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Sustainable supply chain management in the oil and gas industry: A review of corporate sustainability reporting practices

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Abstract

Purpose – The purpose of this paper is to assess the sustainability reporting practices of oil and gas (O&G) companies and the integration of sustainability in the management of their supply chain.

Design/methodology/approach – A content analysis of sustainability report of 30 companies was conducted based on the Pacific Sustainability Index that contains 21 topics on social and environmental reporting. An analysis was also conducted on supply chain management (SCM) topics related to supplier management, product stewardship and logistics management.

Findings – There is inconsistency in the sustainability reporting practices among the O&G companies studied. While 63 percent of the companies expressed higher environmental intent compared to social intent, their reporting of environmental performance is lagging behind social performance reporting. There is also a lack of supply chain indicators in the sustainability reporting guidelines. This affects the companies ability to report their supply chain practices objectively.

Practical implications – The findings of this study can be used as a guideline to improve the sustainability reporting practices and to identify relevant supply chain indicators that can be incorporated in a sustainability reporting index.

Originality/value – There is a lack of research on sustainability reporting practices in the O&G industry context, especially in terms of SCM. Previous studies focussed on companies in specific countries and/or do not incorporate all sustainability dimensions, namely, economic, environmental and social factor. We think that this is the first comprehensive study on the sustainability reporting practices and the integration of sustainability in SCM in the O&G industry.

Keywords Sustainability reporting, Oil and gas, Sustainable supply chain management

Paper type Research paper

1. Introduction

The number of oil and gas (O&G) companies that publish sustainability reports has increased over the years. While Shell and BP started to publish the report in 1998, Saudi Aramco and Gazprom produced their first report in 2010. This indicates that more companies are recognizing importance of public dissemination of information regarding their sustainable practices. Sustainability report helps stakeholders learn

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about companies' sustainability initiatives and performance, and about the way in which sustainability issues are addressed. Despite a growing interest from academics and practitioners in studying these reports, studies that focus on supply chain aspects are still lacking (Tate *et al.*, 2010). Furthermore, research evaluating industry-specific practices is also scarce.

To address these gaps, our paper aims to review the quality of sustainability reporting practices of companies in the O&G industry regarding two dimensions:

- the consistency of current sustainability disclosure practices – the alignment between expressed intent for sustainable practices and the actual reporting of sustainability-related performance; and
- the degree of the integration of sustainability into supply chain management (SCM) practices.

The O&G industry is chosen because it is central to the discussions of sustainable development. The industry plays a very important role in economic activities and in our daily lives. However, there are increasing concerns regarding the negative impact of its activities and products on the environmental and societal well-being. It is therefore important for us to understand the state of sustainable practices in the industry. This allows us to identify opportunities for improvement that could facilitate effective implementation of sustainable supply chain management (SSCM) strategy in the industry. The review of sustainability reports provides readily available data for such endeavor.

This review is accomplished through a content analysis of the sustainability reports of 30 major O&G companies. For the first issue, we distinguish between intent-related indicators (i.e. commitment expressed toward sustainability practices such as environmental policy and vision) and performance-related indicators (e.g. emissions and, health and safety incidents). For the second issue, we focus on the integration of sustainability into three key supply chain areas, namely, supplier management, logistics and product stewardship.

The paper is organized as described next. Section 2 presents an overview of literature related to sustainable practices in the O&G industry and to sustainability reporting. Section 3 explains the methodology for content analysis used in this study. It is followed by Section 4, which discusses the results of the analysis. We draw conclusions in Section 5, including recommendations for future studies.

2. Overview of sustainability reporting studies of O&G industry

The O&G supply chain consists of companies that can be categorized into operators (oil companies), contractors and suppliers (Anderson, 2003). Its products and supplies are transported daily within and across countries, onshore and offshore, using various modes of transports such as barge, ships, rail and trucks (Hamedi *et al.*, 2009; Lior, 2010). Many of its activities are engineering intensive and conducted in environmentally sensitive areas. It is also a high-risk industry where small mistakes can have severe repercussion to all companies involved, their employees, the environment and society.

The importance of SSCM practices in the O&G industry was reaffirmed in the wake of the Deepwater Horizon oil spill in the Gulf of Mexico. According to Janus and Murphy (2013) companies are now expected to disclose their plans and initiatives to address sustainability issues of their internal business processes as well as suppliers' activities. However, they note that there is a lack of guidance in the reporting field

regarding the measurement and communication of these practices related to supply chain. The fourth generation of sustainability reporting guidelines by the Global Reporting Initiatives (GRI) attempts to address this issue (GRI, 2013).

Table I summarizes some sustainability reporting studies related to the O&G industry and/or SCM. Generally, the review of the literature indicates that earlier studies focussed on the environmental aspects of sustainability, while the consideration of both environmental and social factors increased during the recent years. There is also increased number of studies related to sustainability reporting of O&G companies

Year	Author(s)	Focus area of disclosure	Type of firm selected
2005	Freedman and Jaggi	Pollution and greenhouse gases	Largest public firms in O&G, chemical, energy, and motor vehicles and casualty insurers
2007	Jose and Lee	Environmental policies and practices	Fortune Global 200 companies
2008	Clarkson *et al.*	Environmental performance and disclosure practices	Five most polluting industry in the USA
2010	Cowan *et al.*	Environmental sustainability reporting (also include leadership, assurance, certification and method of reporting)	Five largest companies of 26 industrial sectors in the USA
	Dong and Burritt	Quantity and quality of social and environmental reporting against general and industry's benchmark	Australian O&G companies
	Morali and Searcy	Integration of sustainability criteria in SCM	Canadian companies
	Tate *et al.*	Integration of sustainability into operations and SCM strategies	Companies from eight industries
2011	Bell and Lundblad	Comparison of ExxonMobil sustainability reporting to outcome over 7 years	A case study in ExxonMobil (EM)
2012	Wu *et al.*	Integration of green concepts and practices in SCM	Fortune Global 500 companies
	Fifka and Drabble	Influence of contextual factors on sustainability reporting	50 largest companies in UK and Finland
2013	Alazzani and Wan-Hussin	Environmental performance reporting	Eight O&G companies operating in developing countries
	Schneider *et al.*	Evaluation of the maturity of environmental, health and safety practices	Ten major oil companies
	Asif *et al.*	Patterns of sustainability reporting (includes SCM indicators)	Dutch companies
	O'Connor and Gronewold	Discourse in communication of environmental sustainability strategy and performance	Fortune Global 500 petroleum companies
	Thurner and Proskuryakova	Changes in the approaches to environmental management	Six Russian O&G producers
2014	Fernandez-Feijoo *et al.*	Effect of stakeholder pressure on transparency of sustainability reports	Various industries that report based on GRI framework (including energy)
2015	Herremans *et al.*	Stakeholder engagement strategy through sustainability reporting practices	All major O&G companies in Canada
	Meckenstock *et al.*	Effects of differences in interpretation of sustainability on SSCM strategy	Twelve industries including the O&G

