practices. The estimated model fit showed a good fit, as shown in Table 4.16 and Figure 4.2. The value of chi-square was (139.530), degree of freedom d,f was (46), CFI was (.943), RMSEA (.099), and P- value (.000) were significant.

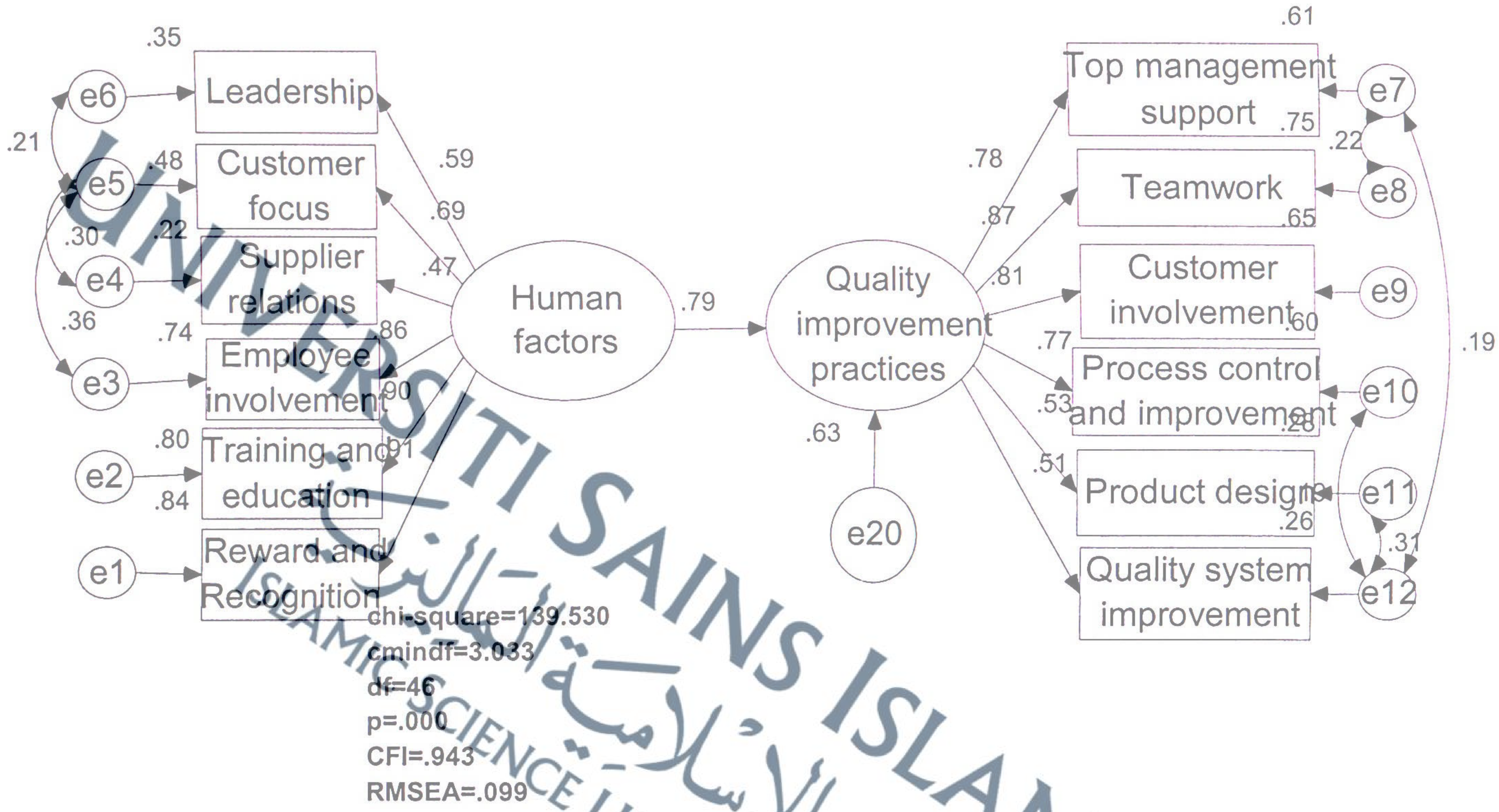

Figure 4.2: Structural model of relationship between human factors and quality improvement practices

