

Identifying and Ranking the Factors Influencing Supply of Machinery on the Agility of Supply Chain Management (Case Study: Pressure Vessel Mills CNG)

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Abstract: The aim of this study examined the relationship between identify and rank the factors affecting supply management for supply chain agility is CNG pressure vessels. The aim of this study is an applied research is a descriptive survey research data collected. The population of the investigation is mills CNG pressure vessels. Survey data collected through interviews and questionnaires. Cronbach's alpha was used to assess the reliability of the values obtained 0.778 which indicates that the questionnaire is of good reliability and the questionnaire has 27 questions. Also, due to the volume of statistical population is 270 people. The results show that there is a positive relationship between the empowerment of supply chain agility. Ability and agility to the supply chain agility positive. Driving agility on a positive supply chain agility. Price has a positive impact on supply chain agility.

Key words: Supply chain agility, empowerment, skills agility, drive agility, cost

INTRODUCTION

Increased competition in the decade 1990 organizations will have to improve the efficiency in many aspects of its business. That's why industry leaders have realized that it is not enough merely to produce a quality product but also to supply products according to the demands of the customer (when, where how) the quality and cost are cared for. In such circumstances, found that organizations have to manage the units that provide inputs organizations as well as delivery and after-sales service centers linked to the product to the customer, pay.

Supply chain management engineering is one of the new topics that are trying to use the powerful tools known in the field and its related disciplines, goals such as supply demand management, reducing costs and risks associated with investments and increase competitive ability in the world of Millennium third fulfill. Research areas and have a lot of work in the field of supply chain researchers and experts in the field of study is located. One of these are the design of the supply chain. Supply chain design policies for strategic, tactical and operational even used in the collection.

Such as location, facilities, set open or closed the facility and determine how the relationship between them, scoping and optimization goals such as issues are considered in the design of the supply chain. Supply

chain design includes mathematical modeling based on the nature and characteristics of the supply chain and its resolution accurate methods have been optimized and are approximate.

In recent years, Supply Chain Management (SCM) due to the globalization of business has become more important. Supply chain management process of planning, implementation and effective control of supply chain operations. Two effective way to maintain competitive advantage and improve the performance of the organization. Shorter product life cycles, the emergence of new technologies, enhancing the relations between the suppliers and product development, supply chain complexity will advance to the side. With increasing complexity, the level of uncertainty and risk also increases chain. Overall, this study seeks to answer these questions:

- Are the identification and ranking of factors affecting supply management for supply chain agility CNG pressure vessels there a relationship?

Questions and research hypotheses

Research questions:

- Is the supply chain agility enabling effective?
- Has the ability of agile supply chain agility is effective?

- Do drivers on the agility of supply chain agility is effective?
- Is it cost effective supply chain agility?

Research hypotheses:

- Empower the effective supply chain agility
- Ability of effective supply chains agility
- Effective supply chain agility is driving agility
- Cost effective supply chains agility

Theoretical research

Literature (supply chain management): A set of methods for effective and efficient integration of suppliers, manufacturers, warehouses and dealers in such a way that the need to minimize system cost and realization of services, goods numbers in the right place at the right time production and distribution are suitable. Coordination of supply chain management in production, inventory, location and transport between the participants in a supply chain to achieve the best combination of responsiveness and efficiency for success in the market.

To gain competitive advantage in the changing business environment, companies must be in line with efficient operations with suppliers and customer is king and to obtain an acceptable level of agility to collaborate and cooperate. Subsequently, agile supply chains and significant competitive proposals for honoring the customers and staff. Therefore, an agile supply chain is able to in an appropriate way to changes that occur in the workplace, answer. Agility in the supply chain can be defined as: the ability of a supply chain to respond quickly to changes in market and customer needs.

Supply chain management: Set of effective methods for integrating suppliers, manufacturers, warehouses and dealers in such a way as to minimize system costs and fulfill the needs of services, goods to the right place at the right time in the correct number of their production and distribution. Coordination of supply chain management in production, inventory, location and transport between the participants in a supply chain to achieve the best combination of responsiveness and efficiency for success in the market.

Integrated supply chain management philosophy to the management of the distribution from suppliers to end users and as a managerial philosophy including the amount and scope of integrated actions for cooperation between the customer and the supplier is in the process of integrating external.

Supply chain management literature has been defined in different ways and some of the most important and valid definitions are listed below.

