A Comprehensive Structural Equation Modeling for Financial Performance Evaluation of Petrochemical Companies

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ABSTRACT

Financial performance evaluation emerged as a great academia and business concern in the competitive world today. In order to clarify the progress status and improvement trend of finance, it is of supreme significance to appoint a professional financial performance evaluation study for the supportable progress of enterprises. This research focused on the seven critical factors which represented principal effects on the financial performance of the Persian Gulf Petrochemical Companies. Experts and engineers of 12 companies in Persian Gulf Petrochemical Company have been surveyed by sampling method, in which 180 questionnaires have been completed, and the basis of the work has been used to achieve the research objectives. The confirmatory factor analysis (CFA) approved the divergent validity of all desired factors and correspondent to the questionnaire. The nonparametric analysis demonstrated the study's central hypothesis regarding the effectiveness of all under investigation parameters to meet the research goals. By the Friedman ranking test, the internal processes and external environment of the organization provided the highest and the lowest rank of impact on the financial performance of the petrochemical companies under review, respectively.

1. Introduction

In the current era, dramatic changes in management knowledge have made the existence of an evaluation system inevitable so that the lack of evaluation system in various dimensions of an organization, including evaluation in the use of resources and facilities, employees, external processes, goals, and strategies emerged as one of the symptoms of diseases of that organization (Baird, 2018; Sadeghi, 2020). Performance appraisal has been a challenge for researchers and users for many years. In the past, businesses used only financial metrics as a tool to evaluate performance until Kaplan and Norton in the early 1980s (Lucianetti, 2010). They reviewed and evaluated management accounting systems and identified many inefficiencies in evaluating the performance of organizations. This inefficiency was due to the increasing complexity of organizations, the

dynamics of the environment, and market competition (Rafiq, 2020). Every organization urgently needs to be evaluated in order to be aware of the desirability and quality of its activities, especially in complex and dynamic environments (Kabirifar, 2019).

On the other hand, the lack of evaluation and control system in a system means not communicating with the internal and external environment of the organization, the consequences of which are aging and ultimately the organization's death (Lesáková, 2016). Top managers may not feel the phenomenon of organizational death due to its non-occurrence. However, studies show that the lack of a feedback system makes it impossible to make the necessary reforms to grow, develop and improve the activities of the organization, which eventually creates organizational death (Dhaifallah, 2018). The shortcomings of traditional performance appraisal systems have led to a revolution in performance management. As a result, researchers and users create new performance appraisal systems that address current goals and environments; thus, multiple appraisal processes for use by different organizations were created, and these models have constantly been changing and developing (Blome, 2015; Duman, 2018). In the current era, dramatic changes in management knowledge have made the existence of a robust financial system inevitable. Financial performance evaluation can guarantee the implementation of the organization's goals and its development and progress. In such a way, the global economy's new conditions have led to the formation of conflicting economic goals and expectations in the organization (Nejjari, 2021). Financial performance is a central issue in all organizational analyses. Evaluating and measuring financial performance make the system innovative, motivate people to behave optimally, and are the central part of formulating and implementing organizational policy (Chen, 2021). Therefore, considering the importance of the above, this article examines the importance of influential factors and their impact on the financial performance of the studied companies. The previous research applied the grounded theory method and interpretive structural method (ISM) to identify the most influential factors for financial performance evaluation. As a result, human resources, management and leadership, internal processes, production and procurement, marketing, and economic issues represented the most stimulating effects (Shiarbahadori, 2020). The primary purpose of this study is to clarify the conceptual model of factors affecting the financial performance of 12 companies in the Persian Gulf

Petrochemical Company and investigate the impact of each factor and their ranking. Based on the above primary purpose, the sub-objectives of the research are to determine the impact of each factor on the financial performance of the companies under study.

2. Literature review

In all organizations, one of the most influential factors in the progress of the organization is the marketing dimension. Every organization spends many resources to maintain and strengthen its performance capabilities, which pressure managers to evaluate their effectiveness, creating an effective relationship between influential parameters such as marketing-related activities. On the other hand, using resources with the financial performance and value of the organization has become one of the most fundamental priorities of marketing researchers (Dehdashti, 2017). Another key parameter in achieving each of the predetermined goals is a significant focus on internal processes designed by the management, governance, and other personnel. Through internal processes and controls, it is possible to achieve the goals of the organization concerning financial reporting, effectiveness and efficiency of operations, and compliance with applicable laws and regulations. The internal processes of any organization as an effective system are beneficial in achieving the organization's financial performance goals (Kinyua, 2015). One of the most critical issues in managing a company is managing the financial flow of the supply chain, which plays a significant role in the growth and survival of that unit.

Further, managing the cash flow of the supply chain is a fundamental requirement of the organization's ability to adapt to a challenging economy. In general, supply chain cash flow deals with money flow along the chain, which helps companies overview the chain and optimize financial processes. Supply chain cash flow management deals with optimizing a company's working capital. This optimization is done by coordinating accounts payable, accounts receivable, cash, and risk (Aparicio, 2016). It is also well known that the external environment of the organization has a significant impact on its performance so that the performance of an organization depends on the complexity and dynamism of the external environment.

On the other hand, the degree of heterogeneity capacity and consensus of organizations are influential external factors (Kinyua, 2014). In all organizations, utilization of the teams is increasingly vital and affects

its success and the advancement of its goals. Creating capable teams leads to practical cooperation between employees, which plays a crucial role in expanding knowledge and skills through consultation and cooperation in the growing process of the organization. Creating individual motivation by delegating authority to the individual in the decision-making of the lower levels of the organization leads to individual empowerment. The management system is a conscious learning process due to the relationship between this actual and individual performance.

Moreover, the significant role of leadership cannot be ignored to make the team more effective. Therefore, considering the broad approaches of leadership, the importance of studying the behavior of leaders has become more prominent. Among various leadership behaviors, one of the most effective components empowers leadership behaviors, adapted by creating more independence for employees. In many studies, leadership has been evaluated from two perspectives: employee responses to empowerment and leadership actions (Tung, 2011).

On the other hand, many studies have been conducted by examining and evaluating the effects of human factors on organization performance. These studies have compared the relationship between high-performance work practices systems versus firm ones. Meanwhile, the significant economic and statistical effects of these practices on the results of mid-term employees (turnover and productivity) and short-term and long-term measures of companies' financial performance have been proven. Huselid et al. examined in detail the role of human resources on the factors such as productivity, turnover, and corporate financial performance (Huselid, 2017).

