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The Study of Mutual Effect of Supply Chain Management and Customer Relationship Management

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ABSTRACT

The current study is intended to find how the mutual effect of supply chain management and the customer relationship management is in Esfarayen steel company. In order to response the questions of the study and also meet the research aims, the research outline and method have been determined after examining the study's literature and finding different aspects of variables of supply chain management and the customer relationship management; and after the operational definitions and creating the questionnaire of measuring the aspects of the mentioned variables, 260 persons of the employees of different departments of Esfarayen steel company were selected and given the questionnaire. Different structural models were applied using structural equations modeling (Lisrel) and then the best structural model was selected from the applied models. After applying the model, the ultimate model of the research was selected which better fitness indicators had compared to the other models. The obtained results indicate that all the described variables and their relationships are direct and mutually the other variable improves by improving and optimizing one of them. As an instance, maintenance and customer care is improved by increasing trust extent in the supply chain management and also, improving the customer care leads to increasing trusts in the supply chain management. Therefore, the different aspects of customer relationship management and the supply chain management influence each other in synergy form and they strengthen each other.

KEY WORDS: supply chain management, customer relationship management, structural equations modeling

INTRODUCTION

Supply chain management is one of the basic factors in any supply chain and plays a very critical role in survival and continuity of the successful activity of the supply chain in competitive global marketplace. Many factors play their role in order for the successful performance of Supply chain management (SCM), but the element playing the most important role in today's business is identifying the needs and demands of customers by the customer relationship management system (CRM).

Supply chains relate the suppliers to a production company and the company to its customers. In order for correctly management of the supply chain, it is necessary to make sure about the excellent serving customers, low costs and short cycle time.

For the same reason, the relationship between the supply chain management and customer relationship management is very important. In this regard, we focus on this matter in this paper.

Problem Statement

The success of most of the private, governmental and military organizations depends upon their ability to present approved outputs, i.e. resenting better productions in a wide range and with a lower cost and fast performing it. The desired presentation of these outputs (cost, quality, performance, delivery, flexibility and innovation) depends on the organization's ability in managing the material, information and money process of inside and out of the organization. This process is known as the supply chain. Some problems are created in the supply chains because they may be complex and long and including many trading partners. These problems lead to dissatisfaction of customers and losing the sales if they are not solved immediately and it may force high costs for eliminating them. Some companies in global class consider many of their successes due to the supply chain management, i.e. what which is widely supported by the customer relationship management. Esfarayen steel company is one of the country's large companies in producing steel. Due to the role and importance of the supply chain management in

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optimal management of the company and also the customer relationship management as the completer of the management process, in this paper, we have studied the mutual relationship of different aspects of supply chain management and the customer relationship management in the form of a case study.

The importance and necessity of the research

Since no research has been done about the mutual relationship between the supply chain management and the customer relationship management in Esfarayen steel company so far, therefore it is necessary to fill the research gap through performing this study and ultimately, to enrich the existing scientific resources in this regard. Also, doing such a research leads to recognizing the mutual relationships between the different aspects of supply chain management and the customer relationship management in the company and ultimately more productivity of the company.

The research's purposes

Basic purposes of the research

Integration of supply chain management and customer relationship management

Special purposes of the research

a- Identification of related factors of the supply chain management and customer relationship management

b- Determination of influential components on the selection of factors of the supply chain management and customer relationship management

Research's Question

a- Are the factors of supply chain management and the factors of customer relationship management mutually influenced by each other?

b- How is the way of the factors' relationship? (Direct or indirect relationship of supply chain management and customer relationship management)

c- The state of integration of supply chain management and customer relationship management

Research Background:

No similar research has been examining the mutual relationship of the different aspects of supply chain management and customer relationship management like the current study so far. Therefore, the researcher has attempted to examine the different aspects of the mentioned concepts through revealing the customer relationship and also supply chain management using structural equation modeling. The studies done about this research are in the following table.

Table (1): Research background

Qolam Hossein Soleymani	2009	Presenting a multi criterion decision making model in order to choose the best suppliers in the supply chain through integrating hierarchical analysis and goal programming
In this study, the relationship between the product's characteristics with the strategy of supply chain has been investigated and the functional criteria of a level of reference operational model have been used as the decision making criterion.		
Mohamad Reza Tabibi	2009	Presenting a model in order to analyze, select and apply the strategy of business supply chain
In this article, this scientific structure is explained by two major and observable characteristics of supply chain and strategic management and under the title of strategic management of supply chain from traditional structure.		
Ali Reza Shahraki	2010	Study of customer relationship management system in Iran's banking system
In this study, it has been tried to examine the role of customer relationship management in Iran's Banks and its weakness and power points, goals and also the influences of its appliance and the critical role of the customer as the vital and fundamental pillar for propping the studied bank up.		

Conceptual Model:

As it can be seen in figure 1, in this study, it has been attempted to examine the different aspects of customer relationship management and also supply chain management using structural equations modeling of the mutual relationship of aspects of the mentioned concepts.