Table 4.16 Fit indices for the structural models of the relationship of human factors and quality improvement practices

Model	Chi-square $\chi 2$	df	P	CFI	RMSEA
Human factors ---> Quality improvement practices	139.530	46	000	.943	.099

The results that shown in Table 4.16,Table 4.17, and Figure 4.2 reveal a positive relationship between human factors of quality management and quality improvement practices. These results also present that human factors of quality management have positive direct impact on quality improvement practices; the standardized coefficient was .795, effect size (R2) was .632, and significant at .001 level (P = .000).

That means 63% from quality improvement practices was accounted by human factors of quality management, which considered as a large effect size (Cohen, 2003). Indeed this positive results support the second hypothesis (H2a) that mentioned earlier and claimed a direct impact of human factors of quality management on quality improvement practices. While, the second null hypothesis (H2o), which claimed no direct impact of human factors of quality management on quality improvement practices, was rejected.

Table 4.17: Structural parameters of the relationship between human factors and quality improvement practices

			Unstandardized	Standardized	S.E.	C.R.	R^2	P
Quality improvement	<---	Human factors	.529	.795	.048	11.046	.632	000
Reward & Recognition	<---	Human factors	1.000	.915			.837	
Training & Education	<---	Human factors	.874	.896	.044	19.902	.804	000
Employee Involvement	<---	Human factors	.954	.863	.052	18.294	.744	000
Supplier Relations	<---	Human factors	.570	.471	.079	7.219	.221	000
Customer Focus	<---	Human factors	.598	.689	.050	12.010	.475	000
Leadership	<---	Human factors	.645	.589	.067	9.623	.347	000
Top Management Support	<---	Quality improvement	1.000	.782			.611	
Teamwork	<---	Quality improvement	1.459	.868	.096	15.170	.753	000
Customer Involvement	<---	Quality improvement	1.050	.809	.088	11.962	.655	000
Process control and improvement	<---	Quality improvement	1.818	.775	.159	11.420	.600	000
Product design	<---	Quality improvement	.579	.526	.077	7.476	.277	000
Quality System Improvement	<---	Quality improvement	.569	.510	.074	7.709	.260	000

Wilkinson (1992) started to make highlight emphasis on human factors of quality management. He divided quality management practices into two aspects; soft aspect interests on human side of quality management and hard aspect interests on work process. Actually, quality improvement practices consist of both technical and human factors, in which human factors of quality management act to create a suitable environment to implement technical aspect of quality management. Abdullah et al. (2008) suggested that effective implementations of human factors in organization act and play as a central role to quality improvement which aim to improve the performance and productivity.

To evaluate the relationship of human factors of quality management H_2 was established and structural model was estimated. The results of this study reveal a positive direct impact of human factors of quality management on quality improvement practices, which make this research is consistent with previous studies that brought evidence confirmed the positive relationship of human factors of quality management and quality improvement practices such as Flynn et al., 1994; Motwani et al., 1994; Anderson et al., 1994; Dow et al., 1999; & Abdullah et al., 2008.

4.5.3 Direct impact of quality improvement practices on organization performance

Table 4.18 shows the correlation test results of the relationship between quality improvement practices (top management support, teamwork, customer involvement, process control and improvement, product design and quality system improvement) and organization performance (Customer satisfaction, Employee moral, Productivity, Defects, Delivery customer).

The results show that top management support factor is significantly related to four dimensions of organization performance; they are customer satisfaction ($r = .264$, $p = .000$), employee morale ($r = .382$, $p = .000$), productivity ($r = .420$, $p = .000$), and delivery to customer ($r = .157$, $p = .023$). Also, teamwork is

significantly related to four dimension of organization performance; they are customer satisfaction (r = .280, p = .000), employee morale (r = .372, p = .000), productivity (r = .431, p = .000), and delivery to customer (r = .215, p = .002). Process control and improvement factor is also related to four dimensions of organization performance; they are customer satisfaction (r = .313, p = .000), employee morale (r = .361, p = .000), productivity (r = .470, p = .000), and delivery to customer (r = .221, p = .001).