Among different analysis methods, factor analysis is a way to work with large volumes of data and summarize them into smaller sets of data that are easier and more understandable to manage (Bircha, 2001). Factor analysis is a way to find hidden patterns and shows how patterns overlap and which features are seen in multiple patterns. This method is also used to create a set of similar variables called dimensions (Ruscio, 2012). Confirmatory factor analysis can be used in designing assessment tools in various fields such as finance, management, health approaches, customer service questionnaire, and many others (Guo, 2017; Helms,

2006). The most crucial goal of confirmatory factor analysis is to determine the power of a predefined operating model with a set of observed data. In other words, confirmatory factor analysis seeks to determine the extent to which the number of factors and loads of variables measured on these factors is consistent with what was expected based on theory and theoretical model. In other words, this type of factor analysis tests the degree of conformity between the theoretical and the experimental structure of the research. The relevant variables and indicators are first selected based on the initial theory in this method. Then, loading variables and indicators on the existing factors are determined and compared with predetermined predictions. This study focused on the capability of this excellent analyzing method for performance evaluation on monetary units of Persian Gulf Petrochemical Company. For this purpose, seven important factors were selected and analyzed while followed by the Friedman ranking test to clarify their corresponding scores.

3. Methodology

In order to analyze all collected data and development of research hypotheses, in this section, first, a statistical description of the research sample was provided, and then its hypotheses were developed. First, descriptive statistics were used to describe the main variables of the research and demographic characteristics such as age and level of education to clarify the pattern of the results. Then, in the inferential statistics stage, in order to evaluate the appropriateness of the measurement tool, the questionnaire (Appendix A), the confirmatory factor analysis (CFA) with partial least squares (PLS) approach was used by Smart PLS3 software. Furthermore, to examine the type of data distribution, the Kolmogorov–Smirnov test was employed to evaluate previous questions and the research objectives. It should be noted that due to the abnormality of data distribution, nonparametric binomial tests were used by SPSS26 software. Friedman ranking test was utilized to classify the desired factors like management and leadership, external environment, financial issues, internal processes, production and procurement, human resources, and marketing parameters that have been designed based on the following conceptual model (Figure 1).
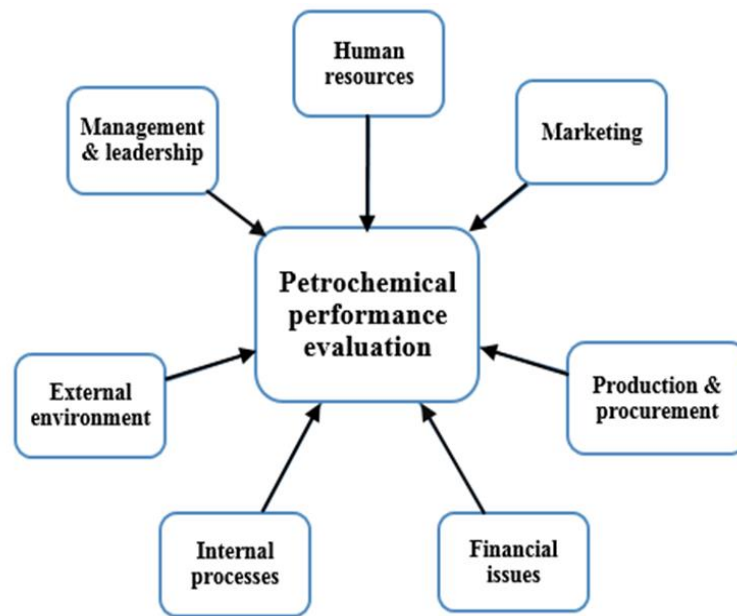
Figure 1. The conceptual model.

3.1. Descriptive statistics

Descriptive statistics is a powerful tool for summarizing large sets of understudy data, through which it can be reported understandably by using indicators. Descriptive statistics is considered as a basis for inferential tests. This section described demographic variables individually using descriptive statistics, so the main significant ones were determined. Additionally, descriptive indicators related to the questionnaire were presented.

3.1.1. Description of demographic variables

This part summarized the nature of the statistical community via age, level of education, and gender. In this study, 180 usable questionnaires were returned for further analysis. Table 1 presents the frequency distribution of individuals by the level of education. As can be seen, bachelor's (BS) degree, master's degree (MS), and doctoral education (Ph.D.) followed by 51.1%, 35%, and 13.9%, respectively (Fig. 1). The research findings indicated that the highest frequency is related to 36 to 45 years, which accounts for 40% of the total. In contrast, the lowest values observed for 46 to 50 years old are 13.9% of the total (Table 1 and Figure 1). As shown below, out of 180 participants in the statistical sample, 61.1% and 38.9% are male and female, respectively (Table 1 and Figure 1). Finally, for the final demographic parameter of work experience, the highest frequency was reported for the category of 11 to 15 years (28.3%), followed by the employees of 6 to 10 years (26.7%). All the results are summarized in Table 1 and Figure 2.

Table 1. Frequency distribution of respondents based on demographic variables.

Education level				
Level description	Parameter	No.	Frequency (%)	Cumulative frequency (%)
1	BSc	92	51.1	51.1
2	MSc	63	35	86.1
3	PhD	25	13.9	100
	Total	100	180	
Age				
Level description	Parameter	No.	Frequency (%)	Cumulative frequency (%)
1	≤ 25	32	17.8	17.8
2	26–35	51	28.3	46.1

