

Assessing the Effect of Abnormal Stock Returns on the Content of the Autopoietic Restructuring Theory: Case Study of Petrochemical Industry Companies

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ABSTRACT

With the increasing competitiveness of the capital market, one of the topics that has attracted the attention of many financial researchers in recent years is the reasons for the formation of abnormal stock returns as a stimulus for restructuring companies due to the difference between real returns and Expected (normal) returns can motivate investment in the capital market. The purpose of this study is to evaluate the impact of the reasons for the formation of abnormal stock returns on the content of the autopoietic restructuring theory of companies operating in the petrochemical industry in the capital market. In this study, in order to identify the components (reasons for the formation of abnormal stock returns) and research propositions (content themes of corporate autopoietic restructuring theory), a combined analysis was used with the participation of 15 accounting experts at the university level. In the quantitative part, the components and propositions identified in the form of matrix questionnaires were evaluated by interpretive ranking process (IRP) by 20 financial managers of capital market petrochemical companies. The results showed that the most effective reason for the formation of abnormal stock returns is the institutional and regulatory causes of the stock market, which has the greatest impact on the dimension of autopoietic restructuring strategy of petrochemical companies. In other words, institutional and regulatory changes in the stock market by upstream institutions will be able to influence the restructuring process with the aim of matching the content with the structural process (the autopoietic approach).

1. Introduction

With the change in the approach of societies and the development of capital markets, accounting information systems today play a very important role in the information flow of companies in the development of stakeholder decisions, because many economic decisions are made based on information derived from these systems. Accounting information systems in the form of an accounting unit as a part and process, from the organizational structure of the company as a whole, play an effective role in developing the level of interaction between companies and stakeholders, including investors; shareholders; analysts and legislators have. In other words, developing interactions based on providing better and more desirable financial reporting, not only companies, but the market as a whole is affected by information transparency (Wachira et al, 2019). One of the effective theories in the field of dynamics of corporate structure in interaction with the market is the theory of autopoietic. This theory is considered as an extensible basis for aligning corporate structures with accounting systems, which can develop the level of dynamics of corporate financial performance and create values in line with the goals of the functions of autopsy theory so that stakeholders can have more effective decision-making capabilities. On the other hand, companies can be able to make the most of their liquidity-generating capacity to develop their designs and projects through better quality information disclosure. This theory includes mechanisms of convergence between corporate structures based on macro-strategic dimensions. Which makes the accounting unit as an effective system in the field of stakeholder communication by understanding the norms and social expectations, to create a more tangible level of inclusive values for stakeholders. The theory of autopoietic was first introduced in the science of biology and examined a set of different ideas about life and existence in a single phenomenon. Later, this theory was introduced to the theories of management and organizations by researchers such as Varela et al. (1974) and Maturana (2002) and tried to use more effective functions of structural and environmental cognition to create more dynamics of systems by modeling the definition of structural relationships with systems. (Paucar-Caceres et al, 2011). The most important principle in this theory was the existence of cyclical causality as the basis for the interaction of the corporate structure with internal systems, which received its philosophy of existence from changes in the external

environment with the aim of creating value or so-called "productive self". In other words, cyclical causality means the production or creation of values that help to create an independent identity. And enables environmental needs and requirements within the corporate structural system to contribute to greater dynamism for committed accountability to stakeholders (Minagres, 2008). One of the external changes that the autopoietic theory mentions as the axis of change in the organizational structure of companies is the abnormal return on stocks. In fact, anomalous stock returns as a model for predicting the expected returns of stocks of the capital asset pricing model are based on the assumption of full competition and equal access of traders to symmetric information, which can be very effective in shareholder investment decisions. Abnormal returns, although internal dimensions such as managerial performance may be involved, but according to research by Chen et al. (2021); Kolari et al. (2020); Chen et al. (2015) are more influenced by external stimuli in the market and the economy. Therefore, abnormal stock returns as a challenge to companies active in the field of competition, especially in a situation where the country's industries, especially the petrochemical industry is facing severe economic sanctions, can greatly reduce the competitive performance of companies due to inflexible structures. Because abnormal functional returns from market interactions and decisions of upstream institutions that try to control the economy through grammatical changes in the stock market to attract more investment in this area. For example, the instructions for regulating the market of petrochemical products in accordance with the General Policy Implementation Law of Article 44 of the Constitution and its subsequent amendments, which were communicated to companies active in this industry in the capital market in 2018 in the form of 11 articles, caused Stock prices in other industries such as steel, competitive functions of petrochemical companies upset the market balance. Critics of the law have argued that when the price of a product (with leverage) is traded 90 percent higher than the export rate in the domestic market, no doubt the profits will not go to the complementary industries and petrochemicals, because raw materials will reach companies in the field at a much higher price, and this can affect abnormal returns due to the lack of competitive infrastructure.

Based on the theory of autopoietic, structure can be defined as components of a company's content dimensions such as strategy; technology; culture and inner environment were considered, under the influence

of changes such as abnormal stock returns, it can lose its effective competitive functions (Eshaqzadeh et al, 2017). Indeed, the importance of extending the autopsy restructuring theory to the reasons for the formation of abnormal stock returns could include a better understanding of the external values for restructuring companies as an output in a competitive capital market environment. Because abnormal stock returns due to the difference between the actual return and the expected (normal) return can disrupt the company's financial planning in the future and the need to match the content and the structural process based on the autopoietic approach is able to make the company more resilient to these changes. Therefore, the purpose of this study is to evaluate the effect of the reasons for the formation of abnormal stock returns on the content of the autopsy restructuring theory of companies operating in the petrochemical industry in the capital market. Accordingly, in this research in the second part, while stating the theoretical foundations of the research based on the analysis of the subject under study in order to perform the analysis are presented first the research questions and then the experimental background of the research. In the third part, the research tries to provide a more coherent path of research content by stating the research method, participants, collection tools and validity of the research and in the fourth part, the analyzes are presented in two parts, qualitative and quantitative, so that finally, in the fifth part, the discussion and reasoning of the research results are presented and the necessary suggestions are presented.

2. Literature review

2.1. The theory of restructuring autopoiesis

Autopoiesis means the continuity of the functions of a system in creating integration and achieving a certain level of effectiveness, and it is called self-production (Iba, 2010). The metaphor of self-production in this sense is the maximization of the values of a system that can occur through coherence. It should be noted that structure does not determine the characteristics of the system as a whole, and since the organization is the aspect of realized relationships in the structure, it cannot exist independently of the structure that has realized it. Therefore, the accounting system and related procedures will not have the necessary effectiveness without a coherent structural system in the company. In other words, autopoiesis refers to the functional coherence of decision-making within a coherent whole, such as the company structure, which can be dynamic when the system interacts with the structure and goes back and forth with the environment. In fact, maintaining the effectiveness of the system is a condition for the existence of an integrated structure, and if a system changes without changing its structure, that system will collapse, and loses its functions (Brocklesby, 2011). To better understand the system and its structure and the differences between them, Whitaker (1995) provides a very interesting example. He uses a painting by an Italian painter in the 16th century to convey this concept.



