Environmental Management Accounting and Supply Chain Management
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Environmental Management Accounting and Supply Chain Management
Sustainability requirements continue to be driven strongly both by regulators and customer demands. For some years, pressure concentrated on large, often stock-listed corporations. However, it soon became clear that much of the social and environmental impacts are to be found within the supply chain. As large multinationals hand down the societal pressure they are facing, suppliers increasingly need to be transparent about the social and ecological impacts of their products and services, and need to be able to assess and improve their respective performance. This creates new challenges. On the one hand, suppliers, often companies of much smaller scale and limited (financial and human) resources are faced with the need to deal with complex social and environmental issues. On the other hand, large companies with complex supply chains need to secure the consistency of data they receive by their suppliers, and need instruments for a meaningful interpretation of this data. To cope with this challenge in a consistent and cost effective manner, clear accounting standards and sound information systems are pivotal.

The literature on sustainable supply chains has reached a considerable level of maturity within the last years. However, accounting aspects have not been in the centre of attention of this discourse. The fifth volume in the Environmental and Sustainability Accounting Network (EMAN) research book series fills this gap by providing in-depth knowledge on supply chain related aspects of environmental management accounting. It offers both a general perspective on key issues and sector specific highlights for highly exposed industries like food and beverages (e.g. coffee, dairy), oil and gas and chemicals. A general perspective on environmental management accounting and on supply chain issues both upstream and downstream is rounded out by assessments of core regulatory developments, like the EU chemicals regulation REACH. Based on this comprehensive perspective, we believe this book to be of high value not only for academic readers, but also for interested practitioners.

Mr Michael Werner
Partner at Pricewaterhouse Coopers Germany and
Leader of the German PwC
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Recent developments in environmental and sustainability accounting are addressed in this fifth volume in the Environmental and Sustainability Management Accounting Network (EMAN) research book series. The main subject is the role of environmental management accounting in supply chain management – a topic which has been dealt with at various EMAN conferences from which a selection of the best papers is now collected. As well as highlighting new developments in environmental and sustainability management accounting (EMA) generally, the papers presented here link sustainable supply chain management with EMA, which was the core theme of the EMAN-EU conference held in Espoo, Finland, in 2007. The book also considered papers which originated from the EMAN-EU conferences on sustainability and corporate social responsibility accounting in Budapest in 2008 and on environmental accounting and sustainable development indicators in Prague in 2009, as well as the first EMAN Global Conference on integrated environmental management accounting for sustainable development at Tshwane, South Africa in 2008. It is a pleasure to see the number of participants at EMAN conferences continuing to flourish, with 150 attending in Espoo, 100 in Budapest, 200 in Prague and 120 in Tshwane. Given the changing core topics of the EMAN conferences, the conferences were attended by not only experts on EMA but also by academics and practitioners from different disciplines and industries. The continued interest in EMA is also reflected in the growing interest in EMAN generally and shows that the role of EMA is acknowledged in an increasing number of disciplines, professions and industries.

The result is that this volume is able to present a collection of contributions relating to sustainable supply chain management, the social and economic aspects of environmental and sustainability management accounting, and the integration of EMA with sustainable development, a characteristic of sustainability which is sadly lacking from much of the earlier literature.
The editors would like to thank Rainbow Shum, Research Administrator at the Centre for Accounting, Governance and Sustainability (CAGS), Amanda Carter, especially for her proofing work, and Irida Lekaj, both Research Assistants at CAGS, for their outstanding administrative support in dealing with the large number of submissions, revisions and reviewers involved. Special thanks also to the 48 reviewers listed below, who performed an excellent job, many of them reviewing papers several times:

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Part I

Introduction and Structure
Chapter 1
Sustainable Supply Chain Management and Environmental Management Accounting

Roger L. Burritt, Stefan Schaltegger, Martin Bennett, Tuula Pohjola, and Maria Csutora

