

# Evaluate the Financial Performance of Petrochemical Companies through the Interpretive Structural Modeling: A Special Case Study

Mojtaba Shiarbahadori<sup>a</sup>, Saber Molla-Alizadeh-Zavardehi<sup>b\*</sup>, and Ali Mahmoodirad<sup>c</sup>

<sup>a</sup> Ph.D student in Industrial Management, Industrial Management Department, Masjed-Soleiman Branch, Islamic Azad University, Masjed-Soleiman, Iran, Email: bahadori.m@stpc.ir

<sup>b</sup> Assistant Professor, Industrial Management Department, Masjed-Soleiman Branch, Islamic Azad University, Masjed-Soleiman, Iran, Email: sa.alizadeh@mci.ir

<sup>c</sup> Assistant Professor, Department of Applied Mathematics, Masjed-Soleiman Branch, Islamic Azad University, Masjed-Soleiman, Iran, email: ali.mahmoodirad@iauctb.ac.ir

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## ABSTRACT

The present study was conducted with the aim of designing a model for evaluating the performance of financial units in petrochemical industry. This exploratory practical study carried out based on the descriptive-analytical method and all data were gathered via two separate processes as interview and literature review. The statistical population included professional and academic experts in the field of human resources (HR) to answer qualitative questions by targeted sampling for experts. According to the experts' opinion, in order to identify effective factors, the Grounded Theory method and Interpretive Structural Method (ISM) were applied for evaluation of method and structural equations, respectively. After reviewing all the 67 indicators of financial performance that were extracted from theoretical foundations and previous research, 48 indicators have been approved by Delphi Roxab Group and then were selected. Finally, content factor analysis showed that all 48 indicators are significant enough. The novelty of this research compared to the similar ones raised from identifying the factors related to "production and procurement" and so "marketing" of the understudy organization that have not been evaluated in the previous studies.

## 1. Introduction

Organizational performance evaluation is an issue that all organizations, regardless of their public or private nature, face at the micro and macro levels. One of the performance evaluation dimensions is being intra-organizational which makes it more important. Organizational performance evaluation passed through

different stages during its evolution route. In the systems with traditional performance, the criteria are mostly based on traditional, profit-oriented and short-term accounting indicators (Centobelli, Cerchione & Esposito, 2018). In the recent years, petrochemical industry has been one of the most important and effective industries in terms of foreign exchange and high potential of employment and investment. But in the case

\* Corresponding author

of petrochemical industry to be better and more up-to-date, it is necessary for its financial units to evaluate their performance correctly and up-to-date, which include financial management, sales and business categories. Currently, there are different methods for evaluation in the financial units of the petrochemical industry as well as other important businesses, and this has in some ways led to overlaps in the activities of this institution. Nowadays, organizations face many challenges in very changeable and complicated internal and international environments in which performance evaluation and performance management is very complicated and difficult. Designing and deploying evaluation system of an organization's necessary requirements aims at determining the rate of achieving the objectives. The executive institutes and organizations with whatever mission, objectives and vision they have act in the same national and or international territory and they are obliged to respond the customers and stakeholders (Petersoon & Rathod, 2017). Every organization necessarily needs design and deployment of financial evaluation to achieve its strategic objectives. If performance evaluation is done from process viewpoint and properly and continuously, it causes responsiveness and general trust promotion on the organizations' performance, efficiency and effectiveness in public sector and resource management promotion, customer satisfaction, helping national development, making new capabilities, stability and promotion of organization class (Masoudi, Eskandari, Jafari, Ahmadi, 2016). The issue of performance evaluation in the organizations has been challenging the researchers for years to design a comprehensive model for it. In the past, the organizations used the financial indicators only as performance evaluation tools until Caplan and Norton after examining and evaluating management accounting systems in the early 1980s revealed many inefficiencies of this information for evaluating the organizations' performance which result from organizations' complexity increase, environment dynamism and market competition (Collins, Hribar & Tian, 2012). Designing performance evaluation model causes better decision making in logical support of managers' choices and the industry experts in critical conditions (Aviso, Mayol, Promentilla, Santos & Ubando, 2018). As a result, performance evaluation is one of the factors of meritocracy realization in the organizations (Yang, Chen, Zhou & Jiang, 2012).

## 1.1 Literature Review and Hypotheses Development

In recent years, in order to create an appropriate strategy for providing value in organizations, various models have been used that will help meet the expectations of investors, customers and employees, and on the other hand in the four dimensions of improving services, learning, creativity and internal processes. For this reason, the great desire of organizations and senior industry managers to evaluate the performance of the subdivisions under their supervision has led to the implementation of multifunctional models, which doubles the importance of research in this field. Since intra-organizational strategies are changing rapidly and unfortunately there is no powerful tool to evaluate and review them, the method used in this research as a very intelligent and strong evaluation system plays a key role in the implementation of organizational strategies. The impact of the performance appraisal model on the perception of organizational justice to build loyalty through reward programs in US NGOs has yielded significant results. This evaluation has shown that using a strong example of a reward program, members of the organization based on the theory of justice and fairness are evaluated as a key element to increase the effectiveness of loyalty programs. (Hwang, Baloglu & Tanford, 2019). Many used patterns in the evaluation process are chosen from foreign models or based on criteria which have been used many years ago and according to the recent changes and job process change, they need patterns and processes revision and modification. Regarding the very high significance and the central role of petrochemical industry in the development of Iran, performance evaluation of financial units especially in the sanction period is of high significance and if these units have sufficient authorities, they can make a movement in the country development. On the other hand all over the world there had been done great researches on different types of factors affecting on performance evaluation as gross profit margin (Ghousi, Nadafpour, 2016, Bohner & Minner, 2017, Hwang et al., 2019, Haji Zamani, Moghadam, 2016, Samavati, Jilgani Tilki, 2018), product cost system (Bazaz-zadeh, 2015, Ghousi, Nadafpour, 2016, Hwang et al., 2019), marketing costs supply (Balotf, Ramazanpour, 2016, Pargan, Paula & Charbel, 2016, Hwang et al., 2019), innovation and reduction of administrative bureaucracy (Mirfakhroini et al., 2012, Verma et al., 2018), reduction of raw material supply cost (Bohner & Minner, 2017, Hwang et al., 2019), on time provision of annual balance (Bazaz-zadeh, 2015, Ghousi, Nadafpour, 2016)