Figure 1. the concept of structure and system schematically

If we look at the painting shown in Figure 1 as a whole, it shows the face of a human being, which is in fact the structure of a whole, but if we look at the painting a little more carefully, we will understand that the components of the face These humans are all fruits and vegetables that if any of the fruits are removed, the structure will be damaged. This example creates a general picture by placing a real connection between real components such as fruits and vegetables, which falls into a specific category. Thus, a structure is a way of relating between components that represent the identity of the system as a whole, while a structure refers to the actual components and the actual relationships between them that can change in terms of the type of components and the way they communicate (as long as identity is maintained). (Villalbos and Palacios, 2021). Therefore, in developing this theory in developing the functional functions of the company in a competitive market, strategy; Culture; Environment; Technology is the nature of content, a structure that, if put together properly, can bring a company's level of interaction closer to integration. In other words, the identity of the system (ie, competitive functions and the preservation of effective values in supporting stakeholder resources in this research) is created based on structural content mechanisms, and will be able to change identity if these dimensions are strategy; Culture; Consider technology and the environment (Kilic et al, 2020). Maturana and Warel (1987) realized and visualized the structure of living things (utopian organization) in different systems, and defined structure as the basis for system identification. With this explanation, they introduced the structure of living things as self-production, that is, a valuable system that can have a coherent identity based on integrity (Razeto-barry, 2012). In fact, the utopian structure helps a system such as an accounting unit to form a more coherent level of stakeholder interaction based on information values. Self-production in utopian companies will bring about effective features that balance the link between operations with outcomes and change the system, ie financial reporting without alignment with the structure, will not be effective (Rezaei et al, 2019).

3. Abnormal stock returns

Stock prices in financial markets are significant and important for decision makers and can convey useful information to decision makers. On the other hand, the market value of a company is actually a reflection of the aggregation of information of a wide range of investors, which is the result of the influence and interaction of

various factors in the market. Therefore, managers can obtain new information from the financial markets and include this information in the company's policies, including profit sharing (Arabsalehi et al, 2020). But prices alone cannot have a meaningful burden for decisions, and information about stock returns based on shareholder expectations is another important issue. Which contains very important information in investors' financial decisions. Stock return is one of the achievements of financial markets that has more informative content compared to performance criteria based on accounting (Ghasemi and Nikbakht, 2015). Because performance appraisal based on market value better reflects investor information. Abnormal stock returns are calculated by subtracting the firm's stock returns from the benchmark returns (returns of the Fama and French portfolios) and represent unexpected changes in the value of the firm that carry an information burden and influence decision-making (Tai, 2020). In fact, unexpected changes in the value of the company reflect the news about cash flows and interest rates. News of more cash flows than expected or an unexpected drop in interest rates will lead to a positive market reaction and increased returns, and managers in such favorable conditions will be able to increase dividends (Rienganum, 2018). Thus, abnormal stock returns are associated with changes in dividends as part of intra-organizational performance processes. But not all changes in abnormal returns necessarily depend on internal organizational and managerial decisions. Some of these changes may be related to outsourcing functions, changes that are shaped by the economic or political environment, and may pave the way for more cash returns for investors in the short term and possibly future fluctuations in return on investment. In fact, the abnormality of returns as one of the factors affecting the return of securities reflects the state of the investment environment in the capital market and the economies of countries and the ability to attract capital in different markets with various trading strategies can affect. Because the occurrence of abnormal returns on stocks is a stimulus to investment behavior in the market, which, depending on whether it is positive or negative, will make investors want to invest more or sell stocks in bulk (Ebadi and Hasanpour, 2011). Therefore, recognizing the causes of the formation of abnormal stock returns, both at the macro level (capital market level) and at the micro level (investor trading behavior) can be a reason for companies and capital market analysts to formulate strategies to create more dynamism in the capital market. Therefore, according to the theoretical foundations, the research questions are presented in the following order:



1. What are the components of the causes of the formation of abnormal stock returns as a basis in the interpretive analysis of matrix homogeneity?

2. What is the content of the theory of corporate autopoietic restructuring as a reference in interpretive analysis?

3. What is the most effective reason for the formation of abnormal stock returns on the content of the autopsy restructuring theory of companies operating in the petrochemical industry in the capital market?

4. Research background

Kumar et al. (2021) conducted a study entitled "Combining AHP and TOPSIS Analysis to Prioritize Corporate Restructuring Functions." In this study, based on a theoretical analysis of similar studies, eight features of firm restructuring with the aim of agility in production were identified to be applied based on the comparison of the results of AHP and TOPSIS methods and the results of prioritization of identified components. In this study, AHP was used to guide the priority weight of features and TOPSIS was used to prioritize features for the successful implementation of agile production. The results showed, "Information technology"; "Issues related to human resource management"; "Customer issues"; "Leadership support" and "organizational issues" are ranked as five important features that can pave the way. For top management, focus on key areas and allocate significant resources to ensure the successful implementation of agile production. Plastun et al. (2021) conducted a study entitled "The Evolution of Price Effects after Abnormal One-Day Returns in the US Stock Market." The study was conducted between 1890 and 2018, examining leaked data from US stock market companies. The results, periodically reviewed through multiple regression and torque models, showed that between 1940 and 1980, after a day of abnormally positive returns on the US stock market, there was a strong acceleration effect that could be exploited for profitability. Ramsheh and Jannati (2020) conducted a study entitled Deviation from Optimal Leverage and Abnormal Stock Returns. For this purpose, the data of 96 companies listed on the Tehran Stock Exchange during the years 2009 to 2017 and the approach of controlling the effects of years and industries were used. The results show that the information market considers the deviation of the lever from the optimal lever in the stock price and the factors of leverage status relative to the optimal lever (higher and lower than optimal) and incorrect stock valuation (overvaluation and undervaluation) moderate

price influence. This means that the market increases the distance between the lever and the optimal leverage in companies that have lower than optimal leverage, and their stocks are overvalued, react positively, and deviate from the optimal leverage in these companies leads to an increase in abnormal stock returns. In order not to affect the results of how to measure the optimal lever, four measures were used for it, among which the results obtained using the moving average lever measure are more compatible with the research literature. Yamrali (2020) conducted a study entitled Predicting Abnormal Stock Returns with Neural Networks Approach (Evidence from Tehran Stock Exchange). In this study, to predict abnormal stock returns, two approaches of artificial neural network and fuzzy neural network were used to evaluate the accuracy of predicting abnormal returns by these tools. Input variables for predicting abnormal returns included earnings forecast error, financial leverage, investment rate of return, accounting profit transparency, accounting conservatism, corporate brand value, and over-management confidence. For this purpose, 452 companies-years were examined by screening method for a period of five years (2011-2016) in companies active in the Tehran Stock Exchange. The results showed that the predictive power of artificial neural network is higher than fuzzy neural network for predicting abnormal stock returns with a lower error rate. With evaluating the researches, it is clear that a study has not been done with the nature and approach of this research and this research can develop innovative analytical processes due to the combination of qualitative and quantitative, fill in the gaps of theories related to the structural functions of companies in the field of finance and accounting with practical realities from a competitive and decision-making perspective.