Furthermore, product design is related to four dimensions of organization performance; they are customer satisfaction (r = .138, p = .046), employee morale (r = .175, p = .011), productivity (r = .285, p = .000), and delivery to customer (r = .177, p = .010). Quality system improvement is also significantly related to four dimensions of organization performance; they are customer satisfaction (r = .144, p = .036), employee morale (r = .183, p = .008), productivity (r = .249, p = .000), and delivery to customer (r = .153, p = .027). While customer involvement significantly is only related to three dimension of organization performance; they are customer satisfaction (r = .210, p = .002), employee morale (r = .304, p = .000), and productivity (r = .330, p = .000).

Table 4.18: Correlations quality improvement practices and organization performance

QIP \ OP		Customer satisfaction	Employee moral	Productivity	Defects	Delivery customer
Top management support	*r*	.264**	.382**	.420**	.042	.157*
	p	.000	.000	.000	.545	.023
Teamwork	*r*	.280**	.372**	.431**	.030	.215**
	p	.000	.000	.000	.661	.002
Customer involvement	*r*	.210**	.304**	.330**	.061	.097
	p	.002	.000	.000	.376	.163
Process control and improvement	*r*	.313**	.361**	.470**	.056	.221**
	p	.000	.000	.000	.418	.001
Product design	*r*	.138*	.175*	.285**	-.019-	.177*
	p	.046	.011	.000	.782	:010
Quality system improvement	*r*	.144*	.183**	.249**	-.021-	.153*
	p	.036	.008	.000	.760	.027

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Literature of quality management suggested that quality improvement practices play a key role in the effort of total quality management implementations from one hand and have a significant impact on organizational performance from the other hand. Due to the important role of quality improvement practices in the implementation of quality management and their positive impact on organization performance, this study analyzes the direct impact of quality improvement practices on organization performance through generating and then examining the following hypotheses:-

- ***H3o:*** *Quality improvement practices have no direct impact on organization performance.*

- ***H3a:*** *Quality improvement practices have direct impact on organization performance.*

Structural model was established to evaluate the relationship between quality improvement practices and organization performance. The estimated model fit reveal a good fit as shown in Table 4.19 and Figure 4.3. The value of chi-square was (91.897), degree of freedom d,f was (39), CFI was (.952), RMSEA (.081), and P- value (.000) were significant.