and etc. So, while the importance of the problem was clarified in the above, the correct and appropriate method of performance evaluation is a good way to measure the performance of the desired units of the organization. On the other hand, due to the fact that so far, a systematic method has not been used to determine and identify the effective factors in the petrochemical industry. Therefore, in this research, it is intended to determine the components for evaluating the performance of financial units of petrochemical industry in a new way, and to determine a model for it. Thereafter, all components will be ranked based on the dimensions and their impact on how the organization performs. In recent years, the petrochemical industry has been one of the most important and influential industries in the country in terms of currency and high potential for employment and investment. In order for this industry to be better and more up-to-date, it is necessary for its financial parts (financial-business management) to be evaluated correctly and up-to-date. On the other hand, due to changes in recent years in work styles, existing performance appraisal systems, are mostly old, imported and belong to other industries. As a result, unfortunately they are unable to consider the impact of different levels of foregoing industry on each other. Today's organizations face many challenges in the highly changing and complex domestic and international environments. In such an environment, performance appraisal and performance management have become very complex and difficult. Therefore, it is necessary that the models used are re-evaluated and reviewed due to the lack of necessary indicators for measurement and review in the organization. This has led to the consideration of all aspects of evaluation and the elimination of unclear and incomplete evaluation processes and their replacement by new and more efficient processes. In the following study, by using the data theory method of the foundation, the dimensions and performance characteristics affecting the organization have been identified. It should be noted that this research focused on the performance evaluation analysis by combination of two separate method which is carried out for the first time on the petrochemical industry. In addition to fit the modeling validation, test of structural equation of variance or the least squares method has been used. In this method, more attention is paid to estimating a set of model parameters and the aim is to reduce the difference between the covariance matrix of the theoretical model and the covariance matrix of estimation values. In this regard, the ISM method can prioritize and determine the level of elements of a system, which will significantly

help managers for better implementation of the designed model.

## 2. Methodology

This exploratory practical study carried out based on the descriptive-analytical method and all data were gathered via two separate processes as interview and literature review. The main aim of this research is evaluating the financial performance of petrochemical companies through the interpretive structural modeling in a way that results in expansion and development of current literature. Therefore, this research is based on aim of practical-developmental type and it is based on method of descriptive-analytical type and the research methodology is of combined type. Combined methodology is a research strategy or a methodology for collecting, analyzing and combining qualitative and quantitative data which is used in a study to understand the research issues. Both quantitative and qualitative research method are used in designing and implementing research plans (Almalki 2016, Pamela, Wesely 2011, and Pauline 2008). The main characteristics of combined research method are affected by how two quantitative and qualitative research method categories are used based on which this study is of combined research type on data pluralism basis. Pluralism is a methodological technique in which using many methods and theories purposefully in studying a phenomenon, the orientation resulting from individual viewpoints will be minimized and the research result credit will increase (Greene, 2007). Pluralism in methodology implies applying multi-method to study a single subject (Teddlie & Tashakkori, 2009). The method of data collection in this research is of combined type. In combined type method, data collection must be done in both quantitative and qualitative ways although data collection in this plan can be done in both simultaneous and consecutive forms. However, since this research is done in different stages, information collection methods are as follows: a) cognition phase: information collection from the previous research and data collection through heuristic interviews with experts, b) design phase: data collection in model designing and its evaluation. Regarding the aims of this stage of the study which include achieving a proposed model and model test, necessary information was obtained through different questionnaires (Appendix 1, (Table 9) and in design phase, it is obtained based on experts' opinions through structured questionnaire fitting interpretive structural modeling technique, c) evaluation phase: in model quantitative evaluation phase (model evaluation phase), the questionnaire made by the researcher fitting structural

equations with minimal square method was used. Given that one of the goals of this project is to use the real experiences of individuals. On the other hand, the hasty commitment to a set of analytical categories predetermined in the systematic approach will be avoided, so use a constructivist approach to data theorizing of the foundation has been carried out. In general, it can be said that the present study was conducted in three main phases. In the cognition phase, through a study of thematic literature, a deep understanding of the problem has been done. In this phase, by using a systematic review approach, the existing articles in this field are identified and then, the initial and appropriate variables for the financial performance evaluation model of considered companies are extracted. At the same time, according to the conditions and requirements of the petrochemical industry, the model has been localized through meetings and interviews with experts. Then, using the data theory method, effective factors and variables in the model are obtained. Due to the fact that in order to determine the most important factors influencing the process of reviewing the experiences, knowledge, awareness, thoughts and views of people involved in management affairs, data theory has been selected as a suitable method. Therefore, according to the research background, experiences gained and also modeling of valid samples, a questionnaire based on 44 factors in 6 dimensions has been designed. This research has been done in three phases and eight main stages. In the second phase (design phase) in order to establish the relationship between the elements of the financial performance appraisal case in a conceptual model, interpretive structural modeling method has been used. In fact, at this stage, after using the data theory of the foundation and identifying the most important factors, the construction of the initial model to evaluate the financial performance of petrochemical companies has been done exploratory by modeling the interpretive structure based on expert's idea.