In a supply chain management, the producer and their suppliers, buyers and customers spread in other

words, all members of the organization, work together to jointly to market a product or service that the customer is willing to pay these partner companies as an act of expanding the shared resource is uniquely optimized to achieve a competitive advantage. The result is a high-quality product or service, easy availability and low cost (Huang *et al.*, 2011).

Supply chain management involves the integration of business processes to meet the primary end use is of a product, service or information that provides value to its customers (ibid).

Supply chain management includes all the steps that are active directly or indirectly in the customer demand estimate only includes production and supplier is not carrying quotations, warehouses, retail down methods, including dehumidified (ibid).

Supply chain agility: To gain competitive advantage in the changing business environment; companies must be in line with efficient operations with suppliers and customer is king and to obtain an acceptable level of agility to collaborate and cooperate. Subsequently, agile supply chains and significant competitive proposals for honoring the customers and staff. Therefore, an agile supply chain is able to in an appropriate way to changes that occur in the workplace, answer. Agility in the supply chain can be defined as: the ability of a supply chain to respond quickly to changes in market and customer needs.

A winning strategy for growth is even vital some organizations, the agile approach seems a logical step in the supply chain (Sharif and Ismail), agile word in the dictionary, means to move fast, agile, active, able to move on quickly and easily and being able to think for bold and with a clever method is used but in the current climate, meaning agility to respond to changing environments and non-effective, predictable and changes as opportunities for its use organizational development.

Agility in the supply chain can be defined as: the ability of a supply chain for a rapid response to changes in market and customer needs.

According to the scholars of supply chain agility in the supply chain as a whole and its members' ability to quickly align the network with fluctuations in the dynamics and requirements of the clients. Parallel developments in the areas of agility and SCM introduce the concept of "agile supply chain" led to him being one of the first promoters of agility in the supply chain, a supply chain for agile is that you really should have four characteristics: first sensitive the ability of the supply chain in understanding and responding to actual demand in the secondary market unlimited use of information technology and information sharing between buyers

and suppliers to share virtual supply chain using advanced electronic devices such as Electronic Data Interchange (EDI), etc., it quickly helps the exchange of information and transparency; third process integration: cooperation between buyers and suppliers, the development of common principles, common systems and shared information and ultimately interested network the understanding that a single company cannot be successful and the supply chain. You should consider a network. Lin and colleagues developed a model of the agile supply chain based on the literature. In this conceptual model such as dimensions and component supply chain agility drivers, capabilities, empowerment and agility objectives have been paid (Jayaraman and Ross, 2003).

Agile suppliers: Following the first meeting of scientific experts and industry executives, a new paradigm in a report entitled “strategy of manufacturing enterprises in the 21st century: industrial expert opinion” published by the Institute Yakuka and was introduced to the public. Soon after the agile manufacturing jointly with the public release of the report was used.

Various researchers to identify and assess the main factors of supply chain agility are an organization that has been done which continues to introduce and explain its characteristics will be discussed. Goldman agility in three words strategic response, relief and dominant summarizes the changes sweeping system. He believes that agility is a comprehensive and complete response to fundamental changes in the system of governing business competition in economy class on the Goldman.

Following the first meeting of scientific experts and industry executives, a new paradigm in a report entitled “Strategy of Manufacturing Enterprises in the 21st Century: Industrial Expert Opinion” published by the Institute Yakuka and was introduced to the public. Soon after the agile manufacturing jointly with the public release of the report was used.

A supply chain consists of three parts: upstream, this section contains measures that a company in the first layer in conjunction with their suppliers and their relationship with suppliers with lower layers do. Supplier relationships can be developed at different levels of the first suppliers of materials in the supply and preparation activities. The second part of the internal supply chain; it includes all activities that are within the organization and are done for inputs into outputs. This process since the arrival of raw materials to the organization until the goods out of the organization and is the distributor. This study, mainly to production management, manufacturing and inventory control deals. The third part of the supply

chains downstream which includes all activities that are done in shipment to the original client. This includes the distribution chain, warehousing, transportation and after-sales service. Any activity that adds value to the product or service, part of the supply chain and product life cycle encompass (Christopher and Towill, 2001).