3	36–45	72	40	86.1
4	46–55	25	13.9	100
	Total	180	100	
Gender				
Level description	Parameter	No.	Frequency (%)	Cumulative frequency (%)
1	Male	110	61.1	61.1
2	Female	70	38.9	100
	Total	180	100	
Work experience				
Level description	Parameter	No.	Frequency (%)	Cumulative frequency (%)
1	≤ 5	15	8.3	8.3
2	6–10	48	26.7	35
3	11–15	51	28.3	63.3
4	16–20	39	21.7	85
5	>20	27	15	100
	Total	180	100	
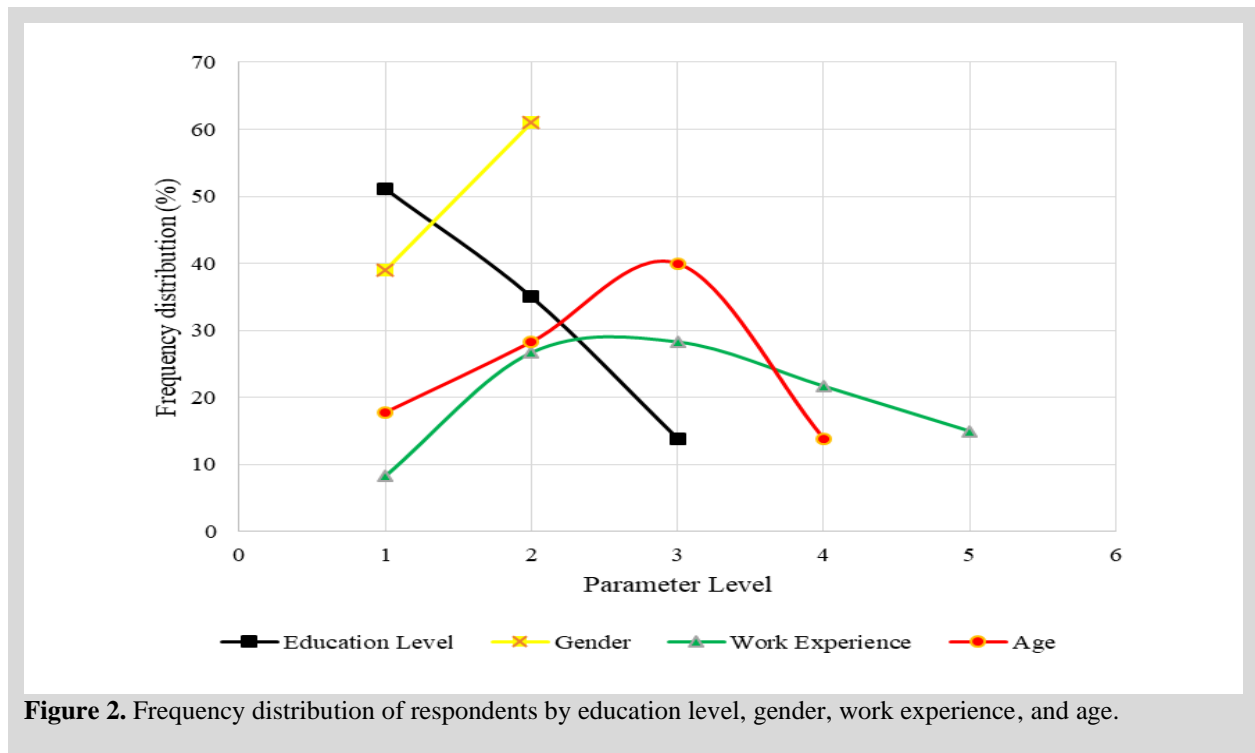
Figure 2. Frequency distribution of respondents by education level, gender, work experience, and age.

3.1.2. Description of understudy variables

The importance of variable description is vital while test results of the research hypotheses are extracted based on the data and indicators of these variables. In the previous research, all gathered data had a distance scale. Central indicators and dispersion were used to describe the research variables discussed below. In the following, the questionnaire scoring pattern is presented in Table 2. In this research, a questionnaire with a Likert scale of five options (1 to 5) was designed, then evaluated with

their related questions, and finally averaged in the SPSS software (Appendix A). The results show that all scores arranged in the interval between 1 and 5 approved great accuracy for feeding, coding, and computerizing in the software. Table 3 summarizes the descriptive indicators of research variables. Most of the understudy society chose options above three while the mean value was more than three.

Moreover, the coding and feeding of the questionnaire information into the software was entirely

conducted without violation, while the minimum and maximum values of the parameter's score are more than one and less than five, respectively. On the other hand, variables followed an acceptable range in the case of

skewness and elongation (+3 to –3), which demonstrated the desirability of data. Overall, it can be concluded that the sample results can be generalized to the statistical community with high confidence.

Table 2. Questionnaire scoring pattern in the software.

Level description	Very high	High	Medium	Low	Very low
Score	5	4	3	2	1

Table 3. Descriptive indicators of research variables.

Parameters	No.	Mean value	Standard deviation	Variance	Scores range		Earned values		Skewness	Stretching
Human resources	180	3.95	0.78	0.61	1	5	1	5	–0.98	1.03
Leadership	180	4.24	0.74	0.56	1	5	1.6	5	–1.24	1.31
External environment	180	3.33	0.66	0.44	1	5	1.2	5	–0.07	0.83
Internal processes	180	4.48	0.6	0.37	1	5	2.83	5	–1.27	0.46
Financial factors	180	4.007	0.8	0.64	1	5	1.67	5	–0.66	–.35
Production and procurement	180	3.76	0.83	0.69	1	5	1	5	–0.2	–0.6
Marketing	180	3.56	0.83	0.69	1	5	1	5	–0.2	–0.6

3.1.3. Descriptive indicators related to the questionnaire

In this part of the research, how to answer questions by understudy society is discussed via frequency table

(Table 4). It is perceived that the questions are well explained as the mean value is greater than three (the middle of the 5-point Likert spectrum) for all cases. In addition, most of them chose level descriptions of "high" and "very high".

Table 4. Descriptive indicators related to the questionnaire.

Questions	Mean value	Standard deviation	Questions	Mean value	Standard deviation
Q1	4.16	0.946	Q36	4.46	0.828
Q2	4.07	1.039	Q37	3.97	1.121
Q3	3.87	1.005	Q38	4.27	0.890
Q4	3.86	1.050	Q39	4.21	1.041
Q5	4.00	0.945	Q40	3.87	1.158
Q6	4.00	1.073	Q41	3.58	1.108
Q7	3.84	1.134	Q42	3.94	1.074
Q8	3.87	1.090	Q43	3.93	1.028
Q9	4.40	0.913	Q44	3.97	1.054
Q10	4.31	0.993	Q45	4.09	1.026
Q11	4.13	0.977	Q46	3.93	1.028
Q12	4.14	1.013	Q47	3.92	1.096
Q13	4.24	0.899	Q48	3.99	1.049
Q14	4.28	1.025	Q49	4.13	0.999
Q15	4.11	1.033	Q50	4.12	0.961
Q16	4.21	0.967	Q51	4.36	0.844
Q17	4.34	0.893	Q52	4.41	0.831
Q18	4.32	0.887	Q53	3.74	1.140

Questions	Mean value	Standard deviation	Questions	Mean value	Standard deviation
Q19	3.53	0.899	Q54	4.04	1.045
Q20	2.71	1.065	Q55	3.76	1.212
Q21	3.57	0.853	Q56	3.44	1.104
Q22	3.48	0.862	Q57	3.52	1.027
Q23	3.38	0.959	Q58	3.53	0.954
Q24	4.37	0.896	Q59	3.62	0.935
Q25	4.40	0.843	Q60	3.78	0.925
Q26	4.46	0.834	Q61	3.73	0.877
Q27	4.54	0.765	Q62	4.02	0.815
Q28	4.57	0.740	Q63	4.15	0.787
Q29	4.76	0.613	Q64	3.37	1.098
Q30	4.81	0.560	Q65	3.69	1.150
Q31	4.16	0.908	Q66	3.62	1.105
Q32	4.29	0.900	Q67	3.76	1.151
Q33	4.41	0.810	Q68	3.25	1.172
Q34	4.47	0.862	Q69	3.54	1.125
Q35	4.61	0.758	Q70	3.72	1.134

