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Research Article

The Most Effective Functioning of Competitive Supply Chain Pricing Based on Social Responsibility Dimensions: A Case Study of Oil Products of Knowledge-Based Companies

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In today's competitive environment, taking the advantage of supply chain which is both effective and efficient is a competitive advantage. An adequate supply chain has a multifaceted structure that focuses on integrating all factors, including pricing. The final product is delivered to customers based on maintaining market values and increasing strategic interactions. Present study aims to present the most effective functioning of competitive supply chain pricing in accordance with aspects of social responsibility. In doing so, we conducted a case study on oil-related products of Iranian knowledge-based companies. A combined analysis with 15 university-level industrial management experts was employed in this study to establish the components (competitive supply chain pricing function) and research propositions (dimensions of social responsibility). Twenty managers of knowledge-based enterprises in the oil field evaluated the components and propositions identified in the form of matrix questions using interpretative rating (IRP). The results showed that the proposition of the ethical dimension is the most effective measure of the social responsibility of knowledge-based companies in the oil field, creating competitive supply chain pricing functions based on value. This result shows that, under the ethical dimension of social responsibility, processes of competitive supply chain pricing are formed in accordance with the customer values and, according to the strategic relationship between the company and the economy with regional and global partners, maintaining values are a critical factor in developing our interactions between pricing factors. Given the results, in the first step for success, knowledge-based companies are recommended to consider the priorities of professional ethics in addition to knowledge in order to be able to gain the trust of customers by understanding their functional nature in the country's developing economy. In this situation, the pricing process based on the creation of comprehensive values for customers can help to increase the company's competitive position and make these companies to be at the first level of strategic interactions with companies that use petroleum products.

1. Introduction

One of the biggest problems faced by organizations, especially knowledge-based businesses, is that as political, social, cultural, and economic change intensifies, competitive functions based on that change will become more complicated because the status of expectations and social approaches will change [1]. The significant point is that an institution or organization will be able to have the capacity to participate and support stakeholders if it implements

competitive processes with social responsibility considerations in mind in order to sustain the majority of interests. On the other hand, in today's competitive world, other traditional methods of management in supply chain processes that sought less integration in their procedures do not have the required efficiency because this area has seen significant change as a result of environmental change, social development, technological progress, and growing cultural contradictions [2]. Making the right decision and selecting the appropriate option among many available ones in a variety of areas, such as choosing the best manufacturer, distributor, location to draw in customers, business partners for forming integrations, pricing strategy, and similar matters, is crucial for decision-making to produce integrated values in supply chain management. These choices range from trivial difficulties to serious and important topics.

In many cases, if the decision is incorrect, it would impose high costs on companies operating in a competitive environment [3]. Hence, organizations can no longer achieve a competitive advantage and increase their market share as a separate product or service unit. They require a well-planned and principled partnership with their suppliers and customers. As a result, organizations should partner with each other in integrated supply chains rather than isolated islands [4]. One of the dimensions of integration is value integrity in supply chain pricing functions, which is based on how well the manufacturer collaborates strategically with supply chain partners to provide high-quality products, set prices that are tailored to the needs of the market and its customers, and jointly manage internal and external organizational processes [5]. Since integration of supply chain value is a promising yet complicated tool that is still considered as a weapon to reach maturity in a competitive environment to enhance the development dimensions of businesses [6], the need to pay attention to it can help companies as a competitive advantage, even in proper pricing, to create a level of stability for flexibility in the face of an ever-changing environment. Therefore, during the past years, many researchers have tried to develop a level of value integration to achieve more competitive advantages based on the creation of various paradigms such as stability and agility based on the flexibility of the supply chain. The significant point is that the supply chain must be flexible in multiple dimensions such as pricing; its operation has always been a subject to various uncertainties, such as customer demand and supplier capacity under turbulent economic conditions [7]. In other words, with increasing structural complexity at the level of markets and production processes, meeting customer needs should be achieved in the shortest possible time by improving the degree of supply chain flexibility, since this indicates the system's capacities and ability to react rapidly and effectively to both internal and external changes. Considering the importance of this research, it is essential to note that competitive supply chain pricing generally reduces the process cycle time and reimplementation. At the same time, it can help increase competitive effectiveness and improve value chain integrity in the supply chain. To the best of our knowledge, no study has been so far conducted on the most effective functioning of competitive supply chain pricing based on social responsibility dimensions regarding oil products of knowledge-based companies. Therefore, this research aims to investigate the most effective functioning of competitive supply chain pricing in accordance with the dimensions of social responsibility regarding the oil-related products of Iranian knowledge-based companies.

2. Theoretical Foundations

2.1. Social Responsibility. Social responsibility as one of the organizational philosophies is one of the challenging functional issues in the social environment, which, despite its many complexities, has many hidden and overt dimensions. Numerous terms, such as strategic philanthropy, corporate citizenship, social responsibility, and others, are used to characterize corporate responsibility [8]. According to the words, it can be said that each of them has a specific view on the role of the organization in society. The dominant paradigm that underlies corporate social responsibility focuses on creating shared value [9]. In 1971, the Committee For Economic Development defined corporate social responsibility as the interaction between society, profession, philosophy of existence, and the social nature of an organization. The presence of responsibility and accountability for the interests of the majority of stakeholders expands the cornerstone of this concept in societies. These interests should add to the sum of social, human, cultural values, etc., and cause motivation in individuals [10].

On the other hand, Van De Velde et al. [11], in a precise definition, consider social responsibility to include all policies that combine functions and value business with the interests of all stakeholders, including customers, employees, and citizens that may contribute essentially in the sustainable development of societies. In another definition, corporate social responsibility means the organization's obligation to consider stakeholders' interests, which goes beyond the legal requirements. Its purpose is to minimize any harm caused by the organization's activities and maximize long-term beneficial effects on society. Social responsibility has many consequences for organizations. Recognizing these effects can motivate organizations to perform their social responsibilities. Increasing the organization's legitimacy, observing the interests of society, and promoting self-control are among these effects [12].

2.2. Sustainable Supply Chain Management. Over the past 20 years, a great deal of research has been conducted on the idea of sustainable supply chain management. The 1960s saw a lot of development work, mostly on the economic side of sustainable development [13]. In the years after the 1960s, the noneconomic factors of development activities were also considered, and in the 1980s, the concept of sustainable development was introduced. With the overall development of this concept, various dimensions of the supply chain sustainability literature, whether in social, economic, cultural, or environmental dimensions, were discussed, which often included common goals. In a classification, Elkington

[14] divided the sustainability literature into three basic aspects: social, economic, and environmental. The significant point is that before 2000, no coherent, integrated, and independent definition of sustainable supply chain management was provided explicitly. But from 2001 onwards, the descriptions included various dimensions of sustainability more purposefully and with wider dimensions. According to one definition, business sustainability can be included into supply chain management. The primary elements of supply chain management are connected to the corporate sustainability traits [15].

Besides, According to Srivastava [16], who defines sustainable supply chain management from an environmental point of view, it encompasses product design, material sourcing and selection, production procedures, delivery of the finished product to customers, as well as the management of products after their useful lives. On the other hand, Shen [17], given the significant effect that supply chain network design has on companies' flexibility, profitability, and competitive competencies, asserts that network design is one of the most important strategic choices in supply chain management and that network design can influence supply chain sustainability and long-term profitability. As mentioned today, the process of sustainable chain management definitions revolves around a three-dimensional cycle (3BL), including social, economic, and environmental. Other exciting aspects of the proposed reports include external stakeholder pressures and the idea that sustainable supply chain management goes beyond the traditional business concept but is also related to economic performance [18]. By focusing on collaboration between supply chain partners, sustainable supply chain management is viewed from an operational perspective as a subset of internal and external activities. The methodical coordination of crucial interorganizational processes is what defines strategic integrity, transparency, and the accomplishment of an organization's social, environmental, and economic goals while enhancing the long-term financial performance of businesses and their supply chains [19].

2.3. Supply Chain Flexibility. Today, flexibility has become a common term among managers, researchers, and supply chain consultants. But what are the meaning and concept of flexibility? Flexibility points to "the ability of a system to survive, adapt, and grow in the face of change and uncertainty" [20]. In another definition, flexibility is "the ability of the supply chain to return to the original state (before being disturbed) or move to a new state that is more desirable than before" [21]. Regarding supply chain flexibility, we can only refer to conceptual studies, including reviewing the literature and definitions or principled guidelines based only on compelling examples [22]. According to Lummus and Vokurka [23], the ability of the supply chain to quickly respond to consumer demand and the degree to which production capacity may be adjusted in reaction to shifting market conditions are both examples of supply chain flexibility. Supply chain flexibility is presented by Vickery et al. [24] in Figure 1.

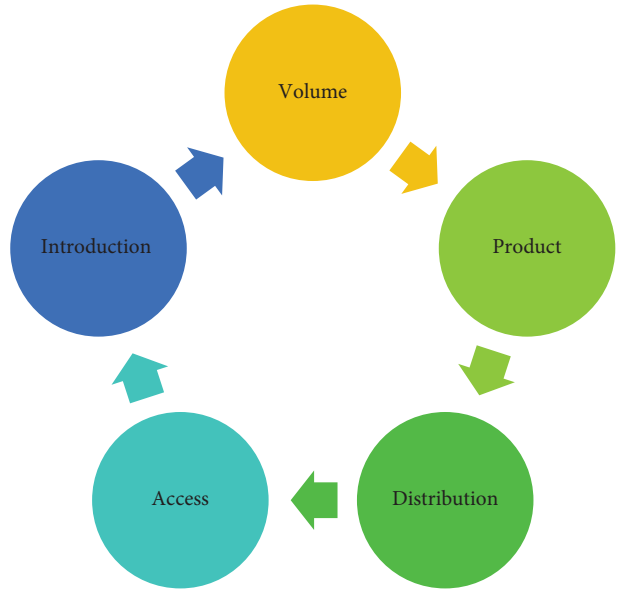

Figure 1: Five-dimensional model of supply chain flexibility (source: author).