Different components of the supply chain typically have different objectives are conflicting. For example, providers with high-volume purchases from producers want and have a stable and flexible delivery date. Unfortunately, although most manufacturers tend to have long production cycles, should be flexible to changing customer needs and demand. Thus, the goal’s provider is flexibility in the face of demands for manufacturers. Also, manufacturers aim to produce great production values usually for the purposes of warehousing and distribution centers who want to reduce inventory in the conflict. Worse, the decline in volumes means more frequent transit operations in distribution and therefore, higher cost of transportation.

Supply chain is a dynamic system that evolves over time. Not only customer demand and supplier capabilities change over time but also, supply chain relationships evolve over time. For example, by increasing the purchasing power of customers, pressure on manufacturers and suppliers to produce diverse and quality products and ultimately increase the production of customized products (Jharkharia and Shankar, 2005).

At a time when agility as a winning strategy for growth and even survival of some organizations raised or selected agile approach seems a logical step in the supply chain. In terms of supply chain agility in their supply chain as a whole and its members’ ability to quickly align the network with the dynamics and volatility on customer’s requirements. Parallel developments in the areas of agility and SCM introduce the concept of “agile supply chain” was leading. In his view, one of the promoters of agility in the supply chain, a supply chain for agile is that you really should have four characteristics: first sensitive to market: the ability of the supply chain in understanding and responding to actual demand in the secondary market unlimited use of information technology and information sharing between buyers and suppliers to share virtual supply chain using advanced electronic devices such as Electronic Data Interchange (EDI) and so quickly and transparency will help exchange information; third process integration: cooperation between buyers and suppliers, the development of common principles, common systems and shared information and ultimately benefit the network: understanding that company alone cannot succeed and supply chain should consider a network. Lin and

colleagues developed a model of the agile supply chain based on the literature. In this conceptual model such as dimensions and component supply chain agility drivers, capabilities, empowerment and agility objectives have been paid (Lin *et al.*, 2006).

Van Hoek after multiple studies to be agile supply chain operations presents three characteristic: management and use of fluctuations and distortions; rapid response; accountability unit and in a small volume. Sou afford at the end of his letter-based framework for agile supply chain flexibility and agilities are affected state's flexibility in different parts of the supply chain, including product development, procurement and sourcing, manufacturing and distribution. Gonaskarano colleagues introducing the notion of "Responsive Supply Chain" (RSC) as a competitive strategy of the network economy enjoyed trying new dimensions of responsiveness, speed and flexibility in the supply chain are investigated and explained (Ibid). Following the first meeting of scientific experts and industry executives, a new paradigm in a report entitled "Strategy of Manufacturing Enterprises in the 21st Century: Industrial Expert Opinion" published by the Institute Yakuka and was introduced to the public. Soon after the agile manufacturing jointly with the public release of the report were used.

In a study in 2009 by Pandey and Garj as analysis of the interaction between the enables of agility in the supply chain have taken place, thirty six enabling studies from other researchers that the researchers have put them in twelve categories. The twelve empowerment to achieve supply chain agility is provided, their influence on each other to investigate and evaluate how these potentiation together. The twelve enables include:

- Automatic off (automatically or manually replacing production with CAM, CAD)
- Mutual trust and communication between buyer and seller
- Integration and participation in production planning and buying
- Integration process
- The use of information and communication technology tools
- Logistics management and planning
- JIT production approach
- Understand the market imbalance (confusion)
- Timely delivery and reasonable
- Reduce costs
- Improve quality
- Customer satisfaction

In another study on the topic of CAM, CAD tool to achieve agility by Rajanayagam has been done to introduce some agility capabilities have already been mentioned by other scientists is paid. This study examines the impact of systems CAM, CAD on organizational agility has introduced the following capabilities:

- Production and rapid recovery of the product
- Restructuring processes dynamically
- Improve the product
- Changes to improve the product
- Reduce delivery time and product shelf life and meet the diversity of demand and new technology
- Ability to perform instrumental works continuously and respond to unpredictable changes
- Size low demand and relatively short lifetime of the product

In this study, agile manufacturing indices also pointed out that although this index is derived from other studies. These features include:

- Reducing the production cycle time
- Dynamic structured production process
- Reduce production costs
- Restructuring product and production at minimum cost
- Improved quality

Background research: Rabieh (2005) in a study entitled modeling inventory management and order planning in the case of several supplier's manufacturers case study: esfahan steel company to select the supplier of raw materials to the issues of inventory management and the optimum combination of use of such as drug the specific case study (single agglomeration Esfahan steel company) payment. In this study, inventory (raw materials) using classification method's inventories (ABC and VED) classification and identification of raw materials as the materials and the provision of such as model taking into account the total cost of logistics, property's suppliers and buyers as well as the optimal combination was designed. He is a base model (model Ghodsi pour and O'Brien and five other models offered terms. He that among these models, two models (mixed integer linear programming) recognized the appropriateness and actual data test two consecutive years, then it was found that the ratio of the actual cost models shows good performance.

