

Challenges and Prospects of Emerging Management and Accounting of Green Supply Chain in the Next Millennium

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Abstract- Green Supply Chain is a system of organizations, people, technology, activities, information and resources involved in moving green supply product or service from supplier to customer, green Supply chain activities transform natural resources, raw materials and components into a finished green product that is delivered to the end customer. There are a variety of supply chain models, which address both the upstream and downstream sides. In the 1980s, the term Supply Chain Management (SCM) was developed to express the need to integrate the key business processes, from end user through original suppliers. Management and accounting of green Supply Chain is a recent and important concept. Their contributions are organized around five key issues in the green chain:- concepts of measuring performance; empirical research in measuring costs, benefits and risk; modeling; value of information; and governance and performance. Papers with a wide variety of approaches from different economic disciplines have been demonstrated to be useful in analyzing the supply chain. Green supply chains entered a new era in which customer orientation and social responsibility are the main driving forces. Globalization of supply chains complicates the chain governance. In order to develop a research agenda that meets the challenges facing industry and policymakers, invited experts from around the world convened to review the state of the art. There is a large number of research and dissensions is necessary. Understanding the management and accounting of green Supply Chains systems requires more investments in retrieving empirical data for testing propositions and developing appropriate models.

Index Terms- agribusiness; food production chains; performance measurements; risk and uncertainty; chain governance; financial accounting; reporting guidelines; accounting standards; reciprocity Generally accepted accounting principles.

I. EMERGENCE OF GREEN SUPPLY CHAINS

Now a day's public becomes more aware of environmental issues and global warming, consumers will be asking more questions about the products they are purchasing. It has been increasing in consciousness of the environment in the last few decades. More people are aware of the world's environmental problems such as global warming, toxic substance usage, and decreasing in non-replenish resources. The Government has released campaigns to promote this problem to people. Several organizations responded to this by applying green principles to their company, such as using environmental friendly raw

material, reducing the usage of petroleum power, and using the recycle papers for packaging. **Green** Supply Chain is a system of organizations, people, technology, activities, information and resources involved in moving green product or service from supplier to customer green Supply chain activities transform natural resources, raw materials and components into a finished green product that is delivered to the end customer. During 1980's and 90's, there has been a rapid industrialization of agriculture in the developed economies around the world. The trend toward greater concentration in agricultural input and food distribution, the increasing role of information and logistic technologies, and the growing importance of food safety, quality, and other technical requirements have resulted in dramatic changes in green systems. Green supply chain systems have become highly organized and linked from producer through consumer with an increasingly dominant role being played by highly concentrated agro-industrial firms and retailers.

The most notable change is the rapidly changing in green supply chain distribution systems worldwide.

The key indicators of the change can be summarized as follows:

- Rising modern retail outlets such as supermarket, fast food and other food services.
- Increasing vertical partnerships and horizontal alliances.
- Greater market segmentation.
- Availability of range of goods at market.
- Brand marketing.
- Strong presence of Multinational Corporations (MNCs) in processing and retailing.
- International purchasers/agents.

Successful participation in global markets has increasingly required efficient organization of domestic green system. In parallel with these interrelated trends, a new type of organization and management in green system - supply chain management (SCM) has emerged in developed countries. With the rapid economic growth, the increasing urbanization, and accelerated integration into the world market, the similar trends have been observed in many of developing countries in Latin America and South East Asia. The quest for a more efficient supply chain organization has been considered by many as a driving force for the future growth of green industries in developing countries. In the future, it will no longer be company competing with company, but supply chain competing against supply chain.

II. DEFINING

Green Supply chain management: Green Supply chain management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of green -product and green -service packages required by end customers (Harland, 1996). Green Supply chain management encompasses the planning and management of all green activities involved in sourcing, procurement, conversion, and logistics management. It also includes the crucial components of coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Green supply chain management integrates supply and demand management of green products within and across companies though it has not well understood yet, SCM usually refers to the management of the entire set of production, distribution, and marketing processes that deliver competitive products to consumers. The terms "supply chain", "value chain", "commodity chain", and "green system" are used liberally throughout the literature, but the meaning is often shaded differently depending on the focus and context. Some people use these terms interchangeably. Other use each of the terms to describe different processes. It is not uncommon that these terms are used for political and promotional reasons as well. It is fair to say that these terms are now overworked and routinely applied to a wide range of activities that are dissimilar. For this presentation, the term green supply chain system refers to the entire vertical chain of activities: from production on the farm, through processing, distribution, and retailing to the consumer - in other words, the entire spectrum, from farm gate to plate, regardless how it is organized or how it functions. The supply chain typically deals with a product-specific sub-sector of the green system. Green supply chain management refers to the management of the entire set of production, distribution, and marketing processes that deliver competitive products to consumers. The term supply chain has an attached meaning of 'managing' in order to distinct itself from usual sub-sector assessments. In a traditional spot market, business-to-business transactions are decentralized. A producer supplies several wholesalers; a wholesaler's purchase from various producers; and likewise retailers have various sources of supply for a given product. Business entities often change their sources of supply and lose and win new customers over time. In a green supply chain environment, the number of actors involved in transactions is reduced and the business-to-business relationship is relative lasting and more centralized. At one end of the continuum, a supply chain may function close to a situation of vertical integration. In the most streamlined chain, one producer supplies product to one wholesaler, who supplies to one retailer, though the wholesaler may be bypassed.