4. Results and discussion

4.1. Inferential statistics

The role of descriptive statistics is to collect, summarize, and describe quantitative information obtained from samples or statistical populations (Fisher, 2009). For this reason, when generalizing the obtained results to the whole statistical population, inferential statistics and statistical methods appropriate to the type of research method should be applied. In the inferential statistics section, the data normality test was used. Meanwhile, according to the questionnaire and objectives of the research, the Friedman ranking test and binomial test were used. Further, the confirmatory factor analysis and partial least squares approach were utilized by Smart PLS3 software to evaluate and measure the questionnaire.

4.2. Normality of data

To implement statistical analysis and logical inference of research hypotheses, the clarification of data distribution is a top priority. Bell-shaped distribution followed a normal distribution (Altman, 1995). In the case of the normal distribution of variables, parametric tests are used to evaluate the hypotheses. Otherwise, nonparametric tests should be used (Luengo, 2009). In order to check the normality, the Kolmogorov–Smirnov test is used, which follows the following hypotheses (Lilliefors, 1967) (Equation 1):

$$\begin{cases} H_0 = Normal\ distribution \\ H_1 = Abnormal\ distribution \end{cases} \quad (1)$$

If the significance level of the corresponding test is less than the error value of 0.05, it indicates that it is abnormal, and in other cases, it follows an abnormal pattern (Lilliefors, 1967). The significance level for all the variables has zero value (Table 5). Therefore, based on the above, it is concluded that the data distribution of variables is abnormal.

4.3. Confirmatory factor analysis of questionnaire

In confirmatory factor analysis, the researcher tries to obtain confirmation of a hypothetical factor structure (Finch, 2017). It determines whether the data is consistent with a particular factor structure in the hypothesis or not. Confirmatory factor analysis is also used to assess the validity of the indicators in the questionnaire to determine the necessary coordination and alignment between defined indicators. In other words, it can provide the validity of the questionnaire. Compared with exploratory factor analysis, each factor is related to a specific subset of variables. Confirmatory factor analysis evaluates the degree of conformity between the theoretical structure and the experimental structure of the research. Figures 3 and 4 show the factor analysis model with standardized path coefficients and loads.

Table 5. Distribution of variables based on Kolmogorov–Smirnov test.