5. Methodology

In terms of outcome categorization, this study is part of developmental research, because the theoretical inconsistency in concepts and theories related to this field, has led to this study to identify the most effective dimension of abnormal stock returns based on the content structure of the petrochemical industry. Based on the given explanations, the interpretive ranking process can be expressed in the form of the following processes:

A) An efficient interpretive ranking process for multi-criteria valuation

The method of the efficient IRP to perform multi-criteria valuation the reasons for the formation of

abnormal stock returns should be considered, including the following important steps:

(1) Identify the components of the abnormal stock return components and the contents of the autopoietic content restructuring propositions or reference variables based on the definition of a contextual relationship between the components and the propositions.

(2) Relating components to propositions in the form of a cross-interaction matrix (binary matrix). In fact, matrix ideas are interpreted based on the participation of experts and become an interpretive matrix.

(3) The identification of a centralized implicit relation is measured by comparing each of the propositions based on 0 and 1. If proposition A affects

proposition B, the cell in question is 1, and if it is the other way around, it is 0, and if they are reciprocal, the cell is numbered 1 and is symmetric. If they are unrelated, both houses will be assigned zero. In other words, if two options for a criterion have "0" values, then it should be considered as an implicit non-dominant relation and entered as "0" in the dominant interaction matrix for that criterion.

(4) Also, if the relation between two propositions be straightforward and the related proposition is directly related to one of the propositions and takes the number 1, the other proposition is also polarly related to the corresponding proposition. For example, if Proposition A has a direct effect on Proposition B, then Proposition B has a direct effect on Proposition C, Proposition A on Proposition C is a polar effect, or so-called transferable.

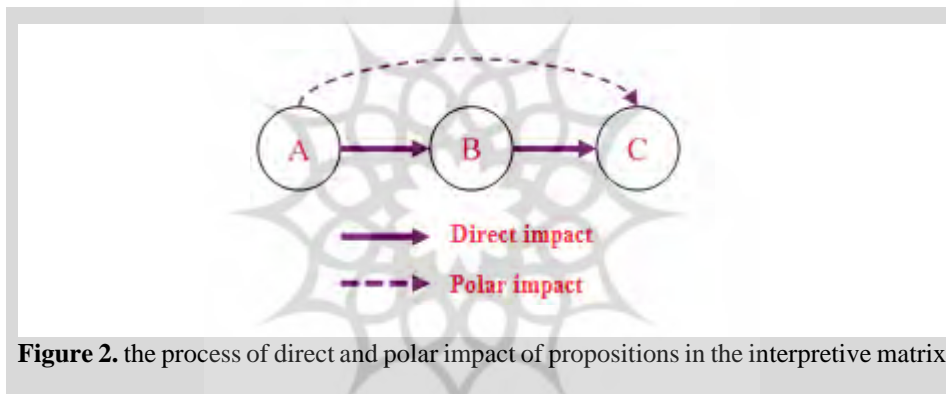


Figure 2. the process of direct and polar impact of propositions in the interpretive matrix

The sum of all dominant interactive matrices is represented by the symbol $[D_i]$ and the reciprocal matrix is represented by the symbol $[D]$. Equation (1) is used for the simple interpretive rating process and Equation (2) is used for the weighted interpretive rating process with weight W_i for the first criterion:

$$D = \sum_i D_i \quad (1)$$

$$D = \sum_i w_i D_i \quad (2)$$

The derivatives of weights using total interpretive structural method (TISM) modeling are described in the next section. Comprehensive structural interpretive modeling can be used to generate a hierarchy of metaphysical content restructuring themes criteria to obtain component weights, ie the causes of abnormal

stock returns according to the Social (2017) approach. These steps can be viewed in the form of the following interpretive processes:

Step 1) in this step, they should be identified based on qualitative analysis methods such as over-composition of components (causes of abnormal returns) and propositions (themes of restructuring the autopoietic content) (in the first part, the research findings were identified).

Step 2) in this step, checklists are compiled and prepared as a pairwise comparison to determine the self-interaction matrix and distributed among members of the research community. Parallel and columnar comparisons are made between individual variables to determine if the row index "i" is the cause of the column index "j" or vice versa, either there is a connection or there is no



connection. It also shows the degree of symmetry of the relationship between the indicators.

Step 3) in this step, self-interactive matrices are created and interpreted. In fact, the pairwise comparison of elements takes place by forming the structural self-interaction matrix "SSIM". An interpretation that identifies only the path of communication in the ISM analysis, while in the TISM comprehensive interpretation method, it fully interprets any pairwise comparison by answering the interpretive question mentioned in the previous level. For pairwise comparisons, the i -th index is compared in pairs with all elements from $(i + 1)$ to n th. For each relationship, the answer is yes "Y" or "N" and if the answer is yes, the reason is stated. In this case, the interpretive logic of couple relationships is presented in the form of the scientific basis of interpretive logic. The table below shows the pairwise comparison form between the research indicators.

Step 4) in this step, the achievement matrix is determined as +1 or 0 in the matrix table based on pairwise comparisons made by the target community. These relationships are defined as follows:

□ If i leads to j and there is + ve symmetry, we set the number +1 in cell ij and 0 in cell ji

*If j leads to i and there is + ve symmetry, we put the number +1 in cell ji and 0 in cell ij

*If i is equal to j and there is a symmetry of + ve, we put the number +1 in both cells ij and ji

*If there is no connection between i and j , we put the number 0 in both cells ij and ji

Step 5) in this step, the hierarchy of the achievement matrix is done. Determining the relationships between variables must first identify the output set, input set, and common elements. The scoring level and priority of the variables are determined by the achievement set and the prerequisite set for each variable.

Step 6) in this step, a hierarchical diagram is prepared according to the symmetry of the relationships between components and propositions. Hierarchical level propositions are first sorted and then linked directly to the components based on the accessibility matrix with symmetry.