Vickery et al. [24] believed that from the above five dimensions, there is an interrelationship between the first two components, namely, volume flexibility and product flexibility, leading to supply chain flexibility in manufacturing systems, access, and distribution flexibility follow market process approaches. New product flexibility is also related to R&D teams to develop supply chain flexibility functions [7]. Process flexibility and distribution flexibility were two of the most important components of supply chain flexibility according to Sawhney [25]. Three aspects of supply chain flexibility were also mentioned by Swafford et al. [26]: sourcing flexibility, production flexibility, and distribution flexibility.

2.4. Integrating Supply Chain Pricing Values. The degree to which the manufacturer collaborates with supply chain partners and as a group manages procedures inside and outside the firm to generate competitive advantages is known as supply chain pricing integration [27]. Stevens [28] first considered value integration to include the following three dimensions (Figure 2).

As it can be seen, according to Stevens [28], functional integration, internal integration, and external integration are known as the three levels of integration, which includes integration with suppliers and customers. Then, researchers identified and introduced other dimensions of integration. For example, Lee and Hang [29] also considered supply chain value integration to include as the following model (Figure 3).

The researchers described the three elements of supply chain value integration, information integration, coordination and resource sharing, and organizational connection linkage with partners, but placed particular emphasis on relationship integration in light of the dynamic environment. Consequently, three integrated supply chains

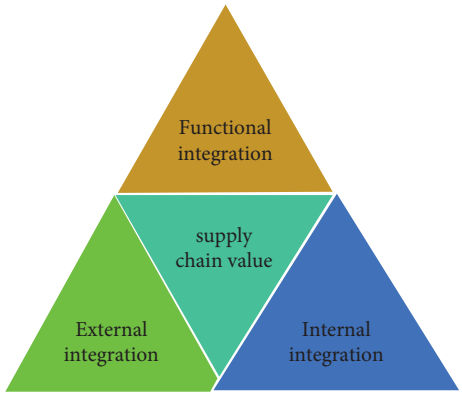

Figure 2: A 3D approach to supply chain value integration (source: author).

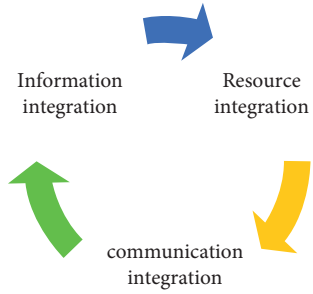

Figure 3: Supply chain value integration, according to Lee and Hang [29].

were introduced: one with internal integration, one with suppliers, and one with customers [30, 31]. According to various studies, in this study, internal and exterior integration are the two dimensions that make up integration [32], while customer integration and supplier integration are the two sizes that make up external integration. Internal integration is a process of cross-functional contact, collaboration, coordination, communication, and cooperation that combines functional domains into a unified organization, according to Wong et al. [30]. He thinks that internal integrity has a big effect on cost and quality. According to Baofeng [33], a company has high levels of internal integration when all departments have access to accurate and timely information from other departments, the information systems utilized by those departments are linked, and there are practical tools for connecting all the jobs. The process of interacting and working together with suppliers to ensure a sufficient flow of supplies is known as supplier integration. Supplier integration increases capacity and improves performance indicators such as delivery, quality, and cost. The cooperation and strategic coordination of a central organization with its clients is referred to as supplier integration. According to Ataseven and Nair [4], this aspect of integration contributes to a deeper comprehension of customer and market expectations and opportunities and facilitates a quicker and more precise supply-demand reaction to customer demands and objectives. The following research inquiries are based on the theoretical underpinnings provided:

(1) What are the functional elements of supply chain pricing competition that serve as the foundation for interpretive analysis?

(2) What are the social responsibility tenets that interpretive analysis refers to?

(3) In knowledge-based oil firms, what pricing method for the supply chain is the most competitive and effective in terms of social responsibility?

2.5. Literature Review. Here, we will review and evaluate some domestic and foreign studies conducted in the field of the subject raised in the current research.

Taghavifard et al. [34] in their study entitled "The role of corporate social responsibility in the adoption of green supply chain management with regard to the mediating role of big data analysis" stated that the findings of the joint analysis of social responsibility and green supply chain management can help businesses adopt and execute green supply chain management, and they can also help businesses enhance performance by adhering to green supply chain management. In order to attain effective performance, their study looked into how effective elements affected the moderating role of big data analysis in the relationship between social responsibility and green supply chain management. Their research has an applied goal and use correlational data collection techniques to gather descriptive information. 426 supply chain, green supply chain, social responsibility, and big data analysis managers from small and medium-sized businesses in the provinces of Golestan, Mazandaran, and Tehran make up the statistical population. The questionnaire was randomly distributed to 252 managers of these organizations, with the minimum necessary sample size calculated to be 201 individuals based on Morgan's table. 213 returned completed questionnaires were subjected to confirmatory factor analysis (CFA). To address the research hypotheses, structural equation modeling and partial least squares methods have been applied. Wang et al. questionnaires for social responsibility variables, Raut et al. questionnaires for big data analysis variables, and questionnaires for firm performance were used to electronically collect study data. According to the research, corporate social responsibility increases businesses' awareness of and willingness to engage in environmentally friendly practices. On the other hand, by enabling access to thorough information as well as integrating and deploying resources connected to data analysis, the ability to analyze big data can change the impact of a company's social responsibility in the direction of greenness. As a result, business performance will also increase. The findings also demonstrated that among the key elements of big data analysis, social practices, supply chain management, lean management, and comprehensive quality management, all have a favorable impact on it. By contrast, environmental, organizational, and financial practices had no impact on big data analysis.

Parsaeifar et al. [35] in their study entitled "pricing in a three-tier competitive supply chain using the game theory approach" looked at a three-tier supply chain with various retailers, a single manufacturer, and various suppliers, where

there is rivalry at each level of the chain and the manufacturer provides the retailers with a variety of goods. There are two ways to display competition between chain members: horizontally and vertically. A nonlinear mathematical model including competition and cooperation modeling on pricing strategy is offered. The relationships between supply chain participants in the noncooperative game style are also taken into account in this model. Demand is a function of retail price and pricing of rival retailers, according to their article. In this model, the manufacturer is presumptively more powerful and imposes his judgments on suppliers and retailers; in other words, the manufacturer assumes the position of the leader, while the other members assume the role of the followers, creating a Stackelberg-type of rivalry. Finally, the model's most crucial parameter underwent sensitivity analysis.

Najafikhanshan and Omrani [36] in their study titled "presenting a model for competitive pricing in the supply chain network with traditional and online sales channels" stated that price competition is one of the major issues that companies face. However, many companies are faced with not having a suitable strategy in terms of price competition. Nowadays, game theory plays an essential role in finding equilibrium prices in traditional and Internet sales channels. Considering the increase of competition in the markets and the desire of companies to use Internet channels, it is necessary to design models for the pricing of goods in different channels. So far, there has been little research in Iran about pricing in online sales channels. In their article, a model is presented for finding prices in different sales channels based on game theory. For this purpose, competition in the market is modeled and pricing is performed based on Stackelberg's theory. Therefore, the price function for the orange juice product of Orom Narin Shadlee Company was designed in traditional and Internet sales channels, and then game theory was used to find the equilibrium price in the said channels.

Wang et al. [37] in their study entitled "corporate social responsibility of green supply chain management and company performance considering big data analysis" stated that both internal and external social responsibility have a positive impact on supply chain management. The findings also indicate that green supply chain management improves a company's performance and that big data analysis has a beneficial moderating influence on the relationship between green supply chain management and external social responsibility.

Raut et al. [38] in their study entitled "the role of big data analysis as a mediator between sustainable business performance of the supply chain and key factors (i.e., lean practices, social environmental, organizational measures, financial supply chain, and comprehensive quality management)" stated that total quality management has no effect on big data analysis. Also, the results show that big data analysis has a favorable impact on the supply chain's sustainable business success.

Dubey et al. [39] in their study titled "investigation of how and when to create the ability to analyze big data to improve supply chain agility and gain competitive advantage" stated that big data analysis has a positive and significant impact on agility of supply chain and organizations' competitive advantage. In addition, the results show that organizational flexibility adjustment has a positive and significant effect in adjusting the path of joining big data analysis and supply chain agility; however, contrary to the authors' opinion, no support was found for the effect of adjusting financial shows on the path of joining to the big data analysis and competitive advantage.

Younis et al. [40] in their qualitative study entitled "the relationship between garlic supply chain management practices and company performance" identified some of the primary causes for why approaches for managing the supply chain for garlic could not have an impact on many aspects of business performance. Most of the issues were related to implementation included environmental design, procurement of garlic, environmental cooperation, and reverse procurement.

