

## USING ENVIRONMENTAL REPORTING TOOLS IN THE SUPPLY CHAIN: PERSPECTIVES FROM UK, FINLAND AND THAILAND

*Sarah Shaw<sup>1</sup>, David B. Grant<sup>1,2</sup>, Nikolai Shenin<sup>2</sup> and Siriwan Chaisuryakarn<sup>3</sup>*

<sup>1</sup>Hull University Business School, UK

<sup>2</sup>Hanken School of Economics, Finland

<sup>3</sup>Kasetsart University Sriracha, Thailand

Email: [sarah.shaw@hull.ac.uk](mailto:sarah.shaw@hull.ac.uk); [d.grant@hull.ac.uk](mailto:d.grant@hull.ac.uk); [alexshenin@me.com](mailto:alexshenin@me.com); [chsiriwan@yahoo.com](mailto:chsiriwan@yahoo.com)

### **Abstract**

**Purpose:** Supply chain performance measures and reporting tools must evolve as new societal challenges are met, and the natural environment has become one of today's most significant challenges. An inter-disciplinary interest in the field of environmental supply chain management has grown amongst researchers and practitioners in recent years as a potential source of competitive advantage due to climate change issues, diminishing raw materials, excess waste, and increasing levels of pollution. Measurement of environmental performance has also developed as a related topic and environmental management systems (EMS) within a logistics context have garnered some attention in the literature. However, little work has been done to assess the use of appropriate environmental reporting tools or the adoption of extant standards such as ISO14001 or EMAS in which to position and report environmental performance measures in the logistics sector. This paper builds on work presented by Shenin and Grant at the 2015 LRN conference to compare and contrast the adoption and use of environmental reporting tools in the UK, Finnish and Thai logistics sectors and identify key drivers and barriers.

**Research Approach:** This is a new area of research and thus exploratory tools were used to collect data from different perspectives. The study used a combination of semi-structured interviews, focus groups and two large scale industry surveys.

**Findings and originality:** The study found that the two most commonly known EMS are ISO 14001 and EMAS. However, they have been inconsistently adopted across the various sectors. For example, many UK logistics practitioners have developed their 'own company designed' reporting tools. Further, logistics and supply chain practitioners in all countries indicated a lack of understanding of environmental management systems (EMS), with small firms demonstrating no reporting at all. Key drivers and benefits for adoption of reporting tools were financially linked to customer requirements, to reduce waste and be more operationally efficient. Additionally, a lack of standard ESCPM reporting and measurement tools and government direction, and the complexity of the supply chain were seen as key barriers to effective implementation.

**Research Impact:** Reporting tools widely discussed in the academic literature such as the Global Reporting Initiative (GRI), Balanced Scorecard (BSC) and Green SCOR were not found to be extensively used in the three logistics sectors. There appears to be 'no one size fits all' tool in current environmental supply chain reporting and thus a clear divergence between theory and practice.

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*<sup>1</sup>Hull University Business School, UK*

*<sup>2</sup>Hanken School of Economics, Finland*

*<sup>3</sup>Kasetsart University Sriracha, Thailand*

*Email: sarah.shaw@hull.ac.uk; d.grant@hull.ac.uk; alexshenin@me.com; chsiriwan@yahoo.com*

## **Introduction**

Environmental supply chain management (ESCM) has grown in interest amongst supply chain researchers and practitioners in recent years because of climate change issues, diminishing raw materials, excess waste production, increasing levels of pollution, globalization and because it is a good source of competitive advantage (Abukhader and Jönson, 2004; Srivastava, 2007; Sarkis et al. 2011). This has led to the emergence of research into environmental supply chain performance measurement (ESCPM), which is positioned with the broader domain of sustainability (Seuring and Muller, 2008; Carter and Rogers, 2008; Pagnell and Wu, 2009; Carter and Easton, 2011).

ESCPM is important as it enables organizations to externally report their environmental performance, for example through public disclosure programs such as the Global Reporting Initiative (GRI) or for benchmarking. It also helps organizations to internally control and assess their environmental performance, so that they can understand their business better and continually improve. Fundamentally, it enables organizations to measure how well they are mitigating their impact on the natural environment. There are also a number of other specific pressures/motivators which highlight the important purpose of measuring green performance in supply chains (Holt and Ghobadian, 2009). These include external pressures from customers, suppliers, competitors and government legislation, and internal pressures from stakeholders.

Yet, there has been little work done in developing and incorporating environmental supply chain performance measures and there is a substantial gap regarding the use of appropriate reporting tools or the adoption of standards such as ISO14001 or the Eco-Management and Audit Scheme (EMAS) in which to position and report these measures (Hervani et al., 2005; Olugo et al., 2011; Shaw et al., 2010; Shaw 2013; Beske-Janssen et al., 2015; Morana and Gonzalez-Feliu, 2015).