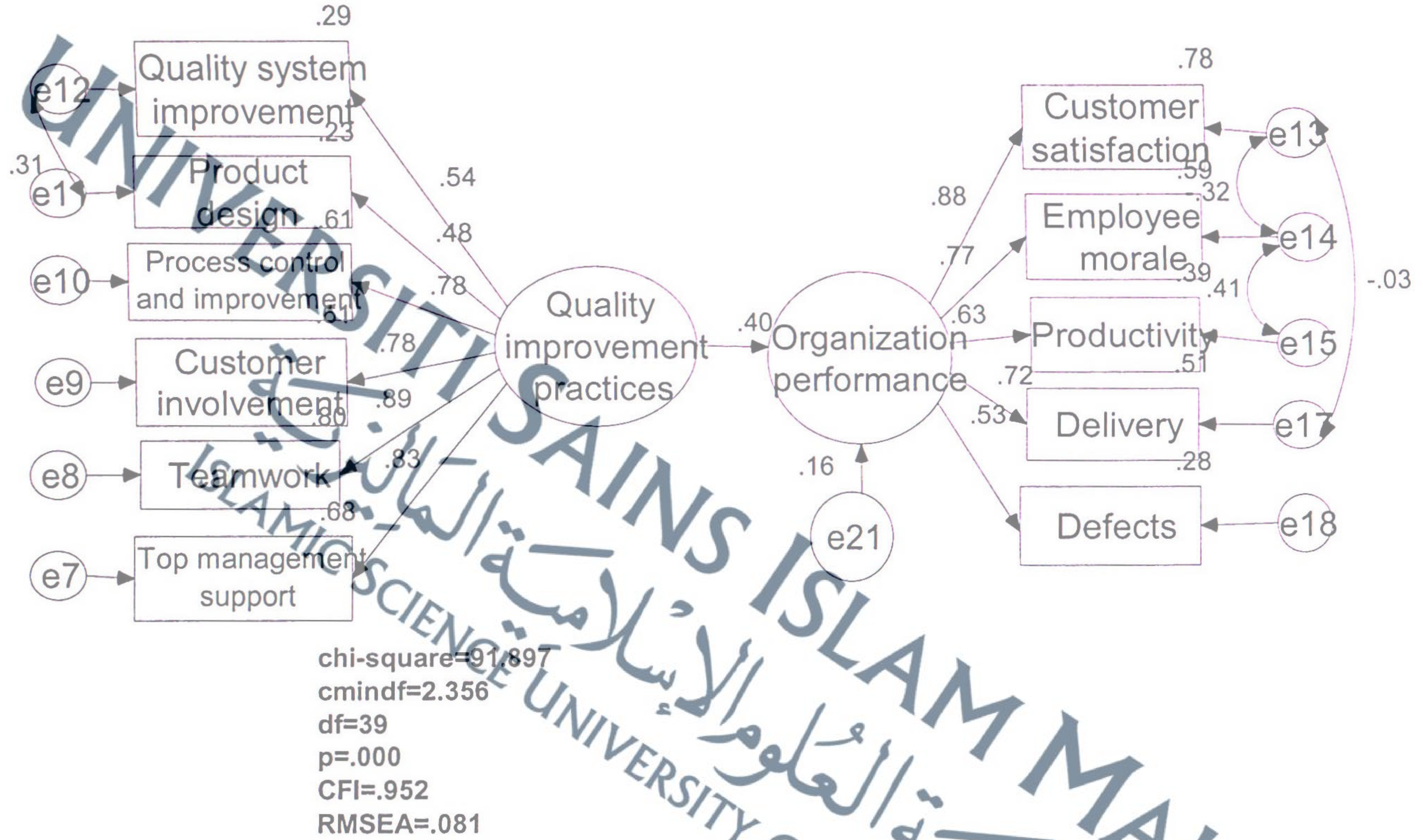

Figure 4.3: Structural model of relationship between quality improvement practices and organization performance

Table 4.19: Fit indices for the structural models of the relationship of quality improvement practices and organization performance

Model	Chi-square $\chi 2$	d.f	P	CFI	RMSEA
Quality improvement ---> Performance	91.897	39	000	.952	.081

The results in Table 4.20 and Figure 4.3 reveal a positive relationship between quality improvement practices and organization performance, in addition to a direct impact of the quality improvement practices on organization performance. The standardized coefficient was .396, effect size (R2) was .157, and significant at .001 level (P = .000).

That means 16% of organization performance was explained by quality improvement practices and thus considered as a large effect size (Cohen, 2003). These results support the third hypothesis (H3a), which claimed a positive direct impact of quality improvement practices on organization performance, and rejects the third null hypothesis, which claimed no direct impact of quality improvement practices on organization performance.

In summary, the results show the important role of quality improvement practices in the implementation of total quality management and their positive impact on organization performance, which make this study is consistent with the previous researches, which evaluated the relationship between quality improvement practices and organization performance.

Table 4.20: Structural parameters of the relationship between quality improvement practices and organization performance

			Unstandardized	Standardized	S.E.	C.R.	R^2	P
Performance	<---	Quality improvement	.139	.396	.027	5.219	.157	000
Top management support	<---	Quality improvement	1.000	.825			.681	
Teamwork	<---	Quality improvement	1.424	.894	.093	15.238	.799	000
Customer involvement	<---	Quality improvement	.963	.783	.075	12.814	.614	000
Process control & improvement	<---	Quality improvement	1.733	.780	136	12.357	.608	000
Product design	<---	Quality improvement	.501	.480	.071	7.014	.231	000
Quality system improvement	<---	Quality improvement	.572	.542	.071	8.055	.294	000
Customer satisfaction	<---	Performance	1.000	.884			.781	
Employee morale	<---	Performance	.718	.768	.088	8.165	.589	000
Productivity	<---	Performance	.616	.628	.087	7.055	.394	000
Delivery customer	<---	Performance	1.011	.716	.103	9.831	.512	000
Defects	<---	Performance	.696	.527	.106	6.594	.278	000

Literature of total quality management suggested that quality improvement practices lead to higher level of organization performance (Badri et al., 1995; quazi et al., 1998; Dow et al., 1999; Roa et al., 1999; Abdullah et al., 2008). According to Abdullah et al. (2008), effective of quality improvement practices lead to increase organization performance.