The statistical population of this research includes professional and academic experts familiar with human resource issues to answer the qualitative question. One of the important issues in grounded theory research method is the number of members of grounded theory panel. In sampling, the sample size depends on factors such as access to individuals, time and cost of data collection. In the grounded theory method, the members must be experts in the field of research, as a result these limitations are added. In this regard, one of the issues that must be considered is the homogeneity between the members of the grounded theory panel. Due to the extraordinary importance of appointing specialists in order to form a grounded theory group, so 20 experts, including a combination of university professors and members working in the profession, including different categories of professions and the above-mentioned factors to them was presented. The condition for selecting members of the profession is to have at least 6 years of work experience. In addition, in selecting university professors, we tried to use the opinions of people who, in addition to academic experience, have work experience in the field of performance appraisal. It should be noted that the statistical society of the quality department of experts includes managers, officials and those involved in performance appraisal in petrochemical companies and some related university professors, which includes 20 people. On the other hand, the statistical population of the quantitative sector, including all experts and engineers working in the financial, business and domestic and foreign trade units of petrochemical industry companies belonging to the Persian Gulf Holding, the total number of which is about 400 people. The research plan of this study has been shown in Figure 1. It is worth to clarify that in the following the brief information of statistical society and its corresponding analyzing method summarized for the understudy companies as petrochemical companies located in Mahshahr-Assaluyeh-Abadan and Ahvaz Petrochemical Special Economic Zone (Table 1).

**Table 1.** Brief information of research methodology.

Sampling	No. (people)	Statistical society	Analyzing method	Data gathering tools
<b>Targeted</b>	20	Petrochemical industry experts	Content validity Data Theory Foundation	Interview
<b>Simple random</b>	20	Managers and officials of petrochemical industry financial units	Analysis of structural equations	Questionnaire



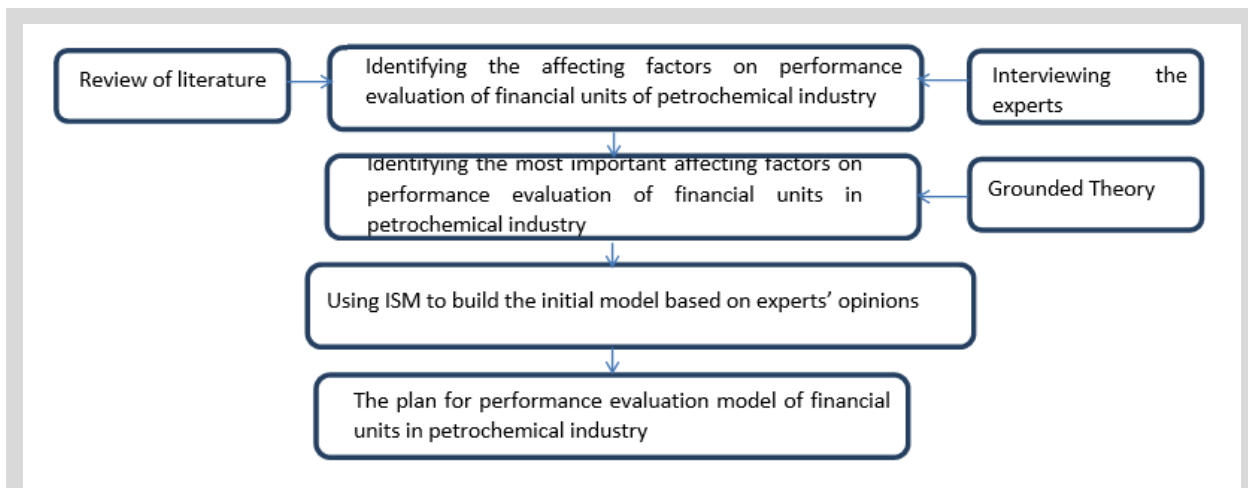


Figure 1. Flow chart of research plan.

## 2. Research Findings

According to what was said, in the first step, the researchers reviewing the literature comprehensively in the study field and also, interviewing with 20 experts determined the affecting factors on performance evaluation of financial units in petrochemical industry of which the summary was shown in Table (2) and the factors' dimensions in Table (3 & 4). Considering the use of ISM method that can prioritize and determine the level of elements of a system, it can help managers to design a model as well as possible. The tool used in this step is a questionnaire consisting of 44 factors in 6 dimensions that has been evaluated as a pairwise comparison. In this regard, 20 industrial experts have been asked to compare their relationship in the absence of a relationship, the existence of a one-way relationship and the existence of a reciprocal relationship by comparing two factors. Finally, in the third phase, which is the measurement and evaluation phase, the quantitative evaluation of the proposed model is measured through the structural equation method based on the partial least squares approach. It should be reminded that the aforementioned cases are all among the initial factors in Grounded Theory process and to enter this study as a variable, they

need final confirmation during the process of Grounded Theory research method. In the current research, after the initial coding of the articles, different codes have been categorized in the form of primary themes. At the end of this stage, a total of 6 main themes were obtained. Since reliability refers to the consistency of research findings, the reliability of the first phase of the research (cognition phase) was done through the reliability of the retest and the method of internal thematic agreement. The method of calculating the reliability between the coding performed by the researcher in two-time intervals is as follows (eq. 1) (Tuckwell, et al. 2002)

$$\text{Percentage of retest reliability} = \frac{\text{Number of agreements} \times 2}{\text{Total number of codes}} \times 100 \quad (1)$$

To calculate the reliability of the retest, out of 20 interviews conducted in this study, 3 interviews were randomly selected and each of them was re-coded twice in a period of 15 days by the researcher. Due to the amount of agreement and disagreement in the codes, the index is equal to 0.86, which is a reliability of more than 60% (Sprangers 1996), the reliability of the codex is confirmed.

Table 2. Combining the content codes and the extracted sentences from the study and interview (source: research findings).