3. Methodology

Diagonal matrix analysis based on the multicriteria decision-making (MCDM) method is one of the matrix analysis techniques [41]. However, straightforward MCDM techniques are divided into categories such as AHP or ANP, depending on where the analysis is placed [42]. The analytical hierarchy process (AHP), which is employed in multicriteria decision analysis, is more broadly categorized as the analytic network process (ANP). ANP constructs a decision problem as a network, whereas AHP builds it into a hierarchy with a goal, decision criteria, and alternatives. Depending on the design of the choice problem based on each of the criteria related to the kind of the analysis, each alternative is either examined separately or in pairs compared to the other possibilities. A process consisting of 7 phases is used to carry out AHP and establish the priorities of criteria and subcriteria; each stage is detailed below.

(i) Stage 1: Collection of experts' answers

In this stage, first, the main criteria based on the purpose and subcriteria compared to the primary standard were compared using Saaty's pairwise questionnaire with a nine-point scale in pairs.

(ii) Stage 2: Fuzzification of experts' viewpoint

In this stage, the viewpoint of experts was quantified through the Fuzzy scale. The Fuzzy scale used in the Fuzzy hierarchical analysis process method based on Chang's method [42] is presented in Table 1.

In this stage, the questionnaires were given to the experts, and they answered them using Saaty's nine-point scale. Therefore, the matrix of pairwise comparisons is now formed using the fuzzification of the experts' viewpoint. Now, the point is what to do when faced with multiple respondents? Based on Chang's Fuzzy hierarchical analysis method [42], the arithmetic means of the views need to be calculated. Therefore, after collecting the experts

Table 1: Crisp, Fuzzy, and Fuzzy inverse numbers of pairwise comparisons based on Chang method [42].

Comparison of i to j	Crisp number	Fuzzy numbers			The inverse of fuzzy numbers		
		Lower limit (L)	Middle limit (M)	Upper limit (U)	Lower limit (L)	Middle limit (M)	Upper limit (U)
Equally preferred	1	1	1	1	1.000	1.000	1.000
Intermediate	2	1	2	3	0.333	0.500	1.000
A little preferred	3	2	3	4	0.250	0.333	0.500
Intermediate	4	3	4	5	0.200	0.250	0.333
Strongly preferred	5	4	5	6	0.167	0.200	0.250
In between	6	5	6	7	0.143	0.167	0.200
Very strongly preferred	7	6	7	8	0.125	0.143	0.167
Intermediate	8	7	8	9	0.111	0.125	0.143
Completely preferred	9	8	9	10	0.100	0.111	0.125

"opinions with Saaty's nine-point scale and fuzzifying the experts" opinions, the experts' views were added using the Fuzzy average. To calculate the mean view of n respondents, the Fuzzy mean will be calculated as follows:

$$f_i = (l_i, m_i, u_i),$$

$$\text{Fuzzy Average} = \left[\frac{l_1 + l_2 + l_3 + \cdots l_n}{n}, \cdot \frac{m_1 + m_2 + m_3 + \cdots m_n}{n}, \cdot \frac{u_1 + u_2 + u_3 + \cdots u_n}{n}\right]. \quad (1)$$

(iii) Stage 3: Calculating the Fuzzy sum of each row

The eigenvector must be determined once the fuzzy average of the obtained pairwise comparison matrix has been determined. To begin, the following formula is used to determine the Fuzzy sum for each row:

$$\sum_{j=1}^{n} M_{g_1}^{j} = \left(\sum_{j=1}^{n} l_i^j, \sum_{j=1}^{n} m_i^j, \sum_{j=1}^{n} u_i^j\right). \quad (2)$$

(iv) Stage 4: Calculating the Fuzzy normalized weight (S_i)

After calculating the Fuzzy sum of each row using formula (3), the normalized Fuzzy weight (Fuzzy compound expansion) of each criterion is calculated.

$$S_i = \sum_{J=1}^{m} M_{g_i}^{j} \otimes \left[\sum_{i=1}^{m}\sum_{j=1}^{n} M_{g_i}^{j}\right]^{-1}. \quad (3)$$

The Fuzzy compound expansion is determined by dividing the total of that criterion's values by the total of all preferences (column elements). The Fuzzy sum of each row is multiplied by the inverse of the aggregate because the values are fuzzy.

(v) Stage 5: Defuzzification and calculating the eigenvector

There are various methods for defuzzification of the obtained values. One method was used for defuzzification of the calculated values for calculating the possibility and the crisp number. In this study, possibility degrees are calculated, and the crisp number calculations are used. Due to the consistency of the results and the simplicity of understanding the crisp measures. Defuzzification to calculate the crisp number is as follows:

$$x_{\max}^{1} = \frac{l + m + u}{3},$$

$$x_{\max}^{2} = \frac{l + 2m + u}{4}, \quad (4)$$

$$x_{\max}^{3} = \frac{l + 4m + u}{6},$$

$$\text{Crisp Number} = Z^* = \max\left\{x_{\max}^{1}, x_{\max}^{2}, x_{\max}^{3}\right\}.$$

(vi) Stage 6: Evaluating the inconsistency rate

In this study, to calculate the consistency, Gogus and Butcher's method was used, the description is given below. Gogus and Boucher suggested that each Fuzzy matrix should yield two matrices: the middle number and the Fuzzy number limit. Then, using Saaty's method, the matrix's consistency rate (CR) may be determined. The following would be the formula for calculating the consistency rate for fuzzy pairwise comparison matrices.

Step 1: Two matrices make to the fuzzy triangular matrix. The second matrix is made up of the upper and lower geometrical limits of triangular numbers, whereas the first matrix is made up of the intermediate numbers of triangular judgments $A^g = \sqrt{a_{iju}.a_{ijl}}$.

Step 2: Using Saaty's approach, the vector of weights for each matrix is calculated as follows:

$$w_i^m = \frac{1}{n}\sum_{j=1}^{n} \frac{a_{ijm}}{\sum_{i=1}^{n} a_{ijm}},$$

$$w^m = [w_i^m],$$

$$w_i^g = \frac{1}{n}\sum_{j=1}^{n} \frac{\sqrt{a_{iju}.a_{ijl}}}{\sum_{i=1}^{n}\sqrt{a_{iju}.a_{ijl}}}, \quad (5)$$

$$w^g = [w_i^g],$$

Step 3: For each matrix, the biggest eigenvalue is determined as follows:

$$\lambda_{\max}^{m} = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} a_{ijm}\left(\frac{w_j^m}{w_i^m}\right),$$
$$\lambda_{\max}^{g} = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} \sqrt{a_{iju}.a_{ijl}}\left(\frac{w_j^g}{w_i^g}\right). \quad (6)$$

Step 4: The following equation was used to determine the Consistency Index (CI):

$$CI^m = \frac{(\lambda_{\max}^m - n)}{(n-1)},$$
$$CI^g = \frac{(\lambda_{\max}^g - n)}{(n-1)}. \quad (7)$$

Step 5: We must divide the CI index by the random index (RI) value in order to determine the consistency rate (CR). If the outcome is less than 0.1, the matrix is regarded as valid and consistent. Saaty created 100 matrices using random numbers and the requirement that they be reciprocal in order to get the values of random indexes (RI). He then determined the values of inconsistencies and their mean. Saaty's random index (RI) table cannot be utilized, even if Saaty's (1–9) scale is employed, because the numerical values of fuzzy comparisons are not necessarily integers. As a result, the geometric mean typically changes fuzzy comparisons' numerical values into noninteger numbers. As a result, 400 random matrices were produced by Gogus and Boucher to construct the random indices (RI) table for fuzzy pairwise comparison matrices (Table 2).

The Fuzzy triangular number's middle number was initially randomly generated in the range [1/9, 9] and it was also generated reciprocally in order to create random matrices. The upper limit, lower limit, and middle values in the interval were then generated randomly for each triangular number. The value of their random index was then calculated by splitting the resulting random matrix into two matrices of the central limit and the geometric mean of upper and lower limits. It should be noted that it is more significant than the inconsistent value in the column. The reason for this discrepancy is that while the range of random numbers generated for the middle limit is [1/9, 9], the range of random numbers generated for the lower and upper limits based on the middle number generated is more constrained and hence less likely to be inconsistent.

We compared the two matrices' inconsistency rates with the 0.1 thresholds by computing the inconsistency rates using the following equation:

Table 2: Random indices (RI), (source: author).

Matrix size	RI^m	0
1	0	0
2	0	0
3	0.4890	0.1796
4	0.7937	0.2627
5	1.0720	0.3597
6	1.1996	0.3818
7	1.2874	0.4090
8	1.3410	0.4164
9	1.3793	0.4348
10	1.4095	0.4455
11	1.4181	0.4536
12	1.4462	0.4776
13	1.4555	0.4691
14	1.4913	0.4804
15	1.4986	0.4880

$$CR^g = \frac{CI^g}{RI^g},$$
$$CR^m = \frac{CI^m}{RI^m}. \quad (8)$$

If both indices are less than 0.1, the fuzzy matrix will be consistent. The decision-maker would be prompted to reassess the priorities if both numbers were higher than 0.1. Additionally, the decision-maker must consider the values of the middle numbers (limits) of fuzzy judgments if only one of the two values is larger than 0.1.

(vii) Stage 7: Total weight of the subcriteria

The relative importance of each subcriteria is multiplied by the weight of that criterion to determine its relative weight.