Rabia and Arman study as a model for supplier selection in receive mode receive the immediate approach of suppliers and at the same time reducing the number of suppliers to extend Ghodsi pour and O'Brien (base model) out, assuming that shipments received from suppliers due to certain circumstances forced to orders received in the first period and for specific states and pour the holy O'Brien applicable may not be of some use. Furthermore, in this study were changes in the base model in terms of lower limits.

Hushmandi Maher in a study entitled Mathematical Modeling of Supplier Selection Using Multiple Criteria Decision Makings, a Case Study: Chain Store Payment Citizen. A researcher integrated approach to supplier selection and rationing the demand came between them. A researcher in order to achieve the aims of the research, to design a model that simultaneously considers multiple criteria decision making capabilities of the two techniques, the Analytical Network Process (ANP) and multi-objective mixed integer linear programming has benefited. The output of this model is the most suitable suppliers to satisfy the demand of selected items, plus the amount of their quota, according to the intended purpose.

Bagherzadeh Azar and Darry study of the use of ANP to select the best suppliers of parts, pieces performed in four supplier companies were compared. Multiple Criteria Decision-Making Model three clusters strategic vendor selection criteria, sub-criteria and is the alternative. The results showed the most striking target more market shares and most important factor in vendor selection for its facilities and technology.

Ketabi study as multi-criteria selection of suppliers using fuzzy AHP did. This study was conducted to select the best supplier of plastic parts company. In this study, three Saina industry supplier based on product performance, service and performance criteria were compared supplier and finally was chosen the best supplier.

Rashidzadeh study of the selection of suppliers in supply chain process using network analysis conducted in Fars Province Gas Company. The aim of this study was to select the best supplier of domestic gas meters that were developed through 5 suppliers. In this study, groups of 13 criteria in the technical, commercial and technical-trade was used. The results showed that the decision criteria, technical criterion (financial power) is the highest relative importance.

Development of theories and conceptual models:

Today, supply chain has become a critical factor in global markets, so that in the global arena, the main competition in the supply chain. Stadler supply chain network of organizations connected upstream to down stream knows the processes and activities involved and the products and services provided to the end customer, create value. In other words, the supply chain includes two or more organizations that the flows of materials, information and money are interrelated (Liu *et al.*, 2009).

Supply chain management, warehouse management is the result of evolution. This concept was introduced in the early 1990s and in recent years, due to the globalization of markets and increased competition has become more important (Ibid).

One of the ways to improve the performance of organizations in manufacturing, service and achieve a competitive advantage is the efficient management of the supply chain. Creating an integrated supply chain creates a competitive advantage for the organization. Supply chain management includes all the activities that the link between suppliers, distributors and customers to apply the right amount and at the right time and place the goods with the objective of minimizing system costs and maximize customer service levels, produced and distributed. In other words, the supply chain is the result of combining the different operational circles at the beginning of the end of its suppliers and customers are (Fig. 1).

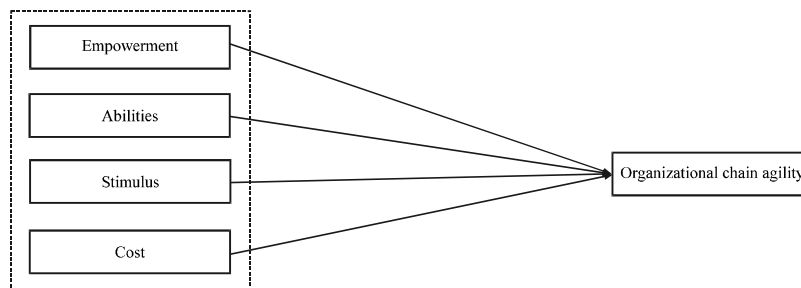


Fig. 1: Conceptual model

MATERIALS AND METHODS

The aim of this study is an applied research is a descriptive survey research data is collected. In this study, descriptive statistics (average variance, etc.) to describe the population and inferential statistics for the analysis of the components t-test to determine the significance of the difference between the mean and also confirm or reject hypotheses have been used. The population of this research was to mills CNG pressure vessels. Recent survey data collected through interviews and questionnaires. Cronbach’s alpha was used to measure the reliability of a value that is obtained 0.778 indicates indicate this these are reliability indexes. Also furthermore, this study to examine the validity of the methods used validity. It should be noted that the questionnaire contained 27 questions. In addition, due to the volume of research population is 270 people. Given the number of variables and questionnaires using the range Q15>N>Q5 selected sample of 200 people was taken.