Affecting factors	characteristic	background	experts	Affecting factors	characteristic	background	Expert
Staff related education	E1	✓	✓	Operational costs	T1	✓	✓
Staff experience	E2	✓	✓	The ratio of real costs to allocations	T2	✓	✓

Affecting factors	characteristic	background	experts	Affecting factors	characteristic	background	Expert
Number of expert human resource	E3	✓		Product cost system	T3	✓	✓
Staff accountability	E4	✓		Paying attention to operational budgeting	T4	✓	
Expert committed managers	E5		✓	Accuracy and speed in document registration	T5	✓	✓
Supporting courageous elite staff	R9		✓	Using workflow automation		✓	✓
Bright organization objectives and vision (min-term and long-term program)	R1		✓	Using marketing-driven knowledge management	B1		✓
Supplying financial resources in the organization	R2		✓	Product marketing	B2		✓
Talent search regulations	R3	✓		Determining competitive price	B3	✓	
Management power and policy	R4		✓	Power of cash and credit sale	B4	✓	✓
Appropriate operational policies	R4		✓	Asset management	M17	✓	
Appointing related non-political managers	R6		✓	State of financial supply of export marketing costs	M16	✓	
Pressure of competitive environment of other companies	R7		✓	Concentration increase on capital formation	T6	✓	



Affecting factors	characteristic	background	experts	Affecting factors	characteristic	background	Expert
<b>Constructive interaction with holding and similar units</b>	R8		✓	Attention rate to competitive marketing	B5	✓	
<b>Thoughtful cost management</b>	F4	✓	✓	Paying attention to maintain and increase the market share	B6		✓
<b>Logical relation of costs with how the organization works</b>	F2		✓	Paying attention to service compensation system	E6	✓	
<b>Periodic physical adaptation</b>	F3		✓	Financial support of other units	F13	✓	
<b>Organization economy (liquidity)</b>	M1		✓	Rate of handling complaints	F6	✓	
<b>Expected quality in financial reports</b>	M2	✓	✓	Paying attention to innovation and reduction of administrative bureaucracy	F7	✓	
<b>Setting payment procedures</b>	M3	✓		Quality of financial reporting	M16	✓	
<b>Rate of return on capital</b>	M4	✓		Increasing performance scalable factors	F12	✓	
<b>Settlement of debts and currency arrears</b>	M5		✓	State of information feedback system	F5	✓	
<b>Settlement of debts and Rial arrears with contractors</b>	M6		✓	Paying attention to upstream document of performance evaluation	F11	✓	
<b>Receivables from the customers</b>	M7	✓		Attention rate to smart work steps	F6		✓

Affecting factors	characteristic	background	experts	Affecting factors	characteristic	background	Expert
On time provision of annual balance	M8	✓		Attention rate to resistive economy documents in work unit	F9		✓
Reduction of raw material supply cost	M9	✓		Paying attention to implementation of sixth development plan circular	F10		✓
Optimal combination of production and sale	M10	✓		Deployment of product cost system	F7		✓
Attention rate to smart internal control system deployment	F8		✓	Following international accounting standards	M17		✓
Net profit margin	M12	✓		Reduction of lack of information symmetry	M18		✓
Gross profit margin	M13	✓		Reduction of financial supply costs	M19		✓
Office value	M14	✓		Increasing intangible assets	M19		✓
Receivables period	M15	✓		building appropriate information bank in the organization	R10		✓
Managing cost reduction in the organization	F15	✓		Removing unnecessary costs in the organization	F14		✓
Saving program	F16	✓					

Next step is answering the questions and repeating them to get the response from Grounded Theory group. One of the important subjects in the research method of Grounded Theory is the number of people in Grounded

Theory group. In samplings, the sample volume depends on the factors like people availability, time and cost of information collection. In addition to these limitations, in Grounded Theory method, it is necessary that the





members are among the research field experts (Stephan, Wagner et al. 2015, Xingwei Li et al. 2019). In line with this, one of the subjects which should be considered is the homogeneity among the Grounded Theory group members. While there is homogeneity among the members, 20 to 30 members have been recommended.

Regarding the significance of selecting experts to make Grounded Theory group, 20 experts including a combination of university professors and the practitioners in different job level were selected and the aforementioned factors were presented for them. The condition of selecting practitioner member was theoretical mastery, practical experience, tendency and capability of participation in research and availability.

Moreover, in selecting the university professors, it was tried to use the opinions of people who have background in the field of university human resource in addition to university experience. In this regard, in order to ensure the correct implementation of the issues, most of the meetings were held in person or video conference. Also, in the following you can find the structural self-interaction matrix of dimensions of factors via grounded theory method affecting the evaluation of the performance of financial units in the petrochemical industry. In the following corresponding dimensions and their effective factors summarized based on the interview and recent studies (Table 3) also it followed by their corresponding dimensions (Tables 5 and 6).

**Table 3.** Dimensions of affecting factors on designing the performance evaluation model of financial units in petrochemical industry (source: research findings).

Dimensions	Financial and economic indicators														
Factors	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	-
Dimensions	Human factors					Organization management and strategy									
Factors	E1	E2	E3	E4	E5	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Dimensions	Organization internal processes						Indicators related to production and logistics					Marketing			
Factors	F1	F2	F3	F4	F14	F15	F16	T1	T2	T3	T4	T5	B1	B2	B3

In this part, the experts' opinions about to what extent the mentioned factors affect performance evaluation of financial units in petrochemical industry were collected. To do this, the experts were requested to express their opinions based on the 5-choice range of strongly agree,

agree, no idea, disagree, strongly disagree. Regarding the number of evaluator experts and based on content validity indicator in table (4), the questions with content validity ration (CVR) less than 0.5 are removed from the test because of not having acceptable content validity (Sandraz, Julien et al. 2014, Caporaso 1998).

**Table 4.** Acceptable CVR value based on number of experts scoring the references of affecting factors on model design (source: research findings).