Parameters	Kolmogorov–Smirnov test		Distribution type
	Statics value	Significance level	
Human resources	0.113	0.00	Abnormal
Leadership	0.157	0.00	Abnormal
External environment	0.097	0.00	Abnormal
Internal processes	0.199	0.00	Abnormal
Financial factors	0.108	0.00	Abnormal
Production and procurement	0.161	0.00	Abnormal
Marketing	0.079	0.00	Abnormal
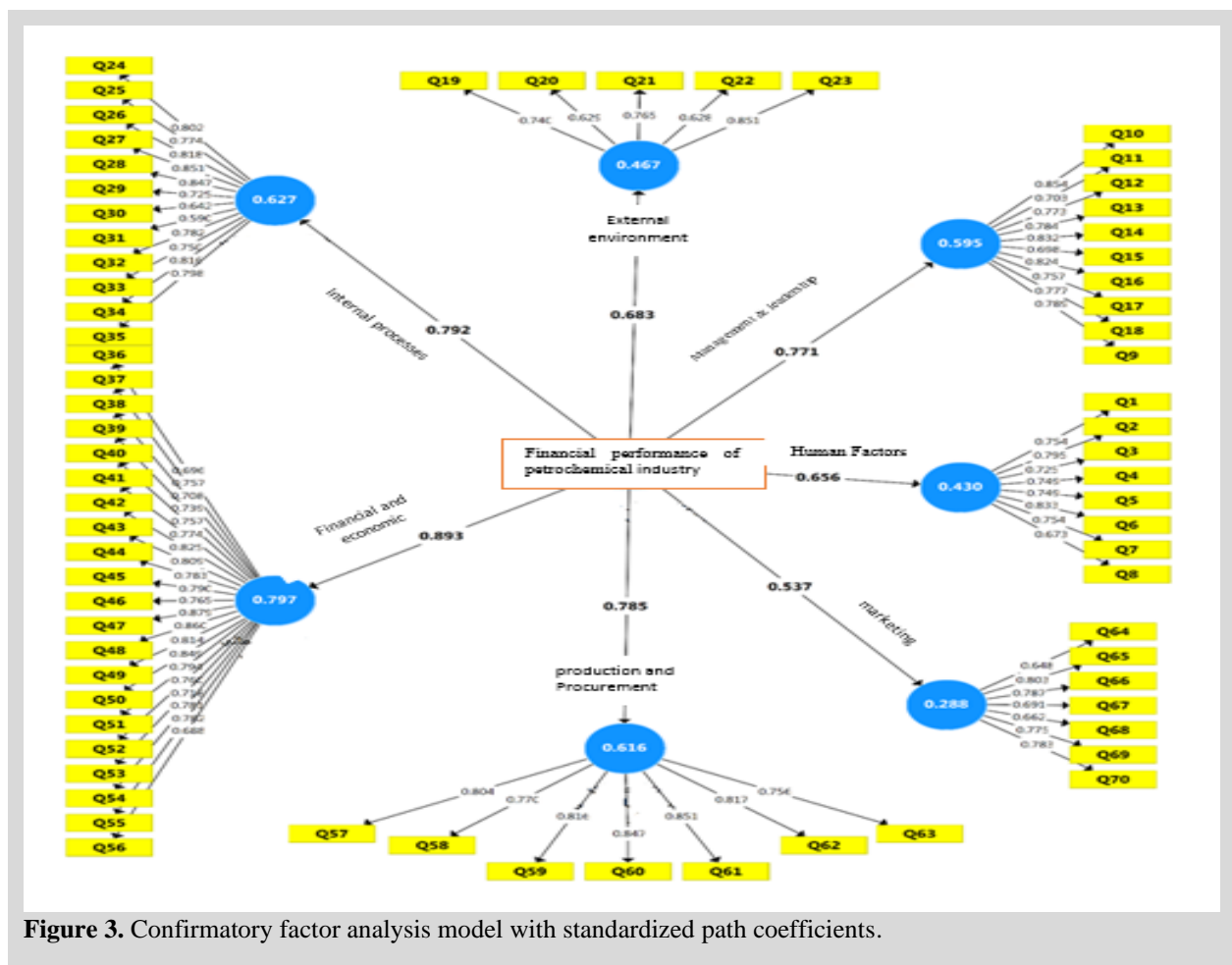
Figure 3. Confirmatory factor analysis model with standardized path coefficients.
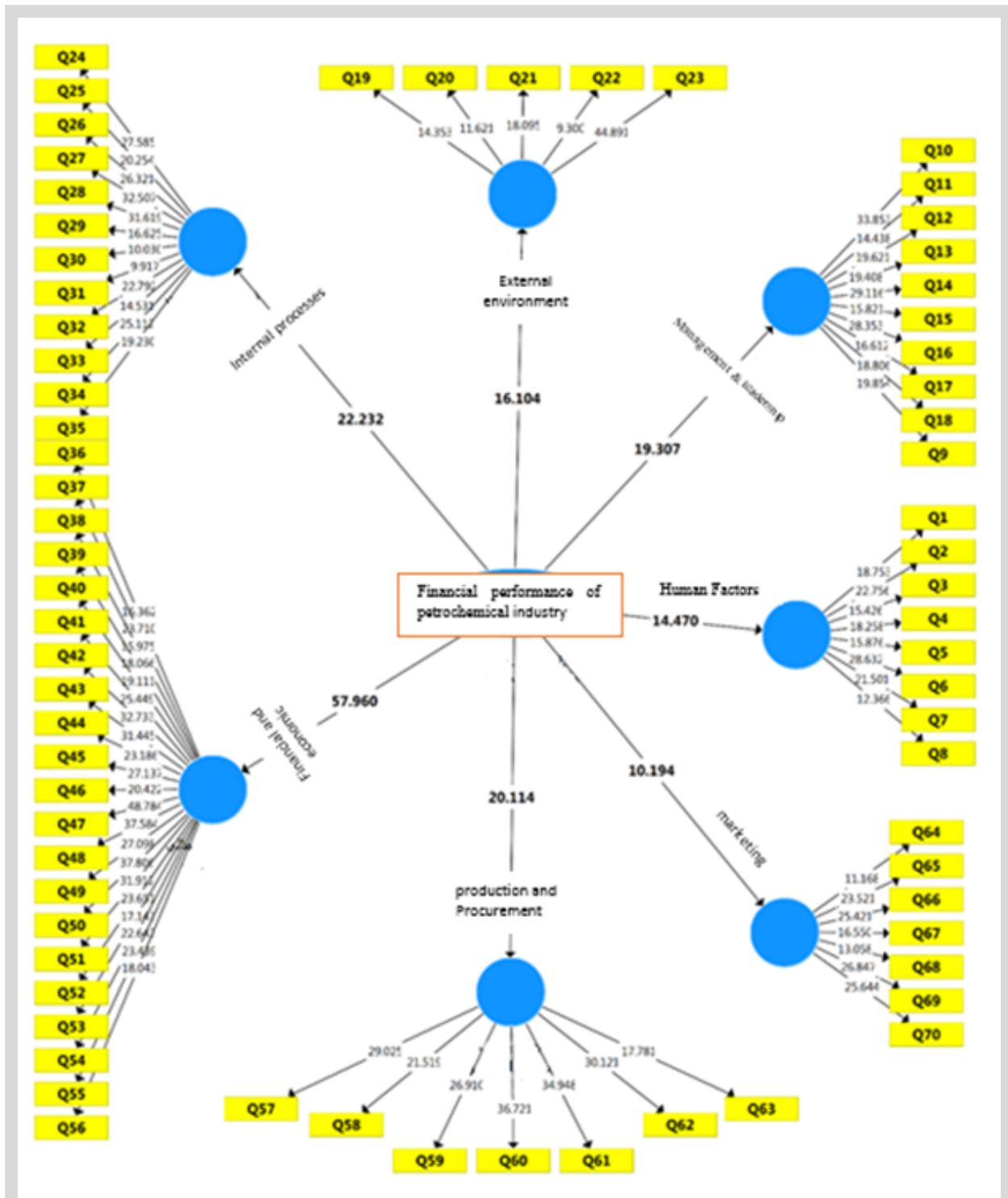
Figure 4. Confirmatory factor analysis in the case of significance coefficients T.

4.4. Investigation of standardized factor load and T coefficients between sub-factors and latent variable

The standardized coefficient measurement model investigates the correlation between the relevant latent variables and their corresponding indicators. Standardized coefficients represent standardized coefficients of path or factor loads between agents and markers. A significant correlation between variables and the questionnaire will lead to validity between variables. If the standardized factor load be higher than 0.4, it can

be said that the questions have good explanatory power (Familiar, 2015). On the other hand, the significance of each parameter is determined by T-values.

Meanwhile, if the value of the T coefficient is greater than the absolute value of 1.96 or the significance level is less than 0.05, the model parameters are significant (Bewick, 2003). In this case, the validity of measurement structures of the relevant variables is confirmed at a significance level of 0.05. As can be seen, the value of t-statistic and level of significance between corresponding items and their latent variables were calculated to be greater than 1.96 and less than 0.05, respectively, in all the cases (Table 6). Therefore, the significance of relationships between sub-factors and their

corresponding variables was confirmed. Moreover, the standardized factor load for all questions was more than 0.4, so eliminating no parameters was required. Identifier reliability indicates the number of variations related to the latent variable applied to the items. The variance analysis of corresponding items can extract this parameter. As the latest studies clarify it for fitting the measurement model in the partial least squares method, the requirement items should be checked as Cronbach's alpha (Helms, 2006); combined reliability (CR) (Guo, 2017); factor load coefficients, its significance, and the mean of extractive variance (AVE) (Drigo, 2020); and Fornell and Larcker matrix (Lazarus, 2014), and finally the factor load of each index with different structures should be compared.

Table 6. Standardized factor loads and t-coefficients between latent variables and related questions.