Similar to the analysis process in multicriteria decision-making methods, the related elements and propositions to improve the choice of the most effective functioning of competitive supply chain pricing based on social responsibility are identified through a meta-synthesis process in this study. The problem structure is explored through a pairwise comparison between the research components used as a basis (competitive supply chain pricing functions) and the research propositions (dimensions of social responsibility). The lack of theoretical coherence in terms of concepts and theories related to this field has thus led this research to seek to develop an integrated approach to competitive supply chain pricing functions, and as a result, it can be said that this research falls under the category of developmental research in terms of the nature of the result. However, based on the data type, this research is hybrid because, in the qualitative section, it seeks to identify the elements and hypotheses of the functioning of competitive supply chain pricing and social responsibility through theoretical screening based

on the systematic meta-synthesis method. Then, it investigates a model of the effectiveness of social responsibility on the functioning of competitive supply chain pricing through the diagonal method. One of the most effective interpretative ranking processes (IRPs) is often one that bases decisions on the elements and hypotheses that are examined in pairwise comparison and matrix analysis [43]. According to the above justifications, the interpretative rating process (IRP) might be expressed in the following ways:

The various steps of interpretive ranking are shown in Figure 4, respectively.

Step 1: A list of the standards and factors were taken into account in this study.

Step 2: A substantial relationship between the criteria and the variables found in Step 1 is defined with regard to each pair of standards. A conceptual connection between the system's parts that is appropriate to the purposes of the system in terms of meaning and substance is referred to as a substantive relationship. Assume, for instance, that a cloud drives rain; in this case, "cloud" and "rain" are system components, and their substantive relationship is what generates the rain. Other phrases such as "takes priority over," "supports," "prevents from," "reports to," and "affects" can also demonstrate these interactions. Definitional relationships, close relationships, effect relationships, temporal links, judicial relationships, and mathematical relationships are only a few of the several types of substantive interactions that can exist between two components. We exploited the cause-and-effect relationship in this study.

Step 3: To highlight the pairwise interactions between competitive supply chain price functions based on social responsibility dimensions, a structural self-interaction matrix (SSIM) is created for barriers.

Step 4: A structural self-interactive matrix is used to create a reachability matrix, which is then tested for transitivity. The content connection of a core premise in interpretive structural modeling is transitivity. Transitivity describes the relationship between variables A and B as well as the relationship between variable B and the unstable variable C. As a result, variable A is also related to variable C (Figure 5).

Step 5: The fourth step's reachability matrix is broken down into tiers.

Step 6: A directional graph is created based on the relationships specified in the reachability matrix, and the transitivity relationships are removed.

Step 7: By replacing the names of the variables with criteria instead of nodes, the completed diagram is converted into interpretive structural modeling.

Step 8: Interpretive structural modeling, created in step 7, is examined to ensure that its content is consistent. If there is a discrepancy, the necessary adjustments will be made.

3.1. Structural Self-Interactive Matrix (SSIM). To establish meaningful linkages between the variables, the interpretive structural modeling advises employing expert judgment based on various management techniques, such as brainstorming and nominal groups. Regarding any criteria pair, the experts were consulted for their opinion on how the two criteria relate to one another. To emphasize the relationship's simplicity, English letters were not utilized in the source; instead, the integers −1, 1, 2, and 0 were used.

1: If only criterion j is impacted by criterion i.

2: If both criterion I and j have an impact on each other.

−1: If only criterion I is impacted by criterion j

0: If the two criteria, I and j, do not effectively relate to one another.

Garfield's instructions [44] state that the relationship between competitive supply chain pricing functions based on social responsibility dimensions has been established using expert judgments.

3.2. Initial Reachability Matrix. The reachability matrix's (i, j) cell becomes one and the (j, i) cell becomes zero if the intersection of the criteria (i, j) in SSIM is 1.

The (i, j) cell and the (j, i) cell in the reachability matrix both become 1 if the intersection of the criteria (i, j) in SSIM equals 2.

Both the (i, j) cell and the (j, i) cell in the reachability matrix become zero if the intersection of the criteria (i, j) in SSIM is 0.

The (i, j) cell in the reachability matrix becomes 0 and the (j, i) cell becomes 1 if the intersection of (i, j) in SSIM is −1.

$$D = \begin{bmatrix} & C_1 & C_2 & \cdots & \cdots & C_n \\ C_1 & 0 & d_{12} & \cdots & \cdots & d_{1n} \\ C_2 & d_{21} & 0 & \cdots & \cdots & d_{2n} \\ \vdots & \vdots & \vdots & 0 & \cdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & 0 & \vdots \\ C_m & d_{m1} & d_{m2} & \cdots & \cdots & 0 \end{bmatrix}. \tag{9}$$

The initial reachability matrix, matrix D, also displays competitive supply chain price functions based on social responsibility dimensions by substituting the digits zero and one for the signs.

3.3. Final Reachability Matrix. In order to make the final reachability matrix for criteria compatible with the initial reachability matrix, the extended relationship is taken into consideration. In order to achieve this, the starting matrix needs to be in $k + 1$ exponentiation in order to maintain a stable status $M^k = M^{k+1}$. By doing this, some zero components will be converted to 1 and displayed as (1^*).

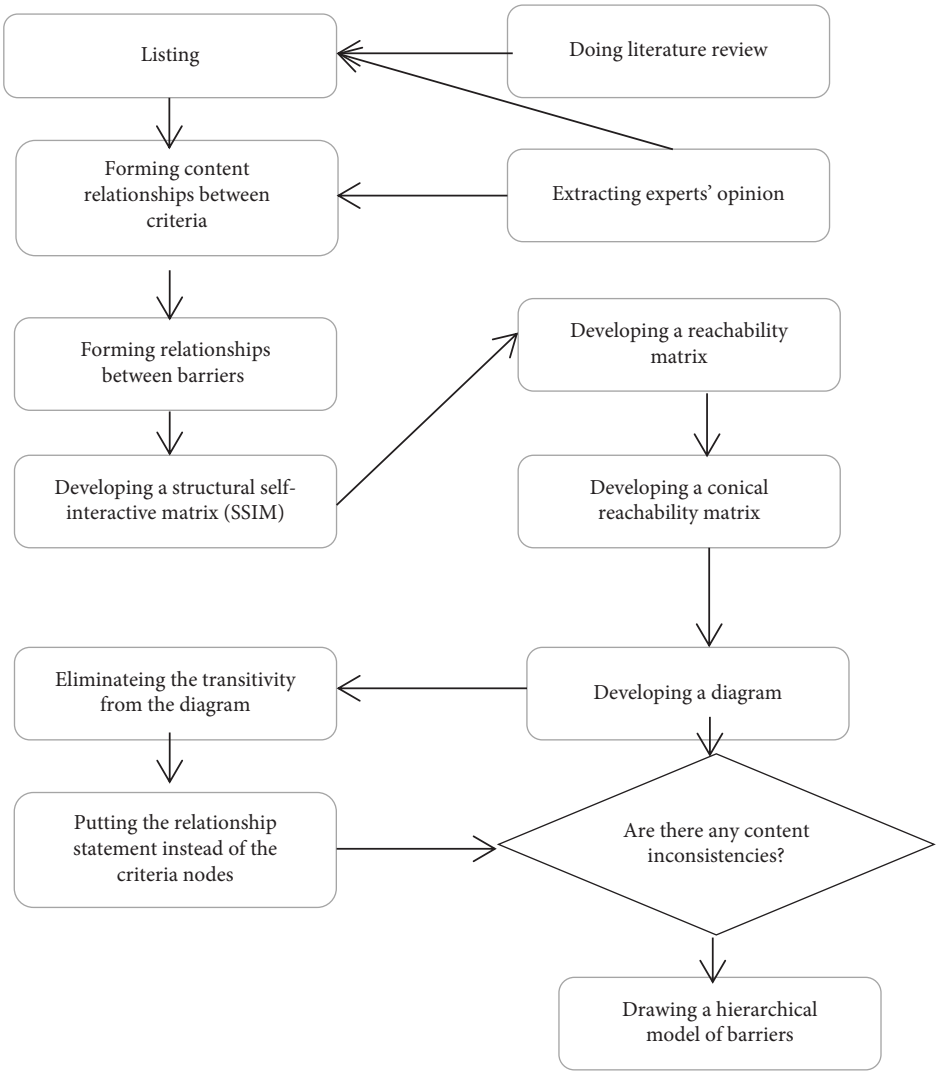

Figure 4: Steps of the interpretive ranking process method (source: author).

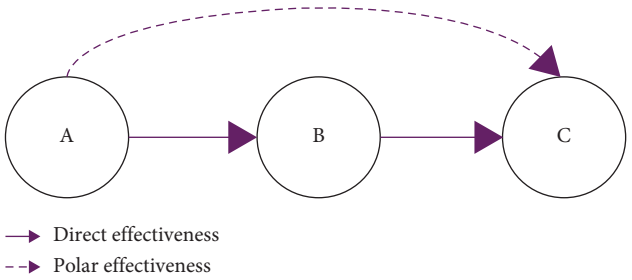

Figure 5: The process of the propositions' direct and polar effectiveness in the interpretive matrix (source: author).

The following relations ("I" is the identity matrix) should be used to generate the relation matrix, or initial reachability matrix, before gaining the final reachability matrix:

$$M = D + I$$
$$M^* = M^k = M^{k+1}, \quad k > 1. \tag{10}$$

Each component in huge complicated systems is meant to be accessed from within. As a result, the system's final matrix's primary diagonal entries are all always 1. To obtain the final matrix, the identity matrix is consequently added to the initial reachability matrix. One of the final matrix's characteristics is as follows:

$$M^2 = M. \tag{11}$$

The gained matrix should be the final matrix, and the final matrix should be in exponentiation to the point where

the emergency situation arises. The first line's number of 1s indicates the lines or impacts that the first criterion has produced. The number of 1s in the first column indicates the weight that the first criterion has been given. Source is the element that has an impact on all system elements but is unaffected by any other element.