Table I. Sustainability reporting studies related to oil and gas and/or supply chain

during the later period of the review – most studies generally cover the reporting practices of various industries. Studies on the reporting disclosure of multiple industries allows us to identify best practice examples that can be applied across industries. However, we expect that industry-specific studies would likely result in knowledge that is more applicable and, therefore, more useful to that particular industry context.

Sustainability may be viewed differently by different industries depending on their business model, inputs, outputs and customer base (Azapagic, 2003; Cowan *et al.*, 2010). The interpretation of sustainability is found to be different across supply chain echelons where companies would emphasize the complexity of implementing sustainable practices in their report the further downstream they operate (Meckenstock *et al.*, 2015). Furthermore, various contextual factors could influence the sustainability disclosure such as regulatory requirements and the degree and level of institutionalization of sustainability in local business environment (Bell and Lundblad, 2011). Therefore, the contents of sustainability report could vary widely (Asif *et al.*, 2013). For example, companies that operate in the countries that ratified the Kyoto Protocol for pollution management have higher disclosure indexes compared to companies from other countries (Freedman and Jaggi, 2005). In addition, cultural and socio-economic environment in which a company operates can impact the extent of its reporting practices (Fifka and Drabble, 2012).

We argue that understanding the sustainability reporting practices of companies in the O&G industry constitutes an important step in advancing their integration of sustainability in business processes. As can be seen in Table I, there are seven content analysis studies which are conducted specifically on the sustainability reporting of O&G companies. Generally, these studies are either country specific (Dong and Burritt, 2010; Thurner and Proskuryakova, 2014; Herremans *et al.*, 2015), focus on one facet of sustainability – i.e. environmental aspects (O'Connor and Gronewold, 2013; Alazzani and Wan-Hussin, 2013; Schneider *et al.*, 2015) or a case study on one company (Bell and Lundblad, 2011).

Dong and Burritt (2010) found that the reporting of social and environmental aspects among the O&G companies that they studied are internally focussed and under-reported relative to the industry guideline. There is also a lack performance-related information that could help stakeholder measures companies performance objectively (Schneider *et al.*, 2015; Dong and Burritt, 2010). Companies tend to express the importance of and commitments toward environmental sustainability policies but fall short when it comes to advancing the commitments by having a systems that could help the companies achieve them (Jose and Lee, 2007). These finding are consistent with Bell and Lundblad (2011) studies on the reporting practices in ExxonMobil. Earlier sustainability reports of the company mainly serve as a tool to improve its corporate image and legitimacy. However, its reporting improved over the years as a result of institutional pressure and increased incorporation of external standard as guideline.

The environmental sustainability discourse among companies within the refining industry are found to be based on competitive advantage and institutional logics (O'Connor and Gronewold, 2013). The companies address the regulatory and stakeholder pressure for sustainable practices through their reporting, while positioning themselves, for example, as industry leader or first mover with regard to their sustainability performance compared to their competitors. Although regulatory institutions play an important role in advancing sustainable development as well as transparent and more comprehensive reporting, a company's voluntary actions and initiatives could actually be the main driver for the adoption of sustainable

practices that could help them gain competitive advantage in the market (Thurner and Proskuryakova, 2014).

Companies often have to respond to the pressure exerted by various stakeholders, which could improve the quality of their reporting (Fernandez-Feijoo *et al.*, 2014). Tate *et al.* (2010) suggest that companies can use sustainability report to manage institutional pressure and meet stakeholder demands. In order to address the pressure, the companies must develop a strategy that incorporate various sustainability issues in their strategic and operational plan (Hervani *et al.*, 2005). Their engagement with the stakeholders through sustainability reporting could either be informing, responding or involving depending on their resource dependencies on the different stakeholders (Herremans *et al.*, 2015). However, the companies could neglect to report the information that could be more relevant to certain stakeholders, thereby undermining the credibility of their reporting practices (Dong and Burritt, 2010).

With regard to SCM aspects, Tate *et al.* (2010) note the lack of research that focusses on understanding the communication of both social and environmental aspects of companies operations and supply chain strategies. They stress that corporate social responsibility reports are a rich source of secondary data that could help us understand companies' intentions, strategies and activities, thus how sustainability is being addressed in operations. A similar view comes from Rabinovich and Cheon (2011), specifically with regards to the use of secondary data sources in understanding logistics and supply chain phenomena. Results obtained from these data sources can be more relevant for practical managerial applications especially when the data are collected from the field (Rabinovich and Cheon, 2011).

Table I indicates that there are three supply chain-related studies which are all basically on the integration of sustainability into SCM (Wu *et al.*, 2012; Tate *et al.*, 2010; Morali and Searcy, 2010). According to Meckenstock *et al.* (2015), there is increased emphasize on the reporting of social complexity in SSCM as a company operate further downstream in a supply chain closer to the final consumers. The complexity of integrating sustainability in SCM is amplified by the difficulty in operationalizing a shared interpretation of sustainability across the supply chain, which hinders the implementation of effective SSCM strategy (Meckenstock *et al.*, 2015).

SSCM seeks to achieve joint-optimization of business processes to ensure sustainable economic, environmental and social performance of all supply chain members. Therefore, individual company no longer operate as an autonomous entity, but as an intertwined group of businesses that could determine the overall performance of a supply chain (Li *et al.*, 2006). Transparency is crucial in SSCM to facilitate cross-functional integration of all supply chain member. Corporate wrongdoings are increasingly difficult to manage, which necessitate vertical integration across supply chain and horizontal integration across networks to improve transparency and reduce risk (Carter and Rogers, 2008).