Parameters	Item	Factor load	The statistical value of T	Reagent reliability	Significance level	Result
Human factors	Q1	0.754	18.75	0.569	0.00	Desirable and meaningful
	Q2	0.795	22.75	0.632	0.00	
	Q3	0.725	15.42	0.526	0.00	
	Q4	0.749	18.25	0.561	0.00	
	Q5	0.749	15.87	0.561	0.00	
	Q6	0.833	28.63	0.694	0.00	
	Q7	0.754	21.5	0.569	0.00	
	Q8	0.673	12.36	0.453	0.00	
Management and leadership	Q9	0.789	19.85	0.623	0.00	Desirable and meaningful
	Q10	0.854	33.85	0.729	0.00	
	Q11	0.703	14.43	0.494	0.00	
	Q12	0.773	19.62	0.598	0.00	
	Q13	0.784	19.40	0.615	0.00	
	Q14	0.832	29.11	0.692	0.00	
	Q15	0.698	15.82	0.487	0.00	
	Q16	0.824	28.35	0.679	0.00	
	Q17	0.757	16.61	0.573	0.00	
	Q18	0.777	18.80	0.604	0.00	
External environment	Q19	0.740	14.35	0.548	0.00	Desirable and meaningful
	Q20	0.629	11.62	0.396	0.00	
	Q21	0.765	18.09	0.585	0.00	
	Q22	0.628	9.30	0.394	0.00	
	Q23	0.851	44.89	0.724	0.00	

Parameters	Item	Factor load	The statistical value of T	Reagent reliability	Significance level	Result
Internal processes	Q24	0.802	27.58	0.643	0.00	Desirable and meaningful
	Q25	0.774	20.25	0.599	0.00	
	Q26	0.818	26.32	0.669	0.00	
	Q27	0.851	32.50	0.724	0.00	
	Q28	0.847	31.61	0.717	0.00	
	Q29	0.725	16.62	0.526	0.00	
	Q30	0.642	10.03	0.412	0.00	
	Q31	0.590	9.91	0.348	0.00	
	Q32	0.782	22.79	0.612	0.00	
	Q33	0.750	14.53	0.563	0.00	
	Q34	0.816	25.11	0.666	0.00	
	Q35	0.798	19.23	0.637	0.00	
Financial factors	Q36	0.696	16.36	0.484	0.00	Desirable and meaningful
	Q37	0.757	23.71	0.573	0.00	
	Q38	0.708	15.97	0.501	0.00	
	Q39	0.739	18.06	0.546	0.00	
	Q40	0.757	19.11	0.573	0.00	
	Q41	0.774	25.44	0.599	0.00	
	Q42	0.825	32.73	0.681	0.00	
	Q43	0.809	31.44	0.654	0.00	
	Q44	0.783	23.18	0.613	0.00	
	Q45	0.790	27.13	0.624	0.00	
	Q46	0.765	20.42	0.585	0.00	
	Q47	0.879	48.78	0.773	0.00	
	Q48	0.860	7.58	0.740	0.00	
	Q49	0.814	27.09	0.663	0.00	
	Q50	0.849	37.80	0.721	0.00	
	Q51	0.749	31.91	0.630	0.00	
	Q52	0.760	23.65	0.578	0.00	
	Q53	0.718	17.14	0.516	0.00	
	Q54	0.781	22.64	0.610	0.00	
	Q55	0.782	23.43	0.612	0.00	
	Q56	0.688	18.04	0.473	0.00	
Production and procurement	Q57	0.804	29.02	0.642	0.00	Desirable and
	Q58	0.770	21.51	0.593	0.00	
	Q59	0.816	26.91	0.666	0.00	

Parameters	Item	Factor load	The statistical value of T	Reagent reliability	Significance level	Result
	Q60	0.847	36.72	0.717	0.00	
	Q61	0.851	34.94	0.724	0.00	
	Q62	0.817	30.12	0.667	0.00	
	Q63	0.756	17.78	0.572	0.00	
Marketing	Q64	0.648	11.16	0.420	0.00	Desirable and meaningful
	Q65	0.803	23.52	0.645	0.00	
	Q66	0.787	25.42	0.619	0.00	
	Q67	0.691	16.55	0.477	0.00	
	Q68	0.662	13.05	0.438	0.00	
	Q69	0.775	26.84	0.601	0.00	
	Q70	0.783	25.64	0.613	0.00	

4.5. Cronbach's alpha coefficient, composition reliability coefficient, and average extracted variance

Cronbach's alpha coefficient is the traditional index used to measure the reliability or internal consistency between observable variables in a measurement model. Internal consistency indicates the degree of correlation between a structure and its characteristics. The acceptance criterion for this index, which will indicate the reliability of the measurement model, is at least 0.7 (Helms, 2006). In the PLS method, there exist other criteria for evaluating the internal consistency of the measurement model CR. If the value of the combined reliability for each structure is higher than 0.7 (Smith, 1974), it indicates the appropriate internal stability for the measurement model. As the final one, convergence validity makes sense when the scores obtained from two tools on the desired concept are highly correlated. In other words, convergent validity means measuring the

explanation of the hidden variable by observable ones, which is measured by the average variance extracted. Convergent validity index means measuring the explanation of the hidden variable by its observable variables. This criterion has been proposed as an indicator for measuring the internal validity of the measurement model. In simpler terms, this index reveals the degree of correlation with its indicators. A minimum value of 0.5 is considered for this index (Tong, 1999), which means that the latent variable in question explains at least 50% of its observable variance. The table below shows the results of Cronbach's alpha coefficients, combined reliability, and mean extraction variance. As can be seen, the Cronbach's alpha value and the CR coefficient of all variables are within the acceptable range and above 0.7. Further, the AVE value of all variables is above the 0.5 limit. Therefore, it can be inferred that the convergent reliability and validity of understudy variables are acceptable (Table 7).

Table 7. Summarized results of Cronbach's alpha coefficient, CR, and AVE.

Parameters	Cronbach's alpha coefficients	CR coefficient	AVE
Human resources	0.892	0.914	0.570
Management and leadership	0.928	0.940	0.609
External environment	0.772	0.847	0.529
Internal processes	0.936	0.945	0.593

Financial factors	0.967	0.970	.0607
Production and procurement	0.912	0.930	0.655
Marketing	0.859	0.893	0.545

4.6. Divergent validity by Fornell and Larcker method

If the correlation between analyses that measure different characteristics represents a low value, the analyzing method has divergent diagnostic validity. Divergent validity also measures the ability of a measurement model to differentiate the observable variables of that latent variable from the others in the model; as a result, it plays a complementary role with respect to convergent validity. Table 8 presents the results of the divergent validity study by the Fornell and Larcker method. The value of the AVE root of the latent variables, located in the cells in the primary diameter of the matrix, is greater than the amount of correlation between them, arranged in the lower left side. Therefore, it can be stated that in the preceding model, hidden variables have more interaction with their related questions concerning the others. In other words, the divergent validity of the model followed an appropriate pattern.

Table 8. Divergent validity by Fornell and Larcker method.