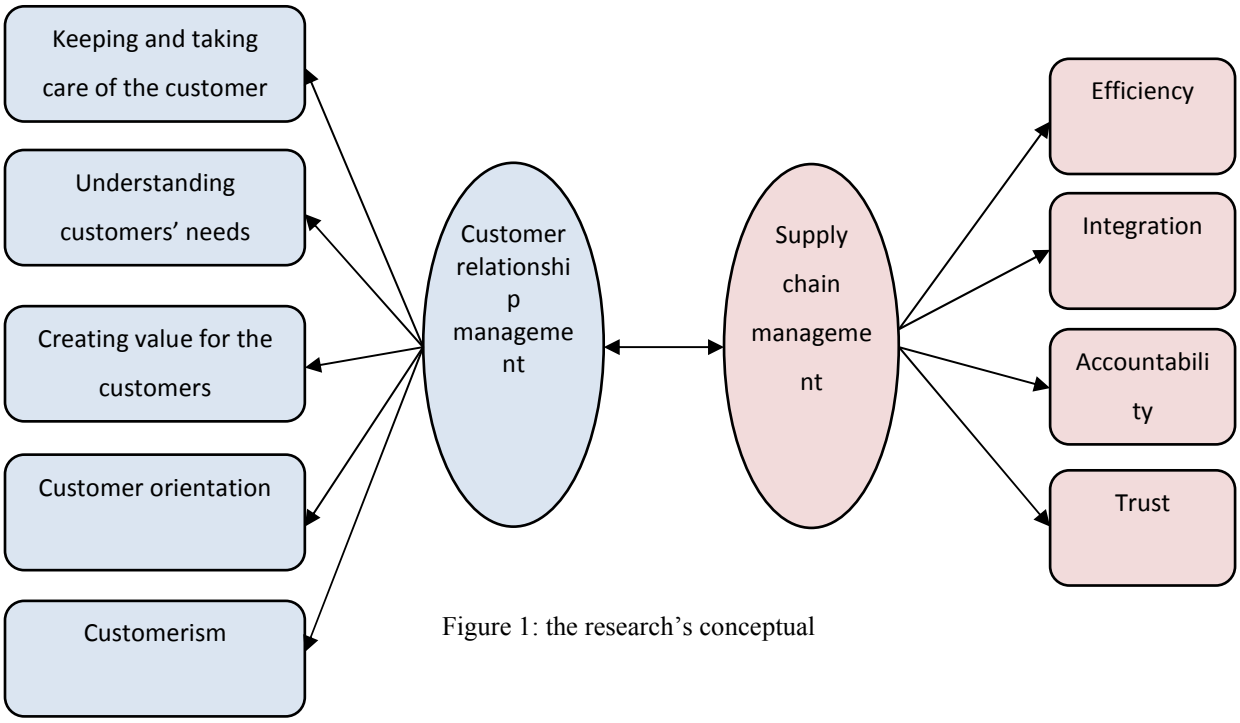

Figure 1: the research's conceptual

This study is from the kind of descriptive functional research since it evaluates the characteristics of the studied society through measuring; therefore, it is a descriptive research from the kind of measuring in which the researcher focuses on the society without manipulating it and after gathering the needed information analyzes the factors using structural equations modeling technique. So, the research method in this study is from the kind of measuring study method. In this method, the information is collected in the form of questionnaire and it is changed into qualitative data through SPSS software.

Statistical Society and Statistical Sample:

The statistical society of this study includes managers and staffs of different departments of Esfarayen steel company.

Estimation of Sample and Sampling Method:

In Esfarayen steel company 803 personnel work in different departments, the sampling was done from this number. The needed number of persons for the study and presenting questionnaire to them was estimated by Cochran Formula. The sample group is a derivational set of the statistical society which the researcher is able to expand the result to all the statistical society through studying it (Sokaran, 2002 p 295). Or in other words, a limited number of individuals of the statistical society indicating the main characteristics of the society is called sample (Azar, Mo'meni, 2004, p 6).

In order to calculate the number of individuals of the study, Cochran Formula has been used as following:

$$n = \frac{Nt^2pq}{Nd^2 + t^2pq} = \frac{803(1/96)^2(0/5\times 0/5)}{803(0/05)^2 + (1/96)^2(0/5\times 0/5)} = \frac{771}{2/97} = 260 \qquad \text{Formula (1)}$$

In this formula N is the population of the statistical society which is equal to 803 personnel of Esfarayen steel company

t = 1.96 is the reliability coefficient in level of 95% (α = 5%)

P = 5%is proportion of the persons with special trait in sample population

q = 5% is proportion of the persons without special trait in sample population

$pq = s^2$ is the variance of desired variable in the sample population

d = 0.05 is the potential efficiency or the confidence interval

Therefore, the sample volume examined in this study is 260 personnel of Esfarayen steel company.

Sampling Method:

The classical random sampling method was used in order to select sample's population in the company, in the way that the sample's population was determined 260 persons based on the share of each department from the total number of company's personnel, and ultimately, the needed individuals were randomly selected from them and they were presented questionnaire. In table 2 the number of sampled individuals of each of the departments has been determined.

Table 2: distribution of sample individuals in Esfarayen steel company

Sample individuals number	Percent	Number of staffs	Productive and administrative departments of company	Row
5	2	16	Manager and Assistant	**1**
9	3	22	Storage	**2**
53	20	163	Technical and Engineering	**3**
5	2	20	Procurement	**4**
18	8	65	Public service	**5**
10	4	24	Chiefs	**6**
150	58	468	Production	**7**
10	4	25	Financial department	**8**
260	100	803	Total	**9**

Measuring Tool:

The measuring tool of variables in this questionnaire is the 5 level range of Likertranked from very low to very high.

Very high	High	Average	Low	Very low
1	2	3	4	5

Questionnaires' Validity:

In order to determine the validity of the used questionnaire in this research, we utilized the ideas of supervisors and advisor professors and also the researchers who had research experience in this field. Based on their ideas, the questionnaire has the acceptable validity under some reforms.

Questionnaires' Reliability:

In order to measure the reliability value of the questionnaire the Cronbach's alpha was used as a criterion for determining reliability. In this study, Cronbach's alpha method has been used in order to calculate the questionnaire's reliability. Results of Cronbach's alpha are as following:

Table 3: questionnaire 1's Cronbach's alpha

Cronbach's alpha value	Number of questionnaires	Number of questions	Factors
0/7844	20	4	Efficiency of supply chain management
0/8250	20	5	trust of supply chain management
0/7869	20	6	Integration of supply chain management
0/7425	20	3	Accountability of supply chain management
0/8831	20	6	Understanding
0/7440	20	4	Creating value for customers in customer relationship management
0/8871	20	10	Keeping and taking care of customers in customer relationship management
/9210	20	13	Customer orientation in customer relationship management
0/7758	20	9	Consumerism in customer relationship management

Regarded to the Cronbach's alpha value which is higher than 0.70 for each of the factors, it can be said that the questionnaire tool of this study has desired reliability.