Step 7) an interpretive matrix is prepared with symmetry that the interpretation of nodes and links related to the indicators are developed in the form of a comprehensive interpretive structural model.

6. Statistical population of the research

In the qualitative part, this study, through the basis of homogeneous sampling, selected 15 specialists and experts in the field of accounting at the university level to participate in determining the components and propositions based on the theoretical approach to the research topic. Also based on meta-analysis, in this part of the research conducted in sites such as University Jihad in Iran; Iran Database of Publications; Iran Islamic Computer Science Research Center; International Science direct; Emerald insight reference and OnlineLierary reference were used to determine components (abnormal stock returns) and research indicators (content propositions of corporate autopsy structure). In the second phase, in order to conduct the interpretive prioritization analysis, 20 financial managers of petrochemical companies in the capital market were asked to it should be done by participants based on a specific criterion such as experience or specialized knowledge, which is limited in terms of sample size and in accordance with research such as Soshil (2017); Chithambaranathan et al. (2015).

7. Findings

In order to make a connection between the components of abnormal stock returns and the content propositions of the autopoietic structure of petrochemical companies, meta-synthesis analysis is used to enter the first phase of interpretive analysis by compiling the identified components and propositions in the form of research matrix checklists.

8. Meta-synthesis findings

The method of meta-analysis through theoretical and research screening seeks to identify components and propositions related to the research topic. The time period for analyzing similar researches was 2017 to 2021. In other words, in order to find similar articles and researches and using international and domestic research databases and references, researches related to the research goal were identified.

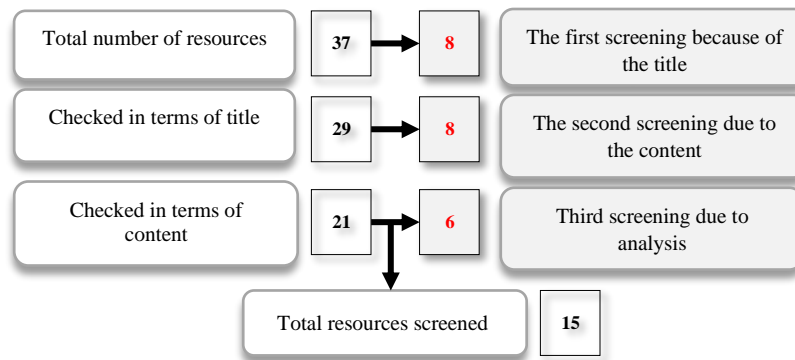


Figure 3. Screening of initial research

As shown in Figure (3), all the primary sources identified are 37. After several stages of the screening process in terms of content, title and analysis, finally, 15 content-appropriate research, title and analytical processes are selected. It was found that 8 studies are related to determining the components of abnormal stock returns and 7 studies are related to determining the content propositions of the utopian structure of companies. At this stage, concepts should be broken down into components and propositions to determine the most important dimension of abnormal stock returns based on the content themes of the autopsy structure of petrochemical companies in the form of rating checklists. In fact, through the criterion of critical evaluation based on 10 criteria of research objectives, logic of research method, research design, sampling,

data collection, reflectivity, accuracy of analysis, theoretical and transparent expression of findings and research value in section A) to determine the components of abnormal stock returns and in Section B) Determine the content propositions of the autopsy structure of companies.

A) Identify the components of abnormal stock returns (A)

In this section, according to the explanations given, the components of abnormal stock returns with the symbol (A) are identified. Table (1) evaluates how to evaluate the components based on a 50-point index in the form of scores from 1 to 5 based on the 10 criteria described.

Table 1: The critical analysis process of screened research.

		Asem & Alam (2021)	Lyle & Yohn (2021)	Erickson et al. (2020)	Roszkowska & Langer (2020)	Amir et al. (2018)	Docherty et al. (2017)	Arabsalehi et al. (2020)	Rameshe & Jannati (2020)	Bakhshinejad (2018)	Kanami Amiri et al (2017)
	Confirm <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
	Delete <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Critical evaluation	Research purpose	4	2	4	3	2	4	3	3	3	1
	The logic of the research method	3	3	3	3	1	5	4	4	4	2
	Research plan	4	2	4	4	2	4	3	3	3	2
	Sampling	4	3	4	3	3	5	4	2	4	3
	Collecting data	3	3	5	4	3	5	3	3	4	1



Generalized Findings	4	2	4	4	2	4	3	2	4	3
Ethical	5	2	5	5	2	3	3	2	3	2
How statistical analysis	4	4	5	4	3	3	3	2	4	2
Theoretical capability	5	3	4	3	3	4	3	2	3	3
Research value	4	3	4	4	2	4	3	3	3	2
Total	40	27	42	37	23	41	32	26	35	21

The scores presented based on the fashion index showed that four studies were excluded due to the fact that they received less than 30 out of a total of 50 points and according to the guidelines of sufficient scores of this analysis, the research scores that scored 30 and above were eliminated. The reason was removed from the investigation. Next, the components of the causes of the formation of abnormal stock returns are extracted. Accordingly, the following scoring method is used to determine the mentioned components. Based on this

method, all sub-criteria extracted from the text of approved articles are written in the table column and then the names of the approved research researchers are listed in the row of each table. 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 average of the researches are selected as research components.

Table 2: The process of determining the main components of research.

		Researchers	Causes of economic policy	Causes of parallel stock market changes	Reasons for corporate leadership	Institutional and regulatory causes	Stock Market Management Causes	Commercial causes of the stock market
Research status	International	Asem & Alam (2021)	-	☑	-	☑	-	-
		Erickson et al (2020)	-	-	☑	☑	-	☑
		Roszkowska & Langer (2019)	-	☑	☑	-	-	☑
	Internal	Docherty et al (2017)	☑	☑	-	☑	-	-
		Arabsalehi et al 92020)	-	-	-	☑	☑	☑
		Bakhshinejad (2019)	-	☑	-	☑	-	-
	Total		2	4	2	5	2	3

Based on this analysis, it was found that the three components have the highest frequency and therefore in this study are examined as criteria for the formation of abnormal stock returns. In this section, after analyzing

the theoretical foundations of the approved researches, each of the identified components has been defined according to Table (3).

Table 3: Components of abnormal stock returns.