In reality, most 'chains' in green are loose, fragmented, and unstable over time. A successful chain often has an effective 'channel manager', a role often taken by supermarket or processors in developed countries. A related concept is that of global commodity chains discussed by Gereffi (1994). By explicitly focusing on the co-ordination of globally dispersed, but linked, production systems, Gereffi has shown that many chains are characterized by a dominant party who determine the overall character of the chain, and as lead firm(s) become responsible for upgrading activities within individual links and coordinating

interaction between the links. This is a role of governance, and here a distinction is made between two types of governance: those cases where the co-ordination is undertaken by buyers (buyer-driven commodity chains) and those in which producers play the key role.

III. DEVELOPMENT OF GREEN SUPPLY CHAINS

Though the phenomenon of green supply chain while, relatively new to the green industry has been well established in other industries for some time. The automotive industry is perhaps one of the first sectors to developed sophisticated supply chain management skills. The high volume manufacturers developed supplier relations with such designations as OEM (Original Equipment Manufacturers) and PSS (Preferred Suppliers Status). The retail sector has been revolutionaries by firms such as Wal-Mart. The use of sophisticated inventory management systems and on-line ordering and stocking procedures with suppliers has propelled the company to become the fast growing and one of the most profitable retail organizations in the world. The rapid growth of the personal computer industry has led to the rise of corporate giant such as Dell Computer to conduct business in entirely new ways formerly unthinkable. Dell, for example, has no original manufacturing - it simply assembles components and creates a machine using supply chain management methods that ensure the prompt and timely arrival of hundreds of parts on a daily basis. A recent Ernst & Young Study estimate that 85% of the companies in electronics industry have at least one alliance in place. Booz-Allen & Hamilton estimates that more than 20,000 alliances have been formed worldwide since 1996. It appears that the firm is convinced that alliances are a central engine to achieve growth and profitability.

The formation of supply chain of food and agricultural products is also taking place world-wide. Beginning with the evolution of information technology (IT) in the 1980s, it has become possible to extend the supply chain management further to include the final consumer and the suppliers. Efficient Consumer response (ECR) in the 1990's was the food industry's first coordinated response to embrace the concept of supply chain management. Much of the initial development and experience has taken place in Europe. Perhaps the most illustrative example of strategic supply chain formation can be found in the Netherlands. With the formation of the Agri Chain Competence (ACC) Foundation in 1995 and an overall budget of 50 million USD, over 60 supply chain pilot projects have been initiated. In the United Kingdom, the formation of a supply chain is led by major retailers with some government support, while in Japan it is led by retailers and trading companies. In the United States, the formation of value chain is focused on niche markets with some movement at the large company level, though the market continues to be defined by vertical integration or low cost commodity strategies. In Australia, the formation of supply chain is driven by the Japanese market requirement with support from industry association. In Canada, Alberta has recently created AVAC, a public institution; to encourage the formation of value chains in green systems. Supply chain formation within green system is driven by the desire to improve competitiveness.

The following three key market drivers of supply chain formation in developed economies can be identified:

- Food safety and quality assurance: the development of detailed quality assurance systems from primary production to retail. This type of chain may be small scale or involve an entire sector strategy involving major producer organizations and large scale food processors and retailers.
- Product innovation and differentiation: typically involves the development of niche markets and is most appropriate for smaller organizations working to develop specialist markets.
- Lowering systemic cost: the drive to reduce logistics costs which can include a range of transaction, delivery, and warehousing and delivery costs. Typically these chains require a strong operations research focus to identify system bottlenecks and to seek out inefficiencies best suited for improvement.

Green Supply chains develop through different stages over time. Porter (1980) identifies, through industry life cycle perspective, four stages for the chain development: birth, expansion, efficiency, and self-renewal. Some of generic characteristics for each stage of chain development is discussed in the presentation. It is important to recognize that, in reality, the formation of a chain does not necessarily follow a clear path as defined. Two cases are used to illustrate the complexity of building supply chains in practice. Thailand, typical of many developing nations, has an emerging middle and higher income class with sufficient income to desire processed foods sold in supermarkets. Traditional food supply chains in developing nations are often inefficient with many middlemen between the grower and the retail outlet. Supermarkets want to provide safe environmental friendly high quality products at competitive prices, a difficult goal to achieve with existing supply chains. There is a case example presented on Tops Supermarkets in Thailand (Tops is owned by Royal Ahold of The Netherlands). Tops is working in cooperation with KLICT and ACC of The Netherlands, Syngenta, Rabobank International and the Thai Ministry of Agriculture to develop a production, assembly, and distribution network to provide safe food from domestic sources for their supermarkets. The discussion will focus on required activities, successes, problems, and the possible usefulness of the model elsewhere.