RESULTS ANALYSIS

Data analysis includes two parts: 1- descriptive analysis of data using descriptive statistics such as frequency distribution table, percentage and standard deviation, 2- hypotheses testing using structural equation modeling; for this regard, the obtained data was analyzed through SPSS and EQS6.1 softwares.

Table 4: descriptive statistics of research's variables

Variable	Aspects	Number	Minimum	Maximum	Mean	Standard deviation
Supply chain management	Efficiency	260	1	5	3/99	0/7
	Integration	260	1	5	3/12	1/06
	Accountability	260	1	5	3/51	0/89
	Trust	260	1/34	5	3/24	0/65
Customer relationship management	Keeping and taking care of customer	260	1	5	3/74	0/65
	Understanding customers' needs	260	1	5	3/97	1/03
	Creating value for customers	260	1/88	5	4/28	0/77
	Customer orientation	260	1	5	3/73	0/87
	Customerism	260	1	5	4/56	0/62

Examining Data Normality (Kolmogorov – Smirnov test):

In most items, the z value is not meaningful in the alpha level of higher than 0.05. Therefore, the current data is normal and it is allowed to use parametric statistical tests. Among the examined questions, 6 questions have meaningful z value that indicates the normality of data of these questions. But regarded to the sample volume which is more than 40, parametric tests may be used based on the central limitation theory.

Structural Equation Modeling:

In this part, we obtain the relationships between the study's variables in test's conceptual model using the obtained coefficients and then answer the research's questions.

Introducing Structural Equation Modeling and Model Fitting Coefficients:

The relationships between variables in the structural equation model are divided into two general areas: 1- the relationships between hidden variables with observable ones, 2- the relationships between hidden variables with hidden variables. The first category is called measuring model and the second one is called structural model. The general form of structural equations is as following:

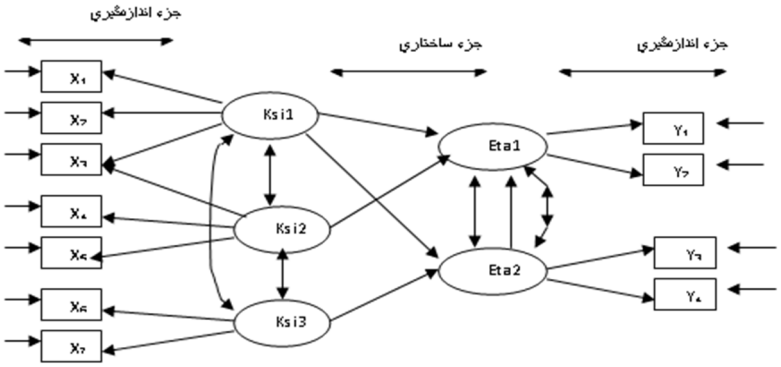

Figure 2: general form of structural equations

In this model y1 to y4 and x1 to x7 are the observed variables and Ksi1 to Ksi3 and Eta1 to Eta2 are latent variables. Ksi1 to Ksi3 are exogenous variables and Eta1 to Eta2 are endogenous variables. The diagram of presented path in lisrel may also be indicated through symbolizing as following:

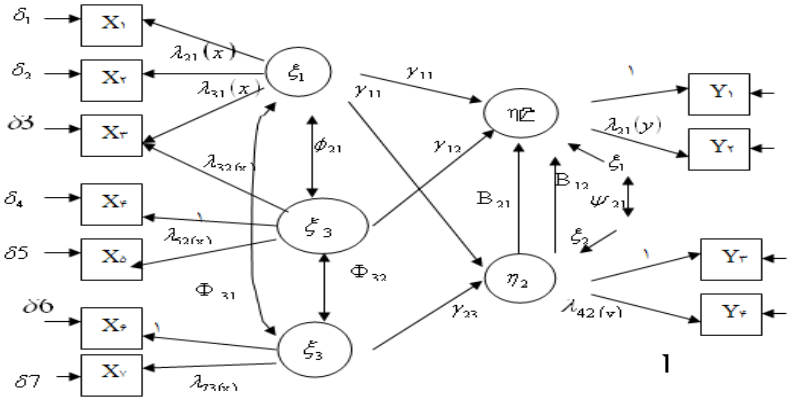

Figure 3: symbolizing

Table 5: defining symbols of the model

indicates the direct influence of ξ variables on η variables	Γ
Indicates the influence of η variables on the other η variables	β
Vector m * 1 is for errors of equations in structural relationships between η and ξ	ξ
n * n matrix for indicating correlation between ξ s	Φ
m * m matrix for indicating correlation between η s	Ψ

According to the above, circular symbol indicates main (hidden) variables and rectangle indicates research's aspects (obvious variables) in which the one way movement from hidden variable (circle) to the obvious one (rectangle) indicates the correlation and two way arrow between hidden variables indicates the relationship between variables known as φ in structural equation model (Kalantari, 2009).

Model Fitting Indicators:

More than 30 fitting indicator have been introduced which can be divided into three general categories:

Absolute fit indices

Comparative fit indices

Frugal fit indices

Absolute fit indices:

Absolute fit indices which from one side are based on the difference of variances and covariance observed and on the other hand are based on the predicted variances and covariance of the adjusted model's parameters. These indicators are shown in table 6:

Table 6: Absolute fitting indicators

Index Domain	Abbreviation	Persian equivalent
As its value is smaller, the model's fitting is more and Chi0 means perfect fitting	$^2\chi$	Chi-square – Chi 2
As it is closer to 1, fitting is more	GFI	Index of Goodness of fitting
As it is closer to 1, fitting is more	AGFI	Index of adjusted Goodness of fitting
As it is closer to 0, fitting is more	RMR	Root Mean Squared Residual

Comparative fit indices:

Comparative indicators are based on the adjusted model and are calculated through a basic model. This basic model is an independence model in default in which the only free parameters are the variances of the observed variables. Therefore totally these indices indicate to what extent the adjusted model has been able to get far from an independence model as a model which its variables have no correlation or covariance with each other. Independence model is a kind of zero models (Qasemi, 2010, p 150).

