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Optimal Analysis of Valuation of Petrochemical Stock in the Capital Market by Total Interpretive Structural Model

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ABSTRACT

With the growth of the analytical level in financial decisions, the valuation of cost-effective stocks is considered one of the functions of analyzing the returns and risks of financial investment, which balances the behavioral effect of investment and analytical processes in the market. Furthermore, it makes the gap between current and corporate stock market values a signal in financial decisions to increase returns and control risk in investors' decisions. This study aims to level the optimal analytical topics for evaluating the cost of petrochemical stock in the capital market. In this study, which was synthetic and inductive-deductive in the data collection method, 12 accounting and financial management specialists at the university level participated as panel members in the quality department. In fact, in the qualitative part, which used meta-synthesis and Delphi analysis, the aim was to identify the optimal analytical themes for the valuation of cost-effective stocks and then, in a small section with the participation of 16 petrochemical brokers, to classify the identified statements in the form of a total interpretive structural modeling based on impact priority. Therefore, relying on meta-synthesis analysis, 12 studies were first evaluated as the basis for evaluation to determine the optimal analytical themes of cost-based stock valuation based on critical evaluation, based on which 11 themes were the selected propositions and entered into Delphi analysis to determine theoretical adequacy. In this stage, three propositions were removed during the two stages of Delphi analysis, and eight analytical propositions of stock valuation were economically entered into the quantitative analysis section, i.e., complete interpretive structural analysis. In this section, the results show the most influential analytical themes of cost-effective stock valuation in the petrochemical industry: two statements of the regular stock market price analysis based on the current rated price of "K2" and a focus on the net asset value of "K3", at the fourth level of this model. The results show that petrochemical companies, as one of the most critical industries in the capital market, will be able to focus on the difference between the actual

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value and stock market value on the one hand and the difference between the value of assets and corporate debt on the other hand to reduce financial constraints due to confidence in the capital market so as to provide the financial resources needed to advance its investment plans and projects, even in an unstable economy; they can even encourage more investors to invest in petrochemical stocks by continuing to increase their stock market value.

1. Introduction

With economic changes since the end of the last century, capital markets have played a more cohesive role in the circulation of capital and the industrialization of many large countries. Markets that have evolved from traditional to more mechanized and beyond the borders of countries into emerging markets worldwide, such as the Forex and CFD markets, have played an effective role in investment dynamics with higher returns for investors (Callagher et al., 2015). With the development of markets, investors in these markets have a higher capacity to earn higher profits that are better acquainted with the financial functions of companies. Because investing in companies as a generator of cash flows has a significant role in long-term performance for the continuity and stability of the economy and future values of companies for development (Rahmani Norouzabad and Mohammadi, 2019), investors need to know the stimuli to enter the capital markets while controlling the risk. They can gain more returns in the investment period. Some of these stimuli are based on fundamental analysis, and some are based on technical analysis (Moosa and Li, 2011). Investors cannot be expected to succeed in the technical analysis due to the complexity and reliability of economic forecasts without accurate information support. However, focusing on fundamental analysis, either in the form of personal investment knowledge or with the help of brokerage advice, can help investors better understand these stimuli in investing in the capital market (Kubinska et al., 2016). One fundamental analysis in investing stocks in the capital market is the optimal analysis of valuing stocks. The valuation of corporate stocks is one of the fundamental analysis factors that give meaning to investment values for analysts and investors. Because the basis of any investment is its correct and accurate evaluation (Badavar Nahandi and Sarafraz, 2018), a lack of accurate valuation of stocks will cause investors to face many risks. If they invest without accurate valuation, they will not possibly hit the target. By accepting very high risk, they may never get a return commensurate with accepting that risk. Understanding the factors affecting stock valuation, on the one hand, helps analysts and legislators of upstream institutions to control stock market crises and drastic stock price changes. On the other hand, it helps investors and stockbrokers to trade more accurately and thus understand the difference between stock prices. The nature of stocks helps investors to make decisions to gain more returns by controlling risk within certain limits (Taleb Bidokhti and Alishahi, 2011). It is noteworthy that in a developed market, due to information transparency, not much change occurs in the short run to widen the gap between the market price and the intrinsic stock price, while the existence of economic crises can cause severe crises in the market and cause deeper narrowing of the market price. Intrinsic price gaps will only give more returns to investors with a more accurate analysis of market changes based on speculative behavior (Shaffer, 2019). When the market is inefficient, the degree to which market value deviates from the intrinsic value of companies' stock prices leads to random errors and ambiguity about the relationship between market valuation and corporate investment, causing investment attractiveness to plummet (Dhaliwal et al., 2012). Therefore, according to the explanations provided, it should be stated that the Iranian capital market, especially the shares of petrochemical companies over the past few years, has been one of the stocks considered in investments at the capital market level. However, severe fluctuations in the market have caused the stock market confidence to decline significantly. Therefore, invoking analytical functions in the financial performance of companies, especially their assets and income levels, as an analytical basis for stock valuation can lead to increased returns from shareholder investments in the market, even in inefficient market conditions. Because analytical capabilities in valuing cost-effective stocks help analysts and investors better understand past performance, so they have the present and future of companies. Therefore, the sudden growth of the market during the last year and its sudden decline over the past few months since 2020 caused investment in the capital market to decrease sharply. Despite the lack of accurate and transparent information and problems in

studying and evaluating effective financial decision-making models for investment, this research can help better understand the information in financial statements. Moreover, it can assist investors in developing the application of accounting information companies disclose to make the best investment decision. Therefore, understanding the importance of stock valuation functions, this study seeks to determine the most important analytical themes of cost-effective stock valuation of petrochemical companies to help stockbrokers, while controlling risk, create more returns on investing in these companies for investors. Therefore, the main question in this study is what the most effective analytical themes of the optimal valuation of costly petrochemical stocks in the capital market are. In addition, while stating the theoretical foundations and empirical support, an attempt is made to help identify the analytical themes of stock valuation by relying on the level of theoretical knowledge. Finally, in the last part of the research, the discussion and conclusion of the findings are presented, and the necessary suggestions are explained.