Structural model that established to evaluate hypothesis 3, which claimed earlier a positive impact of quality improvement practices on organization performance, shows a positive relationship of quality improvement practices and organization performance since quality improvement practices directly impact organization performance.

These results confirmed the positive direct impact of quality improvement practices on organization performance. Thus, these results make this study in line with previous studies (Flynn et al., 1994; Badri et al., 1995; quazi et al., 1998; Dow et al., 1999; Roa et al., 1999; Abdullah et al., 2008).

4.5.4 Final structural model

To investigate the objectives of this study, four structural models were established to examine the hypotheses. The first three structural models were established separately to evaluate the direct relationship of the variables of study: the first model examined the direct impact of human factors of quality management on organization performance, the second model evaluated the direct impact of human factors of quality management on quality improvement practices, and the third model assessed the direct impact of quality improvement practices on organization performance. Regarding the fourth structural model, it discussed the general relationship between the variables of this study. This model also examined the direct relationship between the variables of study; in addition to the mediation relationship through evaluate the indirect impact of human factors of quality management on organization performance through their direct impact on quality improvement practices.

In this section the results of final structural model is shown; it reveals the fit and the coefficient values (y) of this model as shown in Tables 4.21 and 4.22 and Figure 4.4.

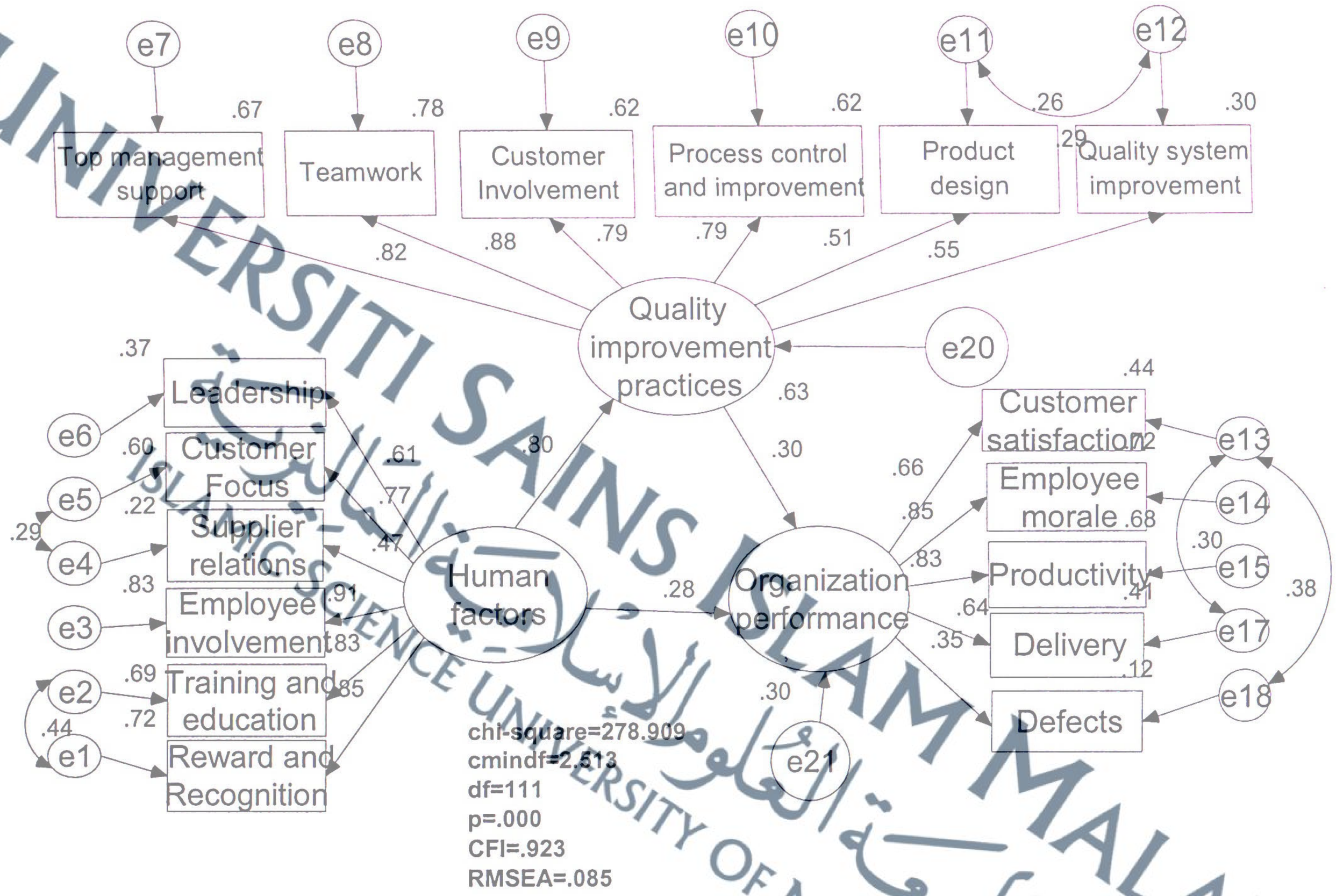

Figure 4.5 Final structural model of the full relationship between human factors, quality improvement practices and organization performance

Analytically, each structural model established the existence of a causal relationship between human factors of quality management, quality improvement practices and organization performance. A significance of y coefficient would indicate that the causal relationship exists between the variables. The magnitude of the relationship can be observed by the value of this coefficient.