Some characteristics of comparative fit are as following:

Table 7: comparative fit indices

Indicator Domain	Abbreviation	Persian equivalent
If it is higher than 0.9, fitting is more	NFI	Normal Fit Index
As it is closer to one, fitting is more	RFI	Relative fit index
As it is closer to one, fitting is more	IFI	Incremental fit index
As it is closer to one, fitting is more	CFI	Comparative fit index

Frugal fit indices:

The discussion of model's economy is related to the subject of cost/ reward and its expression is important because, in the adjustment of his model, the researcher must be frugal in order to leave parameters free and make the parameters free that have powerful theoretical and experimental base. The most important frugal fit index which is paid attention to here is the root mean square error of approximation (RMSEA). This index was introduced by (Qasem quoting from: Steiger, 1990) for the first time. The acceptable models for this index have the value of 0.05 or lesser. Fitting of models having values of more than 0.10 is estimated weak. In this study, in order to examine the model's fitting, we will not use all these indices, but some of the most important indices are used in order to examine the fitting of the structural equation model.

In this part, we take the following steps in order to answer the study's questions:

1- Examining the structural model of questions
2- Examining the fitting value of the final model with the data
3- Examining the meaningfulness of relationships with the data
4- Structural model power analysis

Examining the fitting of model:

After entering the questionnaire data in the SPSS software, the EQS6.1 software was used in order to design and apply the structural equation model. Different models have been applied which ultimately two important and basic models of them will be explained in the following. The primary conceptual model was designed and applied based on the research's literature in form of figure 4-5. As you can observe, the external latent variable includes: customer relationship management (ξ1 or xi) which is measured in five aspects of keeping and taking care of the customer, understanding customer's needs, creating value for the customers, customer orientation, and Customerism. The internal latent variable also includes: the variable of supply chain management (η1) which is measured in four aspects of efficiency, integration, accountability, and trust; there are also some relationships between the external (ξs) and internal (ηs) latent variables which are the same research's questions and are posed in the final model. Efficiency, trust, integration, accountability, understanding customer's needs, creating values, keeping customer, customer orientation, Customerism

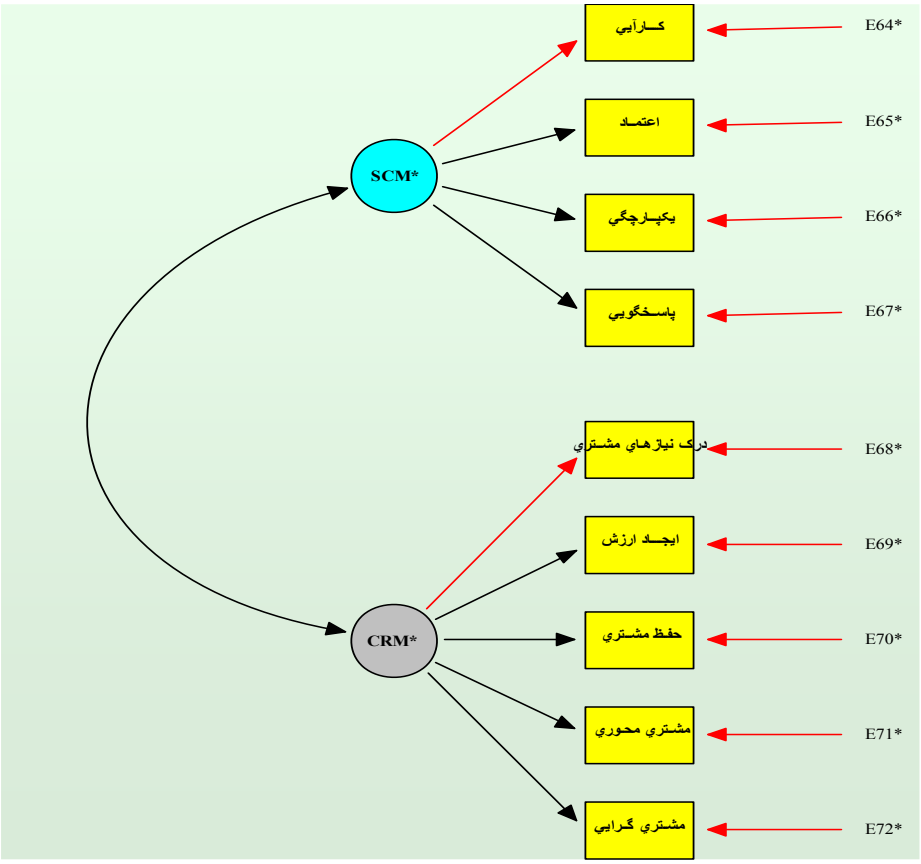

Figure 4: the research's conceptual model and the relationships supposed between the research's variables

After applying the primary model of figure 4, different fitting indices indicated that the model has desired fitting value.