2. Literature review

2.1. Cognitive functions of the market in investor behavior

In general, investing means spending the available money to make more money in the future; In other words, investing means postponing current consumption to achieve more consumption in the future. In investing, two different and essential characteristics are time and risk. The importance of these two issues is that in investing, money is spent in the present, and its amount is definite. While the reward is obtained in the future and is usually accompanied by a lack of confidence. In some cases, the nature of time prevails (such as government bonds), and in some cases, risk takes precedence in terms of importance (such as a standard stock option); in other cases, both are important (such as common stock) (Barary et al., 2020). Therefore, investors' knowledge of the functions of each factor can lead to a change in investment behavior.

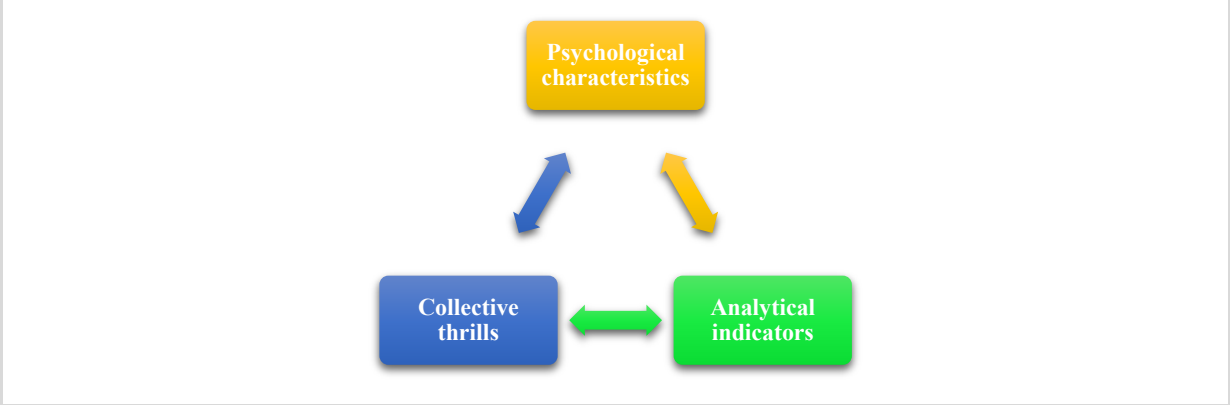

Figure 1: Dimensions shaping the behavior of investors in the capital market

As seen in Figure 1, there are three dimensions of psychological characteristics, market norms, and analytical indicators making investors decide. Based on these behavioral characteristics, investors' behavior can be interpreted as a tendency to buy and sell stocks, which is done to achieve higher returns and avoid risk in investing (Wallmeroth, 2019). In addition to the psychological characteristics in shaping investment behavior, market indicators can help develop individual and collective decisions of investors. For example, when financial market watchers are aware of the capital market boom in various ways, investors move from other markets to try to make more returns by buying stocks in the market, but this does not necessarily mean that, in time, a market downturn cannot be profitable. Instead, the difference in understanding the nature of such market signals can shape differences in investor decisions (Liu and Krystyniak, 2021). In other words, investors who rely on analytical knowledge while better understanding the market can invest in stocks, defined as hot stocks: a stock that brings investors closer to potential returns through financial and information analysis. The difference in these behaviors can explain the extreme reaction of investors who choose to be in the market for more profit, an interest that may have been done without any support and only based on mass behaviors (Yazdani et al., 2018).

2.2. Equity stock evaluation

The development of industry, trade, and financial relations and processes today has made it necessary for the stock market to easily create the information investors and stakeholders need to analyze and invest with a high degree of confidence. This process allows the stock market to grow economically by attracting small, stagnant capital. It should be noted that the basis of any investment is its correct and accurate evaluation. Choosing an appropriate valuation method for stock valuation can cover risk and cost characteristics in a limited time frame and meet the needs of investors in determining the fairest value for decision-making. Although the calculation of the company's income has particular credibility for evaluating and determining the price of shares traded among financial analysts and investors, evidence shows that most revenues are affected by managerial manipulations, which in practice, challenges stock valuation (Nel and Roux, 2017). Such manipulations, which more or less indicate the expected revenue, meet the specific objectives of management, and reduce the revenue quality, requiring the accurate analysis of investors when making decisions in an inefficient market (Faseruk and Faseruk, 2008). According to the efficient market hypothesis, finding securities priced below intrinsic value is difficult. Capital market analysts often use different models to discover these bonds because investors always look to buy growth stocks for higher returns than other investment opportunities.

Given that the stock price committee first evaluates the shares of companies listed on the stock exchange market and then offers them to the capital market, after a short period, the automatic process of rising or falling stock prices resulting from the flow of stock supply and demand is the expectations and predictions of shareholders and investors, causing a massive difference from the initial price presented by the pricing committee; in such a case due to the incompatibility of the pricing committee evaluation model with market conditions, the stock market is practically disturbed and knowledgeable, and they buy or sell their shares for higher returns (Islami Bidgoli and Karimkhani, 2016). This simple reasoning process is known as stock valuation, which can bring the best results for investors by focusing on analytical processes by investing in equity stocks evaluation. Capital market analysts try to establish a line of communication between a company's market value and other factors affecting it, such as distributed profit or residual profit; they often determine this line of communication by using forecasting models. The goal is to prevent market imbalances (Reschreiter, 2009). For example, financial analysts focus on the discount cash flow model (DCFM) as an accepted model for valuing ordinary stock accounting, trying to assume that the firm's price equals the discounted value of the future cash flow. Indeed, they believe that this causes cash dividends to be applied with binding policies so that there is not much difference between the market price and the actual stock price, leading investors to react quickly in the market. However, most methods introduced in the teachings of the financial management and investment texts for stock valuation are generally used as a theoretical framework and cannot express the actual value of a stock alone. Therefore, a look at the experiences of some prosperous countries shows that the liberalization of information flow while balancing supply and demand in stocks, achieving higher returns in such markets, depends on analytical knowledge in various fields such as stock valuation. Alternatively, by separating the specialized level of stockbrokers in the industries and stocks of different companies, they seek to provide specialized consultants at the level of such markets (Heidarzadeh Hanzaee and Hosseinzadeh Zorofchi, 2019). Applying scientific and applied evaluation methods according to local conditions and a set of factors that are effective in determining the value of a company is another point that can help increase integration in this area with the growth of research and development in the market. Therefore, according to the theoretical foundations described, the research questions are presented as follows:

1. What are the optimal analytical components of equity valuating petrochemical stocks in the capital market?
2. What are the optimal analytical themes for equity evaluating petrochemical stocks in the capital market?
3. What are the most effective analytical themes for equity evaluating petrochemical stocks in the capital market?