The existing literature on the reporting of sustainable supply chain aspects reveals that companies in general discussed the strategy used to address the issues at a strategic level (Morali and Searcy, 2010). According to Wu *et al.* (2012), even though the main focus among companies are on cost reduction and pollution prevention, they are beginning to incorporate more proactive measures in the management of their supply chains. While there is an apparent increase in the attention given to the supply chain sustainability, major improvements are still needed in the extensiveness of the disclosure of the implementation and performance of the strategy (Morali and Searcy, 2010; Wu *et al.*, 2012).

Overall, it is clear that there is a lack of study that focus on both sustainability reporting practices and the integration of sustainability in the SCM practices in the O&G industry context. This gap, therefore, should be addressed. Our study differs from the existing studies in terms of several aspects. Specifically, focus on sustainability reporting of global O&G companies, assess their intent for and reporting of sustainable environmental and social practices and include supply chain aspects in our analysis.

3. Methodology

Company selection

The companies used in this study were selected using three listings: the 2011 Dow Jones sustainability index (DJSI), the Oil & Gas Journal's world's largest O&G company ranking (based on total reserves, *OGJ*), and Platts top 250 global energy company ranking 2011 (based on economic performance, Platts). Overall, we identified 80 O&G companies through the listings where 30 companies that publish sustainability reports were selected using purposive sampling method. The latest reports published were used for the content analysis purposes. Table II shows the selected companies. Overall, the latest sustainability reports published during the period in which this study was conducted were from the following year: 2009 (two companies), 2010 (25 companies) and 2011 (three companies). We grouped the companies into:

- Group A: triple-listed companies;
- Group B: dual-listed companies; and
- Group C: single-listed companies.

Content analysis

This study used a questionnaire developed by Roberts Environmental Center (REC) as a benchmark to assess sustainability reporting of the selected O&G companies. The questionnaire, Pacific Sustainability Index (PSI), is chosen due to the extensiveness of sustainability measures included. The index was developed by REC to study the reporting of sustainability intention and performance. The questions included in the index are based on frequently mentioned topics that REC researchers discovered through the analysis of 1,900 reports from 2002 to 2009 (REC, 2012). The index is considered as very suitable to be used as a benchmark for this study, given that it was developed after a long period of research.

Group	Dow Jones sustainability index	Companies listed in Platts top 250 global energy company	World's largest O&G company	Total	
A	Repsol, Petrobras, Ecopetrol, BG Group, Eni, Statoil and Total			7	7
B	MOL and Sasol			2	14
		Hess, ExxonMobil, BP, Shell, Gazprom Neft, Occidental, Gazprom, Chevron, Rosneft, Lukoil, PetroChina and Suncor		12	
C		CNPC, TNK-BP, Marathon Oil, OMV, Husky Energy and Galp Energia		6	9
			Saudi Aramco, ADNOC and Petronas	3	

Table II. List of companies selected according to listings

There are 84 indicators used in the index to measure sustainability intention and performance reporting. Environmental and social intent are expected to be incorporated into 13 indicators, while environmental reporting and social reporting are expected to appear in the reports through 32 and 26 indicators, respectively. The indicators are grouped into several topics as shown in Table III; for instance, ten indicators correspond to emissions to air, while three are recycling related.

Intentions toward sustainable practices were measured based on commitment-related indicators which can be categorized into five topics: accountability, management, policy, vision and social demographics (measured in social intent only). Performance reporting, on the other hand, was measured using the following performance indicators: environmental reporting – such as water and air emissions, energy and water use, investment, prevention and recovery programs, and waste management; social reporting – such as human rights protection initiatives, safety and health performance, and community development initiatives and investment.

The content analysis involved keywords search based on the description of each indicator specified in the questionnaire – for example, keywords for accountability include "management structure" and "contact person." The goal is to obtain an overview of the sustainability issues discussed in the reports as an indication of the issues which are important for the companies studied. Therefore, nominal data were used in the data analysis to identify whether an indicator is discussed or not in a report (i.e. 1: yes and 0: no).

Although the questionnaire is adequate in measuring disclosure regarding sustainability in general, the same cannot be said for the supply chain sustainability aspects since there are only few supply chain indicators in the index. Therefore, an additional keywords search was conducted, leading to those listed in Table IV. This process enabled for the identification of organizational patterns specific to SSCM practices in the O&G industry context.

The data gathered through the PSI questionnaire were analyzed quantitatively. On the other hand, the statements related to SSCM practices among the companies were analyzed qualitatively to isolate patterns and describe them. We calculated the score for each topic and the score for environmental and social intent and reporting as

Environmental topics	No. of indicators	Social topics	No. of indicators
Intent			
Accountability	2	Accountability	2
Management	4	Management	5
Policy	5	Policy	3
Vision	2	Social demographic	1
		Vision	2
Reporting			
Emissions to air	10	Human rights	11
Emissions to water	3	Management	1
Energy	2	Qualitative social	6
Management	8	Quantitative social	8
Materials usage	1		
Recycling	3		
Waste	4		
Water	1		

Table III. The Pacific sustainability index topics

the percentage of indicators discussed – i.e. the score is calculated by dividing the number of indicator discussed in the report by the total number of indicators. Hence, the maximum score for the topics and the overall sustainability intention and reporting is always 1 or 100 percent. The score calculation is based on the assumption that each indicator carries the same weight. For instance, if ten indicators correspond to reporting on air emissions, a company reporting only two of those indicators gets a score of 20 percent on this topic. Our score calculation method resembles the one applied in a study on an assessment of sustainability reporting evolution in the mining industry (Perez and Sanchez, 2009).

4. Results

This section presents the results of the content analysis conducted using the sustainability reports of 30 O&G companies. As mentioned earlier, we selected the companies using three listings that enable us to categorize them into three groups: Group A (listed in all listings), Group B (listed in two listings) and Group C (listed in one listing). The results of our analysis are as follows.