3.4. Antecedent and Succedent Set. The final matrix structure as well as the system design are significantly influenced by the two separate antecedent sets (A) and the succedent or reachable set (R) that each of the system components (criteria) has. The criteria that lead to or have an impact on each criterion are included in the antecedent set of that criterion. In other words, they are placed in front of the criteria in the column that is related to criterion number 1, which is an antecedent set on that column criterion. For instance, if criterion 1 is affected by criterion 2, 3, and 4, then these criteria make up the antecedent set of criterion 1. The succedent set, on the other hand, displays the criteria that a criterion or system component has an impact on. For instance, if criterion 1 influences criterion 2, 3, 4, and 5, then criterion 2, 3, 4, and 5 are the set of criteria that follow criterion 1. The accessible set is another name for the succession set.

3.5. Criterion Leveling. The criteria are leveled after identifying the reachable set, the antecedent set, and the standard set for each of the criteria. A standard-setting is obtained by acquiring the commonality of the attainable and preceding settings. First-level precedence is given to criteria whose formal setting matches the reachability set. By deleting these requirements and then doing it again for the other needs, the story of all requirements is revealed. The ISM diagram is created using the final matrix and the determined levels. This rule is repeated for each class to determine it (C is the set of criteria).

$$R\left(C_j\right) \cap A\left(C_j\right) = R\left(C_j\right), \quad \forall C_j \in C. \tag{12}$$

3.6. Clustering of Criteria. It is necessary to calculate each driving force and dependence component in order to categorize the reachability matrix's criteria. The number of criteria that the connected criterion affects is what motivates an element or criterion. Dependency power is the total number of criteria that influence and ultimately lead to the linked criterion. In the matrix study of the multiplier impact of categorization mutual application cross-reference, these driving forces and dependencies are utilized (MICMAC). The four categories of the criteria are autonomous, dependent, connective, and independent (driving criterion). The goal of matrix analysis is to analyze the driving force, power, and dependency of the variables through the multiplier influence of their applied cross-references. Four clusters are used to group variables (Figure 6). The autonomous criteria, which have a weak driving force and dependency, are included in the first cluster. The system, which has little connectivity to other system components, is almost completely separated from these criteria. They may have significant relationships, of course. Dependent criteria, which have a strong dependency power but a weak driving force, are included in the second cluster. Hybrid criteria, which have a strong driving force as well as a strong reliance power, are part of the third cluster. These criteria are in fact unstable because any change to them will have an impact on other criteria or provide feedback to them. Independent criteria, which have great driving power and low dependent power, are included in the fourth cluster. As you can see, a criterion with high driving force is called a key criterion and is inserted in the dependent or hybrid variables.

3.7. Statistical Population. 15 university-level specialists and experts in industrial management who have a specialized and scientific approach by engaging in scientific research in a related subject make up the statistical population in the qualitative portion. They were chosen using a homogenous sample technique since the participants in this section were expected to have a theoretical understanding of the research issue. Additionally, studies from websites such as University Jihad (SID) in Iran, Iranian Publications Database (MAGIRAN), Islamic Computer Science Research Center (NOORSOFR) of Iran, the international reference for the most recent articles in the world (Sciencedirect), Emerald Reference (Emeraldinsight), and OnlineLierary were used to determine components (functioning of competitive supply chain pricing) and indicators (social resemblance) in this section based on the meta-synthesis. Twenty managers from knowledge-based organizations in the oil sector were utilized in the second phase to complete the matrix checklists in accordance with the nature of the study. This procedure is known as the interpretative ranking process (IRP). It should be noted that the interpretive ranking process (TISM-IRP) is finite in sample size and is consistent with studies such as Sushil [44] and Chithambaranathan et al. [41] because it is an analysis based on matrix analysis and analysis in operations that should be performed by participants based on a specific criterion such as experience or expertise.

3.8. Findings. There is no predetermined and definitive list for components of functioning of competitive supply chain pricing associated with propositions of social responsibility, and there is no definite possibility for identifying and limiting all features related to the research objective in a specific set with clear and distinctive distinctions in the form of the conducted research. However, the findings of this research show that the participants in this study, according to the researcher's initial description of the subject for them, were able to gain an excellent understanding to create matrix checklists to identify the research's elements, markers, and features and to ascertain their dimensions. As a result, the qualitative analysis portion will present a meta-synthesis, and the quantitative area will present an interpretive ranking procedure.

↓ Driving power					
1					
2		Area 4		Area 3	
...					
n-1					
n		Area 1		Area 2	
→ Dependency power	1	2	...	n-1	n

Figure 6: Classification of criteria using driving power and dependency power (source: author).

3.8.1. Findings of Meta-Synthesis. One of the methods of analysis in the qualitative section is meta-synthesis. Meta-synthesis analysis is a qualitative research method. Thinkers in practice have come to the conclusion that it is not possible to a large extent to know and master all aspects of a field and to be up-to-date in this field due to the development of research in various fields of science and the scientific community being confronted with an explosion of information; therefore, conducting synthetic research, which puts the extract of a study conducted on this particular subject systematically and scientifically before researchers, has become increasingly widespread. To perform a meta-analysis, it is necessary first to determine similar research with its content and nature. Hence, in this section, an effort was made to select relevant studies by searching the databases of reputable foreign journals and scientific and research journals. Following this, the analytical processes of this section were used to identify and determine the components and propositions related to the research topic. Analyzing comparable studies took place from 2017 to 2021. In other words, research relevant to the research objective was selected and searched for using domestic and international research databases and references (Figure 7).

As seen in Figure 2, all 51 sources that were first discovered after going through various levels of screening in terms of content, title, and analysis, finally, 26 types of research proportional to the content, identification, and analytical procedures of this research were selected, 16 types of research were related to social responsibility propositions, and ten kinds of research were related to the components of operation of supply chain pricing competition. To define the most efficient functioning of a competitive supply chain pricing system based on social responsibility aspects in the form of score checklists, concepts should be divided based on elements and propositions at this stage. In actuality, through the criteria of critical evaluation based on ten criteria of research objectives, the logic of the research method, research design, sampling, data collection, reflectivity, the accuracy of the analysis, theoretical and transparent expression of findings, and the value of research, the propositions of social responsibility dimensions are determined in Table 3 and the components of the functioning of competitive supply chain pricing are defined in Table 4.

3.8.2. Identification of Social Responsibility Propositions (X). Social responsibility claims are marked in this section with the symbol (*R*) in accordance with the justifications provided. Table 1 analyzes how to evaluate requests using a 50-point scale with scores ranging from 1 to 5 based on the 10 factors mentioned.

The scores provided based on the mode index showed four types of research of Famiyeh et al. [48], Drugan [52], Haghir et al. [56], and Atani et al. [60] were eliminated because they only received 30 out of a possible 50 points. The researchers who score 30 or higher are accepted, per criteria for the score adequacy of this analysis. They were therefore not included in the research. The concepts of social responsibility are extracted in the paragraphs that follow. As a result, the multidimensional social responsibility recommendations are determined using the scoring methodology below. The names of the approved research researchers are listed in the row of each table after each subcriteria has been extracted from the accepted articles and written in the table's column. The sign "☑" is added based on how each researcher used the subcriteria listed in the table's column. The scores of each researcher are then summed up in the subcriteria column, and research proposals with scores higher than the research average are chosen.

Based on this analysis, it was discovered that the seven propositions with the highest frequency are those related to the environment, the economy, society, ethics, voluntarism, and institutional/legal dimensions. They are therefore examined in this study as the primary social responsibility dimensions. Each of the recognized propositions is defined in accordance with Table 5 in the next section once the theoretical underpinnings of the accepted study have been examined (Table 3).

3.8.3. Identifying the Components of Functioning of Competitive Supply Chain Pricing (T). The operation of competitive supply chain pricing is established using the same process as in the phases above and in this section. The operation of the competitive supply chain pricing with the symbol (*T*) is identified in this section in accordance with the justifications provided. According to the ten criteria listed, Table 6 examines how to rate the components using a 50-point scale with values ranging from 1 to 5.

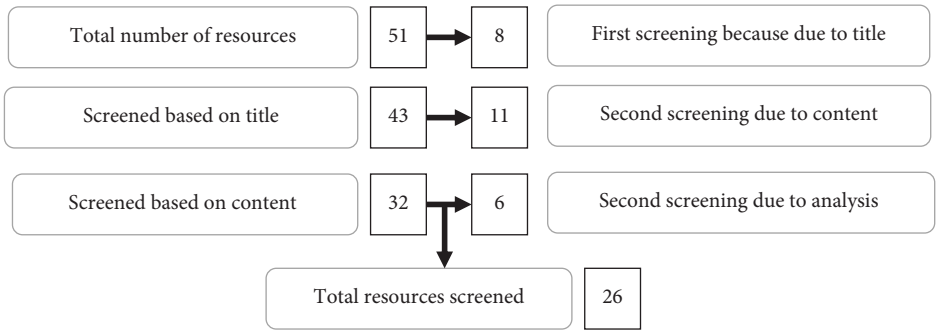

Figure 7: Screening of initial research (source: author).

Out of a total of 10 initial types of study, two types of research by Farham-Nia and Ghaffari-Hadigheh [61] and Mahmoudi et al. [68] were removed because they received fewer than 30 out of 50 points, according to the scores provided based on the mode index. The researchers who score 30 or higher are accepted, per criteria for the score adequacy of this analysis. They were therefore not included in the research. The research hypotheses are then derived. Accordingly, the elements associated to competitive supply chain pricing are determined using the following scoring methodology. The names of the approved research researchers are listed in the row of each table after each subcriteria has been extracted from the accepted articles and written in the table's column. The symbol "☑" is added based on how each researcher used the subcriteria listed in the table's column. After that, the scores of each researcher are summed up in the subcriteria column, and scores that are higher than the researches' average are chosen as the research components (Table 7).