Abstract  Interests in and understanding of supply chain management are growing, along with a number of catalysts which include: reduction in trade barriers; development of logistics structures as a counterforce to globalisation; and reduced geographical spread in business. This raises a set of challenges for sustainable supply chain information management which is explored here, including: confidentiality and business records; cost-management and eco-efficiency; socio-cultural distance; complexity; and the need for rapid responses to the situation when a crisis occurs. These challenges lead to a critique of conventional cost management and the need to make sure credible information is provided in the supply chain relationship. A comprehensive Environmental Management Accounting (EMA) framework reveals that the links between sustainability management accounting and different decision settings are not clear in the supply chain relationship. The papers presented in this book provide a guide towards improved knowledge of EMA and supply chain accounting interrelationships, challenges and potential successes.

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1 Growing Importance of Supply Chain Management

Literature on sustainable supply chain management has increased substantially in volume over the last 15 years (Seuring and Muller 2008). Although the main focus of current supply chain literature, and of sustainable supply chain management literature in particular, is on other issues than information, the management of sustainability information has nevertheless attracted increasing attention.

This raises the questions of what has led to such an increase, and why sustainable supply chain management appears to be of growing importance to companies. Different possible reasons are examined here in turn: globalisation; cost-effective logistics processes; market-pull; information systems which shrink geographical proximity; and recognition of the interdependence between the dimensions of sustainability.

Supply chain management is closely connected to the issue of globalisation which is driven by reduced trade barriers, new logistic systems and lower transportation costs, as well as by new information technologies and the fast growth of newly developing and emerging markets.

First, trade barriers have been reduced by free trade agreements in particular through the World Trade Organisation (WTO), the European Union (EU internal market), the Asian Economic Society Association (ASEAN) and the North American Free Trade Association (NAFTA). This allows companies to produce and acquire goods and services in and from different countries in order to capture lower costs and efficiencies through operations or associations across state borders. These activities are primarily driven by the search for economic gain but can also have sustainability effects – for better or worse. If managed properly, globalisation can help to provide economic opportunities to poor countries and to improve the natural environment and the social quality of life across the world. If not, globalisation and its effects along the supply chain can cause substantial and long-lasting environmental, social and economic problems and even catastrophes, many of which might neither be intended nor immediately detected by either consumers or the companies which have entered into globalised trading. Which of these effects is created depends largely on the information available to managers, consumers and the media. The sustainability of globalisation depends on how it is designed, and this in turn depends on whether decision-makers have appropriate information and incentives and whether the effects of their decisions are transparent to society, regulators and consumers.

Second is the growth of new logistics structures, some of which can cause substantial environmental and social problems whilst others drive cleaner production and processes that are innately safe and secure, and are compliant with norms which respect fundamental human rights and environmental sustainability. The transportation of products, whether intermediate or final, was not an issue for most companies
when production and sale took place locally as suppliers and purchasers were located in close proximity to each other. Global logistics management in contrast has developed to recognise all the activities associated with transactions, transformations and external events in the cross-border supply chain. These range from the purchase of raw materials in resource-rich countries to the production of goods in developing countries and the recycling of finished products, perhaps again in emerging or developing countries. Whether more regional production systems and clusters are preferred, or whether production is spread in tiny steps over the whole world, largely depends on the costs and reliability of transportation and logistics. In any case, the total transportation volume is increasing through not only globalisation but also the growth of economies in Asia, Latin America and Eastern Europe. EMA is therefore also challenged by different cultural contexts and the need to provide decision support to suppliers and investors in fast growing economies.

Third, as a reaction to various problematic effects of globalisation, many companies have experienced pressures from developed markets and their customers to manage their supply chains in the light of sustainability issues (known as ‘market pull’). Customers increasingly require that sustainability is considered and that they can expect a supply of green and fair trade products. The challenge for companies is to keep track of environmental and social issues, not just the economic aspects of creating value, over the whole of their supply chains. This process is reinforced by media and journalists who observe and reveal production conditions along the supply chain, and various international standards such as ISO 14001 (environmental management systems), SA 8000 (social accountability) and ISO 26000 (social responsibility), which can be applied at every step of the supply chain.