Sustainability intention and reporting

Figure 1 shows the difference in the disclosure of intention and reporting of sustainability practices between the three groups. Basically the sustainability reporting of the companies in Group A is more extensive than the other groups both in terms of their disclosure of intention and performance. The companies in Group A reported, on average, 69 percent of the indicators compared to 55 percent in Group B and 52 percent in Group C. As can be seen in the Figure 1, it is clear that most companies generally covered environmental intent indicators more extensively than social intent. However, the active reporting of environmental performance is lagging behind social performance contrary to the intention disclosed in the reports. Overall, only Group A is consistent in their reporting practices – their social intent is higher than environmental intent and they also reported more on social performance than environmental performance.

Figure 2 shows the disclosure of environmental intent and reporting of the companies. Two indicators were used to measure environmental accountability, namely: the disclosure of a report contact person and companies' environmental management structure. Generally, 70 percent of the companies identified specific persons and/or provided information on how they can be contacted regarding their report or sustainability issues. About 73 percent companies reported their environmental management structure and the staffs or functions responsible for the management of

Table IV.
Supply chain management-related keywords

Topic	Keyword
Supply chain	Supply, chain, network, partners
Supplier management	Suppl[a], management, development, collaboration, purchasing, procurement, local
Logistics	Logistics, transport[a], vehicles, mode, routes, suppl[a], warehouse[a], fleet, vessels, journey, distribut[a], network, storage
Product stewardship	Prod[a], life cycle, material[a], REACH, chemicals, end use, quality

Note: [a]Indicates the keyword and its variants, e.g. transport, transportation, etc

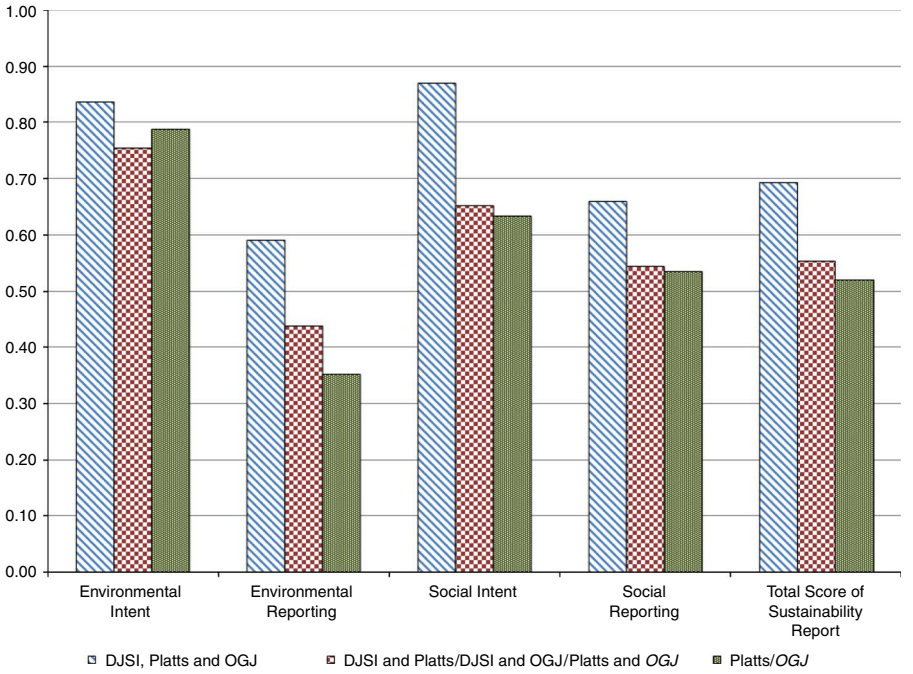

Figure 1. Comparison of sustainability report disclosure between groups

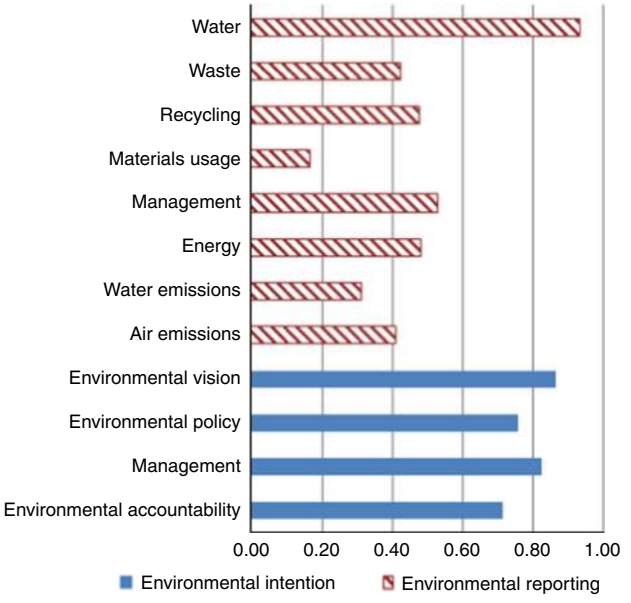

Figure 2. Environmental intent and reporting disclosure score

environmental policies and initiatives. Generally, all companies disclosed their policy regarding environmental protection and responsible practices – 97 percent of the companies explicitly disclosed their plans in addressing climate change and global warming, 93 percent discussed about conservation of habitat or ecosystem, and 87 percent discussed about biodiversity protection. However, only five companies discussed their preference in purchasing of eco-friendly products.

In terms of environmental vision, 90 percent of the companies clearly expressed their commitment to good environmental performance and 87 percent discussed the challenges that they are facing in fulfilling the commitment. The challenges include the difficulty in predicting business impact of greenhouse gas reduction measures due to the uncertainty in the timing and outcomes of international, regional and national regulations (ExxonMobil, 2011). In addition, the O&G companies are also facing significant challenges, among others, in: meeting regulation requirements to address issues related to air emissions, waste and new fuel specifications (Sasol, 2011), and managing and reducing cumulative environmental risks and impacts related to resource as well as infrastructure investment (Eni, 2011). All companies studied realized the importance of stakeholder engagement in helping them address the sustainability issues related to their activities and discussed initiatives taken to facilitate dialogue with the stakeholders. Stakeholder engagement is one of the indicators for environmental intention management apart from environmental education, environmental management systems and environmental accounting which are discussed by approximately 67, 97, and 73 percent of the companies, respectively.