Components	Symbol	Definition
Causes of parallel stock market changes	A1	Changes and developments in other parallel financial markets (bank; foreign exchange market; housing market, etc.) change the stock return in the capital market according to the degree of market substitution. Extensive studies have been conducted on the effect of financial markets on each other that changes in rules and regulations are ordered by upstream institutions such as exchange rate changes; Inflation control; Changes in bank interest rates are all seen as changes in parallel markets, which affects stock returns in the capital market. These

		changes in parallel markets indirectly affect investors' expected returns on investors' future cash flows by affecting risk and return on capital markets and increase the incentive to invest more in companies in this market (Asem and Alam, 2021).
Institutional and regulatory causes of Stock market	A2	According to the report of the Emerging Markets Committee of the International Organization of Securities Commissions (2007), institutional and regulatory factors play an effective role in creating abnormal stock returns. In fact, by increasing the amount of free float stocks; Enabling foreign participation in the market; Reduce transaction costs; Improving the market trading infrastructure and increasing the supply of securities promotes abnormal stock returns due to the difference between the actual return and the expected (normal) return (Roszkowska and Langer, 2019).
Commercial causes of the stock market	A3	Effective business causes, such as the state of cycles of the economy (the state of recession and prosperity); Financial cycles; Financial and banking crises; The structures of the country's financing system, etc., externally play a decisive role in the formation of abnormal returns and cause excessive returns for stocks. Given that the environmental situation of the economy, such as the business cycle, has a direct effect on the situation of most companies, therefore, increasing the expected return of investors can affect the attractiveness of investing in the stock market compared to other markets (Bakhshinejad, 2017).

B) Identify the content propositions of the autopoietic structure of companies (B)

As in the above steps and following the critical evaluation method in this section, the content

propositions of the utopian structure of companies are identified by the symbol (B). Table (4) evaluates how to evaluate the contents of a proposition based on an index of 50 points in the form of scores from 1 to 5 based on the 10 criteria described.

Table 4: the process of critical analysis of screened research

		Critical evaluation criteria										Total
		Research purpose	The logic of the research method	Research plan	Sampling	Collecting data	Reflexivity	Ethical considerations	Accuracy of analysis	Theoretical and transparent basis of the <small>findings</small>	Research value	
Researches	Villalbos & Palacios (2021)	4	5	4	4	4	3	4	4	4	4	40
	Jackson (2020)	2	3	2	3	2	2	2	2	2	3	23
	Bakken et al. (2020)	3	3	3	3	3	4	3	3	3	5	33
	Koo & Chae (2019)	4	3	4	4	4	4	4	4	4	4	39
	Cardenas (2018)	2	2	2	1	2	3	2	3	3	2	22
	Koskinen (2017)	4	5	5	3	4	3	3	3	4	4	38
	Abdolbaqi Ataabadi and Mirlouhi (2019)	5	3	4	3	4	3	4	3	4	4	37
	Sahrakaran and Rezaei (2017)	3	1	2	1	2	3	2	3	2	2	21
	Ishaqzadeh et al. (2017)	4	4	3	4	4	4	3	3	4	4	37



The scores presented based on the fashion index showed that out of a total of 9 studies related to identifying the content propositions of the autopsy structure of companies, 3 studies, considering that out of a total of 50 points, received less than 30, according to the guidelines for the adequacy of the score of this analysis, the studies that have a score of 30 or higher are approved, were eliminated, and therefore were excluded from the review. Next, the research propositions are

extracted. Accordingly, the following scoring method is used to determine the content propositions of corporate autopoietic restructuring. The results confirm the approval of 7 content propositions of corporate autopoietic restructuring based on high frequency distribution. In this section, after analyzing the theoretical foundations of approved research, each of the identified propositions is defined according to Table (5).

Table 5: Content propositions of the autopoietic structure of companies.

Propositions	Symbol	Definition
Peripheral dimension of the structure of utopia	B1	Environmental change is considered as one of the structural pillars of companies, which is in line with the concept of autopsy theory, expressing the difference between cohesive companies and competitive advantage over other competitors based on structural flexibility. In other words, if a company structurally has the necessary capabilities to respond quickly to changes outside the boundaries of a company, it has a more specific direction and ability to improve its financial performance (Villalbos and Palacios, 2021).
The cultural dimension of the structure of utopia	B2	Culture is always an important and significant criterion in shaping the structure of a company in terms of content dimensions. The structural culture dimension based on autopoietic theory refers to companies' norms and performance beliefs towards stakeholders, which, while fitting the content with strategies, can increase the company's effectiveness in terms of financial transparency and shareholder rights (Bakken et al, 2019).
The size dimension of the autopoiesis structure	B3	The size dimension in the structure of capital market companies is another content criterion that, according to the autopoietic theory, measures the firm's performance processes in terms of flexibility in performance functions such as attracting liquidity; Includes reduction of financial constraints, etc. And in terms of hierarchical form, there is a noticeable difference between the structures of large companies compared to the structures of smaller companies, so that it also affects the functional area of information transparency in the company's accounting unit (Eshaqzadeh et al, 2017).
The technology dimension of the autopoietic structure	B4	The technology dimension is another dimension of content that refers to the fit between the technological nature of the company in terms of management information systems and effective decisions to information symmetry. In other words, the more structured a company is in terms of information systems, the more transparent the information disclosure functions are based on the corporate governance, and this can help to develop the functional functions of companies (Tannober et al, 2020).
The strategy dimension of the autopsy structure	B5	Strategy dimension As the last content dimension in accordance with the theory of utopia, refers to the degree of coordination of the main strategies of the company with the sub-strategies of the company in order to maintain the stability of the company structure in competition with other companies in the capital market. In other words, the strategy of autopicis structure is a process to achieve the goals of the company, for example, the financial goals of the company that the organizational structure of a company needs special attention to succeed in a competitive environment (Eshaqzadeh et al, 2017).

9. Interpretive ranking process (IRP)

As described, in the qualitative part of the study, the components of the causes of the formation of abnormal stock returns (A) and the content propositions of the restructuring of corporate autopsy (B) were identified. In this section, in order to affect the line "i" on the column "j" or vice versa or vice versa, the processes related to this analysis are performed. Therefore, in order to create interactive matrices, the level of direct, symmetrical or indirect communication must first be considered in line with the explanations. Therefore, first the matrix

questionnaire is determined in the following order: as described, in the qualitative part of the study, the components of the causes of the formation of abnormal stock returns (A) and the content propositions of the restructuring of corporate autopsy (B) were identified. In this section, in order to affect the line "i" on the column "j" or vice versa or vice versa, the processes related to this analysis are performed. Therefore, in order to create interactive matrices, the level of direct, symmetrical or indirect communication must first be considered in line with the explanations. Therefore, first the matrix questionnaire is determined in the following order:

Table 6: Cross-matrix of abnormal stock returns under the content themes of the autopsy restructuring of petrochemical companies.

		Research propositions					
		A /B	Peripheral dimension of the structure of utopia	The cultural dimension of the structure of utopia	The size dimension of the autopoietic structure	The technology dimension of the autopic structure	The strategy dimension of the autopsy structure
			B1	B2	B3	B4	B5
Components	Causes of changes in parallel stock markets	A1	1	0	0	1	1
	Institutional and regulatory causes of the stock market	A2	0	1	1	1	1
	Commercial causes of the stock market	A4	1	0	1	0	1
		Restructuring of the autopsy of petrochemical companies					
							Abnormal returns

In order to create an interpretation of the contrast between the components of abnormal stock returns under

the content themes of the autopoietic restructuring of petrochemical companies, it is presented in the table below.



