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# The influence of external factors on supply chain sustainability goals of the oil and gas industry



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## ABSTRACT

This paper empirically explores the relationship between the external factors within the oil and gas (O&G) industry business environment and supply chain sustainability goals to understand the factors that could drive or hinder its adoption of sustainable supply chain management (SSCM) practices. It examines the relationships between six external factors (political stability, economic stability, stakeholder pressure, competition, energy transition and regulations) and sustainability goals through multiple regression analysis, using survey data from companies that operate in the O&G industry. Data analyses reveal that there are two types of sustainability goals namely strategic goals (SGO), which are conditional for long term survival, and functional goals (FGO), which are closely related to the companies' operational processes. The analyses also show that stakeholder pressure and economic stability are the most influential factors that could affect the goals. While competition within the O&G industry has a positive effect on the FGO, competition from the broader energy industry results in a negative effect on the SGO. The influence of energy transition relates to a higher focus on SGO. The results are useful in designing SSCM strategy that could help the O&G industry address the pressure from the external factors for more sustainable supply chain practices to achieve its sustainability goals.

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## 1. Introduction

Concerns about the impacts of oil and gas (O&G) exploitation on the environment and society wellbeing have led to increasing pressures for the O&G industry to improve the sustainability of its supply chain. The industry's external business environment, however, can pose huge challenges to its implementation of sustainable supply chain management (SSCM) practices (Silvestre, 2015). This necessitates greater understanding of the factors within the environment ("external factors") that can affect the SSCM practices, which can ultimately help the O&G industry address the external pressures and achieve its sustainability goals.

SSCM is defined by Carter and Rogers (2008, p. 368) as "the strategic, transparent integration and achievement of key organization's social, environmental and economic goals in the systemic coordination of key business processes for improving the long-term economic performance of the individual companies and its supply chain". Lakhali et al. (2007) note that there is a lack of

studies on sustainable supply chain in the O&G industry context. Existing studies are mostly focused on organizational micro-environment and operational issues related to the integration of sustainability in supply chain functions (see for example, Abdulrahman et al., 2015; Ngoasong, 2014; Tesfay, 2014; Yusuf et al., 2013). The macro business environment of the O&G industry supply chain hardly received any attention.

Carter and Rogers (2008) assert that sustainability in supply chains occurs when organizations incorporate explicit and comprehensive economic, environmental and social goals in the development of their strategic vision and long-term strategic objectives. Achievement of these goals can be influenced by internal and external environment factors. This underscores the need to identify the factors that can drive or hinder the achievement of the goals (Seuring and Müller, 2008b). Currently, sustainability goals are seldom explicitly incorporated in SSCM framework as a distinct factor that could influence strategy formulation or be affected by other factors within business and organizational environment (see for example in Hervani et al. (2005) and Pagell and Wu (2009)). The goals are instead often discussed in relation to the aim of designing and implementing SSCM solutions that can facilitate joint-optimization of economic, environmental and social

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performance (Beske, 2012; Harms et al., 2013; Paulraj, 2011). Furthermore, compared to internal factors, the existing SSCM literature offers no empirical evidence on how external factors could determine companies' supply chain sustainability goals.

The sustainability of the O&G industry supply chains is important to the achievement of sustainable future. Greater understanding on how the industry's external business environments can affect its SSCM practices is needed in order to facilitate our transition towards that future. This study, therefore, aims to address the knowledge gap in the area by exploring the relationship between external factors and supply chain sustainability goals. We argue that understanding the relationship is crucial because the sustainability goals that companies pursue will eventually determine the SSCM strategies that are adopted to achieve the goals and address sustainability pressures (Porter, 1991). We formulate the following research questions in order to achieve the aim of this study:

1. What are the factors in the O&G industry external business environment that could affect its SSCM practices?
2. What are the supply chain sustainability goals of the companies that operate in the O&G industry?
3. What are the relationships between the external factors and the supply chain sustainability goals?
4. How can the external factors affect companies' focus on the goals, thus their SSCM practices?