Fourth is a shrinkage in geographical proximity, facilitated by cost-efficient communications mechanisms which speed the flow of information that parallels the transfer of production materials and products (both intermediate and final) between different parties in different countries, as well as assisting interested parties to track companies’ actions in a fast and responsive manner. Given a combination of stakeholder pressure, market opportunities, and increasing opportunities relating to new information technologies, companies have started to establish detailed tracking and supply chain information systems which can be accessed even by customers and suppliers. These information systems mostly represent specific forms of Physical Environmental Management Accounting, but to ensure that the development of such progressive approaches contributes to increasing competitiveness they also should be linked to Monetary Environmental Management Accounting.

Because the emphasis is on sustainable supply chains, successful management requires not only high quality environmental, social and economic performance, but also their integration (Boyd et al. 2007). The interrelation and trade-off between dimensions of sustainability is a vitally important part of sustainable supply chain management, since sacrifices in one dimension can lead to disproportionate gains in other dimensions throughout the supply chain. Once recognised, these net gains in the chain can of course be shared between the parties (Shank and Govindarajan 1992). However, at this stage of development in understanding there is ‘a clear deficit’ (Seuring and Muller 2008:1702) in supply chain management literature about
social and integration issues, with the main emphasis being on the economic and environmental dimensions (Linton et al. 2007).

Given these four core drivers of sustainable supply chain management, a closer examination of the reasons that managers engage in the topic may be helpful in order to understand the managerial requirements for EMA to support sustainable supply chain management. Seuring and Muller (2007:1703), based on available literature between 1994 and 2007, summarise six external incentives for including sustainability in supply chain management:

- Legal requirements and command-and-control regulations are the most frequently cited triggers for action, making regulators a primary stakeholder in sustainable supply chain management.
- Customer demands on the focal company are the second most highly ranked pressure.
- Responding to stakeholders comes a close third.
- Competitive advantage is important, and placed well ahead of pressure from social and environmental groups and reputation loss.
- In addition, internal risk management and the need for minimisation are seen to be important triggers for sustainable supply chain management. Seuring and Muller (2007:1704) suggest that risks can derive from potentially poor environmental or social performance, as well as from potential disruptions of supply.
- Increased outsourcing, particularly to overseas suppliers, multiplies the number of companies in different contexts in the typical supply chain, and thereby encourages the focal company to push their suppliers for an increase in take-up of and compliance with standards and codes of environmental management and social responsibility, so that performance can be improved.

In summary, sustainable supply chain management is increasing in importance to companies for a number of reasons related to external and internal risk, increases in globalised trade and reduction in the barriers to transportation and communications across borders. Taken together within a globalised setting, these manufacturing and information flow processes and product perspectives mean that supply chain management brings pressures to hold companies responsible for their environmental, social and economic performance, not just in their own premises but along the whole supply chain and in the light of expectations from customers, regulators and the media. In such a setting, whether concern is with the overall sustainable performance of the focal business, or with a part of the supply chain which is not under its direct control such as (say) product design and development, purchasing, or logistics, guilt by association with unacceptable practices of suppliers is an ever-present possibility (Seuring and Muller 2008). Hence, reputation-conscious companies tend to assume responsibility for bringing pressure on their suppliers to resist unsustainable practices. Focal companies in supply chains need to accept responsibility for helping to overcome any environmental or social problems associated with all the other companies in the chain. They are aware that any single part of the chain can bring down the other parts if unacceptable environmental or social impacts relating to production processes or lack of product sustainability catch the
public eye. If aspersions are cast about the credibility of a supplier in the chain, the focal company’s reputation can falter and collapse. Companies in supply chains in a globalised setting are subject to increased risks, requiring that management strategy is adapted in order to safeguard against high-risk outcomes.

2 Challenges of Sustainable Supply Chain Information Management

Given the growth in demand for sustainable supply chain management, what are the information challenges facing those companies which are keen to implement relevant management systems? How should environmental and sustainability management accounting be designed to provide the foundation for the supply chain and the sustainability information management challenges for internal management decision-making, as well as for internal and external reporting?