Row	Affecting factors	CVR	Result	Row	Affecting factors	CVR	Result
1	E1	1	Confirmed	23	M1	1	Confirmed
2	E2	0.9	Confirmed	24	M2	1	Confirmed
3	E3	0.7	Confirmed	25	M3	1	Confirmed
4	E4	1	Confirmed	26	M4	0.7	Confirmed
5	E5	1	Confirmed	27	M5	1	Confirmed
6	R1	0.7	Confirmed	28	M6	0.8	Confirmed
7	R2	1	Confirmed	29	M7	1	Confirmed
8	R10	1	Confirmed	30	M8	1	Confirmed
9	R3	1	Confirmed	31	M9	1	Confirmed
10	R4	1	Confirmed	32	M10	1	Confirmed
11	R5	1	Confirmed	33	M11	1	Confirmed
12	R6	0.6	Confirmed	34	M12	1	Confirmed
13	R9	1	Confirmed	35	M13	0.8	Confirmed
14	R7	1	Confirmed	36	M14	1	Confirmed
15	R8	0.7	Confirmed	37	T1	0.6	Confirmed

Row	Affecting factors	CVR	Result	Row	Affecting factors	CVR	Result
16	F1	1	Confirmed	38	T2	1	Confirmed
17	F16	1	Confirmed	39	T3	1	Confirmed
18	F15	1	Confirmed	40	T4	1	Confirmed
19	F14	1	Confirmed	41	T5	0.7	Confirmed
20	F4	1	Confirmed	42	B1	1	Confirmed
21	F2	1	Confirmed	43	B2	0.9	Confirmed
22	F3	1	Confirmed	44	B3	1	Confirmed

Regarding the data in Table (5) which shows the values higher than 0.6 for content coefficients and considering that in the experts' explanations, no other factors were determined and the introduced factors by them at this stage were repeated, the selected questionnaire was confirmed in this step. To analyze the design phase, firstly the constituent variables and elements of literature and interview with the experts include 44 elements in terms of 6 dimensions and then, the structural self-interaction matrix was made; this

matrix was completed by 20 university experts and practitioners. The experts completed the matrices based on the conceptual relation of "resulting in" and using the following signs; V: means i results in j, X: to show the mutual effect (dimension i to j and j to i), A: means j results in i and O: to show no relations between two dimensions. Then, the common responses having the highest frequency were selected as the interpretive structural modeling logic is based on parametric methods and it acts according to mode in frequencies. Finally, structural self-interaction matrix is as Table (6).

**Table 5.** Dimension structural self-interaction matrix (source: research findings).

i \ j	1	2	3	4	5	6
<b>1. Human resource</b>		X	X	V	O	V
<b>2. Organization management and strategy</b>			A	V	O	O
<b>3. Organization internal processes</b>				V	O	V
<b>4. Financial and economic indicators</b>					V	V
<b>5. Indicators related to production and logistics</b>						V
<b>6. Marketing</b>						

Then, the reachability matrix was made. Reachability matrix is the result of changing structural self-interaction matrix to a two-value matrix (zero-one). To extract reachability matrix based on table (5). 1 must replace X

and V signs in each row and zero must replace A and O in reachability matrix. The result of changing all rows is the dimension adapted reachability matrix as shown in Table (6).

**Table 6.** Dimension adapted reachability matrix (source: research findings).

i \ j	1	2	3	4	5	6
<b>1. Human resource</b>	1	1	1	1	1	0
<b>2. Organization management and strategy</b>	1	1	1	0	1	0
<b>3. Organization internal processes</b>	1	1	1	1	1	0
<b>4. Financial and economic indicators</b>	0	0	0	0	1	1
<b>5. Indicators related to production and logistics</b>	1	0	0	0	0	1
<b>6. Marketing</b>	0	0	0	0	1	0

Then, the dimension adapted reachability matrix must be categorized into different levels. Determining

the relations and rating the dimension set are done using the reachability matrix. Each part of the set (criterion)

has two different sets, reachability set and antecedent set, which have fundamental role in the final matrix structure. Reachability set of each criterion include criteria which end in that criterion or affect that. In other words, the criteria which have 1 in front of them in the related column are the reachability set of that column criterion. After determining the reachability set and antecedent set for each criterion and determining the common set, criteria rating will be done. Obtaining what