It should be noted that the qualitative analysis process is used to answer the first two research questions, and the quantitative analysis process is employed to answer the third research question.

2.3. Research background

Sharma et al. (2021) conducted a study entitled "Stock Valuation as an Analytical Basis for Corporate Assets Using the Fractional-Jump Heston Model". In this

study, to evaluate stocks, considering that the prices of primary assets in the financial markets are subject to sudden changes due to various factors, an attempt was made to present a new model of fractional-jump bread by adding the Hurst jump and power criterion. Therefore, by determining the characteristic function of the underlying asset price process in the form of the mentioned model, an attempt was made to create a new criterion for pricing subordinated securities based on the Monte Carlo method along with the technique of reducing the variance of stock valuation based on assets. The results based on analytical comparison showed that the valuation by the Heston fractional-jump model was closer to the actual results of the bond price and had a better performance compared to the two well-known models of random fluctuations, Heston and Bates. Kim et al. (2020) conducted a study combining jumping and fractional Brownian motion to consider fluctuations and long-term memory characteristics in return on assets for stock valuation. Fractional-jump Heston was performed based on time intervals of 3, 6, and 12 months, and the results showed that the above model was a reasonable basis for evaluating stocks in return on assets in short time intervals of 3 months. Fatma and Hidayat (2020) researched earnings persistence, earnings power, and stock valuation in consumer goods companies. This study, conducted from 2010 to 2014, used multiple regression analysis by systematically reviewing 100 selected companies based on annual reports and financial statements. The results showed that the stability of corporate profits had a negative effect on the valuation of investors' stocks, while the profitability of companies increased the positive valuation of stocks by investors. Barary et al. (2012) conducted a study entitled "Modeling Investor Behavior Using Psychological Variables With an Interpretive Structural Modeling Approach to Identify Decision-Making Errors in Investment". For this purpose, experts in this field were used, and 12 psychological variables affecting the behavior/decision of investors were identified. Then, by the initial access matrix, their impact on the behavior/decision model of investors on each other was coded. Finally, they were graded using the final matrix. The results of interpretive structural modeling showed that psychological variables affecting investors' decisions were modeled at six levels.

Moreover, the concept of variability is at the highest level and has more impact than other psychological variables, and the variable of delay is at the lowest level. Nikbakht et al. (2020) conducted a study entitled "The Effect of Management Profit Forecasting Error on the Stability of Cash and Accrual Components of Earnings and Overvaluation of Stocks". They used a statistical population of the companies listed on the Tehran Stock Exchange, and the research sample included 64 companies. Research findings using multivariate linear regression, the use of panel data, and the fixed effects method confirm the hypotheses and indicate that with increasing the level of management profit forecasting error, the stability of cash and accrual components of earnings decreases, and the overvaluation of stocks increases.

3. Methodology

In terms of purpose, this research is in the category of descriptive research to explain the phenomenon in question in the shares of the petrochemical industry in the capital market. Regarding results, it is part of developmental research because first, the concepts related to the advantageous petrochemical equity evaluating stocks are identified based on related research and various theories. Then, based on matrix analysis, it prioritizes each identified criterion. Therefore, relying on the fact that there is no coherent framework in the field of equity valuating stock in the petrochemical industry, this study tries to create an integrated model through development functions. Finally, this research is inductive–deductive in terms of data collection logic. In the qualitative part, first, relying on the inductive approach of the theoretical foundations of the optimal valuation model of high-cost petrochemical stocks is analyzed. Then, based on induction, the statements identified in the target community, i.e., the stock exchange broker, are explained. In this work, which is mixed-method research, meta-synthesis is used in the qualitative part. Meta-synthesis includes steps to reach components and propositions; perhaps the most important way to do so is through process steps, which range from recognizing the root cause of the problem in the form of research questions to providing a specific model based on identifying propositional themes from previous research based on member participation, including the panel. Then, an attempt is made to confirm the propositions in terms of theoretical adequacy based on Delphi analysis to determine the theoretical adequacy according to the two criteria of mean and coefficient of agreement. Finally, in a quantitative part, through the analysis of a comprehensive interpretive and structured model, the identified layers are explained in the form of a prioritization model in terms of influence and effectiveness.

3.1. Statistical population and research sampling method

Based on the nature of the research, which is a mixed method, the target population in the qualitative section includes the relevant research on the subject and 12 accounting and financial management specialists at the university level who identify the content propositions of the research based on the process of meta-synthesis, critical evaluation, and Delphi analysis. A homogeneous qualitative sampling method was used in the form of panel group members to select these individuals. In this sampling method, the researcher tries to select research participants to gain in-depth knowledge and to select experts with the necessary experience and analytical knowledge concerning the research topic. The target audience in the small section is 16 petrochemical stock exchange brokers at the capital market level, which, based on the nature of the analysis based on the limited number of research participants, tries to explain the components and propositions identified in the qualitative sector at the capital market level through cross-matrix analysis. Because the purpose of quantitative analysis is to use cross-matrix questionnaires with the participation of 15 to 30 people, according to Singh and Kant (2011) research, Malone (2014), Ramesh et al. (2008), and Attri et al. (2013), the optimal sample size selection is confirmed in the range of 15 to 30 people.

3.2. Research findings

In this section, according to the nature of the research methodology, the analysis is presented in qualitative and quantitative to create a more coherent understanding of the research findings.

3.3. Qualitative section analyzes

This section uses two meta-combined and Delphi analyses. First, it is necessary to review the valid scientific databases to select similar research from 2018 to 2021 in domestic and foreign research. This will help to obtain newer research on the research phenomenon. Therefore, in the next step, screening, including title screening, content, and action analysis, should be done in the first three stages to achieve research related to the field of research. Figure 2 is used to perform the second step to create a more specific perception.