Based on this investigation, it was discovered that the three elements that make up competitive supply chain pricing that is based on rivals, competitive supply chain pricing that is based on operations, and competitive supply chain pricing that is based on customer value occur most frequently. After examining the theoretical underpinnings of the accepted studies, Table 4 defines each of the identified components in accordance with Table 8.

3.9. Interpretive Ranking Process (IRP). The procedures associated with this study are carried out in light of the fact that the elements of the operation of competitive supply chain pricing (R) and the social responsibility propositions (T) have been determined based on the efficacy of row "i" on column "j" or vice versa. Therefore, the direct, symmetrical, or indirect relation should first be taken into account in line with the explanations in order to develop interactive matrices. Instead, the following is how the matrix questionnaire is determined:

The elements of competitive supply chain pricing with social responsibility are now shown in the Table 9 to establish a reciprocal interpretation.

Each social responsibility proposition's level of efficacy is assessed in light of the findings in this section. The pairwise comparison score form, which is employed in the sections that follow in the matrix prioritization analysis, served as the foundation for this evaluation's scoring methodology.

The social size is the basis for the effectiveness of the environmental dimension of corporate social responsibility, according to the table that was presented as part of the effectiveness of the relationships. For instance, the paired comparison at the level of social responsibility dimensions T, the environmental dimension $T1$, and the social dimension $T2$ are related as the effect of ji. Table 9 compares the study hypotheses pairwise to create the structural self-interaction matrix (SSIM). For pairwise comparisons, all elements from $(i+1)$ th to nth were compared with the i-th index in pairs. For each relationship, a yes or no response is supplied, and if a positive response is given, a justification is offered. In this instance, a scientific, interpretative logical foundation for pairwise relationships' interpretive logic is offered. The links are entered as a reachability matrix in this stage, denoted by the values "1" or "0," as shown in Table 9. The cells with the option "Yes" are numbered one in Table 10, while the cells with the option "No" are numbered 0. The structural self-interaction matrix is transformed into a zero and one two-value matrix to create this matrix (Table 11).

In order to generate the interaction reachability matrix, scores are formed in this stage based on the interaction of the compared indicators.

Considering that the level of direct and transferable effectiveness of the research propositions is determined, the score percentages of the total level of effects are defined in the next step, which is presented in Table 12.

According to the findings, only 17.07% of the social responsibility claims made by knowledge-based enterprises in the provision of petroleum products have a transferable effect, while 53.65% are directly related. The percentage related to the energy of the ethical dimension of social responsibility ($T6$) is higher than other propositions based on the pairwise scale between the research propositions, meaning that the ethical dimension is where knowledge-based companies place the most emphasis on social responsibility, which can reflect the committed functions of businesses towards society. The most effective aspect of the functioning of a competitive supply chain pricing is therefore determined based on the ethical dimension of social responsibility in knowledge-based companies in the field of supply of oil products, according to Tables 9 and 13, and given the influential role of the moral size of social

Table 3: Propositions of social responsibility (source: author).

Components	Definitions
Environmental dimension	The environmental dimension is one of the most critical dimensions of social responsibility towards society and the future, which examines the approaches of institutions and organizations towards the development of environmental sustainability. This dimension includes cautious strategies for preventing or minimizing adverse effects, supporting measures and initiatives that promote more environmental responsibilities, and developing and disseminating desirable and environmentally friendly technologies. [50]
Social dimension	The social dimension has a broader function than other dimensions of social responsibility. It includes the firm's performance processes towards the community and dynamic social relationships with stakeholders such as information provision, transparency in performances, and flexible organizational structures. It generally explores the relationships of an institution and organization with the environment and society. Some of the indicators of this dimension can include respect for human resource rights, education, and development, and assistance to specialties related to social programs. [51]
Economic dimension	The economic dimension includes maintaining benefits for companies. It investigates the effect of financial aspects and profitability of an institution and organization on collectivist social interests and its effect on the economy as a whole [57]
Beneficiary dimension	This dimension refers to the commitment of institutions and organizations in adhering to the needs of stakeholders and is, in fact, a set of management activities that ensure the maximum positive effect of the company's operations on society. It is also a set of processes that somehow meet or achieve more than the rules, ethics, business, and general expectations of society from business [55]
Voluntary dimension	This dimension of voluntary activities such as promoting responsible customs and norms, doing charity work, meeting the social needs of the poor, holding nongovernmental organizations and participating in philanthropic activities, etc., all fall into the category of activities of this dimension that can also help the company perform its competitive operations effectively [46]
Ethical dimension	This dimension refers to the development of professional ethics procedures in business and the existence of observance of spirituality and principles such as work conscience to respect the rights of stakeholders. Organizations and institutions committed to social responsibility will always strive to increase the level of social confidence and belief in accountability and responsibility for the interests of others by developing committed actions against the interests of stakeholders [47]
Institutional dimension	An institutional dimension is also a modest approach to the legitimacy of social laws and standards, which includes the level of adherence of organizations to the laws and institutional requirements by the institutions that oversee the performance of an organization. In other words, it is a kind of promotion of the rule of law and respect for the requirements formulated by higher institutions that can increase the level of culture of respect for directions at the macro level and increase the level of civilization of respect for civil and individual rights at a more detailed level [51]

responsibility in knowledge-based companies in the field of supply of oil products (Table 14).

As it can be seen, this proposition has the highest level of transferability since the functioning of competitive supply chain pricing based on customer value has a higher level of transferability than the other two components. This finding demonstrates that, although affecting other factors, the ethical dimension ($T6$) in the social responsibility of knowledge-based enterprises in the provision of oil products is seen as the most important aspect in developing a competitive supply chain pricing model based on customer value ($R3$). Based on the results, the ranks for interpretative ranking procedures (IRP) are displayed in the table below (Table 15).

The outcomes demonstrate that the competitive supply chain pricing function based on the social responsibility claims of knowledge-based enterprises in the oil field is most closely related to the operation of competitive supply chain pricing based on customer value "R3". The most effective component of a competitive supply chain pricing, however, has a dependence level that, when calculated as the row sum, shows that it is influenced by other components. As a result, this dependence level has a higher correlation with the functioning of a competitive supply chain pricing being based on competitors than its other two dimensions. The collection of output, input indicators, and standard elements are chosen to construct the hierarchical model "TISM," i.e., the structural layer model, after identifying which parts of

Table 4: Components of functioning of competitive supply chain pricing, (source: author).

Functioning of competitive supply chain pricing	Definitions
Functioning of competitive supply chain pricing based on competitors	In many markets, supply chain pricing will be based on competitors' prices. Companies continuously evaluate their competitors' pricing process to achieve supply chain channels that, while reducing costs, provide competitive advantages in the market for them. In other words, it is a kind of evaluation that compares the products that can be offered with the consequences of other competitors so that the customers of the target market feel more favorable about the value of the product purchased. Usually, pricing close to competitors' prices can be a reliable strategy to retain customers [62]
Functioning of competitive supply chain pricing based on operations	The functioning of competitive supply chain pricing based on operations is a method that aims to optimize production capacity to achieve operational efficiency or to match the supply and demand of the competitive supply chain through various prices. In some cases, prices may be adjusted to the supply market and may be determined based on operational strategies [64]
Functioning of competitive supply chain pricing based on customer value	The functioning of competitive supply chain pricing based on value is a method in which a company seeks to balance market value with the mental weight of its customers. The purpose of competitive supply chain pricing is to strengthen the company's overall positioning strategy in customers' minds in terms of image and quality of products [65]

Table 5: The process of critical analysis of screened researches (source: author).

Research position	Papers	Critical evaluation criteria										
		Research objectives	The logic of the research method	Research design	Sampling	Data collection	Reflectivity	Ethical considerations	Accuracy of analysis	Theoretical and clear expression of findings	Value of research	Total
International research	Adegbite et al. [45]	3	5	4	3	3	3	4	5	4	4	38
	Min et al. [46]	4	4	4	4	4	4	4	3	4	4	39
	Arrigoni [47]	3	4	4	4	3	4	3	4	4	4	37
	Famiyeh et al. [48]	2	2	3	3	3	2	3	3	3	3	27
	Sharabati [49]	4	4	3	4	2	3	4	4	4	4	36
	Arli and Tjiptono [50]	4	3	3	4	3	3	3	4	4	4	31
	Amos [51]	4	5	5	3	4	3	3	3	4	4	38
	Drugan [52]	2	3	2	2	3	2	2	2	2	3	23
	Beal and Neesham [53]	3	4	3	4	3	3	4	3	3	4	34
Domestic research	Akbari et al. [54]	2	3	3	3	4	3	3	3	4	4	32
	Ghafourian Shagerdi et al. [55]	4	5	4	4	3	4	4	3	5	4	39
	Baradaran Haghir et al. [56]	3	3	3	2	2	3	3	2	2	3	26
	Noorbakhsh and Akbarian [57]	4	3	4	4	4	4	4	4	4	4	39
	Fayazi Azad et al. [58]	4	4	4	3	4	3	3	4	3	4	36
	Seyed Javadin et al. [59]	3	3	3	3	4	4	3	3	4	4	34
	Atani et al. [60]	3	2	2	3	2	3	2	3	3	3	27

Table 6: Process of determining social responsibility dimensions' frequency.