Assessing of Measuring Part of the First Model:

In assessing the measuring part of the model, researcher must examine the relationships between its latent and obvious variables. Here, our aim is to determine the validity or authenticity and trust or reliability of the used measurements. In the subject of authenticity or validity, there is an issue whether the obvious indices or variables measure the same thing researcher wants or something other. In contrast, the trust or reliability deals with the matter that to what extent the used indices measure the desired subject. Therefore, before any measurement, the researcher must be sure about the measurement quality and the assessment of measurement section of the model must be prior

to evaluation of its structural part (Kalantari, 2009, p 136). In order to examine the authenticity or validity of model, we must examine the meaningfulness extent and level of paths between each of the latent variables or their related indices. For example, in this study, in order to examine the relationship between obvious variables (efficiency, integration, accountability, and trust) and the latent variables (variable of supply chain management ξ), the coefficient of direct relationship of each of the mentioned variables and the supply chain management variable must be acceptable.i.e. it must meaningful differ from zero. This direct relationship is calculated by λ factor load in the following measuring equation:

$$x = \lambda\xi + \delta$$ Formula (2)

In this equation λ = latent variable factor ξ and δ = measurement error

Due to the figure 5 which is shown as the final model, the factor loads of the observed variables are orderly equal to 0.63 for efficiency, 0.65 for trust, 0.73 for integration, and 0.61 for accountability and these variables have been loaded on the latent variable of supply chain management and these factor loads are perfectly meaningful based on the calculated t. equations of factor loads of the observed variables on the variable of supply chain management are as following:

Efficiency = 0.63F1 + 0.78 (Efficiency)
Trust = 0.65F1 + 0.76 (Trust)
Integration = 0.73F1 + 0.68 (Integration)
Accountability = 0.61F1 + 0.79 (Accountability)

Therefore, the mathematic equation (standard coefficients) related to supply chain management is as following:

$$y_1 = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + e$$

$$y_1 = 0/63 x_1 + 0/65 x_2 + 0/73 x_3 + 0/61 x_4 + e$$ Formula (2-4)

In this formula F1 = supply chain management and E (efficiency) to E (accountability) is the measurement error of each of the equations. Regarded to the fact that the value of factor load (efficiency) has been considered equal to 1, so, t value is not calculated for it, but for trust, integration and accountability the t value is orderly equal to 8.35, 9.0442 and 7.92 which is meaningful in the meaningfulness level of α = 0.05 because the calculated t value is larger than the table's t in level of0.05 and α= (1.96); therefore, it can be said that the factor loads of 1 to 4 on the supply chain management (F1) are meaningful and indicate the validity of observed variables in measuring the supply chain management variable. Because it is not needed to mention all the results in detail here, so, we avoid from explaining the next cases and the other variables, but the results and calculations show that the factor loads of all observed variables on each of the latent variables are meaningful and it indicates the validity of measurement part of the model; model's output in graphic form in figure 5 indicates that the factor loads of each of the observed variables on the latent variables are meaningful and acceptable. Also, as it was previously mentioned, the variables with factor load lesser than 0.15 were removed from the equation and this led to the improvement of fitting indices of the model.

Assessing Overall Fitting of the Model:

The aim of assessing the general fitting is to determine to what extent the whole model is compatible with the experimental data (Kalantari, 2009, p 128). There are a wide set of fitting criteria and indices which can be used in measuring the model's fitting. Examining different indices of model's fitting indicates the high fitting level of the model with the data. In table 8, the fitting indices of the model can be observed. χ^2 criterion is equal to 62.5 with the freedom degree of 26 and P value of 0.0521 which indicates the desired fitting of model with the existing data; as the χ^2 criterion is smaller, the model's fitting is more, therefore, if the proportion of χ^2 value to the freedom degree is smaller than 3, this indicates the model's desired fitting with the data. Except χ^2, the other indices also indicate the desired fitting of the model.

GFI and AGFI indices orderly are equal to 0.953 and 0.922 which indicate the desired fitting of the model and data. Although, from the viewpoint of David A. Kenny, the goodness fitting indices of GFI and AGFI are very influenced by the sample volume and may show high extents. Currently it is agreed not to use these indices.

Also RMSEA criterion is equal to 0.07 which indicates the weak performance of remains in the model; this criterion is acceptable between 0.05 and 0.08. The normed fitting index or NFI is equal to 0.939 which indicates the model's desired fitting.

IFI index is equal to 0.982 which was firstly introduced by Bolen (1989). This index is also called Delta2 and is shown by the symbol Δ2 and as its value is closer to 1, it indicates the desired fitting of the model with data.

Comparative fitting index (CFI) is based on the correlation between the variables present in the model, in the way that the high correlation between variables leads to the higher values of CFI index. This index's value for the current model is equal to 0.98 and indicates the desired fitting of the model with data.

RMR index is equal to 0.04 and as its value is closer to zero, it indicates the desired fitting of the model. Anyway, as the RMR value is smaller for a model compared to another model can be one of the criteria of its priority.

Generally, assessment of the different fitting indices of the model for the current model indicates the fitting of the designed conceptual model with the obtained experimental data and it can be said that the model has desired fitting with the experimental data.

Table 8: overall fitting indices of the model and path coefficients

Index	P-Value	χ^2	D.F	GFI	AGFI	CFI	R.M.S.E.A	IFI	RMR	NFI
Index value	0/0521	62/5	26	0/953	0/922	0/98	0/07	0/982	0/04	0/939
Allowed value	$\frac{\chi^2}{d.f} < 3 \Rightarrow \frac{62/5}{26} = 2/4$			Higher than 0.9	Higher than 0.9	Higher than 0.9	**0/05<x<0/08**	Higher than 0.9	Closed to zero	Higher than 0.9

Assessing the Structural Fitting of the Model:

In structural section of the model it is focused on the relationships between the latent variables. Here, the aim is to determine whether the theoretical relationships between variables focused by the researcher in the stage of adjusting conceptual frame are confirmed by the data or not. Three cases are concentrated in this regard (Kalantari, 2009, p 140).

1- The positive and negative signs of the estimated parameters in paths between the latent variables indicate whether the calculated parameters for supposed relationships are confirmed or not.

2- The estimated parameters' values indicate that to what extent the predicted relationships are strong. Here the estimated parameters (correlation coefficient between the latent variables) must be meaningful (that is to say that the absolute t value must be more than 1.96).

3- Multiple correlation square (R^2) for the structural equations indicates the variance value of each internal latent variable expressed by the (external) independent latent value. As the R^2 value is larger, it indicates the higher expressing power of the variance. The estimated parameters between internal and external latent variables and their direction and also their R^2 value are indicated in table 9.

Research Question: does the supply chain management influence the customer relationship management?

Research Hypothesis: the supply chain management influences the customer relationship management.