Figure 2: The screening analysis process of research appropriate to the purpose of the research to identify topics

It should be noted that the first 12 researches should be analyzed in the third step in terms of the critical appraisal process with the participation of research experts. This process includes 10 criteria, which are examined based on a minimum (1) and a maximum (5) score. The total score based on 10 criteria can be 50; if the research scores 30 or more, it enters the fourth step.

Based on a better understanding of the analysis process in this step, with the participation of research experts, 12 approved initial researches will be analyzed for points based on critical evaluation analysis.

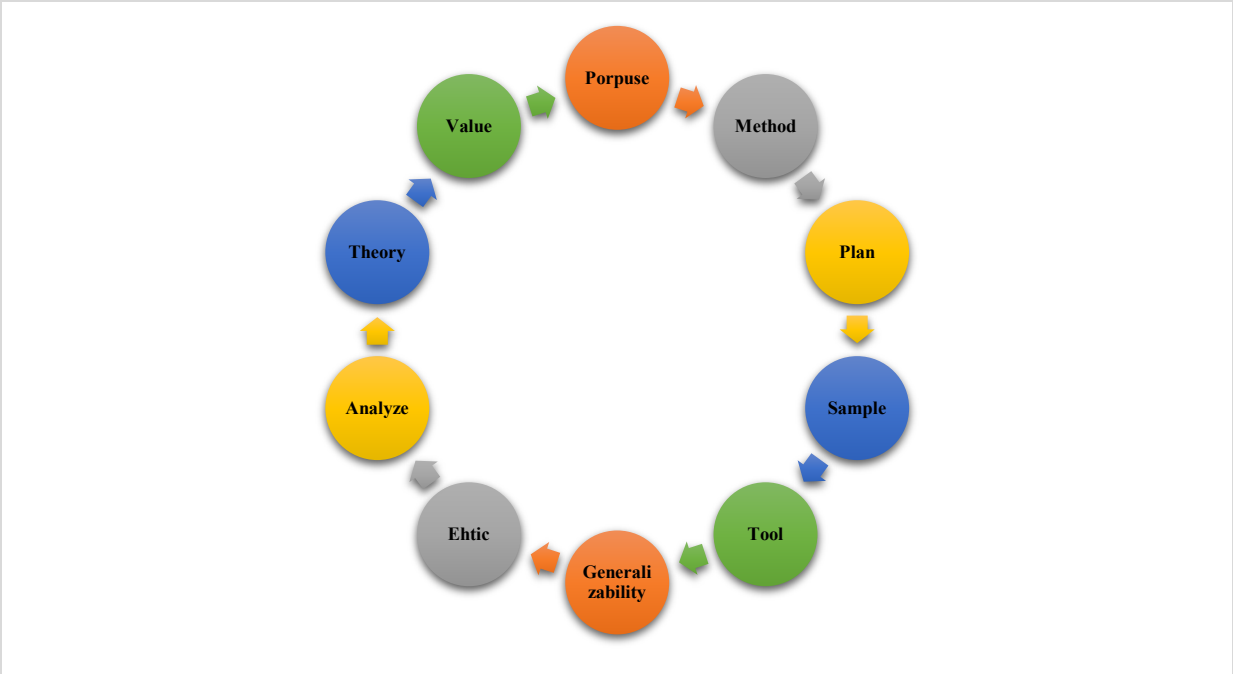

Figure 3: The criteria for the critical appraisal process

Table 1: Critical evaluation analysis

		International researches									Internal researches		
		1	2	3	4	5	6	7	8	9	10	11	12
	Approved research	Agbodjo et al (2021)	Sharma et al (2021)	Fatma and Hidayat (2020)	Boisjoly et al (2020)	Gao et al 92019)	Vasconcelos and Martins (2019)	Beisland (2019)	Badu and Appiah (2018)	Ma et al (2018)	Kebriaii and Dehghan (2020)	Ghanbari–Mamshi (2020)	Hekmat et al (2019)
Critical appraisal criteria	Purpose	3	3	4	2	3	2	3	2	2	3	3	4
	Method	3	3	3	1	4	2	3	1	3	4	5	3
	Plan	4	4	4	3	4	3	3	2	2	3	4	3
	Sampling	3	3	3	2	4	3	4	3	3	3	3	3
	Collecting	5	4	3	3	4	3	3	2	2	2	4	3
	Generalization	4	3	3	2	4	3	4	3	3	3	3	4
	Ethic	3	3	5	3	4	2	4	3	3	2	3	3
	Analyze	4	3	4	2	4	3	3	3	3	3	3	3
	Theoretical	5	3	3	2	4	3	4	2	3	2	4	3
	Value	4	4	4	3	4	3	4	2	3	3	4	3
	Total	38	33	36	23	36	27	34	23	27	28	36	32

After performing the critical appraisal process, 4 research works identified in rows 4, 6, 8, and 10 were excluded from the approved studies because they scored below 30. In order to determine the optimal themes for the equity evaluation stocks, the process of selecting the largest frequency distribution group is used by content analysis at the heart of approved research. Therefore, based on the approved research, all the criteria related to stock valuation are determined and given in column 2 of the table so that by placing a ☑ sign in front of each

research, it is finally determined which is the most frequent component of stock valuation. In other words, based on each researcher's use of the sub-criteria written in the table column, the symbol ☑ is inserted; then, the scores of each ☑ are added together in the sub-criteria column, and the scores above the mean of the researches performed as research components are selected.