RESULTS AND DISCUSSION

Enabling the effective supply chains agility:

- The null hypothesis: enabling the agility of supply chain efficiency
- The hypothesis: the empowerment of an effective supply chains agility

According to Table 1 and 2 is greater than the value of the test statistic 10.65 and 1.96, upper and lower limit signs means and positive significance level of 0.000 which is <0.05 in according to the evidence, we can conclude that the null hypothesis is rejected and the hypothesis is confirmed. The null hypothesis as lack of empowerment effect on supply chain agility enabling impact on supply chain agility and hypotheses of this study was to define the test the null hypothesis is rejected, the same lack of effectiveness and in terms of employee empowerment significant effect on supply chain agility is confirmed. According to Table 1, the mean comments 3.66 are also higher than the average hypothetical 3. This means that staff have considered the relationship between them up (Table 3):

- Hypothesis 2: effective supply chain agility is the ability agility
- The null hypothesis: the ability of agile supply chain agility is not effective
- The hypothesis: effective supply chain agility is the ability agility

Table 1: Statistics related to the first hypothesis

SE	SD	Average	Sample size
0.06	0.87	3.66	200

Table 2: t-test for the first hypothesis

The value of test = 3

The test statistic	Degrees of freedom	The level of significance	The differences between the average	The average confidence interval 95%	
			Average	Upper limit	Lower limit
10.65	199	0.000	0.66	0.78	0.53

Table 3: Statistics related to the second hypothesis

SE	SD	Average	Sample size
0.05	0.71	3.56	200

Table 4: t-test for the second hypothesis

The value of test = 3

The test statistic	Degrees of freedom	The level of significance	The differences between the average	The average confidence interval 95%	
			Average	Upper limit	Lower limit
11.19	199	0.000	0.56	0.66	0.46

Table 5: Statistics related to the third hypothesis

SE	SD	Average	Sample size
0.05	0.70	3.81	200

According to Table 4 is greater than the value of the test statistic 11.19 and 1.96, upper and lower limit signs means and positive significance level of 0.000 which is <0.05 in according to the evidence, we can conclude that the null hypothesis is rejected and the hypothesis is confirmed. The null hypothesis as lack of effect on supply chain agility and dexterity capability’s hypothesis of this study was defined as the impact of supply chain agility capabilities that the test rejects the null hypothesis that the lack of effectiveness and in terms of staff ability’s agility significant effect on supply chain agility is confirmed. According to the Table 3, average is 3.56 comments are also higher than criterion 3. This means that staff have considered the relationship between them up (Table 5):

- Hypothesis 3: effective supply chain agility is driving agility
- The null hypothesis: agility drivers on the agility of supply chain efficiency
- The hypothesis: effective supply chain agility is driving agility

According to Table 6 is greater than the value of the test statistic 16.35 and 1.96, upper and lower limit signs means and positive significance level of 0.000 which is <0.05 as a result, according to the evidence, we can

Table 6: t-test for the third hypothesis

The value of test = 3

The test statistic	Degrees of freedom	The level of significance	The differences between the average	The average confidence interval 95%	
			Upper limit	Lower limit	
16.35	199	0.000	0.81	0.90	0.71

Table 7: Statistics related to the fourth hypothesis

SE	SD	Average	Sample size
0.04	0.67	3.43	200

Table 8: t-test for the fourth hypothesis

The value of test = 3

The test statistic	Degrees of freedom	The level of significance	The differences between the average	The average confidence interval 95%	
			Upper limit	Lower limit	
9.21	199	0.000	0.43	0.53	0.34

conclude that the null hypothesis is rejected and the hypothesis is confirmed. The null hypothesis as lack of agility stimulating effect on supply chain agility and hypothesis of this study was defined as the impact of supply chain agility drivers on the agility that the test rejects the null hypothesis that the lack of effectiveness and from the perspective of employees' agility triggers a significant effect on supply chain agility is confirmed. According to Table 5 in average reviews 3.81 which is also higher than criterion 3. This means that staff have considered the relationship between them up (Table 7).