Insights gained from this study could help increase our understanding on how external factors can drive (or hinder) SSCM implementation in the O&G industry. It could also help companies in the industry to identify the internal capabilities and resources that must be developed to address the pressure from the factors and to achieve their sustainability goals. Generally, this study is part of a larger project that explores the contextual factors (i.e. external business-related factors and internal organizational-related factors) that could influence SSCM practices in the O&G industry. In this paper, we focus our discussion specifically on the relationship between external factors and supply chain sustainability goals.

This paper is organized as follows. Section 2 reviews the literature related to the external factors within the O&G industry business environment. In Section 3 we discuss the important sustainability issues in the O&G industry that help us determine the goals that must be studied. Section 4 describes the method used to determine the relationships between the external factors and supply chain sustainability goals. This is followed by Section 5, which discusses the results of data analysis. Section 6 concludes the study and presents its implications.

## 2. External factors of sustainable supply chain management

The external business environment of the O&G industry consists of dynamic factors that could threaten companies' ability to address sustainability pressures. They could also provide opportunities for business expansion, technological innovations and improvement in working practices.

This study adapted the PESTEL (political, economic, social, technological, environmental and legal) model to identify the external factors that could influence the O&G industry's supply chain sustainability goals. The model can be used to assess companies' operating environment and identify how it could affect their activities (Gillespie, 2011; Yüksel, 2012). Based on the PESTEL model as well as the O&G business environment and SSCM literature, we think that six external factors are especially relevant to this study namely: political stability, economic stability, stakeholder

pressure, competition, energy transition and regulations.

We incorporate three factors from the PESTEL model, i.e. economic, political and legal, in this study. The environmental and social factors are not addressed separately because we consider the factors as intrinsic to the discussion of the external business environment. The technological factor, on the other hand, is addressed through competition between different types of energy companies and sources. We include stakeholder pressure in this study because it is one of the most important external pressures for SSCM practices (Seuring and Müller, 2008b). We consider energy transition as very relevant to the study of SSCM practices in the O&G industry because the factor could affect the sustainability strategy used to address climate change and energy security issues (Escobar and Vredenburg, 2011; Fouquet, 2010). We will discuss the external factors in the following order: political stability, economic stability, stakeholder pressure, competition, energy transition and regulations.

### 2.1. Political stability

The relationship between energy with politics is apparent in the event of crisis (Pascual and Zambetakis, 2008). According to Iankova and Katz (2003), there are two sources of political risks: (1) governmental sources related to official decisions and activities that could affect capital or profits, and (2) societal sources spur by public interest groups that could cause, unrest, civil war, industrial protest or boycotts. For example, government decisions and actions related to tax and fiscal policies, protection of foreign investment, administrative efficiency and transparency can affect companies' decision regarding their plant location (Bhatnagar and Sohal, 2005). Political instability can also threaten the security of O&G supply chain (Urciuoli et al., 2014). Conflicts resulted from the instability could lead to adverse events that can cause financial losses, ecological disasters, and affect employees and infrastructure safety (Al-Damkhi et al., 2009; Urciuoli et al., 2014). This creates uncertain business environment as supply chain is exposed to disruption risks caused by the instability (Abbasi and Nilsson, 2012; Kleindorfer and Saad, 2005). The unstable environment also increases the difficulty of conducting international O&G development cooperation (Correljé and van der Linde, 2006).

### 2.2. Economic stability

Economic slowdown will cause reduction in energy demand and price. As many producing countries rely on their O&G revenue to finance development projects and subsidies (Correljé and van der Linde, 2006; Doraisami, 2015; Wolf, 2009), lower revenue will affect governments' political will to incentivize sustainable energy projects and innovations (Pascual and Zambetakis, 2008). The slowdown will also affect companies' ability to maintain and invest in O&G development technology and infrastructure, as well as in restructuring initiatives towards low carbon energy system (Pascual and Zambetakis, 2008). For example, Ovidia (2016) find that oil companies will use less local goods/services to reduce operating cost during low oil prices. In order to address the needs to reduce spending and downsize operations, Olson (2010) suggests that a strategy based on scalable and variable-cost structure through strategic shared services and outsourcing practices could help the companies to minimize supply chain risks. Similarly, Jüttner and Maklan (2011) find that the risk of ripple effects of economic recession on supply chain can be mitigated through flexibility to shift to cost-effective supply sources and optimize capacity utilization, improvement in supply chain visibility through information sharing, and collaboration with supply chain partners.

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