The estimated model shows a good fit as shown by the fit indices and the significance of $\chi 2$ (see Table 4.21). The coefficients that reflect the direct impact of human factors of quality management on quality improvement practices and organization performance, and indirect impact of human factors of quality management on organization performance can be analyzed. Table 4.22 shows the structural parameters (y) and the p values, the indicator of the reliability of the structural equations.

Table 4.21: Fit indices for the full structural models of the relationship of human factors, quality improvement practices and organization performance

Model	Chi-square $\chi 2$	df	P	CFI	RMSEA
Human factors --> Quality improvement --> Performance	278.909	111	000	923	.085

Table 4.22: Structural parameters of the full relationship between human factors, quality improvement practices and organization performance

			Unstandardized	Standardized	S.E.	C.R.	R^2	P
Quality improvement	<---	Human factors	.600	.797	.054	11.019	.635	000
Performance	<---	Quality improvement	.078	.296	.035	2.227	.300	.026
Performance	<---	Human factors	.056	.282	.026	2.137		.033
Reward & recognition	<---	Human factors	1.000	.848			.719	
Training & education	<---	Human factors	.876	.833	.044	19.943	.693	000
Employee involvement	<---	Human factors	1.090	.913	.065	16.848	.834	000
Supplier relation	<---	Human factors	.608	.465	.089	6.867	.217	000
Customer focus	<---	Human factors	.727	.775	.055	13.216	.600	000
Leadership	<---	Human factors	.721	.611	.076	9.546	.373	000
Top management support	<---	Quality improvement	1.000	.820			.672	
Teamwork	<---	Quality improvement	1.419	.885	.093	15.192	.782	000

Table 4.22: continued...

			Unstandardized	Standardized	S.E.	C.R.	R^2	P
Customer involvement	<---	Quality improvement	.976	.789	.075	12.956	.622	000
Process control & improvement	<---	Quality improvement	1.757	.785	.136	12.874	.617	000
Product design	<---	Quality improvement	.530	.505	.071	7.447	.255	000
Quality system improvement	<---	Quality improvement	.585	.550	.071	8.223	.303	000
Customer satisfaction	<---	Performance	1.000	.662			.438	
Employee morale	<---	Performance	1.079	.851	.111	9.748	.725	000
Productivity	<---	Performance	1.094	.826	.113	9.649	.683	000
Delivery customer	<---	Performance	1.213	.637	.127	9.574	.406	000
Defects	<---	Performance	.617	.347	.116	5.317	.120	000

The results presented in Table 4.22 and Figure 4.4 show a positive relationship between the variables of study which reveal a positive direct impact of human factors of quality management on organization performance; the standardized coefficient was .282 and the significant was at .05 level (P = .033). These results support H1a that claimed a positive direct impact of human factors of quality management on organization performance.