Parameters	Human resources	Management and leadership	External environment	Internal processes	Financial factors	Production and procurement	Marketing
Human resources	0.755						
Management and leadership	0.408	0.781					
External environment	0.577	0.439	0.727				
Internal processes	0.430	0.634	0.511	0.770			
Financial factors	0.469	0.596	0.510	0.569	0.779		
Production and procurement	0.477	0.548	0.540	0.584	0.632	0.809	
Marketing	0.445	0.264	0.420	0.306	0.437	0.374	0.738

5. Evaluation of validity by comparing the factor load of each index with different structures

Comparing the factor load of items with their structure specifies the divergent validity state. Divergent validity is confirmed if the factor load between items with their structures is higher than that of the same item with other structures. According to the matrix design, the table rows belong to the questionnaire's questions, and its columns are related to the variables (Table 9). The displayed numerical values indicate the degree of correlation of indicators with structures. As it is clear, all questions have more factor load with their hidden variable, which demonstrates proper fitting of the model and confirmation of divergent validity.

Table 9. Evaluation of validity by comparing the factor load of each index with different structures.

Questions	Human factors	Management and leadership	External environment	Internal environment	Financial indices	Production and procurement	marketing
Q1	0.754	0.320	0.495	0.338	0.318	0.282	0.266
Q2	0.795	0.258	0.462	0.338	0.337	0.328	0.321

Questions	Human factors	Management and leadership	External environment	Internal environment	Financial indices	Production and procurement	marketing
Q3	0.725	0.371	0.491	0.390	0.317	0.360	0.376
Q4	0.749	0.288	0.412	0.323	0.333	0.340	0.330
Q5	0.749	0.282	0.418	0.319	0.314	0.358	0.359
Q6	0.833	0.281	0.471	0.318	0.414	0.424	0.345
Q7	0.754	0.353	0.397	0.298	0.449	0.423	0.317
Q8	0.673	0.307	0.331	0.270	0.336	0.349	0.375
Q9	0.353	0.789	0.377	0.480	0.483	0.422	0.119
Q10	0.339	0.854	0.368	0.545	0.515	0.477	0.224
Q11	0.201	0.703	0.283	0.431	0.415	0.309	0.159
Q12	0.329	0.773	0.318	0.500	0.416	0.374	0.171
Q13	0.319	0.784	0.355	0.497	0.466	0.381	0.231
Q14	0.346	0.832	0.379	0.553	0.427	0.464	0.270
Q15	0.340	0.698	0.325	0.503	0.471	0.479	0.242
Q16	0.307	0.824	0.336	0.486	0.521	0.460	0.231
Q17	0.324	0.757	0.328	0.441	0.447	0.437	0.208
Q18	0.313	0.777	0.349	0.499	0.478	0.453	0.193
Q19	0.409	0.330	0.740	0.317	0.321	0.394	0.189
Q20	0.335	0.295	0.629	0.390	0.339	0.344	0.364
Q21	0.457	0.293	0.765	0.360	0.378	0.376	0.315
Q22	0.381	0.294	0.628	0.358	0.362	0.311	0.285
Q23	0.497	0.378	0.851	0.424	0.442	0.513	0.362
Q24	0.388	0.484	0.435	0.802	0.503	0.471	0.289
Q25	0.398	0.505	0.465	0.774	0.438	0.531	0.281
Q26	0.300	0.517	0.377	0.818	0.443	0.452	0.280
Q27	0.316	0.511	0.372	0.851	0.435	0.442	0.198
Q28	0.440	0.504	0.446	0.847	0.444	0.483	0.247
Q29	0.397	0.499	0.316	0.725	0.417	0.478	0.155
Q30	0.251	0.478	0.262	0.642	0.403	0.384	0.069
Q31	0.220	0.469	0.358	0.590	0.425	0.355	0.267
Q32	0.320	0.466	0.435	0.782	0.455	0.446	0.295
Q33	0.319	0.368	0.402	0.750	0.369	0.412	0.269
Q34	0.298	0.513	0.408	0.816	0.499	0.484	0.261
Q35	0.293	0.534	0.413	0.798	0.409	0.431	0.187
Q36	0.326	0.368	0.362	0.363	0.696	0.421	0.229
Q37	0.386	0.545	0.463	0.464	0.757	0.491	0.342
Q38	0.344	0.421	0.355	0.422	0.708	0.448	0.277
Q39	0.328	0.388	0.331	0.361	0.739	0.412	0.214
Q40	0.391	0.446	0.368	0.439	0.757	0.434	0.349
Q41	0.334	0.494	0.491	0.461	0.774	0.507	0.413

Questions	Human factors	Management and leadership	External environment	Internal environment	Financial indices	Production and procurement	marketing
Q42	0.398	0.474	0.399	0.499	0.825	0.534	0.413
Q43	0.369	0.430	0.397	0.445	0.809	0.513	0.448
Q44	0.326	0.447	0.338	0.456	0.783	0.503	0.411
Q45	0.371	0.451	0.345	0.541	0.790	0.513	0.402
Q46	0.376	0.402	0.352	0.381	0.765	0.479	0.412
Q47	0.377	0.509	0.362	0.398	0.879	0.530	0.371
Q48	0.363	0.473	0.376	0.475	0.860	0.542	0.359
Q49	0.372	0.480	0.441	0.487	0.814	0.530	0.280
Q50	0.395	0.504	0.425	0.464	0.849	0.581	0.365
Q51	0.394	0.527	0.338	0.505	0.794	0.529	0.273
Q52	0.330	0.481	0.372	0.483	0.760	0.490	0.279
Q53	0.295	0.455	0.415	0.474	0.718	0.471	0.321
Q54	0.410	0.557	0.472	0.429	0.781	0.506	0.365
Q55	0.387	0.410	0.444	0.332	0.782	0.419	0.317
Q56	0.398	0.451	0.502	0.394	0.688	0.451	0.263
Q57	0.363	0.481	0.458	0.446	0.536	0.804	0.328
Q58	0.362	0.461	0.466	0.516	0.518	0.770	0.320
Q59	0.332	0.420	0.376	0.366	0.517	0.816	0.291
Q60	0.371	0.414	0.408	0.481	0.483	0.847	0.233
Q61	0.413	0.464	0.474	0.504	0.539	0.851	0.348
Q62	0.413	0.433	0.466	0.522	0.530	0.817	0.343
Q63	0.442	0.428	0.401	0.463	0.452	0.756	0.241
Q64	0.208	0.152	0.240	0.071	0.298	0.190	0.648
Q65	0.359	0.190	0.349	0.195	0.322	0.346	0.803
Q66	0.347	0.182	0.310	0.327	0.368	0.301	0.787
Q67	0.382	0.221	0.352	0.193	0.249	0.193	0.691
Q68	0.310	0.216	0.286	0.250	0.340	0.246	0.662
Q69	0.363	0.215	0.313	0.236	0.364	0.305	0.775
Q70	0.310	0.185	0.317	0.261	0.304	0.319	0.783