H1: there is correlation between the supply chain management and the customer relationship management.

H0: there is no correlation between the supply chain management and the customer relationship management.

$$\begin{cases} H1: r_{xy} \neq 0 \\ H0: r_{xy} = 0 \end{cases}$$

As it can be seen in table 4-7, the structural relationship between the latent variables with each other is meaningful based on t test. R^2 value of the equation which indicates the expressed variance value is high and this is the indicator of the fact that there is a very strong statistical relationship between these two variables meaning supply chain management and customer relationship management. As it is observed, the coefficient of mutual relationship of the customer relationship management and supply chain management is 0.81; and this indicates that the supply chain management positively influences the customer relationship management. Therefore, the obtained r is equal to 0.81 which this correlation coefficient is larger than critical t of 1.96 in the alpha level of 0.05 with the t value equal to 9.136; therefore, H1 is confirmed and H0 is rejected. It can be said that the supply chain management positively influences the customer relationship management in Esfarayen steel company.

Table9: path coefficients and t values of each of the paths of structural equation

Structural variables model (Multiple items per construct)				
Paths	**Path's symbol**	**t value**	**Standard estimations of the path**	**R^2**
Supply chain management and customer relationship management	11γ	9/136	0/81*	0/66

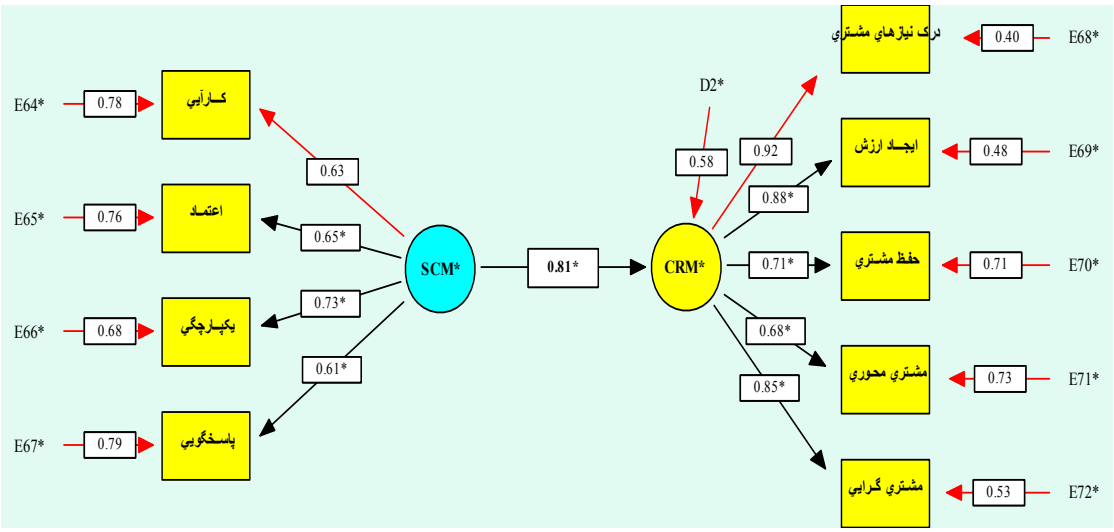

Figure 5: structural equation model

Examining the second model:

The second model of research was applied in the form of a completely structural model in which there are observed variables that measure the latent variables using questions and items. After primary appliance of the model, the questions and items having less factor load were removed from the model gradually; also, the mutual structural relationships between the latent variables were examined and the weak relationships were removed and ultimately the second model of research remained as it can be seen in figure 6 and it was selected as the final model.

Examining the different indices for this model indicates the desired fitting. In the following, we examine the model's fitting indices.

Assessment of the Second Model's Measuring Part:

Regarded to the figure 6 which has been indicated as the final model, the factor loads of the observed variables remained in model are strong enough that it can be said that the measuring part of the second model has enough validity; because the factor loads existing among the observed variables and the latent ones are higher than 0.40 and the variables with factor loads lesser than 0.40 were removed and ultimately, this model was finalized as figure 6.

Assessment of Total Fitting of the Model:

Examining the different indices of the model indicate the high level of model's fitting. In table 10, the fitting indices of model can be observed. χ^2 criterion is equal to 675.5 with the freedom degree of 455 and P value = 0.0221 which indicates the desired fitting of the model with the existing data. As the criterion is smaller, the model's fitting is more, therefore, if the proportion of χ^2 value to the freedom degree is smaller than 3, this indicates the desired fitting of the model with data. Except χ^2, the other indicates are also the indicator of good fitting of model.

GFI and AGFI indices are orderly equal to 0.901 and 0.942 which indicate the desired fitting of the model with data. Also RMSEA criterion is equal to 0.08 which indicates weak performance of remains in the model; this criterion is acceptable between 0.05 and 0.08. Normed fitting index or NFI is equal to 0.978 which indicates the desired fitting of the model.

IFI index is equal to 0.937 and indicates the desired fitting of the model with data.

Comparative fitting index or CFI is based on the correlation between the variables present in the model, in the way that the high correlation between variables leads to the higher values of CFI index. This index's value for the current model is equal to 0.98 and indicates the desired fitting of the model with data.

RMR index is equal to 0.06 and as its value is closer to zero, it indicates the desired fitting of the model.

Generally, assessment of the different fitting indices of the model for the current model indicates the fitting of the designed conceptual model with the obtained experimental data and it can be said that the model has desired fitting with the experimental data.

Table 10: structural fitting indices of the model

Index	P-Value	χ^2	D.F	GFI	AGFI	CFI	R.M.S.E.A	IFI	RMR	NFI
Index value	0/0221	675/5	455	0/901	0/942	0/93	0/08	0/937	0/06	0/978
Allowed value	$\frac{\chi^2}{df} < 3 \Rightarrow \frac{675/5}{455} = 1/48$			Higher than 0.9	Higher than 0.9	Higher than 0.9	**0/05<x<0/08**	Higher than 0.9	Closed to zero	Higher than 0.9

Examining the Structural Fitting of the Model:

In structural part of the model, the relationships between the latent variables are paid attention to. Here, the aim is to determine whether the theoretical relationships between variables focused by the researcher in the stage of adjusting conceptual frame are confirmed by the data or not.