Also, the results that shown in Figure 4.4 and Table 4.22 presents direct impact of human factors of quality management on quality improvement practices; the standardized coefficient was .797, effect size (R^2) was .635, and significant was at .001 level (p = .000). This means that 63% from quality improvement practices were accounted by human factors of quality management, which considered as large effect size (Cohen 2003). In fact, these results support H_{2a} that mentioned earlier. The effective implementation of human factors in organization plays a central role to quality improvement which act to improve performance and productivity (Abdullah et al., 2008).

Furthermore, the results of the examination of the impact of quality improvement practices on organization performance appear in Figure 4.4 and Table 4.22; the standardized coefficient was .296 and significant at .005 level (P = .0.26). This results support H_{3a} that claimed a positive direct impact of quality improvement practices on organization performance. Collectively 30% from organization performance was explained by quality improvement practices as the strongest contributor, and human factors of quality management as secondary contributor. Literature of quality management suggests that the quality improvement practices positively impact organization performance (Abdullah et al., 2008 and Flynn et al., 1994).

4.5.5 The mediation role of quality improvement practices for the relationship between human factors and organization performance

The previous sections discussed the direct relationship between the variables of study which evaluate direct impact of human factors of quality management on quality improvement practices and organization performance, and the direct impact of quality improvement practices on organization performance. According to Holmbeck (1997), to test the mediator impact, a direct impact model should be estimated. Actually, without significant coefficient in direct models, no mediation impact could exist between the dependent and the independent variables (Wei et al., 2003).

Current study established structural mode that was shown in Figure 4.4, to evaluate the direct and indirect impact of human factors of quality management on quality improvement practices and organization performance. This section discusses the mediator role of quality improvement practices for the relationship between human factors of quality management and organization performance through testing the following hypotheses:-

- H_{4o}: *Human factors of quality management have no indirect impact on organization performance through their impact on quality improvement practices.*

- H_{4a}: *Human factors of quality management have indirect impact on organization performance through their impact on quality improvement practices.*

As mentioned earlier, to test the mediator effect, a direct-effect model should be estimated. This model examined the direct impact of the independent variables, which represented in this study by human factors of quality management, on the mediator variable, which represented by quality improvement practices. Hence the direct impact of quality improvement practices as a mediator variable on dependent variable that represented in this study by organization performance. Finally, this model evaluated the mediator role of quality improvement practices for the relationship between human factors of quality management and organization performance.

The analyses of the structural parameters are corresponding to this model as shown in Table 4.23. It makes possibility to draw some initial conclusions about the mediating role of quality improvement practices on the relationship of human factors of quality management and organization performance. As can be observed in Table 4.23 and Figure 4.4 there is indirect impact that corporate the consideration of quality improvement practices as a mediation variable. Therefore, in this model, direct causal relationships between human factors of quality management and quality improvement practices and organization performance were analyzed. Furthermore, the indirect impact of human factors of quality management on organization performance through their impact on quality improvement practices was analyzed.

The findings in Table 4.23 and Figure 4.4 also suggest that human factors of quality management directly impact quality improvement practices; the standardized coefficient was (.797). Also these findings show direct impact of quality improvement practices on organization performance; the standardized coefficient was (.296). Thus, as discussed earlier, to evaluate mediation effect the direct relationship between variables should be tested. Hence, based on the positive direct relationship between the variables, the mediation effect of quality improvement practices for the relationship of human factors of quality management and organization performance was examined, and the findings that shown in Table 4.23 reveal a significant relationship, and also show that human factors of quality management indirectly impact organization performance

through their impact on quality improvement practices; the standardized coefficient was (.236) and significant more than (.08).