One of the least reported environmental reporting indicators is materials usage which is measured based on the implementation of product or process life cycle analysis. Only five companies reported that they have a formal life cycle analysis procedure in place even though 60 percent of the companies studied indicated that they are concerned about the impact of production processes and product use on the environment and health. Environmental reporting indicators which are discussed most among the reports studied are greenhouse gas emissions (97 percent), carbon dioxide emission (73 percent), emissions to water (i.e. release of chemicals or waste to water bodies, 73 percent), pipeline monitoring and maintenance (67 percent), accidental spills (73 percent), wastewater recycling (83 percent) and water use (97 percent). In terms of energy, 83 percent companies discussed about their usage. However, only 13 percent of the companies reported the use of renewable energy in their operations.

Figure 3 shows the disclosure of social intent and reporting. Most companies, about 93 percent, clearly stated their commitment toward socially responsible practices to employees and the communities in which they operate. In terms of social accountability, 67 percent of the companies disclosed their health and safety or social organizational structure, and appointed a third party to validate their sustainability report. In addition, all companies have a formal social policy statement in the report where 97 percent of the companies expect all employees and contractors or suppliers to comply with their code of conduct. About 63 percent of the companies implement suppliers screening measures to determine the suppliers' ability to meet the companies' social or environmental policy and principles. In addition, 93 percent of the companies discussed the training provided for employee career development. Approximately 87 percent have emergency preparedness program in place to help employees and public public community to prepare and cope with potential emergencies that could result from their operations.

Most reported quantitative social indicators are social/community investment (100 percent), recordable incident/accident rate (80 percent), fatalities (80 percent) and lost

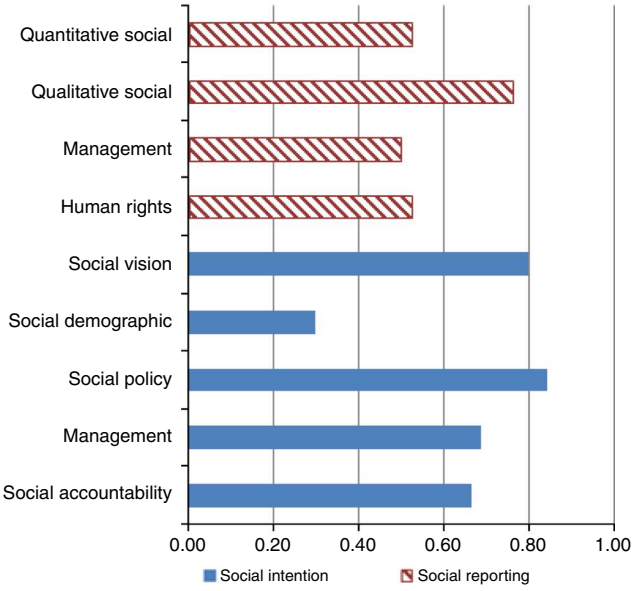

Figure 3.
Social intent and reporting disclosure

workdays (73 percent). In terms of qualitative social, all companies reported their initiatives toward community development, education as well as occupational safety and health. All companies emphasized on occupational safety and health protection for their employees and contractors given the risk involved in the O&G operations. About 77 percent discussed their efforts in providing access to healthcare facilities to employees. Community development, education and investment dominated the discussions on social initiatives especially among national O&G companies, and the companies that operate in countries with strong government influence on local O&G development. Human rights-related indicators that are reported most include elimination of discrimination related to employment and occupation (83 percent), rights of employees to join trade unions (83 percent), fair compensation (73 percent) and anti-corruption policy (73 percent). The least reported indicators are the companies' policy on degrading treatment and punishment to employees (27 percent) and sexual harassment (1 percent). In addition, only 37 percent of the companies conducted employee satisfaction survey.

The difference between intention and reporting disclosure of all companies is shown in Figure 4. About 63 percent of the companies expressed higher intention for environmental management compared to social management. However, only four of these companies' reporting of environmental performance is more extensive than their social reporting. Generally, the disclosure of social performance dominated the discussion in the sustainability reports – 70 percent of the companies studied reported social-related indicators more than environmental indicators. This clearly shows the inconsistencies that exist in the sustainability reporting practices between environmental and social aspects among the companies.

Analysis of variance was conducted to test the differences of sustainability reporting between the three groups. The analysis reveals that there is a significant difference in the environmental reporting between the groups, $F(2.27) = 4.182$, $p = 0.01$. We find no significant differences in the disclosure of environmental

