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Investigating the Effect of Supply Chain Stability on Assaluyeh Refineries Energy Efficiency

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1. ABSTRACT

The purpose of the current research is to investigate the impact of sustainability on energy consumption in Asalouye plants, specifically focusing on the stability of the supply chain and its effect on energy efficiency. The research takes into account the geographical, technological, and cultural context of Asalouye refineries and conducts a case study to compare and examine the issue in detail. The population under investigation includes the managers and employees of Asalouye refinery centers, with a total of 15 refineries in operation. The sample size is determined based on the Morgan table, and a total of 92 people are considered as the sample. The research utilizes two questionnaires, the sustainable supply questionnaire and the researcher-made energy efficiency questionnaire, to collect data on economic, social, and environmental factors that impact energy efficiency. The data is analyzed using SPSS21 software, and the results are presented in tables that indicate the influence of sustainability on energy efficiency in Asalouye refineries. The study highlights the importance of a stable supply chain in preventing energy waste and improving efficiency in refinery operations.

Keywords: Sustainable Development, Supply Chain, Energy Efficiency, Refinery.

2. INTRODUCTION

Over the years, the concept of sustainable supply chain management has evolved to include activities such as ISO 14000, social responsibility, and 8000 codes of conduct [1, 2]. In addition to sufficient diligence in the procurement of raw materials [3] and the restriction of the use of hazardous materials, some studies have also addressed the implementation of sustainable product design in multi-tier supply chains [4, 5]. While sustainable sourcing is considered by stakeholders [6]; and improvement of investment [7] as sustainable methods, recently, maintenance and preservation of social issues that affect all levels of the supply chain and their stakeholders are also considered important [8]. These include health and safety management methods, worker welfare, human rights violations, product safety, and other products. Incorporating the concept of sustainability into supply chain network design, given the growing global population and the resulting increase in human activities and uncontrolled environmental impacts, has become an important issue for organizations, governments, people, and environmentalists. On the other hand, sustainable development requires companies to also pay attention to social and environmental consequences in their daily operations and activities. Intensified international competition, media scrutiny, and consumer awareness have made companies pay more attention to their sustainable performance [4]. Other factors, such as the increasing global population, lead to increased demand for scarce resources such as energy, water, raw materials, and land. As a result, these resources are subject to greater competition and become incompatible [3]. Therefore, producers must use less material, energy, and other inputs, have better use of substitute materials, and accept reuse, recycling, recovery, production of products at the end of their life, and strong production of sustainable consumption products [9]. Therefore, a key challenge to increasing sustainability is industrial production. The evolution of supply chain management dates back to distribution management in 1970, when there was no coordination

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between the different functions of an organization, and each was committed to achieving its own goals. The goal of supply chain management is to eliminate barriers, reduce cycle time and inventory to provide better services to customers at a lower cost. In 2000, it became essential for a company to involve suppliers and customers in the supply chain, as well as consider the interests of stakeholders, including the community, government, non-governmental organizations, and other beneficiary groups. Efficient human resources, as the most important organizational capital and as another resource user, like natural resources, have a special and unique position in the environmental management system. This study examines the impact of the sustainability of the supply chain and human resource management on energy efficiency in Asalouyeh refineries. **Dimensions of Sustainability:** In order to achieve sustainability in a supply chain, it is essential to consider the three dimensions of sustainability: economic, environmental, and social. Implementing plans and programs for sustainable development requires an integrated framework that addresses all three dimensions. **Economic Dimension:** Reducing costs is one of the primary goals when analyzing supply chain sustainability in the economic dimension. Cost reduction leads to the durability of production and resources. Reshaping the supply chain can be achieved by reducing costs, including the costs of resources used, distribution and transportation, production and maintenance, goods in construction, production overhead costs, and return on investment. Savings in these areas lead to supply chain stability. **Social Dimension:** The social dimension is often not included in organizational performance measurement systems. However, people and their skills are key issues for society, and their effect on sustainability should not be ignored. Considering the social dimension means taking into account the social impact of supply chain activities. **Environmental Dimension:** The environmental dimension is one of the most important dimensions of sustainability. It focuses on reducing the negative effects of transportation and other company activities on the natural environment. Environmental responsibility, environmentally-friendly technologies, and waste reduction are important components of the environmental dimension. However, a lack of common standards and forms acceptable to all companies makes measuring the environmental impact of supply chain activities a challenge. The environmental dimension includes radiation, consumption of natural resources, waste and recycling, which all have an impact along the supply chain. Examining a company's activities means paying attention to how those activities affect the environment, including carbon dioxide emissions, energy consumption, and waste reduction. **Energy Efficiency:** Energy efficiency is another important factor in achieving sustainability. The energy efficiency index measures the output of goods and services compared to inputs, including labor and capital efficiency. Improving the energy efficiency index can be done by reducing the energy inputs needed to produce energy services or by increasing the amount or quality of economic output activities. Analyzing energy demand and efficiency, as well as the relationship between energy demand and economic growth, is critical to achieving sustainability. Shah Ebrahimi et al. state in their article that currently, the main obstacle and executive limitation in the development of the oil and gas industry is the lack of access to technical, managerial and financial knowledge. The implementation of gas pipelines in Fars province and the budget allocated to the projects and the actual cost and duration of the projects were the results that had the highest percentage of failure [10].