Table 4.23: Structural parameters of the mediation role of quality improvement practices for the relationship of human factors and organization performance

Model	Direct effect	Indirect effect	Total effect	Significant of indirect effect
Human factors ---> quality improvement	.797	--	.797	.000
Quality improvement ---> Organization performance	.296	--	.296	.000
Human factors ---> Organization performance Via Quality improvement	.282	.236	.518	significant more than (.08)

Moreover, the literature of quality management claimed that quality improvement practices are directly affected by human factors of quality management although; quality improvement practices in turn directly affect organization performance. Besides, the human factors of quality management act to create suitable environment to the implementations of quality improvement practices, which quality improvement practices act as a mediator factor for the relationship of human factors of quality management and organization performance (Flynn et al., 1994; Ho et al., 2001; Rahman and Bullock, 2005; Abdullah et al., 2008).

Abdullah et al. (2008) highlighted the mediation role of quality improvement, and to date, as the best knowledge of the researcher of current study there is no more study has formed any linking mechanism between the human factors of quality management, quality improvement practices, and organization performance. Moreover, Abdullah et al. (2008) made a first attempt to evaluate the mediator role of quality improvement for the relationship between human factors of quality management and organization performance. They found a significant indirect impact of human factors of quality management on organization performance through their impact on quality improvement practices.

Other studies evaluated mediator role of technical factors of quality improvement (hard factors) for the relationship between human factors of quality management and organization performance such as Flynn et al. (1994), Ho et al. (2000), and Rahman & Bullock (2005). Actually, they brought evidence that the human factors of quality management indirectly impact organization performance through their direct impact on technical factors of quality management.

The results of this study confirms the previous claims of the mediator role of quality improvement practices for the relationship of human factors of quality management and organization performance, which make this study is consistency with previous studies such as Flynn et al. (1994), Ho et al. (2000), Rahman & Bullock (2005), and Abdullah et al. (2008).

In view of the above discussion and based on the work that have been done by total quality management gurus (such as Deming, Grosby, Juran, Feigenbaum, and Ishikawa) besides the previous studies that interested on identifying the critical factors for the implementation of total quality management (such as Saraph et al., 1989; Porter and Parker, 1993; Tamimi and Gorshon, 1995; Badri et al., 1995; Black and Porter, 1996; Yusof and Aspinwall, 1998; Quazi et al., 1998; Zhang, 2000; Antony et al., 2002; Sharma and Kodali, 2008; Wahid and Corner, 2009; Fotopoulos et al., 2009, and Guion; 2010) and the studies that concentrated on the human side of total qualiy

management (such as Wilkinson, 1992; Louise, 1996; Demirbag et al., 2006; Tari, 2007; Gadenne and Sharma, 2009; Fotopoulos and Psomas, 2009; Kumar et al., 2009) this study confirms the important role of human factors of quality management in the implementation of total quality management. Consequently, this study in somewhat consistent with previous empirical studies that were carried out to investigate both of direct impact of human factors of quality management on quality improvement practices and organization performance, and indirect impact of human factors of quality management on organization performance through their impact on quality improvement practices (such as Flynn et al., 1994, 1995; Ho et al., 2001; Rahman and Bullock, 2005; Abdullah et al., 2008).

4.6 Summary

The results obtained in this chapter support hypotheses of the current study that claimed a positive relationship between human factors of quality management, quality improvement practices, and organization performance. Based on the data of current study, which was collected from 87 Yemeni industrial companies, the statistical analysis was carried out to investigate the purpose of study. Thus, factor analysis, reliability analysis, descriptive statistic, and correlation analysis were carried out respectively.

The results in this chapter reveal a positive relationship between the variables of study; all human factors of quality management except supplier relations have positive relationship with organization performance, and also all six human factors of quality management have positive relationship with quality improvement practices. Moreover, quality improvement practices have positive relationship with organization performance.

In this study, structural models were established to evaluate hypotheses of study. The results that shown in this chapter support hypotheses of study that claimed earlier a significant direct and indirect impact of human factors of quality management on quality improvement practices and organization

performance. It have been found by researcher a significant direct impact of human factors of quality management on organization performance, and also a significant direct impact of human factors of quality management on quality improvement practices, in addition to a significant direct impact of quality improvement practices on organization performance.

Furthermore, the results in this chapter show a significant indirect impact of human factors of quality management on organization performance through their direct impact on quality improvement practices.