Table 7: interpretive analysis of the abnormal matrix of abnormal stock returns under the content themes of the autopoietic restructuring of petrochemical companies.

		B1	B2	B3	B4	B5
Abnormal stock returns	A1	Causes of changes in parallel stock markets in creating abnormal returns A reason to renew the environmental dimension of the autopoietic structure			Causes of Changes in Parallel Stock Markets in Creating Abnormal Returns	Causes of changes in parallel stock markets changing abnormal returns a reason to reshape the strategy of the autopoietic structure
	A2		Institutional and regulatory causes of the stock market in creating abnormal returns A reason to renew the cultural dimension of the autopsy structure	Institutional and regulatory reasons for the stock market in creating abnormal returns A reason to resize the autopoietic structure	Institutional and regulatory reasons for the stock market in creating abnormal returns A reason to renew the technology dimension of the autopsy structure	Institutional and regulatory reasons for the stock market in creating abnormal returns A reason to renew the strategy dimension of the autopoietic structure
	A3	The commercial causes of the stock market in creating abnormal returns are a reason to renew the environmental dimension of the autopsy structure.		The commercial causes of the stock market in creating abnormal returns are a reason to renew the cultural dimension of the autopoietic structure.		Commercial Stock Market Causes in Abnormal Returns A Reason to Renew the Strategy Dimension of the Utopia Structure

According to the obtained results, in this section, the level of effectiveness of each of the content propositions of the autopsy restructuring of petrochemical companies

is evaluated. This evaluation is a scoring method based on the development of a pairwise comparison score form, the result of which is used in the following sections of the matrix prioritization analysis.

Table 8: Comparison of content propositions of autopoietic restructuring of petrochemical companies.

Number	Couple comparison	Yes/No	Description of how the impact
<input type="checkbox"/> B1 Couple comparison at the level of the environmental dimension of autopoietic restructuring			
1	B1 – B2	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	The environmental dimension of autopoietic restructuring is the basis for changing the cultural dimension of autopsy restructuring.
2	B2 – B1	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
3	B1 – B3	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	The environmental dimension of autopoietic restructuring is the basis for changing the size of autopsy restructuring.
4	B3 – B1	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
5	B1 – B4	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	The environmental dimension of autopoietic restructuring is the basis for changing the dimension of autopsy technology restructuring.

6	B4 – B1	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
7	B1 – B5	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	The environmental dimension of autopoietic restructuring is the basis for changing the dimension of autopoietic restructuring strategy.
8	B5 – B1	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

This table was presented as part of the impact of relationships, showing, for example, a pairwise comparison of the content level of autopoietic restructuring of petrochemical companies B, two propositions of the environmental dimension of autopoietic restructuring B1, and the cultural dimension of autopoietic restructuring i2 with impact i2. They are related, which means that the environmental dimension of autopoietic restructuring is the basis for changing the cultural dimension of autopoietic restructuring. In order to form the structural self-interaction matrix "SSIM", the pairwise comparisons of the research propositions are presented in Table (9). For pairwise comparisons, the i-

th index was compared in pairs with all elements from (i + 1) n to n. For each relationship, the answer is yes "Y" or "N" and if the answer is yes, the reason is stated. In this case, the interpretive logic of pair relationships is presented in the form of the scientific basis of interpretive logic. In this step, the relations are entered in the form of an achievement matrix as "1" or "0", which are presented in Table (9). According to Table (8), the cells that have the option "Yes" are numbered 1 and the cells that have the option "No" are numbered 0. In fact, this matrix is obtained by converting its structural interaction matrix into a zero and one binary matrix.

Table 9: Access matrix.

	Content propositions of corporate autopsy restructuring	B	Research propositions				
			B1	B2	B3	B4	B5
Research propositions	Environmental dimension of the structure of autopoietic	B1	1	1	1	1	1
	The cultural dimension of the structure of autopoietic	B2	0	1	1	1	1
	The size dimension of the autopoietic structure	B3	0	0	1	1	1
	The technology dimension of the autopoietic structure	B4	0	0	1	1	1
	The strategy dimension of the autopoietic structure	B5	0	1	1	0	1

Then, in this stage, points are formed based on the interaction of the compared indicators to form the interaction achievement matrix. For a matrix $A_{(n \times n)}$ the matrix P (nonsingular) can be found to give $P^{-1}AP = D$

a diagonal matrix. In general, the coefficient of two matrices $n \times n$ can be defined as follows:

$$AB = A[X_1, X_2, \dots, X_n] = [AX_1, AX_2, \dots, AX_n]$$



Where X_1, X_2, \dots, X_n are the columns B. So if $E_1, E_2,$ and E_3 represent the columns E and the diameter matrix is D,

$$D = \begin{bmatrix} d_{11}^* & d_{12} & d_{13} \\ d_{21} & d_{21}^* & d_{23} \\ d_{31} & d_{32} & d_{31}^* \end{bmatrix}$$

The result of $AP = PD$ is $[AE_1, AE_2, AE_3] = [d_{11}, d_{22}, d_{33}E_3]$

Accordingly, according to the matrix of research components that have independent special vectors E_1 to E_7 , respectively, the level of diametricity is determined by the relation of imaginary eigenvalues, ie $\neq 1$. For this purpose, since $\lambda_1 = a + \beta$, the special vector V_1 will also be imaginary. The solution of such a system of equations is as follows:

$$X_1 = V_1 e^{\lambda_1 t}, X_2 = \bar{V}_1 e^{\bar{\lambda}_1 t}$$

Table 10: Achievement matrix in terms of the degree of transferability of the relationship between propositions.

		B	Research propositions				
			Environmental dimension	The cultural dimension	The size dimension	The technology dimension	The strategy dimension
			B1	B2	B3	B4	B5
Research propositions	Environmental dimension of the structure of autopoietic	B1	1	1	1	1	1
	The cultural dimension of the structure of autopoietic	B2	0	1	1	1	1
	The size dimension of the autopoietic structure	B3	0	1*	1	1	1
	The technology dimension of the autopoietic structure	B4	1*	0	1	1	1
	The strategy dimension of the autopoietic structure	B5	1*	1	1	1*	1
Impact determination process		Direct impact	Transitional impact				

In order to determine the level of direct and transferable impact of research propositions, in the next step, the percentage percentages of the total level of

impacts are determined, which are presented in Table (11).