3. MATERIALS AND METHODS

The present study was conducted as a field study among managers and employees of petroleum refineries in Asalouyeh city, with a total of 120 individuals in 15 refineries. Out of this population, 92 individuals were selected as the sample size based on Morgan's table. The research instruments used were two questionnaires on sustainable supply chain and energy efficiency. The sustainable supply chain questionnaire consisted of 50 questions in three sub-scales of economic, social, and environmental dimensions, while the energy efficiency questionnaire, constructed by the researcher, included 8 questions in the Likert scale. The validity and reliability of the questionnaires were examined and confirmed.

4. RESULTS AND DISCUSSION

One of the most important activities that can have a significant role in improving this situation is green supply chain management. In fact, the selection of suppliers can be considered as an important part of the concept of green supply chain management, due to its long-term effects, to overcome the negative environmental effects of industrial processes. Sustainable development, targeted and planned development, is aimed at improving the quality of life of current and future generations. The concept of sustainable development in the energy industry is related to various economic, social and environmental issues. Refineries are one of the most important and influential industries that have a significant impact on the growth or decline of a country's economy. The amount of energy production and consumption in each country is considered as an industrial growth index of that country. Therefore, authorities have always sought to develop this industry in each country and improve its position in global rankings. However, in practice, many obstacles have prevented the achievement of desired goals, including:

- Highest energy consumption among industries
- Endangerment of the environment



- Capital-intensive nature
- High production costs
- Need for greater accuracy in choosing transportation methods
- Growth of low technology and related issues

Table 1. Results of variance analysis of research questions

Row	Questions	statistics	Significance coefficient	Result
1	The main question: What effect does the sustainable supply chain have on the energy efficiency of Asalouye refineries?	2.458	0.02	Confirmed.
2	First question: What effect do economic factors have on the energy efficiency of Asalouye refineries?	2.630	0.04	Confirmed.
3	Second question: What effect do social factors have on the energy efficiency of Asalouye refineries?	0.874	0.03	Confirmed.
4	Third question: What effect do environmental factors have on the energy efficiency of Asalouye refineries?	2.565	0.04	Confirmed.

The findings from Table 1 showed that the research questions were confirmed.

5. CONCLUSION

In recent years, there has been a special emphasis on improving energy efficiency, especially in the research of process industries like oil, gas, and petrochemicals. This is because reducing energy consumption while maintaining production and product quality is a primary goal for these industries. By installing measuring devices on important feed, product, and energy carrier flows within the refineries, energy consumption can be determined, and corresponding energy efficiency indices can be calculated. Reducing the intensity of energy carrier consumption and waste within refineries can increase income, reduce device repairs and lifespan, and decrease environmental pollution. Therefore, improving energy consumption is not only important for refineries, but it also has national significance.

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