Research position	Researchers	Environmental dimension	Economic dimension	Organizational dimension	Social dimension	Ethical dimension	Cultural dimension	Voluntary dimension	International dimension	Ethical dimension	Institutional/legal dimension
International research	Adegbite et al. [45]	—	✓	—	✓	—	—	—	—	✓	—
	Min et al. [46]	✓	—	✓	✓	✓	—	—	✓	—	—
	Arrigoni [47]	✓	✓	—	✓	—	✓	✓	—	✓	—
	Sharabati [49]	✓	—	—	✓	✓	—	✓	—	✓	✓
	Arli and Tjiptono [50]	—	✓	✓	—	—	✓	—	—	✓	✓
	Amos [51]	✓	—	—	—	✓	—	✓	—	—	✓
	Beal and Neesham [53]	—	✓	✓	✓	✓	—	✓	—	—	✓
Domestic research	Akbari et al. [54]	✓	—	—	✓	✓	—	—	—	✓	✓
	Ghafourian Shagerdi et al. [55]	✓	—	—	✓	—	—	✓	—	—	—
	Noorbakhsh and Akbarian [57]	—	—	—	—	—	✓	—	—	✓	—
	Fayazi Azad et al. [58]	✓	✓	—	✓	✓	—	✓	✓	—	✓
	Seyed Javadin et al. [59]	✓	✓	—	✓	✓	—	✓	—	—	✓
Total		**8**	**6**	**3**	**9**	**7**	**3**	**7**	**2**	**6**	**7**

The numbers in the Total row show that how many studies of 12 studies, has focused on each dimension, in our opinion as it is not a statistical issue related to a population, significance does not make sense to be addressed.

Table 7: Process of determining the main components of the research (source: author).

Position	Researchers	Customer interaction dynamics	Competitor-based pricing	Income-based pricing	Value-based pricing	Operation-based pricing	Pricing based on psychological characteristics
International research	Chen et al. [62]	—	✓	—	—	✓	—
	TM and Mahanty [63]	—	—	✓	✓	✓	✓
	Kalaitzi et al. [64]	✓	—	✓	—	—	—
	Pang and Tan [65]	—	✓	—	✓	✓	✓
	Li and Yi [66]	—	✓	—	✓	✓	—
Domestic	Ranjbar and Sahebi [67]	✓	✓	—	—	—	—
	Jamali and Karimi Asl [69]	—	—	—	✓	✓	—
	Rahmani et al. [70]	—	✓	—	✓	✓	—
	Total	**2**	**5**	2	**5**	**6**	**2**

The numbers in the Total row show that how many studies of 8 studies, has focused on each dimension, in our opinion as it is not a statistical issue related to a population, significance does not make sense to be addressed.

Table 8: The critical analysis process of screened researches (source: author).

Research position	Paper	Critical evaluation criteria										
		Research objectives	The logic of the research method	Research design	Sampling	Data collection	Reflectivity	Ethical considerations	Accuracy of analysis	Theoretical and clear expression of findings	Value of research	Total
International research	Farham-Nia and Ghaffari-Hadigheh [61]	2	3	2	1	2	3	2	2	3	2	32
	Chen et al. [62]	3	4	4	4	3	4	4	4	3	4	37
	TM and Mahanty [63]	4	5	5	3	4	3	3	3	4	4	38
	Kalaitzi et al. [64]	4	3	4	3	4	3	3	4	3	3	33
	Pang and Tan [65]	4	3	3	4	5	5	4	4	3	4	39
	Li and Yi [66]	4	4	5	4	3	3	4	3	3	4	37
Domestic research	Ranjbar and Sahebi [67]	4	3	4	5	3	4	3	3	3	3	35
	Mahmoudi et al. [68]	2	2	1	2	3	2	3	2	3	2	22
	Jamali and Karimi Asl [69]	3	4	4	4	4	4	3	4	5	5	40
	Rahmani et al. [70]	4	3	4	3	4	4	3	4	4	4	35

Table 9: Interpretive analysis on the reciprocal matrix of functioning of competitive supply chain pricing with social responsibility (source: author).

			T1	T2	T3	T4	T5	T6	T7
Components	Competitive supply chain pricing functions	R1			Economic dimension as the basis for the functioning of competitor-based pricing	Beneficiary dimensions as the basis for the functioning of competitor-based pricing		Ethical dimension as the basis for the functioning of competitor-based pricing	Institutional dimension as the basis for the functioning of competitor-based pricing
		R2	Environmental dimension as the basis for the functioning of operation-based pricing		Economic dimension as the basis for the functioning of operation-based pricing				Institutional dimension as the basis for the functioning of operation-based pricing
		R3	Environmental dimension as the basis for the functioning of value-based pricing	Social dimension as the basis for the functioning of value-based pricing		Beneficiary dimension as the basis for the functioning of value-based pricing	Voluntary dimension as the basis for the functioning of value-based pricing	Ethical dimension as the basis for the functioning of value-based pricing	
						Investor's risks Propositions			

Table 10: Reciprocal matrix of functioning of competitive supply chain pricing with social responsibility (source: author).

Propositions Components	*A*/*B*	Environmental dimension *T*1	Social dimension *T*2	Economic dimension *T*3	Beneficiary dimension *T*4	Voluntary dimension *T*5	Ethical dimension *T*6	Institutional dimension *T*7	
Functioning of competitive supply chain pricing based on competitors	*R*1	0	0	1	1	0	1	1	
Functioning of competitive supply chain pricing based on operations	*R*2	1	0	1	0	0	0	1	Judicial Components
Functioning of competitive supply chain pricing based on customer value	*R*3	1	1	0	1	1	1	1	
					Investors' risks Propositions				

Table 11: Reachability matrix (source: author).

Social responsibility dimensions			Propositions: Environmental dimension $T1$	Social dimension $T2$	Economic dimension $T3$	Beneficiary dimension $T4$	Voluntary dimension $T5$	Ethical dimension $T6$	Institutional dimension $T7$
Propositions	Environmental dimension	$T1$	1	0	0	1	0	0	0
	Social dimension	$T2$	1	1	0	1	0	0	0
	Economic dimension	$T3$	0	0	1	0	0	0	0
	Beneficiary dimension	$T4$	0	0	0	1	1	0	0
	Voluntary dimension	$T5$	1	1	0	0	1	0	0
	Ethical dimension	$T6$	1	1	0	1	1	1	0
	Institutional dimension	$T7$	0	1	1	0	1	1	1

Table 12: Score percentages for the level of effectiveness of social responsibility propositions of knowledge-based oil companies (source: author).

Reference variable			Direct effectiveness	Transferable effectiveness	Interpretive effectiveness	Overall effectiveness	Percentage of interpretive effectiveness
Propositions	Environmental dimension	$T1$	2	0	2	4	9.75
	Social dimension	$T2$	3	1	1	5	12.19
	Economic dimension	$T3$	1	3	2	6	14.63
	Beneficiary dimension	$T4$	2	0	2	4	9.75
	Voluntary dimension	$T5$	3	1	1	5	12.19
	Ethical dimension	$T6$	5	2	2	9	21.98
	Institutional dimension	$T7$	6	0	2	8	19.51
	Total		22	7	12	41	
	Percentage		53.65	17.07	29.28		

Table 13: Pairwise comparison of social responsibility propositions (source: author).

No	Pairwise comparison	Yes/No	Description of the effect
☐$T1$ Pairwise comparison in the environmental dimension			
1	$T1 - T2$	Yes ☐ No ☒	
2	$T2 - T1$	Yes ☒ No ☐	Social dimension as the basis for the effectiveness of the environmental dimension of corporate social responsibility
3	$T1 - T3$	Yes ☐ No ☒	
4	$T3 - T1$	Yes ☐ No ☒	
5	$T1 - T4$	Yes ☒ No ☐	Environmental dimension as the basis for the effectiveness of the beneficiary dimension of corporate social responsibility
6	$T4 - T1$	Yes ☐ No ☒	
7	$T1 - T5$	Yes ☐ No ☒	
8	$T5 - T1$	Yes ☒ No ☐	Voluntary dimension as the basis for the effectiveness of the environmental dimension of corporate social responsibility
9	$T1 - T6$	Yes ☐ No ☒	

Table 13: Continued.

No	Pairwise comparison	Yes/No	Description of the effect
10	$T6 - T1$	Yes ☒ No ☐	Ethical dimension as the basis for the effectiveness of the environmental dimension of corporate social responsibility
11	$T1 - T7$	Yes ☐ No ☒	
12	$T7 - T1$	Yes ☐ No ☒	

Table 14: Investigating the interpretive effectiveness of the functioning of competitive supply chain pricing (source: author).

Functioning of competitive supply chain pricing			Components		
			$R1$	$R2$	$R3$
Components	Functioning of competitive supply chain pricing based on competitors	$R1$	1	1	1^*
	Functioning of competitive supply chain pricing based on operations	$R2$	1	1	1^*
	Functioning of competitive supply chain pricing based on customer value	$R3$	1	1^*	1^*

Table 15: Prioritizing the level of dependency and influence of competitive supply chain pricing function (source: author).

Functioning of competitive supply chain pricing			Components			Evaluation criteria		
			$R1$	$R2$	$R3$	Dependency level D	D-B difference	Rank
Components	Functioning of competitive supply chain pricing based on competitors	$R1$	—	**1**	**1**	**2**	**−2**	**3**
	Functioning of competitive supply chain pricing based on operations	$R2$	**1**	—	**2**	**3**	**0**	**2**
	Functioning of competitive supply chain pricing based on customer value	$R3$	**3**	**2**	—	**5**	**2**	**1**
	Influence level B		**4**	**3**	**4**	**10**		

Table 16: Set of output, input indicators, and common elements of propositions (source: author).