6. Discussion

The conceptual model designed in this study analyzed human factors, management and leadership, external processes, internal processes, production and procurement, economic indices, and marketing factors. It should be noted that due to the abnormality of data distribution, the nonparametric binomial test has been used. Based on the results of binomial analysis, the significance level of the previous test for all variables represented zero and less than the 0.05 error level. On the other hand, the average scores of previous parameters were higher than three. Thus, according to the hypothesis, each factor plays a vital role in the financial performance of the petrochemical companies. Table 10 clarified all corresponding results in the following. At the next step, it is essential to rank the factors affecting the performance quality of the petrochemical industry monetary units. Utilizing the Friedman ranking test, approved that the organization's internal processes with

an average rating of 5.91 had the most critical effect on the financial performance of organizations under review. Table 12 summarizes the ranking of all seven considering parameters. On the other hand, since the significance level of the test with the statistical value of 382.54 is lower than 0.05, it is inferred that the null hypothesis of the Friedman test is rejected, and the opposite one is confirmed. Hence, each factor had its profound individual effect on the organization's performance (see Tables 11 and 12).

Table 10. Identifying the influential factors in the performance of the monetary unit of the petrochemical industry using binomial test.

Parameters	Ranging	Observed value	Test ratio	Significance level	Variables	Result
Human resources	≤3	25	0.14	0.50	0.000	Confirmed
	>3	155	0.86			
Total		180	1.00			
Management and leadership	≤3	13	0.07	0.50	0.00	Confirmed
	>3	167	0.93			
Total		180	1.00			
External environment	≤3	65	0.36	0.50	0.00	Confirmed
	>3	115	0.64			
Total		180	1.00			
Internal processes	≤3	5	0.03	0.50		Confirmed
	>3	175	0.97			
Total		180	1.00			
Financial factors	≤3	24	0.13	0.50		Confirmed
	>3	156	1.00			
Total		180	1.00			
Production and procurement	≤3	27	0.15	0.50	0.00	Confirmed
	>3	153	0.85			
Total		180	1.00			
Marketing	≤3	56	0.31	0.50	0.00	Confirmed
	>3	124	0.69			
Total		180	1.00			

Table 11. Friedman ranking test results.

Test statistics	
Chi-squared value	382.54
Free degree	6
Significance level	0.00

Table 12. Ranking of effective parameters on the financial performance of the petrochemical industry: a particular case study.

Parameters	Average rating	Ranking
Internal processes	4.21	1
Management and leadership	5.08	2
Financial factors	3.33	3
Human resources	5.91	4
Production and procurement	3.01	5
Marketing	3.01	6
External environment	4.29	7

7. Conclusions

The study was carried out to investigate the separate effect of selected significant factors regarding the financial performance of petrochemical companies. The study used questionnaires as a data collection instrument and approved its correspondence via confirmatory factor analysis. The findings suggest that all considered variables have their principal role. The higher ranking rate of 5.91 was adopted for internal processes and 2.18 for the external environment.

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Appendix A

The following table presents the corresponding questionnaire used in the analysis.

Table 13. The corresponding designed questionnaire.

No.	Factor	Item	Very low	Low	Medium	High	Very high
1	Human factors	Staff's education					
2		Employee's work experience					
3		Employee's work experience					
4		Employee's responsibility					
5		Support 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	Management and leadership	The degree of attention to the service compensation system					
9		Planning to provide financial resources for the organization					
10		Creating a suitable database in the organization					
11		Developing rules and regulations for the talent search system					
12		Power and management policy					
13		Adopting correct operating policies in the unit					
14		Paying attention to the innovation and reduction of administrative bureaucracy					
15		Paying attention to intelligent work processes (use of new technologies)					
16		The level of attention to the documents of resistance economy in the work unit					
17		Paying attention to upstream performance appraisal documents					
18		The degree of attention to the intelligence of the establishment of the internal control system					

No.	Factor	Item	Very low	Low	Medium	High	Very high
19	External environment	Appointment of unrelated and political government managers					
20		Monetary and financial sanctions					
21		Competitive environmental pressure with other companies					
22		Constructive interaction with regional holdings and petrochemicals					
23		Ability to deal with foreign sanctions and threats					
24	Internal processes	Cost-saving program					
25		Managed cost reduction in the organization					
26		Eliminating unnecessary costs in the organization					
27		Managing expenses thoughtfully					
28		Reasonable relationship between costs and the organization's activities					
29		Periodic physical adaptation (up to date accounts)					
30		Financial support of other units					
31		Complaint-handling rate					
32		Increasing measurable performance factors					
33		Status of the information feedback system					
34		The extent of attention to the implementation of the directives of the Sixth Development Plan					
35		Establishment of a system for the cost of products					
36	Economic factors	Economic conditions of the organization (liquidity)					
37		Quality of financial reports					
38		Setting up payment procedures					

No.	Factor	Item	Very low	Low	Medium	High	Very high
39		Capital return rate					
40		Settlement of foreign currency debts and arrears					
41		Settlement of debts and arrears in Iranian Rials to contractors					
42		Receiving receivables from customers					
43		Timely preparation of annual balance sheet					
44		Reducing the cost of raw materials					
45		The optimal combination of production and sales					
46		Increasing in intangible assets					
47		Net profit margin					
48		Gross profit margin					
49		Book value					
50		Periodicals collection					
51		Asset management					
52		Financing status of export marketing expenses					
53		Compliance with national and international accounting standards					
54		Reducing information asymmetry					
55		Reducing financing costs					
56		Financial reporting quality					
57	Production and procurement	Operating costs					
58		The ratio of actual to allocated costs					
59		Establishment of a system for the cost of products					
60		Paying attention to operational budgeting					
61		Accuracy and speed in document registration					

No.	Factor	Item	Very low	Low	Medium	High	Very high
62		Using workflow communication technology					
63		Increasing focus on capital formation					
64	Marketing	Use marketing-oriented knowledge management					
65		Product marketing					
66		Maximizing the use of legal exemptions in particular areas					
67		Competitive pricing					
68		Ability to sell cash and credit					
69		Paying attention to competitive marketing					
70		Paying attention to keeping market share constant					