Table 2: The process of determining the components of stock valuation

		E	D	C	B	A		
Approved international researches	Agbodjo et al. (2021)	-	-	-	-	☑	A	Stock valuation based on company assets
		-	-	-	-	-	B	Stock valuation based on market indicators
		-	-	☑	-	-	C	Stock valuation based on industry indicators
		-	-	-	-	-	D	Stock valuation based on company profitability
		☑	-	-	-	-	E	Stock valuation based on economic indicators
	Sharm et al. (2020)	-	-	-	☑	-	A	Stock valuation based on company assets
		-	-	-	-	-	B	Stock valuation based on market indicators
		-	-	-	-	-	C	Stock valuation based on industry indicators
			☑	-	-	-	D	Stock valuation based on company profitability
		-	-	-	-	-	E	Stock valuation based on economic indicators
	Fatma and Hidayat (2020)	-	-	-	-	☑	A	Stock valuation based on company assets
		-	-	-	-	-	B	Stock valuation based on market indicators
		-	-	-	-	-	C	Stock valuation based on industry indicators
		-	☑	-	-	-	D	Stock valuation based on company profitability
		☑	-	-	-	-	E	Stock valuation based on economic indicators
	Gao et al. (2019)	-	-	-	-	-	A	Stock valuation based on company assets
		-	-	-	☑	-	B	Stock valuation based on market indicators
		-	-	☑	-	-	C	Stock valuation based on industry indicators
		-	-	-	-	-	D	Stock valuation based on company profitability
		☑	-	-	-	-	E	Stock valuation based on economic indicators
	Beisland (2019)	-	-	-	-	☑	A	Stock valuation based on company assets
		-	-	-	-	-	B	Stock valuation based on market indicators
		-	-	-	-	-	C	Stock valuation based on industry indicators
		-	☑	-	-	-	D	Stock valuation based on company profitability
		-	-	-	-	-	E	Stock valuation based on economic indicators
	Ma et al. (2018)	-	-	-	-	☑	A	Stock valuation based on company assets
		-	-	-	-	-	B	Stock valuation based on market indicators
		-	-	☑	-	-	C	Stock valuation based on industry indicators
		-	☑	-	-	-	D	Stock valuation based on company profitability
		-	-	-	-	-	E	Stock valuation based on economic indicators
Approved internal researches	Ghanbari-Mamshi et al. (2020)	-	-	-	-	-	A	Stock valuation based on company assets
		-	-	-	☑		B	Stock valuation based on market indicators
		-	-	-	-	-	C	Stock valuation based on industry indicators
		-	☑	-	-	-	D	Stock valuation based on company profitability
		-	-	-	-	-	E	Stock valuation based on economic indicators
	Hekmat et al. (2019)	-	-	-	-	☑	A	Stock valuation based on company assets
		-	-	-	-	-	B	Stock valuation based on market indicators
		-	-	-	-	-	C	Stock valuation based on industry indicators
		-	☑	-	-	-	D	Stock valuation based on company profitability
		-	-	-	-	-	E	Stock valuation based on economic indicators
		3	**6**	3	3	**5**		
		Total						

The results of determining the analytical components of stock valuation showed that the two components of *stock valuation analysis based on company assets* and *stock valuation analysis based on company profitability* were selected as the analytical basis for cost-effective stock valuation of the petrochemical industry. In this section, after analyzing the basics of the approved components of the above research, the themes for each principal component are determined separately.

Table 3: The process of determining stock valuation themes

		Seven-point rating scale								
		1	2	3	4	5	6	7		
The main components of equity valuation stock	Valuation of equity stocks based on the functions of the company assets								Focus on the nominal stock value through the ratio of capital stock to the number of shares	Equity stock valuation propositions
									Focus on the stock book value through the ratio of total equity to the number of shares	
									Focus on the net asset value through the ratio of the difference between the present value of assets and total liabilities to the number of common stocks	
									Focus on the value of stock liquidation through the ratio of resources from the sale of assets to the number of ordinary shares	
									Focus on the replacement value through the ratio of resources needed to start a new company to the number of common stocks	
	Evaluate equity stocks based on the company profitability functions								Analysis of the fixed growth rate of the dividend paid through the ratio of expected value to dividend	
									Single-stage analysis of ordinary dividends through the ratio of dividend growth to the difference between the growth rate and the normal dividend discount rate	
									Two-stage analysis of the share of ordinary earnings through the ratio of excessive earnings to equity	
									Analysis of the earnings method through the ratio of earnings share to the difference between the growth rate and the normal dividend discount rate	
									Analysis of limited earnings through the ratio of dividend payout rates to stock-holding years	
									Normal stock market price analysis based on the current price	

In the next step, Delphi analysis based on two criteria of mean and coefficient of agreement is used to determine the consensus of experts for the appropriateness of research propositions with the main components. Therefore, according to Table 4, the results of Delphi analysis are presented to perform this section according to the scale of seven evaluation options.

After two rounds of Delphi analysis, the results showed that the three propositions were omitted because they had a coefficient of the agreement below 0.5 and a mean below 5. Therefore, eight statements based on two main components were approved to compare the matrix of optimal analytical themes for the valuation of cost-effective stocks on the shares of petrochemical companies in the capital market. In this section, as the last step of qualitative analysis, the theoretical model of the research is presented for the optimal analysis of the valuation of equity stocks on the shares of petrochemical companies in the capital market.

Table 4: The Delphi analysis process to determine the consensus of the experts

		The first round of Delphi		The second round of Delphi		Result		
		Mean	Coefficient of agreement	Mean	Coefficient of agreement			
The main components of equity stock valuation	Valuation of equity stocks	3	0.20	**Delete**			Focus on the nominal stock value through the ratio of capital stock to the number of shares	Equity stock valuation propositions
		4	0.35	**Delete**			Focus on the stock book value through the ratio of total equity to the number of shares	
		5.30	0.65	5.50	0.75	Confirm	Focus on the net asset value through the ratio of the difference between the present value of assets and total liabilities to the number of common stocks	
		5.20	0.60	5.30	0.65	Confirm	Focus on the value of stock liquidation through the ratio of resources from the sale of assets to the number of ordinary shares	
		5.50	0.75	6.10	0.82	Confirm	Focus on the replacement value through the ratio of resources needed to start a new company to the number of common stocks	
	Valuate cost-based stocks	5.20	0.65	5.50	0.75	Confirm	Analysis of the fixed growth rate of the dividend paid through the ratio of the expected value to the dividend	
		3	0.20	**Delete**			Single-stage analysis of the ordinary dividends through the ratio of dividend growth to the difference between the growth rate and the normal dividend discount rate	
		6	0.80	6.20	0/85	Confirm	Two-stage analysis of the share of ordinary earnings through the ratio of excessive earnings to equity	
		5	0.50	5.10	0.55	Confirm	Analysis of the earnings method through the ratio of earnings share to the difference between the growth rate and the normal dividend discount rate	
		5.30	0.65	5.50	0.75	Confirm	Analysis of limited earnings through the ratio of dividend payout rates to stock-holding years	
		5	0.50	5.10	0.55	Confirm	Normal stock market price analysis based on the current price	