Table 11: Percentage of Impact Levels of Content Statements of Autopsy Restructuring of Petrochemical Companies.

Content propositions of corporate autopsy restructuring	Direct impact	Transferable impact	Interpretive influence	Total impact	Percentage of interpretive impact

Research Proposition	Environmental dimension of the structure of autopoietic	B1	5	0	2	7	22.85
	The cultural dimension of the structure of autopoietic	B2	4	0	1	5	16.12
	The size dimension of the autopoietic structure	B3	3	1	2	5	16.12
	The technology dimension of the autopoietic structure	B4	3	1	2	6	19.39
	The strategy dimension of the autopoietic structure	B5	3	2	3	8	25.83
Total			18	4	10	31	
Percentage			58.06	12.90	29.04		

The results showed that 58.06% of the correlations between the content propositions of the autopoietic restructuring of petrochemical companies are direct and only 12.90% have a transfer effect. From the total impact based on the pairwise scale between the research propositions, it was found that the percentage of the proposition influencing the dimension of the autopsy restructuring strategy (B5) is higher than the other propositions. This means that most of the restructuring process with the aim of matching the content with the

structural process (autopoietic approach) is related to the strategy dimension that can make the functions of the company's competitive structure dynamic in the petrochemical industry. Therefore, considering the effective role of this dimension of content propositions of autopsy restructuring of petrochemical companies, according to Tables (10) and (11) in the form of tables (12) to determine the level of effectiveness of the proposition of dimension of autopsy restructuring strategy against open (B5) It becomes abnormal stock.

Table 12: examines the interpretive impact of abnormal stock returns.

		Research components		
Causes of abnormal stock returns		Causes of changes in parallel stock markets	Institutional and regulatory causes of the stock market	Commercial causes of the stock market
		A1	A2	A3
Research components	Causes of changes in parallel stock markets	A1	1	1
	Institutional and regulatory causes of the stock market	A2	1*	1*
	Commercial causes of the stock market	A4	1	1*

As can be seen, the highest level of transferability in this proposition is related to the transitional influence of the institutional and regulatory causes of the stock market "A2" relative to the other two components. In fact, this result shows that the existence of the utopia (B5) restructuring strategy (B5) dimension statement,

while being influenced by other components, is the most common reason for restructuring petrochemical companies based on institutional and regulatory reasons for the stock market. Based on the results obtained, the table below shows the disciplines related to the implementation of interpretive ranking processes (IRP).

Table 13: prioritizes the level of dependence and influence of abnormal stock returns.

		Research components					
Causes of abnormal stock returns		A1	A2	A3	Dependency level D	Difference D – B	Rank
Research components	Causes of changes in parallel stock markets	A1	-	1	2	-2	3
	Institutional and regulatory causes of the stock market	A2	3	-	2	5	2
	Commercial causes of the stock market	A3	1	2	-	3	0



	Infiltration level B	4	3	3	10	
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This table shows that the most effective reason for the formation of abnormal stock returns is the institutional and regulatory causes of the stock market, which have the greatest impact on the dimension of the autopoietic restructuring strategy of petrochemical companies. In other words, institutional and regulatory changes in the stock market by upstream institutions will be able to influence the restructuring process with the aim of matching the content with the structural process (the autopoietic approach). On the other hand, the level of

dependence, as the sum of the most effective factors in the formation of abnormal stock returns, which indicates the influence of other components, is also related to the statement of institutional and regulatory causes of the stock market. After determining the most effective components of research in this section by referring to Tables (9); (10) and (11) to determine the set of output indicators; Common input and elements are used to formulate the "TISM" hierarchical model, ie the structural layer model.

Table 14: a set of output, input and common elements of propositions

		Abbreviation	Output statement	Input statement	Common elements			
Research Proposals	Peripheral dimension of the structure of autopoietic	B1	1,2,3,4,5	1	1	II	Second level	Leveling priorities
	The cultural dimension of the structure of autopoietic	B2	2,3,4,5	1,2,5	2,3,5	III	Third level	
	The size dimension of the autopoietic structure	B3	3,4,5	1,2,3,4,5	3,4,5	I	First level	
	The technology dimension of the autopoietic structure	B4	3,4,5	1,2,3,4	3,4,5	I	First level	
	The strategy dimension of the autopoietic structure	B5	2,3,5	1,2,4,5	2,5	IV	Forth level	

As it turned out, the autopoietic restructuring strategy dimension proposition (B5) has the most influential proposition among other petrochemical corporate restructuring content propositions. It was also found that the least effective propositions are the two dimensions of the "B3" autocomplete restructuring dimension and the "B4" autopilot restructuring technology dimension in

petrochemical companies. Which shows that they do not play a significant role in changing the content of the autopsy restructuring of petrochemical companies, which is why a conical matrix is presented in order to better understand the most effective proposition in Figure (4).

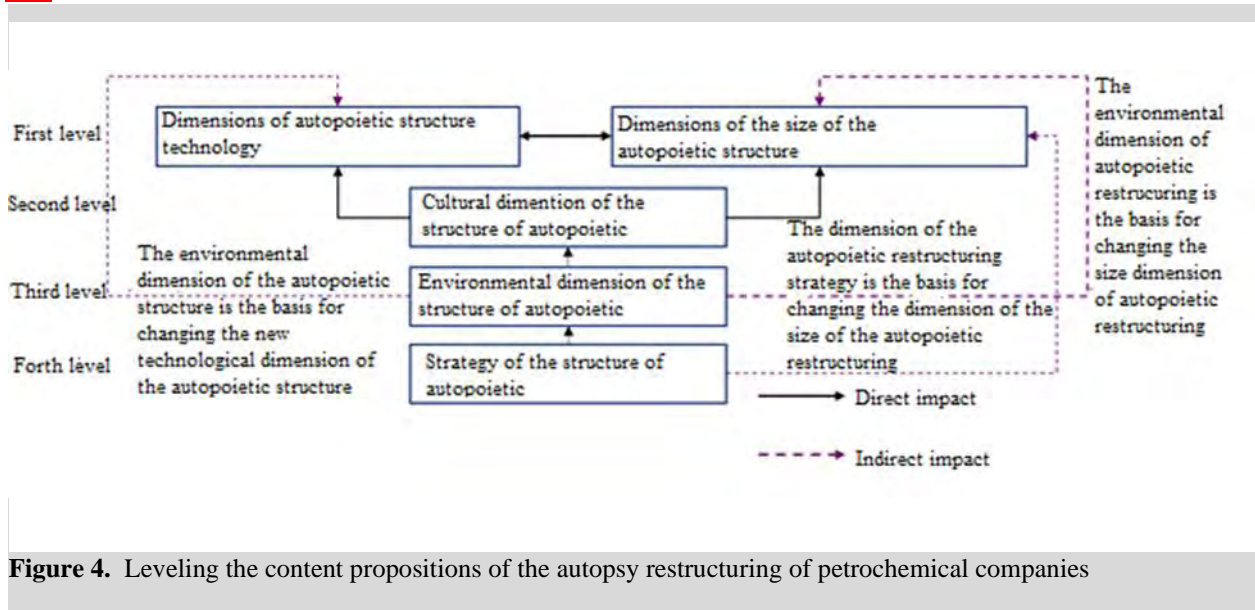


Figure 4. Leveling the content propositions of the autopsy restructuring of petrochemical companies