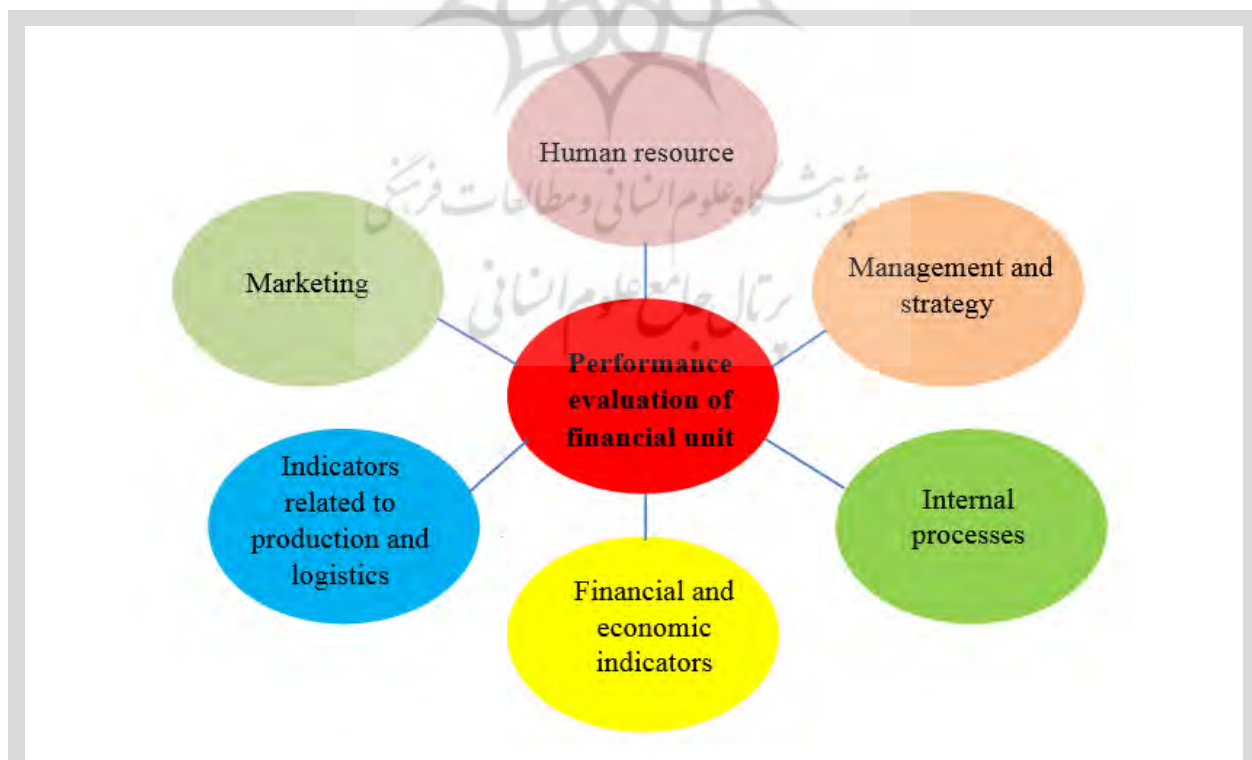
common between the two reachability and antecedent sets, the common set will be obtained. The criteria whose common set is the same as their reachability set devote the first priority level to themselves. Removing these criteria and repeating this process for other criteria, the levels of other criteria will also be determined. In this research, the level of variables has been shown in table (7).

**Table 7.** Determining the relations and dimension levels (source: research findings).

Dimension	Reachability set $R(s_i)$	Antecedent set $A(s_i)$	Common set $R(s_i) \cap A(s_i)$	Level
1	1,2,3,4,5	1,2,3,5	1,2,3	1
2	1,2,3,5	1,2,3	1,2,3	1
3	1,2,3,4,5	1,2,3	1,2,3	1
4	3,5,6	1,3	3	1
5	1,6	1,2,3,4	1	1
6	4,5	5	5	1

After determining variable relations and level, we can draw them in a model form. Therefore. The criteria which have been recognized as first level are placed at the first level of diagram. The performance evaluation model of financial units in petrochemical industry is based on the model in Figure (2) and the findings of

content analysis stage based on which we can present each hidden variable (dimension) and observable variables (codes) in terms of an integrated model. It should be mentioned that the quantitative step of the model test was performed through the structural equation method with partial least squares approach and using LISREL software (Figure 3).