The key purpose of this paper is to discuss and summarise the key findings from three studies conducted in the UK, Finland and Thailand on environmental reporting tool adoption in supply chains. The paper will build upon work by Shaw (2013), Shenin and Grant (2015) and Chaisurayakarn (2016) conference to compare and contrast the adoption and use of environmental reporting tools in the UK, Finnish and Thai logistics sectors and to identify key drivers and barriers.

## **Literature Review**

Despite the importance of this research agenda to supply chain practitioners, very little work has been done in developing and testing environmental reporting tools for the supply chain. The majority of the EMS reporting literature discusses motivations or barriers of environmental supply chain management (ESCM) adoption, however it does not directly assess reporting tool adoption and the associated drivers and barriers. Shenin and Grant (2015) also found that the study of EMS in the logistics literature to be sparse. The most significant study on the theme of EMS and reporting tools in logistics was conducted by Shaw (2013). However, Shaw's study focused on performance measurement indicators and not necessarily EMS standards like ISO14001 or EMAS.

## **Environmental Reporting Tools in the Supply Chain**

Various environmental reporting tools have been documented in the background literature, for instance, the expansion of the Balanced Scorecard (BSC) to integrate environmental performance measures has been developed, but not extensively studied in relation to supply chain management (Hervani et al., 2005; Shaw et al., 2010). Green Supply Chain Operations Reference (GreenSCOR) was developed to enable organisations to incorporate environmental management within supply chain management and track environmental impacts simultaneously (Metta, 2011). The Life Cycle Analysis (LCA) tool assesses the environmental impacts of a product from cradle to grave (Hagelaar and Vorst, 2001), and the ecological supply chain analysis tool (EcoSCAN) maps the environmental impacts of selected equivalent products along a supply chain (Faruk et al. 2001).

Hervani et al. (2005) also propose a framework for environmental reporting in supply chains. They sought to design an ESCPM framework that would integrate: supply chain management, environmental management and performance management. They believed that an ESCM/PMS framework should be positioned within existing environmental management systems like the International Organization for Standardization ISO 14000 or a Total Quality Management (TQM) system that an organisation is already adopting. They recommended the already accepted ISO 14031 Plan-Do-Check-Act model to design an ESCM/PMS and believed in order for organisations to sustain long term competitive advantage they should extend their focus on the environment.

From a broader perspective, the Global Reporting Initiative (GRI) developed in the late 1990's encourages the disclosure of sustainability performance data by organisations. GRI are very exacting over the calculation and reporting of these indicators which enables standardisation of outputs for benchmarking. GRI provides an alternative perspective on how organisations can measure and report on their environmental performance, designed as an external sustainable reporting tool to aid external benchmarking, and although it provides a useful guide of what ESCPMs to measure, there is no indication of how these are applied to the end to end supply chain (Shaw, 2013). Similarly, Morana and Gonzalez-Feliu (2015) also propose a sustainability dashboard for measuring urban delivery performance. They identified a range of social, economic and environmental indicators, but the focus of their study was on the development of indicators rather than reporting.

Other country specific reporting tools that exist, include the Carbon Reduction Scheme (CRC), which is a mandatory carbon emissions reporting and pricing scheme for large public and private organizations who use more than 6,000 MWh per year of electricity (Carbon Trust, 2016). In addition, other large global companies have demonstrated their green compliance to shareholders by being part of schemes such as the Dow Jones Sustainability Index or the FTSE Good Index. However, it is debateable whether this is driven out of a genuine care for the environment or simply a 'greenwashing' exercise (Lyon and Maxwell, 2011).

But despite the importance of this topic, very little empirical work has been completed to date on ESCPM reporting, which is important to the success of sustainability in supply chains. So where do organisations go from here in terms of ESCPM reporting? Although multiple reporting tools are discussed in the literature, there has been no assessment of which tools are currently adopted and appropriate to position and report ESCPMs (Hervani et al., 2005; Shaw et al., 2010; Beske-Janssen et al., 2015). Furthermore, in order to assess EMS adoption in the logistics sector, it is important to understand what the key drivers are and barriers which influence EMS adoption in a general business context, as this may provide insight on why certain tools have been adopted and others have not.

## **EMS Drivers and Barriers**

A significant amount of scholarly work has discussed the key drivers and barriers for environmental supply chain practices (Saha and Darnton, 2005; Walker et al. 2008; Holt and Ghobadian, 2009; Diabat

and Govindan, 2011; Shaw, 2013). In addition, several studies have assessed the drivers and barriers for EMS implementation from a general business perspective. A synthesis of the literature reveals that the key motivational factors of ISO 14001 adoption are both internal and external to an organisation, and range from improving environmental performance and waste reduction through to enhancing the corporate image (Randonelli and Vastag, 2000; Poksinska et al. 2003; Cassells et al. 2008; Prajogo et al. 2012).