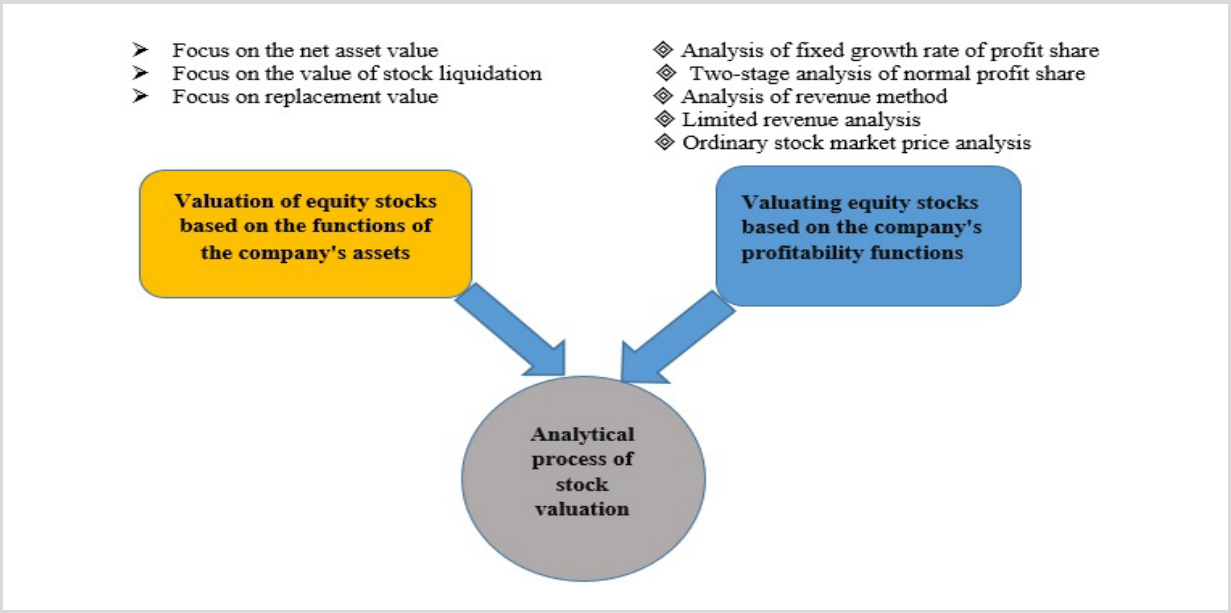

Figure 4: The theoretical model of research

As further explained in this section, the research seeks to evaluate the optimal analytical content of the evaluation of petrochemical stocks in the capital market through comprehensive structural interpretive analysis. First, the propositional contents of each of the main components must be randomly coded.

Table 5: Coding the analytical themes of cost-effective stock valuation of the petrochemical industry

Research proposition		
Focus on the replacement value through the ratio of resources needed to start a new company to the number of common stocks	K1	Abbreviation
Normal stock market price analysis based on the current price	K2	
Focus on the net asset value through the ratio of the difference between the present value of assets and total liabilities to the number of common stocks	K3	
Analysis of the earnings method through the ratio of earnings share to the difference between the growth rate and the normal dividend discount rate	K4	
Two-stage analysis of the share of ordinary earnings through the ratio of excessive earnings to equity	K5	
Analysis of the fixed growth rate of the dividend paid through the ratio of expected value to dividend	K6	
Analysis of limited earnings through the ratio of dividend payout rates to stock-holding years	K7	
Focus on the value of stock liquidation through the ratio of resources from the sale of assets to the number of ordinary shares	K8	

After assigning specific codes, a matrix should be formed with the participation of 16 stock exchange brokers in the petrochemical industry. This matrix performs a pairwise comparison based on rows and columns, and according to the "mode" index, the highest frequency distribution of rows and columns is placed at the intersection of two propositional themes. After comparing the pairs of rows and columns of the research propositions, the achievement matrix is formed. In other words, in this step, the symbols of the structural matrix related to the numbers zero and one can be formed according to the below table.

Table 6: Achievement matrix formation

Proposal contents in column *i*										
K8	K7	K6	K5	K4	K3	K2	K1			
0	0	0	0	0	0	0	**1**	K1	Proposition contents in column *j*	Focus on the replacement value
0	0	1	0	1	1	**1**	1	K2		Normal stock market price analysis based on the current price
1	0	0	0	0	**1**	1	1	K3		Focus on the net asset value
0	1	1	1	**1**	0	0	1	K4		Analysis of the revenue method
1	0	0	**1**	0	0	0	1	K5		Two-step analysis of the normal profit share
0	1	**1**	0	1	0	0	1	K6		Analysis of the fixed growth rate of dividends paid
0	**1**	1	1	1	0	0	1	K7		Limited revenue analysis
1	0	0	1	0	0	0	1	K8		Focus on the value of stock liquidation

In the following analysis to determine the indirect relationship between the contents of cost-effective stock valuation propositions in the petrochemical industry, a pairwise comparison of the first proposition is compared in pairs with all elements from $i + 1$ to n. For each relationship, the answer is *yes*, "Y" or *no* "N"; the reason is stated if the answer is *yes*. However, if the answer is "N", the participants must comment on the pair of variables.