Propositions	Abbreviation	Output proposition	Input proposition	Common elements	Level
Environmental dimension	$T1$	1, 4	1, 2, 3, 5, 6	1	Second level
Social dimension	$T2$	1, 2, 4, 7	2, 5, 6, 7	2, 7	Third level
Economic dimension	$T3$	1, 3, 4, 6	3, 6, 7	3, 6	Fourth level
Beneficiary dimension	$T4$	4	1, 2, 3, 4, 6, 7	4	First level
Voluntary dimension	$T5$	1, 2, 5, 7	4, 5, 6, 7	5, 7	Fifth level
Ethical dimension	$T6$	1, 2, 3, 4, 5, 6, 7	1, 6, 7	1, 6, 7	Sixth level
Institutional dimension	$T7$	2, 3, 4, 5, 6, 7	2, 5, 6, 7	2, 5, 6, 7	Fifth level

the research in this section are the most effective by consulting Tables 9, 10, 13, and 16.

Based on the results, it was found that the effective layers of the dimensions of social responsibility in knowledge-based companies in the oil field have six levels, so that the beneficiary dimension is in the first level. The least practical size of social responsibility and the most effective component is related to the ethical size of social responsibility in knowledge-based companies in the oil field. According to the explanations given, a conical matrix is provided in Figure 8 to show the effectiveness of the dimensions of social responsibility in Figure 4 as follows:

As can be seen, the two propositions of credit risk ($B6$) and inflationary risk ($B6$) are the two bases of risk in oil companies' stock investments that investors are more likely to face, as they are in the last level of Figure 4, i.e., the fourth level. Finally, now that the most influential risk propositions of oil companies' investors' weights are given to each of the research components, namely, the dimensions of the judicial accounting paradigm. In other words, this section seeks to determine the most critical size of judicial accounting by determining the effectiveness level of risk propositions of oil companies' investors (Table 17).

The rankings in choosing the most useful components of the research are similar both interpretively and by weight when compared to the straightforward interpretive prioritization process in Table 18 and the interpretive prioritization in the table above on the operation of competitive supply chain pricing. The following table provides a comparison of these findings (Table 19).

In reality, it should be noted that the high weight of each component in the analysis of the interpretative prioritizing

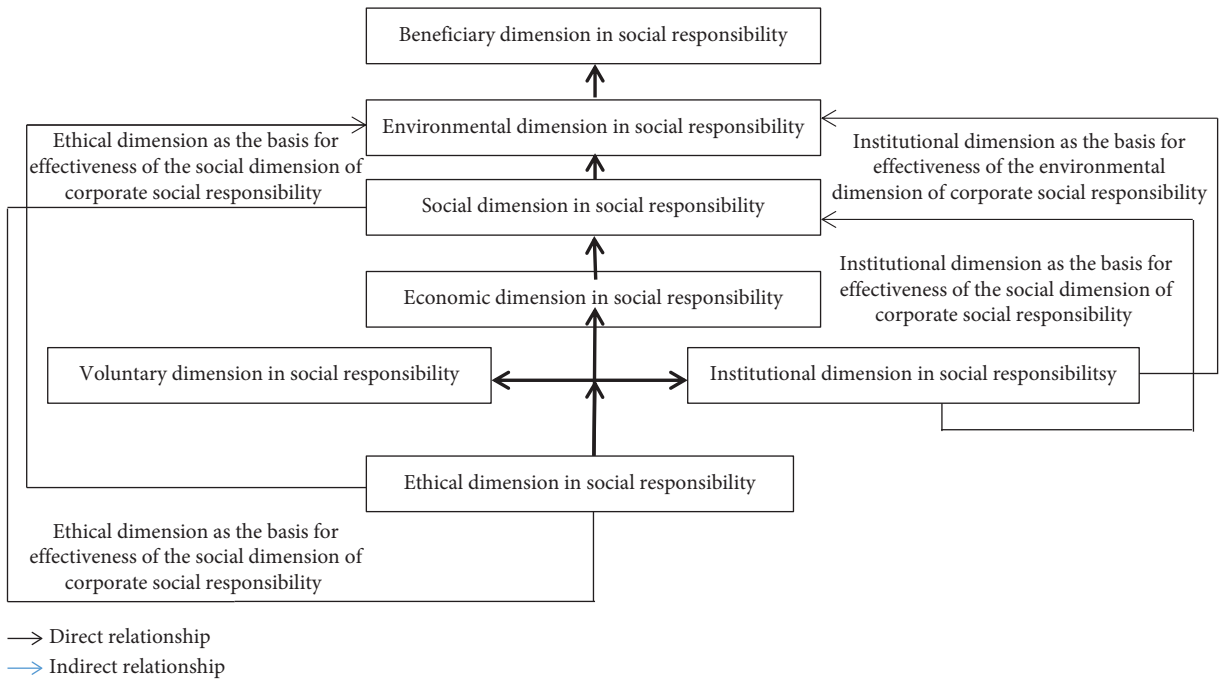

Figure 8: Classifying the dimensions of social responsibility of knowledge-based oil companies (source: author).

Table 17: Selection of the most important component of functioning of competitive supply chain pricing (source: author).

Functioning of competitive supply chain pricing		$R1$	$R2$	$R3$	Dependency level D	D-B difference	Rank
Functioning of competitive supply chain pricing based on competitors	$R1$	—	0.68	1.09	1.77	−1.24	3
Functioning of competitive supply chain pricing based on operations	$R2$	0.54	—	2.13	2.67	−0.66	2
Functioning of competitive supply chain pricing based on customer value	$R3$	1.93	2.65	—	4.58	1.36	1
Influence level B		3.01	3.33	3.22			

Table 18: Reachability matrix in terms of transferability of the relationship between the propositions (source: author).

Social responsibility dimensions			Propositions: Environmental $T1$	Social $T2$	Economic $T3$	Beneficiary $T4$	Voluntary $T5$	Ethical $T6$	Institutional $T7$
Propositions	Environmental	$T1$	1	0	0	1	0	0	0
	Social	$T2$	1	1	0	1	0	0	1*
	Economic	$T3$	1*	0	1	1*	0	1*	0
	Beneficiary	$T4$	0	0	0	1	1	0	0
	Voluntary	$T5$	1	1	0	0	1	0	1*
	Ethical	$T6$	1	1	1*	1	1	1	1*
	Institutional	$T7$	0	1	1	1	1	1	1
Effect determination process			Direct effect			Transferable effect			

Table 19: Comparative rankings for the simple and weighted interpretive prioritization process (source: author).

	Functioning of competitive supply chain pricing based on competitors	Functioning of competitive supply chain pricing based on operations	Functioning of competitive supply chain pricing based on customer value*
	$R1$	$R2$	$R3$
Weighted interpretive ranking	3	2	1
Simple interpretive ranking	3	2	1

process (IRP) weights denotes that component's higher level of importance in the target population. Based on this finding, it should be noted that in knowledge-based oil companies, the function of competitive supply chain pricing based on customer value, which has the highest level of priority among the components of competitive supply chain pricing function, is the most effective under the ethical dimension of social responsibility.

4. Discussion and Conclusion

This study is set out to determine how competitive supply chain pricing based on social responsibility factors functions is best for oil products produced by knowledge-based businesses. Based on the research findings, 3 competitive supply chain pricing functions and 7 propositions linked to the dimensions of social responsibility in knowledge-based enterprises in the oil field were found in response to the study's first and second questions. According to the findings, the proposal of the ethical dimension in social responsibility, which can produce competitive supply chain pricing functions based on value, was discovered to be the most probable dimension of social responsibility in knowledge-based enterprises in the oil field. In fact, the ethical dimension, which refers to the development of professional ethics procedures in line with the nature of knowledge-based companies based on the development of knowledge-based products, creates corporate social responsibility mechanisms and makes them resolutely accountable to stakeholders while strengthening social beliefs regarding their performance to advance the national and domestic economy more thoroughly. Simply put, since oil is regarded as a strategic product in our nation's economy, emphasizing development-oriented dimensions in the field of oil and its derivatives, along with upholding ethical principles, fosters prosperity, and sustainable economic development by increasing the trust and confidence of businesses using such products as primary materials or as raw materials used. On the other hand, based on the third question of the research, it was found that under the ethical dimension of social responsibility, competitive supply chain pricing processes are based on customer values and according to the strategic relationship among the company and the economy and regional and global partners, maintaining values is a key pricing factor to develop interactions. In fact, this price function seeks to entice customers' mentalities toward using the goods of domestic and Iranian knowledge-based businesses in order to win their trust and confidence and thereby provide value for their clients. Knowledge-based businesses will be able to strategically assess their competitive position in this situation, plan for potential future situations, and promote their products to meet the needs of their consumers based on value-based competitive supply chain pricing. The obtained result is consistent with the researches of TM and Mahanty [63], Pang and Tan [65], Li and Yi [66], and Jamali et al. [69]. Given in the results, in the first step for success, knowledge-based companies are recommended to consider the priorities of professional ethics in addition to knowledge in order to be able to gaining the trust of customers, by understanding their functional nature in the country's developing economy. In this situation, the pricing process based on the creation of comprehensive values for customers can help to increase the company's competitive position and make these companies to be at the first level of strategic interactions with companies that use petroleum products. Finally, as the results of this study may not be completely generalized to other populations, the researchers are suggested to apply the same study in other communities with diverse products.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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