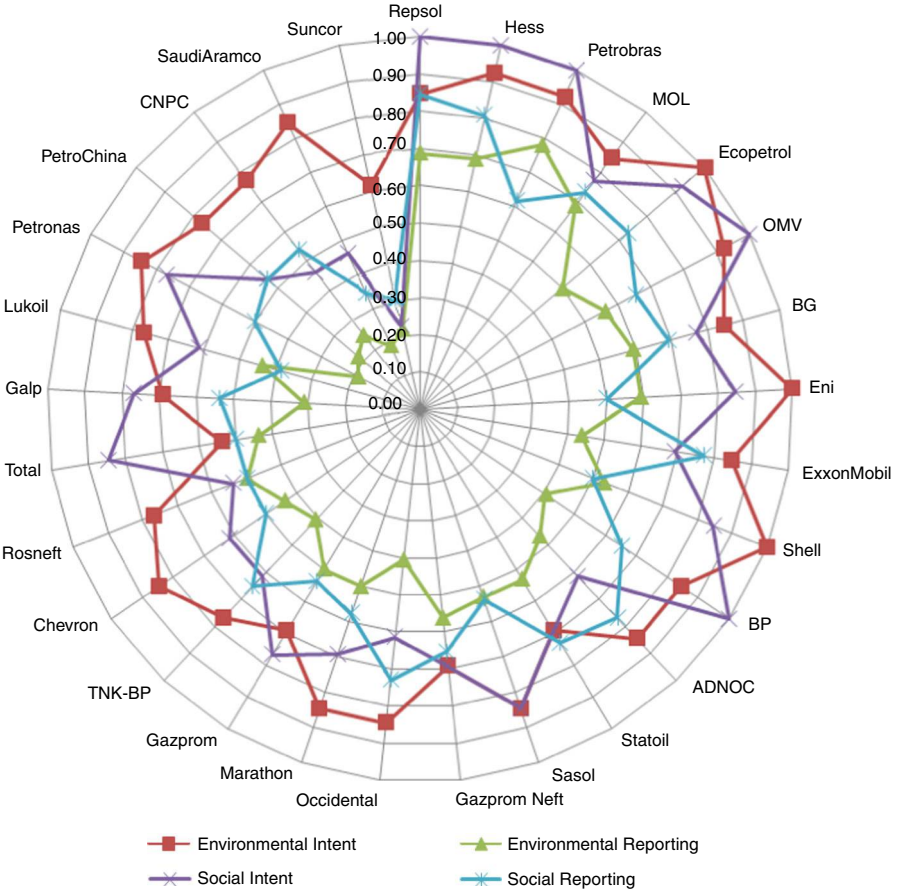

Figure 4.
Average score of intent and reporting disclosure in sustainability reports

and social intent, and social reporting. A Tukey *post-hoc* test indicates that the environmental reporting of companies that are listed in all three listings (Group A) is significantly different from the reporting of companies that are only listed in OGJ (Group C).

The results of analysis of individual company's total sustainability reporting scores is as shown in Figure 5. Overall, 24 companies disclosed more than 50 percent of the indicators used to measure their sustainability reports. Repsol, which is in Group A, has the highest overall score. The company is the sector leader in sustainability performance as announced by DJSI 2010 – the DJSI does not rank the companies listed in its index, but announce the leader for each sector. All the nine companies listed in the DJSI scored higher than 0.5 (reported at least 50 percent of the indicators). However, only six companies are in the top ten among the companies studied.

Integration of sustainability in SCM practices

Less than 50 percent of the companies studied mentions "supply chain" explicitly in their sustainability reports. However, aspects related to SCM are present throughout all of the reports. Most of the companies that discussed "supply chain" focussed on the

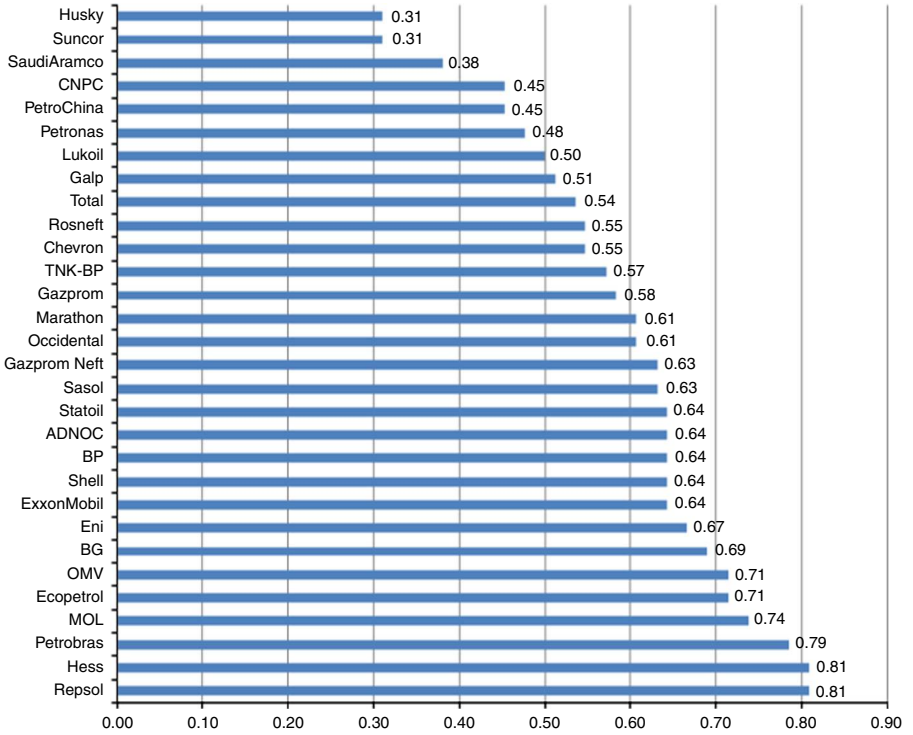

Figure 5.
Total score of sustainability disclosure

policies and management systems that are used to ensure the companies' sustainability strategies are supported by their suppliers and contractors.

There are two indicators related to supplier management function included in the PSI, namely, green purchasing and supplier screening. We find that only five companies expressed their commitment and preference toward purchasing eco-friendly products. In addition, 19 companies screen and select suppliers based on their ability to meet the companies' social and environmental policy requirements. Further analysis of the reports indicates that 17 companies have a local content management strategy. Table V provides a summary of the supplier management strategy and its related challenges identified through the content analysis.

The implementation of a local content strategy is mainly attributed local government's policies that are often used as part of O&G project licensing agreement. Generally, the companies are positive about the policy because it helps them to fulfill their social responsibilities. The strategy helps in creating business and job opportunities and building local competencies which could consequently contribute toward economic development of local communities and businesses (Ecopetrol, 2011; Repsol, 2011; Shell, 2011). However, difficulties might arise in the implementation of the strategy due to the lack of local expertise availability especially for specialized products. In order to address the problem, companies have to hire international suppliers (Repsol, 2011), and require the suppliers to share a percentage of the contract given with local businesses (ADNOC, 2011).