**Figure 2.** Research conceptual model.

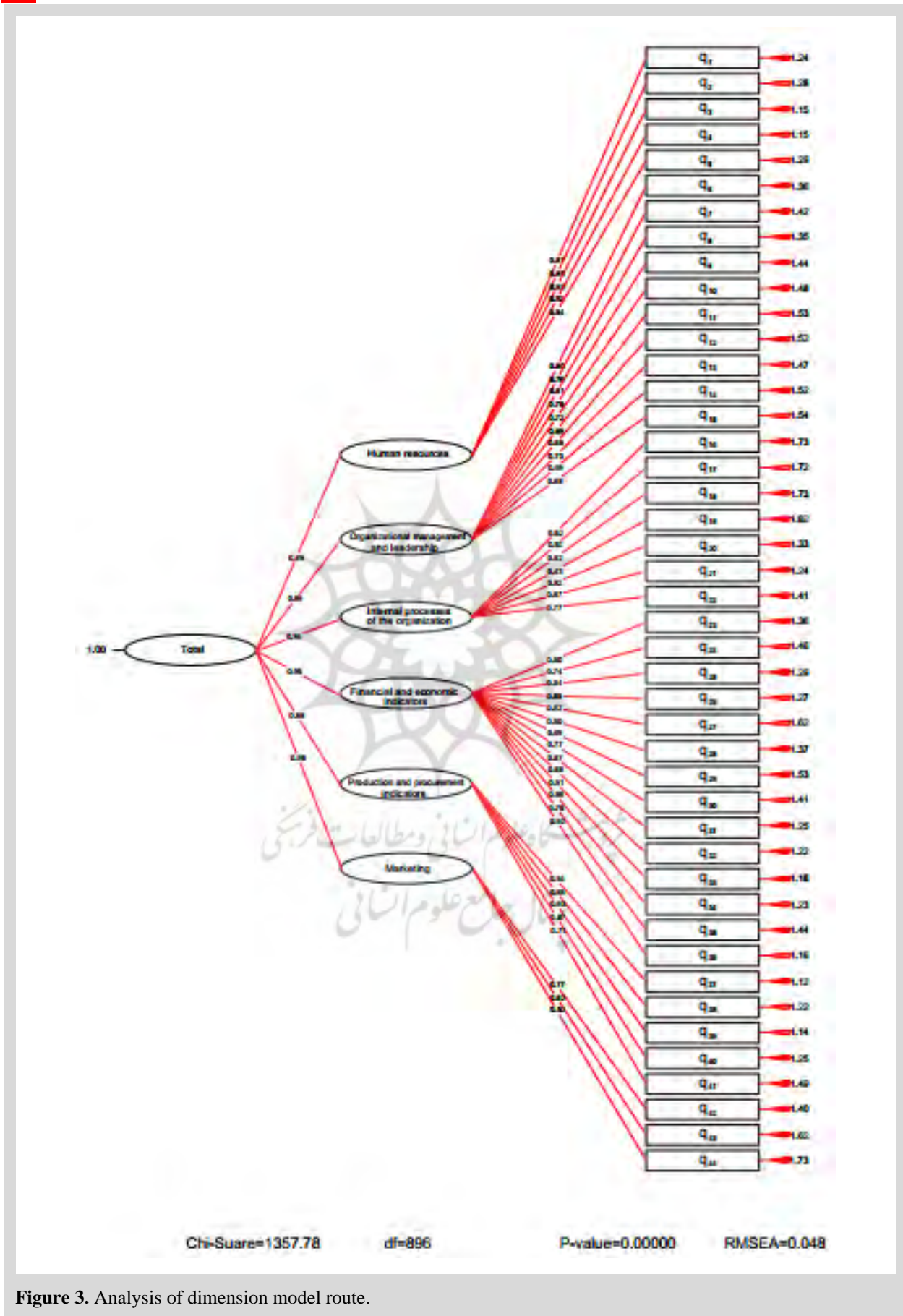


Figure 3. Analysis of dimension model route.





**Table 8.** Route analysis and model indicator fit (source: research findings).

English name	Abbreviation	Criterion	Calculated value	Result interpretation
$\chi^2/df$	CMIN	Less than 3	1.51	Fit approval
p-value	P	Less than 0.05	0.0001	Fit approval
Root Mean Squared Residual	RMSEA	0.08 <RMSEA<0/33	0.048	Fit approval
Goodness-of-Fit Index	GFI	Higher than 0.9	0.92	Fit approval
Adjusted Goodness-of-Fit Index	AGFI	Higher than 0.9	0.92	Fit approval
Non-Normed Fit Index	NNFI	Higher than 0.9	0.93	Fit approval

Analysis of model test phase: in this part, we address the results of statistical analysis of the collected information. Modeling test fit is variance-driven structural equations or the minimal calculated square. In this method, the attention was mostly devoted to estimation of a set of model parameters and the aim is in fact reducing the difference between covariance matrix of theoretical model and covariance matrix of emphasis estimation value. As observed in Table (8) and Figure (3), the rectangles show the obvious (observable) variables and they are the same as the questionnaire questions which are related to affecting factors on performance evaluation of financial units in petrochemical industry; the circles show the factors (hidden variables) and the arrows related to obvious variables show the value of variance related to each obvious variable and one-way arrows from hidden variable to obvious variables are the effects of a variable on another one (factor load). In factor analysis, the researcher always assumes that hidden variables are the root cause of factors caused by observed variables; therefore, the arrows started from hidden variable and ends at the obvious variable. The power of relation between factor (hidden variable) and observable variable are shown by factor load. Factor load is a value between zero and one. If factor load is less than 0.3, the relation is considered as weak and it will be neglected; the load factor between 0.3 and 0.6 is acceptable and if it is more than 0.6, it is completely desirable (Pillarisetti, Anand, 2008). The existence of negative factor loads can help the researcher in interpreting the factors; positive loads about the given factor nature will yield some implications and the negative loads help to reveal the interpretation through expressing what the factor is not.

Regarding the structural equation conditions, fit indicator  $X^2/df$  that is equal to 1.51 and its value is less than 3, this shows the theoretical model fits the data and is confirmed with this data and shows that it has the necessary reliability. RMSEA that is equal to 0.048 (the

root of variance estimation of approximation error or deviation test of each freedom degree) and has been provided by Stiger (1990) as difference size for each freedom degree is used here. The value  $0.03 < RMSEA < 0.08$  shows good model fit. On the other hand, P-value (significance level) is 0.0001 that is less than 0.05 (Pillarisetti, Anand, 2008). Therefore, considering the fit confirmation and applying all structural conditions, we can conclude that the research conceptual model is proportionally appropriate for the collected data. It is necessary to mention that in order to improve the model fit indicators, suggested expressions adapting the literature were used and at the end, the research model in Figure (2) is confirmed.

### 3. Discussion and Conclusion

The role of organization processes' performance evaluation models in achieving the success and pre-determined aims is important and necessary. Different process performance evaluation models have been so far defined with specific characteristics and have been used; however, regarding the extensive environment changes and the intensity of competitive atmosphere to respond the organization requirements, designing performance evaluation model with new characteristics and adapting the present needs of the country and industry is inevitable. The most important reasons for the alignment of the findings are the same working conditions in similar organizations and so existence of repetitive patterns for performance appraisal in the country, but in the proposed model, factors related to "production and procurement" as well as "marketing" have been examined which have not been evaluated so far. Since the criteria in the systems with traditional performance have been more based on traditional, profit-driven and short-term accounting components and regarding the extensive changes in petrochemical companies' ownership during the last 10 years, necessary flexibility in line with the updated country needs, internal and external markets was not observed and since this subject



is of special significance in organizational processes' performance evaluation, in this article with survey approach and content analysis and based on review of literature and related theoretical bases (performance patterns, process frameworks and standard factors) and using interviews with experts and collecting their ideas, an appropriate model for present needs of industry has been designed and provided. As the main aim of this research was identifying the affecting factors on performance evaluation of financial units in petrochemical industry, in the following, the obtained results in line with the main objective and the sub-objectives will be explained. In the first part of the study and after precise review of background and 20 interviews with professional university and practitioner experts and coding the results, 67 propositions were identified; using Grounded Theory method, 48 factors in 6 dimensions as the most important affecting factors in evaluation were identified and finally, the research results showed that all 48 indicators have the general consensus of experts group. Doing content analysis, it was determined that 48 indicators are of sufficient significance. These criteria can cover all the performance dimensions of the organizations related to financial process in the industry under study. Therefore, using an interpretive structural method identified rated dimensions or components, the research model was extracted and its reliability was confirmed.