Multiple correlation square (R^2) for the structural equations indicates the variance value of each internal latent variable expressed by the (external) independent latent value. As the R^2 value is larger, it indicates the higher expressing power of the variance. The estimated parameters between internal and external latent variables and their direction and also their R^2 value are indicated in table 11.

Research Question: do the supply chain management factors influence the customer relationship management factors?

Research Hypothesis: the supply chain management factors influences the customer relationship management factors.

H1: there is correlation between the supply chain management factors and the customer relationship management factors.

H0: there is no correlation between the supply chain management factors and the customer relationship management factors.

$$\begin{cases} H\,1 : r_{xy} \neq 0 \\ H\,0 : r_{xy} = 0 \end{cases}$$

In table 6, the number of supposed relationships is 20 which can be mutually considered between the aspects of supply chain management (4 aspects) and customer relationship management (5 aspects). 12 relationships are meaningful from these 20 ones which are explained in the following. As it can be seen in table 11, 12 structural relationships between the latent variables with each other are meaningful based on t test.

Standard equation of understanding customer's need is as following based of beta coefficients:

Understanding customer's need = (0.96) integration + (0.17) trust

In the same way, the standard equation of the other aspects is as following:

Keeping customer = (0.93) integration + (0.26) trust

Creating values for customer = (0.90) integration + (0.32) efficiency

Customerism = (0.20) integration + (0.38) accountability + (0.34) trust

Customer orientation = (0.20) integration + (0.38) accountability + (0.34) trust

Table 11: path coefficients and t values of each of the paths of the second structural model

the second structural model of variables (Multiple items per construct)				
Paths		**t value**	**Standard estimations of path**	**R^2**
1	Trust and understanding needs	2/73	0/17*	0/976
2	Integration and understanding needs	3/84	0/96*	
3	Trust and keeping customer	3/54	0/26*	0/924
4	Integration and keeping customer	4/24	0/93*	
5	Integration and creating value for customer	4/12	0/90*	0/836
6	Efficiency and creating value for customer	2/35	0/32*	
7	Integration and Customerism	2/27	0/20*	0/280
8	Accountability and Customerism	4/08	0/38*	
9	Trust and Customerism	3/04	0/34*	
10	Integration and customer orientation	2/57	0/22*	0/328
11	Accountability and customer orientation	4/6	0/40*	
12	Trust and customer orientation	3/39	0/37*	

Table 12: summary of the results of research's hypotheses test about the relationship of aspects of supply chain management and customer relationship management

Rejected hypotheses			Confirmed hypotheses		
H0	**H1**	**Paths**	**H0**	**H1**	**Paths**
Confirmed	Rejected	Trust and creating value for customer	Rejected	Confirmed	Trust and understanding needs
Confirmed	Rejected	Efficiency and understanding needs	Rejected	Confirmed	Integration and understanding needs
Confirmed	Rejected	Efficiency and keeping customer	Rejected	Confirmed	Trust and keeping customer
Confirmed	Rejected	Efficiency and customer orientation	Rejected	Confirmed	Integration and keeping customer
Confirmed	Rejected	Efficiency and Customerism	Rejected	Confirmed	Integration and creating value for customer
Confirmed	Rejected	Accountability and creating value for customer	Rejected	Confirmed	Efficiency and creating value for customer
Confirmed	Rejected	Accountability and keeping customer	Rejected	Confirmed	Integration and Customerism

Confirmed	Rejected	Accountability and understanding needs	Rejected	Confirmed	Accountability and Customerism
			Rejected	Confirmed	Trust and Customerism
			Rejected	Confirmed	Integration and customer orientation
			Rejected	Confirmed	Accountability and customer orientation
			Rejected	Confirmed	Trust and customer orientation

