

# Sustainable Supply Chain Management Practices in Petrochemical Industry Using Interpretive Structural Modeling

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## ABSTRACT

Across different geographical and industrial boundaries, different firms are attempting to implement sustainability in their supply chain in response to pressures from different groups. This article aims at identifying and analyzing influential practices for implementing sustainable supply chain management (SSCM). By determining these practices, top management can focus on them in order to improve the performance of their supply chains. The petrochemical industry was selected because of its role in the Iranian economy and its considerable environmental and social impacts. The interpretive structural modeling (ISM) technique was used as a useful technique to identify interrelations between different sustainable practices. According to the results, set up reduction and pull production system (related to JIT practices) are driving other practices, and these practices have vital role among other practices. There are four practices related to evaluating and collaborating suppliers and other industry peers, which occupy the highest level.

## KEYWORDS

Interpretive Structural Modeling (ISM), Petrochemical Industry, Sustainable Supply Chain Management (SSCM)

## INTRODUCTION

The topic of sustainability in supply chain management is of interest in both academia and industry. Firms across geographical and industrial boundaries are implementing different sustainability initiatives in their supply chain in response to pressures from different groups like customers, government regulators, investors, employees, and even local and global competitors (Abidi et al., 2017). Iranian industries are specifically under pressure regarding issues of adoption of strategies for sustainability. At the current time, there is a lack of understanding on how to achieve sustainability in their supply chains. Therefore, the main purpose of this study was to identify and analyze the important and influential practices for implementing Sustainable Supply Chain Management (SSCM). This research focuses on Iranian petrochemical industry.

Petrochemical industry refers to those industries that produce our daily life needed chemical materials from oil by processing and transforming hydrocarbon into final products which have about 10 to 15 times higher surplus value than its feed stock namely gas and crude oil. One advantage of

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this industry to be studied is its infinite possibility of producing thousands of chemical products that are used as feed to other industries (Malmasi et al., 2010). Although petrochemical industries are beneficial in our daily life, they are considered as environmental pollutant. It can be said that control of petrochemical industries pollution have been a cause for concern and is one of today's international major challenges for saving our environment. The environmental impact of this industry, if the environmental standards and regulations are ignored, could cause disastrous impacts on the health of human community (Rooney, 2005). This industry can have environmental impacts due to the nature of their activities and process, such as its waste water, emissions and other hazardous wastes (Jia et al., 2004).

Different products of petrochemical industry that are utilized in different industries, include detergents, paint, serum, auto parts tires etc. According to sustainable development, ignoring environmental and biological factors is equal to ignoring human health, which will lead to health, social and economical impacts (Malmasi et al., 2010). Additionally, because of tighter regulations and increased consumer and community pressures, companies need to incorporate social concerns into their supply chain practices (Marshall et al., 2014). Our literature review shows that majority of the studies have focused on environmental dimension and fewer researches have addressed the social dimension of sustainability (Kleindorfer et al., 2005; Seuring and Muller, 2008).

As Ropial (2009) noted petrochemical industry face challenges in their attempts to implement sustainability strategies in supply chain management. This industry is one of the important components of oil industry and is one of the principal industries in Iran which also has an influential role in Iran's economy (Maitah and Bassam, 2015). According to the increasing importance of sustainability, companies across geographic and industry boundaries are implementing sustainability initiatives in their supply chain in response to pressures from different groups like customers, government regulators, investors, employees and even local and global competitors. Iran's petrochemical industry is not an exception from this issue. However, by considering these issues, there is no way for petrochemical industry to escape the adoption and to incorporate sustainability in Supply Chain Management (SCM). Hence, it is needed to specify sustainability practices in SCM in accordance with industry characteristics. A search in published articles shows that there is a lack of understanding on how to achieve sustainability in supply chains in this industry. There is a significant research gap in identifying SSCM practices, and similarly, there is no research to analyze influential SSCM practices in Iranian petrochemical industry. Therefore, the objective of this study is to identify and analyze the important and influential practices for implementing SSCM in petrochemical industry.

The petrochemical industry is selected for this work for some reasons: 1) major and significant role of this industry in economy of Iran; 2) their facilities are comparatively more polluting than other types industries, we note that it is categorized as heavy industry that creates significant air emissions, wastewater, noise pollution and toxic and hazardous wastes; 3) work environment in this industry is high risk because of the dangerous nature of the job for the employees whom are exposed to the chemical pollutants in the air, as well as the physical hazards at the workplace. Based on these points, more attention to sustainability topic is highlighted. Therefore, with growing importance of sustainability, social aspects like working conditions and workers' health, safety and training are increasingly attracting attention. Sustainable development is one of the new challenges of Iranian petrochemical industry. Ropital (2009) believed that integrating sustainable development practices into petrochemical industries are increasing in importance. The structure of the petrochemical industry is cross-linked and can be imagined as a network of chemical processes connecting basic feedstock chemicals to the desired final products (AL-Sharrah et al., 2010).

In the industrial world, actual progress toward implementation of sustainability is a hard task, as translating sustainability to the business world has been proven to be quite challenging and the challenge is even more important to industries like petrochemical industry that deal with national resources such as oil and gas reserves. Business decisions in Petrochemical industry involve a number of players (partners), which span sourcing, manufacturing and distribution. For such industry with

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