There are also other factors that have to be considered in implementing a local content strategy. These include regulatory requirements, local business environment

	Description
Supplier management practices	1. Supplier selection and screening based on environmental and social/human rights criteria 2. Training for procurement staff to conduct supplier prequalification assessment 3. Supplier development programs in business and management skills, quality management systems, technical and leadership skills, sustainability-related issues, logistics chain, etc. 4. Monitoring of suppliers 5. Due diligence investigation
Local content/supplier-specific practice	1. Issues to be considered in strategy implementation: Local business environment Local government economic priorities Local regulatory and legislative requirements Location of suppliers Competencies of suppliers Direct relationship with suppliers 2. Local content aspects: Materials Services Staff 3. Supplier development programs include: Management/administrative Finance Contract and tendering skills Health, safety and environment requirements Compliance with regulations and ethical business conduct Quality management systems
Issues in the implementation of local content/supplier strategy	1. Scarcity of specialized local supplier 2. Local supplier competencies 3. Safety and product quality standards 4. Legal requirements differences between countries 5. Dependency on supplier conduct for sustainability performance 6. Ensuring compliance with local regulations and company's operating standards and code of conduct

Table V.
Summary of supplier management practices and challenges

and infrastructure (ExxonMobil, 2011). The strategy also requires close cooperation between companies and their suppliers. This is especially important for the O&G industry where requirements for safety and product quality standards are high. In such instances where local competencies are inadequate, companies have to train local workforce and businesses in aspects such as safety, product quality as well as business and technical skills (ExxonMobil, 2011), which could result in the increase of operating costs.

Approximately 60 percent of the companies studied discussed their concerns about the impact of production activities and product use on the environment and health (i.e. product stewardship). The approaches that are taken by the companies to address these issue are summarized in Table VI. Through the analysis, it was found that some companies have a clear product stewardship policy and will consider approaches that can be used to measure its implementation. However, the reporting of these measures in the reports studied is largely absent. Most companies described their strategy, but

Approach	Description
Evaluate, monitor and issues information about the health and environmental risks of products	Calculate (estimation) of GHG emissions associated with the end use of fuel and other products
	Analyze danger posed by raw materials and end products
	Produce safety data sheets to communicate risks throughout supply chain
	Product appraisal for compliance with local and global regulations
	Develop own standards where laws and regulations are considered inadequate or does not exist
Provide information to those who transport, use and dispose products	Appropriate uses
	Potential health and environmental effects
	Personal protection and exposure controls
	First aid measures
	Disposal considerations
Life cycle or integrated approach to product safety and health	Consider the movement of products throughout the life cycle and the variety of management issues which might occur
	Management of product quality from production through storage and transport to sale
Supplier screening	Seek assurance from suppliers that all procured materials meet regulation requirements

Table VI. Summary of product stewardship approach

failed to provide supporting data that can be used to assess performance, for example, in terms of how the information provided through product safety data sheets improves product handling processes by contractors, or if there is a reduction in materials usage for product packaging.

In terms of logistics management, 73 percent of the O&G companies discussed their strategy in minimizing or eliminating the negative impacts of the logistical activities on the environment and health. However, only Ecopetrol explicitly disclosed that it has a formal reverse logistics program in its company. The strategy implemented by the company includes adding new commercial vehicles, updating the existing vehicles, and developing instructions for handling of materials and assets which are not required for operations (Ecopetrol, 2011). The strategy is intended to ensure that the company can generate economic benefits from savings or sales of waste and, surplus or obsolete assets. In addition, the strategy could also ensures that environmental risks from inadequate completion of the life cycle of products used in operations can be managed and prevented appropriately.

Transportation safety is a major concern among the O&G companies, where 66 percent of them discussed about the issue. A closer look at the reports indicates that only few companies clearly outlined their strategy in ensuring safe transportation activities, mostly in terms of vehicle audits and inspection (10 percent), vehicle monitoring (7 percent), journey management plan or routes planning (13 percent) and commuter programs for employees (7 percent). About 67 percent of the companies reported that they conduct pipeline monitoring and maintenance.

Among the challenges that the companies are facing in terms of their logistics activities is the increase in extreme weather events that could affect transportation infrastructure such as road, maritime, inland waterway and pipelines (OMV, 2011; Petrobras, 2011). As sources of O&G supply are often located far from consumer

markets, this increases the risks involved in supply delivery. In order to address this issue, the companies employ several strategies that focus on: increaseing collaboration between commercial logistics department and customer care services (Repsol, 2011); developing competitive logistics networks and exploiting synergies through the use of multi-modal (Ecopetrol, 2011; MOL, 2011); and substituting road transportation for pipelines and waterways (Petrobras, 2011). These strategies are meant to improve the frequency of routes and supplies, reduce the environmental impact of transportation activities, and minimize costs – which could also lead to increased customer satisfaction along more conventional business lines.

5. Discussion

The main insights identified through the content analysis are as follows:

(1) Companies tend to communicate more easily about their commitment toward sustainable practices than about actual performance. The social sustainability are disclosed more than environmental sustainability.

(2) Inconsistency in sustainability reporting can be observed, which could be the result of a lack of effective performance measurement systems.

(3) Sustainability reporting is still dominated by qualitative indicators, resulting in narrative or descriptive reporting practices.

(4) A good financial standing seems to be a necessary but not a sufficient condition for a company to have a more comprehensive sustainability report.

(5) To what extent a company's SCM strategy is implemented or to which degree it affects other members of the chain is not clear.

(6) There is a lack of supply chain indicators in the current sustainability reporting guidelines. Therefore, there is a lack of support for companies to report more objectively on this.

We elaborate on these findings in the remaining part of this section.

The results of the content analysis indicate that companies tend to disclose their intention toward sustainable practices more than the actual performance. On top of it, the companies, in general, expressed more commitment toward environmental sustainability, while they actually reported more on social performance. Therefore, inconsistencies are evident in the sustainability reporting practices among the companies. Generally, 19 companies that have higher intent for the environmental sustainability reported more extensively on the social performance than the environmental performance. The lack of environmental performance reporting is consistent with the studies conducted by Clarkson *et al.* (2008).

Environmental reporting requires companies to collect measurable data such as emissions, material consumption and waste production and management – altogether, there are 32 quantitative environmental indicators and 13 qualitative indicators. However, social reporting mostly uses qualitative measurements such as company's policy toward human rights practices, code of conduct and community development. There are eight quantitative indicators, against 31 qualitative indicators, that measure social reporting aspects such as turnover rate, safety performance and community investment. Generally, about 80 percent of the social indicators are qualitative in nature. Therefore, sustainability reporting tend to become rather narrative or descriptive in nature when social performance is reported more than environmental performance.