Table 7: Pair comparison between propositional themes based on the matrix form

	Number	Couple comparison	Yes/No		
Focus on the replacement value K1	1	K1 – K2	Yes ☐ No ☒		Description of the indirect effect of row *i* on column *j*
	2	K2 – K1	Yes ☒ No ☐	Normal stock market price analysis based on the currently assessed price is the basis for alternative value in the valuation of equity stocks.	
	3	K1 – K3	Yes ☐ No ☒		
	4	K3 – K1	Yes ☒ No ☐	Focus on the net asset value basis for the equity value in evaluating petrochemical industry stocks	
	5	K1 – K4	Yes ☐ No ☒		
	6	K4 – K1	Yes ☒ No ☐	Analysis of the income methods basis for the equity value in evaluating the stocks of the petrochemical industry	
	7	K1 – K5	Yes ☐ No ☒		
	8	K5 – K1	Yes ☒ No ☐	Two-step analysis of the ordinary profit-sharing basis for the equity value in valuing petrochemical industry stocks	
	9	K1 – K6	Yes ☐ No ☒		
	10	K6 – K1	Yes ☒ No ☐	Fixed growth rate analysis of the profit-sharing basis for alternative value in valuing petrochemical industry stocks	
	11	K1 – K7	Yes ☐ No ☒		

	Number	Couple comparison	Yes/No		
	12	K7 – K1	Yes ☒ No ☐	Limited revenue analysis is the basis for alternative value in the valuation of equity petrochemical stocks	
	13	K1 – K8	Yes ☐ No ☒		
	14	K8 – K1	Yes ☒ No ☐	Focus on the stock liquidation value as a basis for the alternative value in valuing equity petrochemical stocks	
Normal stock market price analysis based on the current price of K2	15	K2 – K3	Yes ☒ No ☐	Ordinary stock market price analysis based on the current estimated price is a basis for focusing on the net asset value in valuing equity stocks.	
	16	K3 – K2	Yes ☒ No ☐	Focus on the net asset value basis for analyzing ordinary share market price based on the current price estimated in evaluating equity stocks	
	17	K2 – K4	Yes ☒ No ☐	Normal stock market price analysis based on the currently assessed price is the basis for analyzing the income-earning method in evaluating equity stocks.	
	18	K4 – K2	Yes ☐ No ☒		
	19	K2 – K5	Yes ☐ No ☒		
	20	K5 – K2	Yes ☐ No ☒		
	21	K2 – K6	Yes ☒ No ☐	Normal stock market price analysis based on the current estimated price is the basis for analyzing the fixed growth rate of dividends in stock valuation.	
	22	K6 – K2	Yes ☐ No ☒		
	23	K2 – K7	Yes ☐ No ☒		
	24	K7 – K2	Yes ☐ No ☒		
	25	K2 – K8	Yes ☐ No ☒		
	26	K8 – K2	Yes ☐ No ☒		

Next, the structural self-interaction matrix (SSIM) should be formed based on the pairwise comparisons of cost-effective stock valuation themes in the petrochemical industry according to the results of the above table. Therefore, for each connection in which the answer "Y" or "N" is given while stating the reason, the cell with the option "Yes" is filled with "1*" at the intersection of row *i* and column *j*. This matrix is obtained by converting its structural interaction matrix into a zero and one binary matrix.

As seen in Table 8, the concept symbols assigned according to the mode proposition have been converted to 0, 1, and 1* points according to the definition of the conceptual relationship to the numbers in the previous table. Table 9 specifies the penetration power (1 point obtained from the row) and the dependency power (1 point obtained from the column).

By determining the influence and dependency power, the output set forms a conical matrix, forming common input and elements to determine the most compelling

priorities of the propositional themes. Here, the goal is to know the most compelling propositions.

Table 8: The achievement matrix in terms of the degree of transferability of the relationship between propositional themes

			Proposal contents in column *i*							
			K1	K2	K3	K4	K5	K6	K7	K8
Focus on the replacement value	**Proposition contents in column *j***	K1	**1**	0	0	0	0	0	0	0
Normal stock market price analysis based on the current price		K2	1	**1**	1	1	1*	1	0	1*
Focus on the net asset value		K3	1*	1	**1**	1*	1*	1*	1*	1
Analysis of the revenue method		K4	1	0	0	**1**	1	1	1	0
Two-step analysis of the normal profit share		K5	1	0	0	0	**1**	0	0	1
Analysis of the fixed growth rate of dividends paid		K6	1	0	0	1	0	**1**	1	0
Limited revenue analysis		K7	1	0	0	1	1	1	**1**	0
Focus on the value of stock liquidation		K8	1	0	0	0	1	0	0	**1**

Table 9: The process of determining the influence and dependence of the propositional themes

			Influence power	**Dependency power**	
Themes of equity stock valuation propositions	Focus on the replacement value	**K1**	1	8	The sum of row *i* and column *j* are the contents of the proposition
	Normal stock market price analysis based on the current price	**K2**	8	2	
	Focus on the net asset value	**K3**	8	2	
	Analysis of the revenue method	**K4**	5	5	
	Two-step analysis of the normal profit share	**K5**	3	6	
	Analysis of the fixed growth rate of dividends paid	**K6**	4	5	
	Limited income analysis	**K7**	5	4	
	Focus on the value of stock liquidation	**K8**	3	4	

Table 10: Formation of a conical matrix of propositional themes

			Output statement	**Input statement**	**Common elements**		
Themes of equity stock valuation propositions	Focus on the replacement value	K1	1	1,2,3,4,5,6,7,8	1	I	**Leveling the effectiveness of propositional themes**
	Normal stock market price analysis based on the current estimated price *	K2	1,2,3,4,5,6,7,8	2,3	2,3	IV	
	Focus on the net asset value *	K3	1,2,3,4,5,6,7,8	2,3	2,3	IV	
	Analysis of the income method	K4	1,4,5,6,7	2,3,4,6,7	4,6,7	III	
	Two-step analysis of the normal profit share	K5	1,5,8	2,3,4,5,7,8	5,8	II	
	Analysis of the fixed growth rate of dividends paid	K6	1,4,5,6,7	2,3,4,6,7	4,6,7	III	
	Limited equity analysis	K7	1,4,5,6,7	2,3,4,6,7	4,6,7	III	
	Focus on the value of stock liquidation	K8	1,5,8	2,3,5,6,8	5,8	II	

The results of the similarity of outputs and common elements show that the most influential analytical themes of equity stock valuation in the petrochemical industry are the two statements of the normal stock market price analysis based on the current estimated price of "K2" and the focus on the net asset value of "K3".