Five central challenges are mentioned in the literature: confidentiality and business secrets; movement from cost management to eco-efficiency; distance; complexity; societal observation and going global.

- **Confidentiality and business secrets:** Pereira (2009:372) argues that information management is the current supply chain frontier because although it provides a conduit for information transfer, the technology which it involves can introduce new risks to confidentiality, integrity and availability in the supply chain. A balance between the potential benefits and costs, and a consideration of the distribution of the benefits and costs of higher transparency between different parties in the supply chain, are essential if high-quality data are to be obtained from all these parties in order, say, to assess the environmental and social impacts of a product which has materials provided by countries with high levels of corruption. In this type of setting, environmental management and sustainability information management assume a premium place in order to provide support for sustainable decision-making based on credible environmental, economic and social data from suppliers.

- **Cost-management to eco-efficiency:** accounting for costs along the supply chain can help to reveal potential cost reduction through more efficient designs, or production or logistical organisation between partners. With accounting for eco-efficiency (Schaltegger 1998), EMA provides methods which can support this goal of supply chain management. However, to identify this potential requires a reliable and largely open communication of cost structures and thus also profit margins. This may not always be in the interest of all suppliers and can create tensions in business-to-business relationships.

- **Distance:** distance can be created not only by geography but also by cultural, social and economic differences, and these constitute a challenge to EMA for supply chain management. Prior to the growth of extended supply chains throughout the world, information about activities in the supply chain was easier to obtain
as local laws and customs, local cultures and local mores provided a common foundation. Of course, cultures differ between countries which means that countries can vary in the extent to which the rule of law appears to apply. In some countries corruption is the norm in relation to supplies and related information flows, e.g. where a government inspector will expect to receive a bribe for providing the desired information to enable their ‘client’ to demonstrate compliance with regulatory requirements (Spector 2005). In other countries the situation is less clear as in the recent case of Stern Hu, formerly of Rio Tinto, a large multinational mining business. Hu admitted to bribery in China, where corruption is a common part of everyday business activity (Garnaut and Liu 2010), and received a ten year sentence for undertaking activities which others see as being the norm.

• **Complexity**: with increasing outsourcing of production, supply chains spread over the world, and constant changes in suppliers and sub-contractors, an increase in complexity needs to be managed. With increasing sub-division of supply chains and the need for information confidentiality beginning to change, information-gathering settings and reliability have taken on renewed importance. Advanced information systems developments offset this complexity to an extent (Kaipia 2009:144). Nevertheless, when supply chain management is considered in its sustainability context, information flows take on an importance which has hitherto been underappreciated.

• **Societal observation and going global**: a final challenge is presented by the need for rapid responses to actions which are considered unacceptable. As supply chains in many industries have been extended to different countries, the growth of social networking tools has led to faster possibilities for non-governmental organisations to identify social and environmental problems and to spread information via media such as Facebook and Twitter, thus increasing the economic risk associated with the supply chain since a single bad incident can be sufficient to destroy brand value and ruin a company’s reputation (e.g. currently BP in the Gulf of Mexico). In these circumstances successful brand management becomes crucial, and in order to differentiate a company through the sustainability of its products, its managers need good-quality information about the full extended supply chain. Demonstrating to social observers and watchdog groups that the information communicated is reliable requires standards and third party verification in order to create credibility for the information systems and the managers themselves.

To respond to these challenges, companies need new information systems about environmental and social impacts along the supply chain. Hence, data collection by very different companies in different cultural settings presents a problem for securing reliability in relation to decisions, as factors relating to the credibility of information are less controllable once the supplier is located in a different legal organisation, country, or cultural context.

Other challenges of supply chain information management include the coordination of actors so that they provide and pass on information; auditing and assurance; trust-building; and an understanding of why social and environmental issues are important to the focal company, all in a dynamic setting of constantly changing actors in the whole supply chain as subcontractors change.