In contrast, key barriers to EMS implementation relate to firm size, with smaller organisations seeing little or no benefit of implementing EMS. For example, Rațiu and Mortan (2014) identified both internal and external barriers in SME's, such as a lack of recognition and positive rewards by public institutions, lack of customer interest and awareness, unclear benefits or insufficient drivers for EMS adoption, and difficulty in involving and motivating employees. Psomas et al. (2010) also found the most significant barriers to EMS implementation were divided into two groups, ISO 14001 requirements of periodic audits, knowledge and experience in environmental management issues and required resources, and determining the key issues of environmental performance such as determining objectives and measurable aims, identifying environmental issues and determining employees' tasks and responsibilities. Similarly, Cassells et al. (2008) found documentation preparation and maintenance, scope of legislative requirements and management involvement were the biggest barriers in EMS implementation (Shenin and Grant, 2015). Thus organisational demographics, such as country, industry sector and company size potentially influence EMS certification, and while some of the larger organisations may experience significant benefits to EMS implementation, this is not necessarily true for SME's.

#### EMS Adoption in UK, Finland and Thailand

The International Organization for Standardization ISO 14001 standard and the European Eco-Management and Audit Scheme (EMAS) are now the two most well-known generic environmental management systems globally (Testa et al., 2013; Heras-Saizarbitoria et al., 2014). In the UK 123,532 companies were ISO 14001 certified in 2013, while Finland had 14,226 certifications and Thailand only 2,791. The ISO 14001 adoption rate is inconsistent across many EU countries (Table 1), but ISO 14001 certifications grew by 7% between 2013 and 2014 due to growth in Asia and North America (ISO, 2016).

Country	Total ISO14001 certifications 2013	Population 2013 (millions)
Spain	154574	46,6
Italy	147248	60,2
<b>United Kingdom</b>	<b>123532</b>	<b>64,1</b>
Germany	71325	80,7
France	55058	65,9
Sweden	48987	9,6
Romania	47825	20,0
Czech Republic	37628	10,5
Switzerland	25976	8,1
Netherlands	19251	16,8
Turkey	15232	74,9
Hungary	17143	9,9
Poland	15975	38,5
<b>Finland</b>	<b>14226</b>	<b>5,4</b>
Denmark	12585	5,6
Austria	9738	8,5
Belgium	8694	11,2
Thailand	2791	69,5

**Table 1: ISO14001 Certifications in 2013 (Source: ISO, 2013)**

There is very little work in the literature about ISO 14001 certification in nations such as the UK, Finland and Thailand in relation to the logistics sector. For instance, Nawrocka et al. (2009) investigated ISO 14001 and their impact on environmental supply chain practices, but the sample of the study only consisted of two multinational companies in the Swedish manufacturing industry. Chiarini (2013) and Wiengarten et al. (2013) focussed on supply chain activities but logistics companies were not investigated. The most significant study on the theme of EMS in logistics was conducted by Shaw (2013). However, Shaw's study focused on performance indicators rather than EMS standards such as ISO14001 or EMAS specifically (Shenin and Grant, 2015).

Our study therefore aims to build on work by Shaw (2013), Shenin and Grant (2015) and Chaisurayakarn (2016) to compare and contrast the adoption and use of environmental reporting tools in the UK, Finnish and Thai logistics and identify key drivers and barriers. Accordingly, we analysed the three empirical studies undertaken in these countries to address the following research questions:

**RQ1: What EMS or environmental reporting tools do companies currently use in the logistics and supply chain sector?**

**RQ2: What are the key drivers and barriers to EMS or environmental reporting tools adoption in the logistics and supply chain sector?**

**RQ3: Can existing supply chain reporting tools be used to incorporate EMS performance indicators?**

### **Methodology**

We did content analysis of the three studies. The UK study employed a three-phase mixed method approach. The first phase comprised generating a list of reporting tools from the extant literature and validating them in focus groups with practitioners. The second phase involved testing these tools and their adoption in a major survey of UK supply chain practitioners. Finally, a focus group was conducted in the third phase to verify the overall results with a different group of practitioners. The Finnish study employed nine semi-structured structured interviews with six firms from the capital region of Helsinki in Finland, representing a wide range of company sizes and core logistic activities (three micro, two small, three medium and one large company). Finally, the Thai study employed a three-phase mixed method approach. Similar to the UK study, the first phase comprised semi-structured interviews with Thai logistics service providers, a questionnaire survey in phase two and structured interviews in phase three.