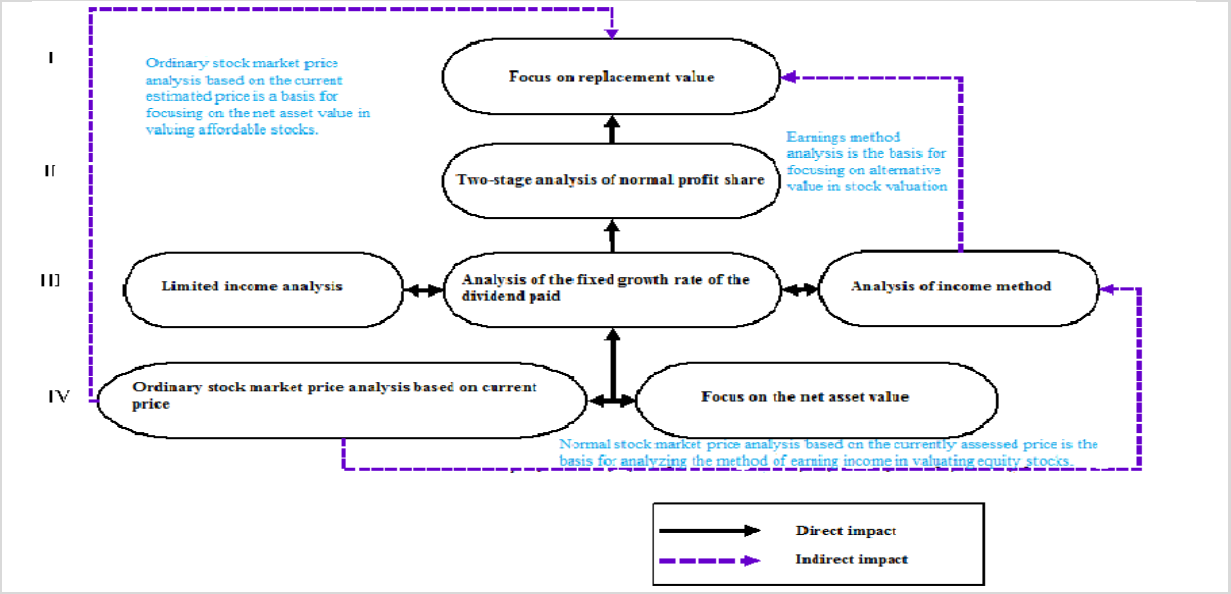

Figure 5: The optimal analytical model for evaluating equity petrochemical stocks based on prioritization

4. Conclusions

This study aimed to level the optimal analytical topics for evaluating the cost of petrochemical stock in the capital market. In fact, this study showed that valuing equity stocks as one of the mechanisms for investing in petrochemical stocks, while it could help investors to carry out a specialized investment process with less risk, could also increase the attractiveness of investing in corporate stocks. Petrochemicals help develop the capital market. The results showed that the analysis of the normal stock market price based on the current price evaluated as a statement of equity stock valuation based on the company's profitability functions and focusing on the net asset value as a stock valuation proposition based on corporate asset performance was the most important factor in stock valuation. It was considered profitable for petrochemical companies. In fact, a normal stock market price analysis based on an estimated price was an analysis that an investor or broker could buy when the common stock's current value was below the current market price ratio. In other words, if the current value of a stock is higher than the current market price, the stocks of petrochemical companies are undervalued, and investors can buy at a lower price than the normal market price, that is, the market is closer to the actual price to buy and thus gain higher returns. Usually, the right of pre-emption created by petrochemical companies for the company's current shareholders can have such conditions and cause the shareholders to benefit from the future cash yield of the purchased shares and experience less risk. Conversely, when the calculated price per share value of a petrochemical company is lower than the market price, the market price of the desired share of the company is overvalued, where investors can sell their shares at a price higher than the market and obtain higher returns. Therefore, assuming the correctness of the analyzed information, the continuously calculated current value of "P0" can be the criterion for the decision of investors and brokers, and the current market price of petrochemical companies, based on the impact of environmental factors, affects the actual price. Moreover, investors and brokers regulate their investment behavior by analyzing it. On the other hand, focusing on the net asset value through the ratio of the difference between the present value of assets and total liabilities to the number of common stocks is another basis that can analytically target investment behavior. Focusing on the net worth of assets through the ratio of the difference between the daily value of assets and total liabilities to the number of common stocks can help shareholders buy petrochemical company shares. In other words, if a broker determines by analyzing the petrochemical company's shares that the difference between the daily value of assets and total liabilities concerning the number of ordinary shares offered to the market is more than one, it can be seen that it is a good time to invest because the value of stocks is growing. It can achieve higher returns in the future due to the reduction of debts and increase of the company's assets. The value of shares based on net asset value also reflects the basis of the company's leverage capacity, indicating that the company seeks to develop plans and projects through debt that can yield higher returns due to the

increased market value of the stock purchased for them. In fact, the results show that petrochemical companies, as one of the most important industries in the capital market, will be able to focus on the difference between the real value and the stock market value on the one hand and the difference between the value of assets and corporate debt on the other hand. However, reducing financial constraints due to confidence in the capital market, providing the financial resources needed to advance its investment plans and projects even in an unstable economy, and continuing to increase its stock market value attract more investors to invest in corporate stocks. The results of Sharma et al. (2020), Fatma and Hidayat (2020), Beisland (2019), and Hekmat et al. (2019) suggested that petrochemical companies use strategies to develop interoperability, transparency, and shareholder dignity, such as preemptive rights, in order to create value for investing in their stocks and build their trust and confidence based on the positive valuation of the industrial stocks. They upgrade the capital market to provide the required cash and thus gain more success in the market. On the other hand, the financial managers of petrochemical companies, through their financial agility, should be able to maintain a level of financial flexibility based on maintaining the current values of assets against their incoming debts in order to maintain their competitive position in the face of economic sanctions and not to lose among other companies. Because companies in the petrochemical industry are more successful in these economic conditions, they have a better understanding of economic forecasts and, thus, are less likely to fall. Therefore, the timely disclosure of information based on debt and asset decision-making functions puts the company in a more competitive position.

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