As can be seen, the utopian restructuring strategy (B5) dimension proposition has the most influential proposition among the other utopian restructuring content propositions of petrochemical companies. Finally, with the identification of the most influential content propositions of the autopsy restructuring of petrochemical companies, a weighting of each of the

research components, ie the causes of the formation of abnormal stock returns, is attempted. In other words, this section seeks to determine the most important causes of the formation of abnormal stock returns by determining the level of effectiveness of the content propositions of the autopoietic restructuring of petrochemical companies.

Table 15: Selecting the most important reason for the formation of abnormal stock returns based on the content of corporate autopsy restructuring.

	Causes of abnormal stock returns	A	A1	A2	A3	Dependency level D	Difference D – B	Rank
Components	Causes of changes in parallel stock markets	A1	-	0.52	1.13	1.65	-0.93	3
	Institutional and regulatory causes of the stock market	A2	1.54	-	2.22	3.76	0.5	1
	Commercial causes of the stock market	A3	1.04	2.74	-	3.78	0.43	2
	Infiltration level B		2.58	3.26	3.35			

By comparing the process of simple interpretive ranking in Table (13) and interpretive ranking in the above table, the most important factor in the formation

of abnormal stock returns is determined. These results can be seen in the following table.

Table 16: Comparative ratings for the simple and weighted interpretive prioritization process.

	Causes of abnormal stock returns	A			
Components	Causes of changes in parallel stock markets	A1	Third rank	Third rank	Simple interpretive ranking
	Institutional and regulatory causes of the stock market *	A2	First rank *	First rank	
	Commercial causes of the stock market	A3	Second rank	Second rank	



In fact, in the analysis of interpretive ranking process (IRP) weights, it should be stated that the high weight of each component indicates the greater level of importance of that component in the target population. Based on this result, it should be noted that the most influential factor in the formation of abnormal stock returns is the institutional and regulatory causes of the stock market in creating abnormal returns, which is the basis for renewing the strategy dimension of the autopsy structure.

10. Conclusion

The purpose of this study was to evaluate the effect of the reasons for the formation of abnormal stock returns on the content of the autopoietic restructuring theory of companies operating in the petrochemical industry in the capital market. Based on the results, the most probable content proposition of the autopoietic restructuring of companies in the petrochemical industry is the dimension of the utopian restructuring strategy proposition (B5), which is more influenced by the restructuring component than the rest of the propositions. The goal is to match the content and the structural process (autopoietic approach) to the strategic dimension, which can make the functions of the company's competitive structure dynamic in the petrochemical industry. In other words, companies operating in the petrochemical industry need to focus on the strategic dimension of their restructuring strategy in order to gain more competitive advantage due to abnormal stock return fluctuations, according to the autopoietic theory, which refers to the proportionality of content restructuring criteria in a competitive market. Based on this dimension in the autopsy theory to restructure petrochemical companies in a competitive market, based on improving the level of coordination between the main strategies and their sub-strategies, companies should try to develop effective capacities in attracting cash resources through abnormal returns while gaining the stability of the company structure in order to compete with other companies in the capital market. In other words, the dimension of autopoietic restructuring strategy is a process for achieving the company's financial goals, which strengthen the organizational structure of companies operating in the petrochemical industry to succeed in a competitive environment. On the other hand, in line with the third question of the research, the results showed that the most influential factor in the formation of abnormal stock returns is the institutional

and regulatory causes of the stock market in creating abnormal returns, which is the basis for renewing the strategy dimension of autopoietic structure. In other words, this result indicates that institutional and regulatory reasons of the stock market due to decisions aimed at increasing investment attractiveness in the Tehran Stock Exchange, such as the liberalization of floating stocks; enabling external market participation by attracting foreign investment; reduce transaction costs; improving the market trading infrastructure and increasing the supply of securities, while creating a difference between the actual return and the expected (normal) return of investors, is accompanied by an increase in abnormal returns, which is effective in restructuring the content of petrochemical companies in terms of proportionality. Content is considered to be in line with the design processes of the organization, in line with the theory of autopoietic. In other words, institutional and regulatory reasons are considered as a strategic dimension to change the content of autopoietic restructuring in petrochemical companies. In this situation, due to the similarity between the main strategies with the sub-strategies and other content dimensions of structural design, companies will have more competitive capabilities in attracting their liquidity to use abnormal stock returns. Under these circumstances, companies operating in this field see the creation of abnormal stock returns as an opportunity to effectively develop their investment plans and projects and are able to gain a competitive advantage to gain more trust of shareholders and capital and investors and their incentives to achieve the incentive to invest in the shares of petrochemical companies. The result obtained with Asem and Alam researches (2021); Roszkowska and Langer (2019); Docherty et al. (2017) and Arabsalehi et al. (2020) are correspond. Based on the obtained results, it is suggested that focusing on the restructuring process in line with the autopsy theory, while it can help increase the liquidity level of the company's stock based on increasing the volume of companies' stock transactions, can also help identify the market to balance supply with company stock demand, and lead to more dynamism in stock exchanges due to increased incentives to invest in stocks of petrochemical companies. In other words, the amount of money generated by balancing the price increases the level of stock liquidity and trades it as a reliable cash asset. It is also suggested that the stock exchange organization and other regulatory bodies

provide information such as liquidity rating and percentage of trading days and the level of the company's capital structure to shareholders and investors in better understanding the market and industry and upgrading the specialized level to select the appropriate investment portfolio to help investigating to make the level of decisions based on the functional realities of the industry and companies active in petrochemicals and to prevent the existence of bubbles in abnormal returns in the capital market to reduce the risk of investments and the resulting returns to be more balanced and rational surrounded by effective factors.

In expressing the limitations of research, we can also refer to the level of generalizability of qualitative research. In other words, since research with such an analytical process can have behavioral or executive discrepancies and complexities, it can be argued that there may be other aspects of the expansion of corporate restructuring values and abnormal stock returns. It has not been examined, but an attempt has been made to make such an analysis based on the link between such an analysis in the qualitative and quantitative sections, given the theoretical concepts and approaches that are not presented mainly in the form of a coherent model of competitive values.

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