We also find there is a difference in the extensiveness of the environmental reporting between the triple-listed companies (Group A) and the single-listed companies (Group C). Both groups are listed in *OGJ* as the world's largest O&G companies based on oil equivalent reserves. However, Group A consists of companies which are listed among the top 40 in the Platts top 250 global energy company rankings – companies are ranked based on financial standings. Therefore, it could be assumed that financial capability could help a company to have more comprehensive environmental reporting, which could be attributed to their ability to invest in, for instance, more sophisticated environmental management measures.

However, caution should be taken when making such generalization because one of the companies in Group C, Abu Dhabi National Oil Company (ADNOC) is the sixth largest O&G company in the world and therefore can also be assumed to have the financial capability to invest in such measures as well. The reason why ADNOC is not listed in Platts as one of the company with good financial standing is beyond the scope of this discussion.

The analysis of individual company's sustainability reporting scores also revealed that while a good financial position could result in better sustainability disclosure, it is not a sufficient condition. We found that the total sustainability reporting score of ADNOC is higher than 59 percent of the companies listed in Platts (i.e. 14 companies, 12 of which are the top 50 in the ranking). Thus, it could be concluded that a good financial position is necessary but not a sufficient factor for comprehensive disclosure of sustainability initiatives and performance. Perhaps factors such as companies' management orientation toward sustainability and organizational culture can also affect their sustainability reporting practices (Walker and Jones, 2012; Hussain, 2011; Pagell and Wu, 2009). These organizational factors could be the differentiating factor that separates those companies that report more extensively than the rest.

The reporting of sustainability performance is difficult without an effective measurement system. Companies tend to overemphasize their social contributions than their performance in environmental protection when data are lacking. According to Wu *et al.* (2012), companies that are more supply chain minded employ a management system that enable them to measure their sustainability performance. The measurement systems can help companies monitor, evaluate and issue information regarding their performance (Faisal, 2010). This is especially important in SCM given the complexity involved and the increased emphasize on environmental and social responsibility across the supply chain (Shaw *et al.*, 2010). Sustainable supply chain initiatives are a costly endeavor (Carter and Rogers, 2008); a performance measurement systems may also require significant investment, which could only be possible if a company is financially able to invest in such systems.

In terms of the integration of sustainability in SCM practices, it is unclear how that aspect is being extended beyond the practices of the companies themselves. The strategy that the companies adopt to improve supply chain sustainability is mainly concentrated on ensuring that suppliers are able to meet the requirements for socially and environmentally responsible operations through services or materials they provide. However, measuring the effectiveness and the impact of the strategy on the supply chain's overall performance is quite difficult. Companies must also consider the implementation issue related to the differences in suppliers' capabilities and resources in complying to the requirements. Careful considerations are needed to avoid discrimination against smaller companies.

We found that companies employ supplier management and development strategy that seek to equip the suppliers with managerial and technical skills that could contribute toward improving supply chain sustainability. Seuring and Müller (2008) emphasize that supplier development and integration should be a focus of proactive companies since reactive approach to supplier's non-conformance could cause adverse impact to supply chain. The proactive approach could include supplier monitoring and training. Collaboration among supply chain partners is also crucial to the overall performance of the chain. It could help companies to find the supply chain solutions that can improve their capabilities and competitiveness (Gold *et al.*, 2010), such as in environmental technology development, environmental audits and training (Kovács, 2008).

The last finding from this study is related to the reporting of supply chain-related aspects. There is a lack of indicators that a company can use to assess its supply chain performance. We used the PSI index that was developed based on roughly a decade of research on sustainability reporting practices. Given that most companies use the sustainability reporting guidelines by the GRI and other industry-specific bodies, for example, the International Petroleum Industry Environmental Conservation Association, then this in itself is an indication that the coverage of supply chain-related indicators is lacking.

Janus and Murphy (2013) argued that the O&G industry will be burdened by the works required to comply with the new sustainability reporting guideline by the GRI, and that this would outweigh its foreseeable real benefit. Since the publication of sustainability report is done by companies on a voluntary basis, the lack of relevant, manageable and useful guidance (Janus and Murphy, 2013), might hinder a meaningful progress in reporting practices of these companies.

Nevertheless, there need to be a greater accountability among companies regarding the impact of their activities on the environment and society wellbeing. The increase in the number of companies that publish sustainability reports indicates the strategic importance of public disclosure of sustainability performance to their corporate legitimacy. Sustainability reporting guidelines, therefore, should be able to assist companies in identifying practically relevant criteria that can help assess and improve the sustainability of their activities. The companies, on the other hand, should not treat the voluntary nature of sustainability reporting as an excuse to selectively communicate or disclose aspects that are able to paint a favorable picture of their commitment to and performance in sustainable practices. This content analysis provides a good starting ground in understanding how sustainability issues are being addressed by companies in the O&G industry.

6. Conclusion

Based on a systematic analysis of sustainability reports of companies in the O&G industry, we found that the companies generally have a clear sustainability policy related to their commitments and plans toward environmental protection and socially responsible practices. However, what matters most is to translate those commitments and policies into measurable indicators that can help the companies to: assess their progress in sustainable practices, identify opportunities for improvement and identify areas of priorities that could lead to a more effective implementation of sustainability strategy. In these areas, their reporting performance seems notably weaker.

The current sustainability reporting practices are concentrated on the communication of companies' intention toward sustainable practices. The reporting of measurable performance can be improved. There is also an inconsistency in the current sustainability reporting practices with regard to the disclosure of intention and performance. Even though the companies expressed higher environmental intention compared to social intention, the reporting of social performance is higher than environmental performance. We also found a lack of guidelines in the reporting of supply chain-related performance. It implies that a more concerted efforts from all involved in the O&G industry are needed to clearly identify the indicators that can be used to measure supply chain sustainability effectively.

There are several limitations of this study that could be addressed in future research. First, we only consider whether topics are discussed or not in a report. The extent to which a topic is meaningfully discussed by a company was not measured. There may be instances in which a company's discussion is more elaborate than others. Therefore, future research could look into understanding sustainability discourse within reports that can provide good measures of the extensiveness of sustainability reporting and the materiality of information disclosed. Second, we only use cross-sectional data, which cannot serve the identification of patterns in reporting practices over time. The evolution of reporting practices is an interesting topic that could help us understand progress, or the lack thereof, that companies are making toward achieving sustainable practices.

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