- Hypothesis 4: cost effective supply chains agility
- The null hypothesis: cost effective supply chains agility
- The hypothesis: cost effective supply chains agility

According to Table 8 is greater than the value of the test statistic 9.21 and 1.96, upper and lower limit signs means and positive significance level of 0.000 which is <0.05 in according to the evidence, we can conclude that the null hypothesis is rejected and the hypothesis is confirmed. The null hypothesis as lack of effect on the cost of the supply chain agility and hypotheses of this study was defined as the impact of cost on supply chain agility in this test the null hypothesis is rejected, the same lack of effectiveness and in terms of staff costs is a significant effect on supply chain agility is confirmed. According to Table 7 comments also 3.43 average that is higher than criterion 3. This means that staff have considered the relationship between them up.

CONCLUSION

In summary, the results of the research hypotheses are as follows:

Secondary research hypotheses

Enabling the effective supply chains agility: The test statistic is greater than the 10.65 and 1.96, upper and lower limit signs mean and positive significance level of 0.000 which is <0.05 as a result, according to this testimony can be said that the null hypothesis is rejected and the hypothesis is confirmed. This means that staff have considered the relationship between high and this suggests is that empowerment is effective supply chain agility.

Effective supply chain agility is the ability agility: The 11.19 and 1.96 test statistic are greater than the upper limit and lower average positive signs and the significance level of 0.000 which is <0.05 as a result, according to the evidence, we can conclude that the null hypothesis is rejected, and the hypothesis is confirmed. This means that staff have considered the relationship between high and this suggests that effective supply chain agility is the ability agility.

Agility driver on the agility of the supply chain is effective: The test statistic is greater than the 16.35 and 1.96, upper and lower limit signs mean and positive significance level of 0.000 which is <0.05 as a result, according to the evidence, we can conclude that the null hypothesis is rejected and the hypothesis is confirmed. This means that staff have considered the relationship between high and this suggests that effective supply chain agility is driving agility.

Cost effective supply chains agility: The test statistic is greater than the value of 9.21 and 1.96, upper and lower limit signs mean and positive significance level of 0.000 which is <0.05 as a result, according to the evidence, we can conclude that the null hypothesis is rejected and the hypothesis is confirmed. This means that staff have considered the relationship between high and this suggests that the cost-effective supply chain agility.

Proposals of research findings: Rank and prioritize agility drivers of each of the indicators in the variable specified. That the structure, design capabilities and system variables agility drivers are involved in defining quality. Given the positive impact on the quality system is proposed supply chain agility by enhancing product quality in accordance with international standards and updated of technology, product quality assessment be subsequently increased competition and increased market share. Due to the impact of supply chain agility is suggested that among car designers and the design of effective communication be established to shape and structure of this product in use and application efficiency is higher.

Rank and priority of each of the indexes is specified in the variable abilities' agility. That the number of strategic and vital parts affected by the sanctions, delivery time, price, flexibility and technical capabilities in explaining the varying abilities contributed agility. Through reverse engineering can be found in many technologies used in parts surrounded by localizing the product can be reduced to the percentage of the product price and also due to geographical conditions and factors affecting the production of steel products and tools that can be used in addition to the flexible production process has a significant impact on commodity prices and delivery time.

Rank the priority of each of the indexes is specified in empowerment. To arrange training of human resources, procurement of trust between users and IT development has played a role in explaining empowerment. It is suggested that given the positive impact on supply chain agility training of human resources is suggested that by holding training courses for human resources managers in the organization and Increase your company's supply chain agility. Due to the increasing development of information technology and the scientific capabilities of nearby countries (India and Russia) to Iran can be of human resources of these countries and by attending these seminars also applied scientific arena to be added.

Rank and priority of each of the indexes is specified in variable costs. That the costs of operations, financial

condition and delay in project costs have played a role in explaining the variable costs. Fixed costs of production can be produced with solutions such as proximity to sources of raw materials, hiring local workers and reduce capital spending on agents as well as capital expenditures rather than overhead costs of production (e.g., the vehicle to the rent it) can greatly reduce the product price only in Iran but this may be applicable.

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