Considering the findings of research and comparing them with the previous research, we can clarify that in the research background, there was no case which can examine all affecting dimensions and indicators on performance evaluation of financial units in petrochemical industry and according to the researchers, this study is new and innovative; however, comparing the identified factors in the research model with other conducted research by the field researchers and regarding that working conditions in similar organizations are the same in some aspects and have repetitive patterns for performance evaluation, we can compare and conclude as follows: Faghihi and Afsharnejad (2012), Mohammadi and Sharifzade (2016) in their research results have mentioned some affecting factors in organization performance evaluation in human factors dimensions and internal processes which have been shown in the present model and are close to the results of this research. Haji Zamani and Moghadam (2016). Samavati and Jilgani Tilki (2018) have also mentioned the affecting factors on organizational performance evaluation in their studies and their research results are in line with financial economic indicators

dimension of this study. Mirfakhrodini et al. (2012), Khajavi and Sarvari (2012) and Smith et al. (2003) have mentioned the factors in their research results which in comparison with the present model are in-line with human factors and management and strategy dimensions and in this way, they are inferred to be close to each other. Also, the results of this model in organization management and strategy and internal processes dimensions are in line with the research by Ghousi and Nadafpour (2016), Bohner & Minner (2017), Hwang et al. (2019) and Pargan et al. (2016).

This means that designing the evaluation model of organizational performance causes better decision making in logical support of managers and industrial experts' selections in critical conditions which are all among the affecting factors in this research and were in line with the present study. The most important reasons of alignment are same working conditions in similar organizations and existence of repeated patterns for performance evaluation in the country; however, in the proposed model, the related factors with "production and logistics" and "marketing" were observed which has not been mentioned in the previous studies of performance evaluation and its reason is the mission kind and special country conditions and the effect of petrochemical industry in terms of foreign exchange and high potential for employment and investment. Finally, the suggested model by the researchers has two main consequences: the first is "responding the present expectations of the organization" i.e. organizational performance evaluation will respond some organization requirements. Many of the processes used to advance the objectives of this research in the evaluation process are derived from models presented in previous research or based on criteria that have been used for many years and due to changes in recent years and changing processes, something needed to be done. The second consequence of the provided method by the present research is "staff satisfaction increase" as staff understanding from motivational policies of performance evaluation is directly correlated with job satisfaction and is reversely related to job leave. Also, job satisfaction mostly results in reduction of staff job leave (Hemmati et al, 2018) i.e. an effective model of performance evaluation with newer technique can improve stakeholders' satisfaction who are the financial units' staff and managers. It should be noted that conducting this study was associated with challenges and limitations, including limited access to information of the organization under review and the involvement of some external variables that can lead to errors in the results. On the other hand, due to the



subjective nature of the questionnaire completion method, some experts may have commented with a conservative approach.

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**Appendix 1**

In the following you can find the corresponding designed questionnaire for interviewing industrial specialists (Table 9).

**Table 9.** Corresponding questionnaire for interviewing industrial specialists.

No.	Parameter	Very little	Low	Medium	Very	A lot
1	Staff education					
2	Staff experience					
3	Number of specialized personnel required					
4	Staff responsibility					
5	Supporting brave and elite staff					
6	Use expert, committed and native managers					
7	Clear goals and vision in the organization (medium- and long-term plan)					
8	Planning to provide financial resources in the organization					
9	Creating an appropriate database in the organization					
10	Develop rules and regulations for the talent search system					
11	Power and management policy					
12	Adopt correct operating policies in the unit					
13	Appointment of unrelated and political government managers					
14	Monetary and financial sanctions					
15	Competitive environmental pressure with other companies					
16	Constructive interaction with regional holdings and petrochemicals					
17	Cost saving program					
18	Managed cost reduction in the organization					
19	Eliminate unnecessary costs in the organization					
20	Manage expenses thoughtfully					
21	Reasonable relationship of costs with how the organization operates					
22	Periodic physical adaptation (up to date accounts)					
23	Economic conditions of the organization					
24	Quality of financial reports					
25	Set up payment procedures					
26	Capital return rate					
27	Settlement of foreign currency debts and arrears					
28	Settlement of debts and arrears in Rials to contractors					
29	Receiving receivables from customers					
30	Timely preparation of annual balance sheet					
31	Reduce the cost of raw materials					
32	The optimal combination of production and sales					
33	Increase in intangible assets					
34	Net profit margin					
35	Gross profit margin					
36	Book value					
37	Periodical collection					
38	Operating costs					

No.	Parameter	Very little	Low	Medium	Very	A lot
39	Ratio of actual costs to allocated					
40	Establish a system of costing of products					
41	Pay attention to operational budgeting					
42	Accuracy and speed in document registration					
43	Use of workflow communication technology					
44	Use marketing-oriented knowledge management					
45	Product marketing					
46	Maximize the use of special exemptions for special areas					
47	Competitive pricing					
48	Ability to sell cash and credit					
49	Asset management					
50	Financing status of export marketing expenses					
51	Increase focus on capital formation					
52	Pay attention to competitive marketing					
53	Pay attention to keeping market share constant					
54	The degree of attention to the service compensation system					
55	Financial support of other units					
56	Complaints handling rate					
57	Attention to innovation and reduction of administrative bureaucracy					
58	Financial reporting quality					
59	Increase measurable performance factors					
60	Status of information feedback system					
61	Pay attention to upstream performance appraisal documents					
62	The extent to which it is able to withstand external sanctions and threats					
63	Attention to intelligent work processes (use of new technologies)					
64	The level of attention to the documents of resistance economy in the work unit					
65	Extent of attention to the implementation of the directives of the Sixth Development Plan					
66	Establishment of a system for the cost of products					
67	Compliance with national and international accounting standards					
68	Reduce information asymmetry					
69	Reduce financing costs					
70	The degree of attention to the intelligent establishment of the internal control system					