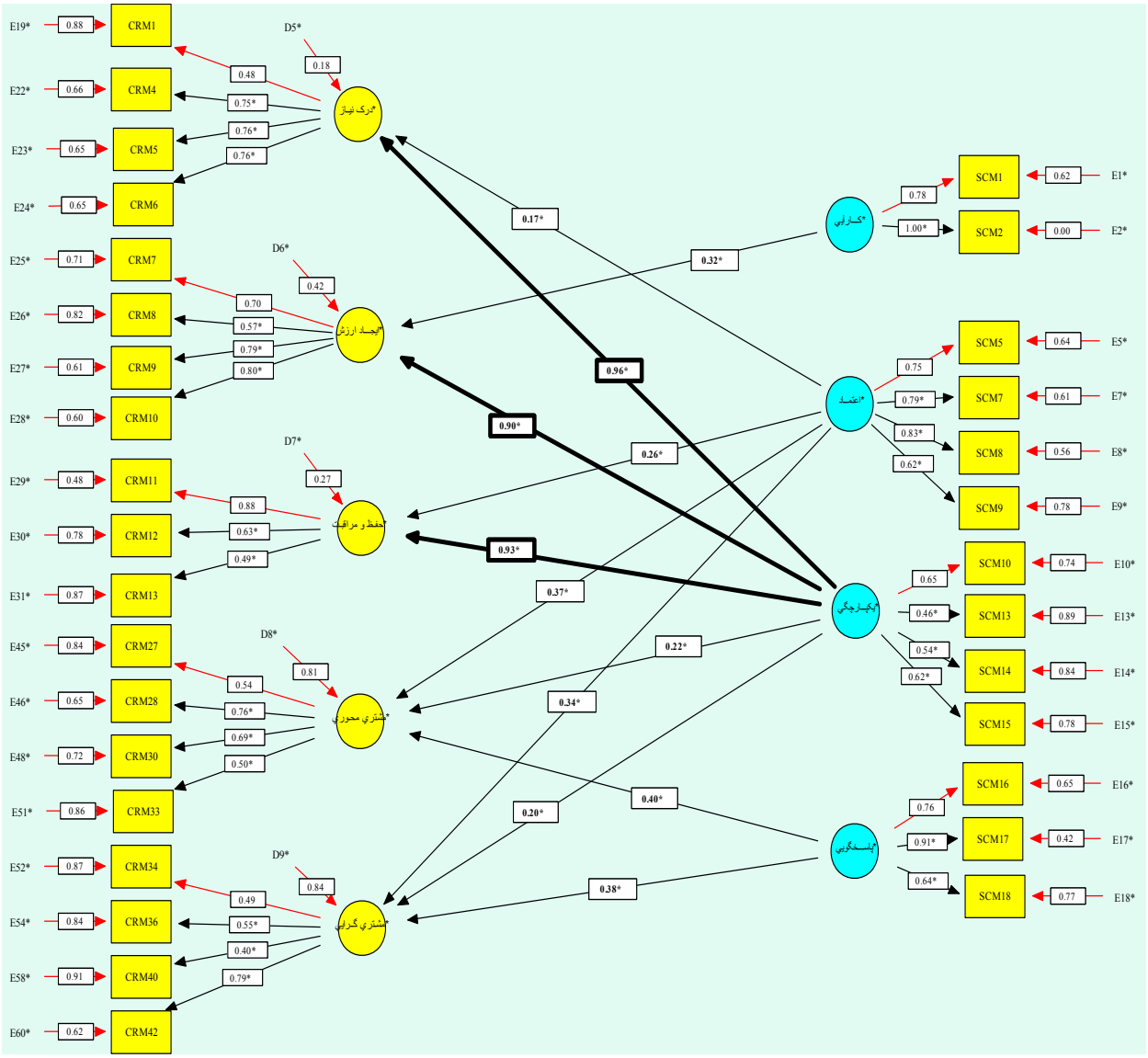

Figure 6: research's structural equation model

Analysis of the structural equation power:

When making decision about H0, two kinds of errors nay be created: "the first kind error" including rejecting H0 while the assumption is right and the other "the second kind error" in which H0 is confirmed while the assumption is wrong. The possibility of occurring the first kind error relates to α; as α is larger, it is more likely that H0 to be wrongly rejected or in other words, the first kind error is more likely to be occurred (Azar, Mo'meni, 102, 2009). The second kind error is usually indicated by β. α and β are used in order to show the kind of error and the possibility of occurring them, i.e.:

[Rejecting H0 when it is true] P = (the first kind error) P = α

[Rejecting H1 when it is true] P = (the second kind error) P = β

The test's power or strength means the possibility of rejecting H0 when it is really wrong; that is to say that:

$1 - \beta = 1$ - (the possibility of occurring the second kind error) = test's power

What reduces the first and second kind errors and also increases test's power is the sample volume (the same, 104).

In this study, the structural equation model is tested by statistical analysis test through fitting indices of the model and some of statistics related to the research's final model. In this test, the following parameters are needed in order to calculate the power of structural equation model test:

1- RMSEA index, this index is the same badness coefficient of fitting and as its value is lesser, this indicates more desired fitting of the structural equation model.

2- Null RMSEA (R0): in fact, this index is the same badness coefficient of fitting of the null hypothesis. A test with desired fitting is the test in which null RMSEA or R0 is equal to or lesser than 0.05; and this indicates the desired fitting of the model and in contrast, if its value is equal to 0.08, this indicates the average fitting of the model (statistica8.5 software guidance).

3- Freedom degree of model DF

4- Number of sample's individuals N

5- Meaningfulness level or the same alpha value which is equal to 0.05

In table 13, some of the indices related to the model are seen and ultimately, the calculated power for the first structural model is equal to 0.6608 and for the second structural model, it is equal to 1 and this indicates the strong power of the first tested structural model and also the very strong power of the second structural model. It seems that the examined n value and also freedom degree increases the power.

Table 13: results of power analysis of the structural model test

Calculation of power index of the structural equation model test H0: R <= R0			
The second model	**Value**	**The first model**	**Value**
The calculated RMSEA value of the second model	**0/08**	The calculated RMSEA value of the first model	**0/08**
Null RMSEA value of the null hypothesis (R0)	**0/05**	Null RMSEA value of the null hypothesis (R0)	**0/05**
Model's freedom degree	**455**	Model's freedom degree	**26**
Sample size (number)	**260**	Sample size (number)	**260**
Meaningfulness level	**0/05**	Meaningfulness level	**0/05**
The calculated power for the model	**1**	**The calculated power for the model**	**0/6608**

As it can be seen in the test's power analysis diagram based on sample size and RMSEA value and the freedom degree value and alpha value, regarded to n value and RMSEA and freedom degree and alpha value, the RMSEA value in both of models is so much that has increased the test's power.

DISCUSSION AND CONCLUSION

Based on the obtained data, it can be determined that from the supply chain management factors, the integration factor is considered as the most important effective variable on the customer relationship management in Esfarayen steel company; this is because of the meaningful influence of this variable on all aspects of customer relationship management. After that, the trust variable influences four aspects of the customer relationship management and accountability has a positive influence on Customerism and customer orientation and ultimately, the supply chain management efficiency can be influential in creating values for the customers of the company. All of the explained variables and their relationships are directly and improving and optimizing each of them mutually improves the other variable. For example, within creasing the trust in supply chain management, the keeping and taking care of the customer improves. Therefore, the different aspects of customer relationship management and supply chain management influence each other forcibly and improve each other.

Due to the lack of similar researches in the field of examining the mutual relationship of supply chain management and customer relationship management in the form that we studied it in the current study, we cannot compare the obtained results with the results of the other researches; but the obtained results can be compared with the other researches' results as a research and scientific finding in the future studies. Anyway, the obtained results indicate that the different aspects of supply chain management influence the customer relationship management and theses influences are positive and improving.

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