### **Results and Discussion**

The analysis confirmed that the two most commonly known EMS are ISO 14001 and EMAS. In Finland and the UK, over 40% of companies interviewed and surveyed respectively used ISO 14001. However, these reporting tools have been inconsistently adopted across the various sectors. For example, in the UK ten reporting tools were identified in total, with UK practitioners developing their 'own company designed' reporting tools. Nine other reporting tools were identified by UK practitioners, with ISO 14001 and the Balanced Scorecard ranked second and third most adopted supply chain reporting tools.

A key finding for that study was that some organisations do not report at all. This was particularly prevalent in SMEs, who see no need or pressure to report on their environmental performance. In contrast, larger sized organisations showed evidence of reporting both internally and externally to either comply with government legislation or to satisfy customer and supplier contractual requirements. In Finland, it was also found that micro-sized logistics service providers have limited knowledge regarding EMS and failed to identify their value. It was apparent the Finnish government does not motivate SMEs in adopting EMS in any way, which needs addressing.

However, in Thailand, evidence of ISO 14001 adoption was evident and growing because lack of ISO 14001 is seen as a key barrier to trading with the west. From a UK perspective, a lack of standardised ESCPM reporting and measurement tools, the complexity of the supply chain itself and government direction were also seen as key barriers to effective ESCPM measurement and reporting. Thus, parallels can be drawn among the countries investigated.

On average, the analysis found less barriers than drivers to environmental reporting, these findings reflect those identified by Walker et al. (2008), Shaw (2013), and Rațiu and Mortan (2014). The study also found that those firms that are ISO 14001 certified could identify the drivers and benefits of ISO 14001 adoption. For instance, ISO 14001 certified firms were able to link having environmental practices to an improvement in competitive advantage, operational efficiency and customer satisfaction. Also, ISO 14001 was seen to improve transparency of different operations, both internally and externally, which helps to create brand value and enhance corporate image. In contrast, a lack of awareness existed amongst the non ISO 14001 certified organisations.

A significant finding from the analysis is that logistics and supply chain practitioners in all countries indicated a lack of understanding of environmental management systems (EMS), and this may explain why there is current reporting inertia. Many organisations are not aware of what environmental management schemes their organizations subscribe to, with answers such as *“Probably do, but not aware”*, *“Yes we do, but not sure, possible Carbon Trust”* and *“Ditto, we have a green centre initiative, so I am sure we do”*. These responses demonstrate a divergence between supply chain management and environmental management practices in organizations, which requires further exploration and has implications on the future of ESCPM research and practice.

A consensus from the analysis was that ESCPM could be integrated into existing supply chain performance frameworks in all three countries and that practitioners did indeed see some benefit in doing so. Finally, reporting tools widely discussed in the academic literature such as the GRI, BSC and Green SCOR were not found to be extensively used in the three sectors. There appears to be ‘no one size fits all’ tool in current environmental supply chain reporting with many organizations developing ‘own company designed’ reporting tools, which also presents challenges for external ESCPM benchmarking and the future of ESCPM reporting, particularly for frameworks such as GRI which rely on standardized results.

## **Conclusions**

To conclude, industry appears to be leading rather than following academia on supply chain performance reporting, particularly in a Thai context where despite small numbers companies see having ISO 14001 as a necessary pre-requisite to doing business with the west. Table 1 also shows that many eastern European countries have higher certification numbers than western European countries and thus this might be a view shared there also. This presents challenges for standardizing and benchmarking ESCPM reporting across different companies and industrial sectors. Further, alongside own company reporting, ISO 14001 and BSC are the most appropriate and relevant tools for ESCPM integration and are the most widely used in practice.

A contribution of this research is that SMEs do little reporting at all and that larger organizations internally report ESCPM, but not externally unless required by government or legislation. This supports the view that reporting and benchmarking of ESCPM are still very much in their infancy (Shaw et al., 2010). This may be because many organizations do not feel under any pressure to report on their ESCPM and are struggling with the initial concept of ‘what to measure’ and ‘how to measure it’.

The study concluded that practitioners agree that ESCPM can be integrated within existing supply chain performance frameworks and that there is a benefit in doing this. However, there is clearly a lack of

maturity and standardized supply chain performance measurement reporting tools to do so, which presents challenges for ESCPM integration. A further issue relates to the fact that many small, medium and even large sized organizations do not yet report on their existing supply chain performance internally or externally (Keebler and Plank, 2009) and suggests some organizations are some ways off from being able to measure at all.

A final contribution of this study is the lack of understanding and knowledge about environmental management practices amongst the SCM community; participants were unclear about what EMS their organization adopted. This suggests that practitioners require information and education in this area if they are to successfully assist their organization in reducing reduce its environmental impact.

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