Key success factors for forming green supply chains are summarized as follows:

- Clear benefits for all partnership and alliance members.
- Business proposition underpinning the partnership that makes long-term commercial sense.
- Focus on specific partnerships, products, and markets.
- Build upon successful partnerships.
- Apply lessons learnt from the partnership to gain benefits in other business areas.
- Partners/alliance members should have a good strategic fit.
- The commercial relationship should be based on interdependence.
- Companies have similar corporate values and the same commercial ethos.
- Mutual trust and respect.
- Aim high on quality - make it difficult for others to follow.

- For junior partners: pick a senior partner with a long-term commercial future.
- Build relationships and communication links between all levels of the two businesses.
- Gain full endorsement of the venture by the most senior management and strong personal commitment of all staff.
- Members should hold a common view on the long-term objectives of the partnership.
- Partnership members should hold a common view of what the final consumer wants.
- Raise the veil of secrecy and focus on sharing information required to make the partnership a success.
- Investment in physical plant and, for horizontal partnerships, joint investment by members builds commitment to the venture.
- Build flexible organizations that meet the specific needs of each partnership.
- Fix problems as they arise - delays only serve to disrupt.
- To ensure success, partnerships require their fair share of commercial good.

There is green supply chain management software also available which includes tools or modules used to execute supply chain transactions, manage supplier relationships and control associated to green business processes. Green chains entered a new era in which customer orientation and social responsibility are the main driving forces. Globalization of supply chains complicates the chain governance. In order to develop a research agenda that meets the challenges facing industry and policymakers, invited experts from around the world convened to review the state of the art.

Activities in management of Green Supply Chains:-

Green Supply chain management is a cross-function approach including managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end-consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other entities that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing management control of daily logistics operations. Less control and more supply chain partners led to the creation of supply chain management concepts. The purpose of green supply chain management is to improve trust and collaboration among green supply chain partners, thus improving inventory visibility and the velocity of inventory movement. Several models have been proposed for understanding the activities required to manage material movements across organizational and functional boundaries. SCOR is a supply chain management model promoted by the Supply Chain Council. Another model is the SCM Model proposed by the Global Supply Chain Forum (GSCF). Supply chain activities can be grouped into strategic, tactical, and operational levels. The CSCMP has adopted The American Productivity & Quality Center (APQC) Process Classification

Framework's a high-level, industry-neutral enterprise process model that allows organizations to see their business processes from a cross-industry viewpoint. These are the following importunate component of Activities in management of Green Supply Chains:-

Strategic

- Strategic network optimization, including the number, location, and size of warehousing, distribution centers, and facilities etc.
- Strategic partnerships with suppliers, distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking, direct shipping, and third-party logistics.
- Product life cycle management, so that new and existing products can be optimally integrated into the supply chain and capacity management activities.
- Information technology chain operations.
- Where-to-make and what-to-make-or-buy decisions.
- Aligning overall organizational strategy with supply strategy.
- It is for long term and needs resource committeemen.

Tactical

- Sourcing contracts and other purchasing decisions.
- Production decisions, including contracting, scheduling, and planning process definition.
- Inventory decisions, including quantity, location, and quality of inventory.
- Transportation strategy, including frequency, routes, and contracting.
- Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise.
- Milestone payments.
- Focus on customer demand.

Operational

- Daily production and distribution planning, including all nodes in the supply chain.
- Production scheduling for each manufacturing facility in the supply chain (minute by minute).
- Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers.
- Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
- Inbound operations, including transportation from suppliers and receiving inventory.
- Production operations, including the consumption of materials and flow of finished goods.
- Outbound operations, including all fulfillment activities, warehousing and transportation to customers.
- Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centers, and other customers.

Integration process in business for management of green Supply chain business process integration:-

Successful green SCM requires a change from managing individual functions to integrating activities into key supply chain processes. An example scenario: the purchasing department places orders as requirements become known. The marketing department, responding to customer demand, communicates with several distributors and retailers as it attempts to determine ways to satisfy this demand. Information shared between green supply chains partners can only be fully leveraged through process integration.

Green supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems and shared information. According to Lambert and Cooper (2000), operating an integrated supply chain requires a continuous information flow. However, in many companies, management has reached the conclusion that optimizing the product flows cannot be accomplished without implementing a process approach to the business. The key supply chain processes stated by Lambert (2004) are:

- Customer relationship management
- Customer service management
- Demand management
- Order fulfillment
- Manufacturing flow management
- Supplier relationship management
- Product development and commercialization
- Returns management

Much has been written about demand management. Best-in-Class companies have similar characteristics, which include the following: a) Internal and external collaboration b) Lead time reduction initiatives c) Tighter feedback from customer and market demand d) Customer level forecasting.

One could suggest other key critical supply business processes which combine these processes stated by Lambert such as:

- Customer service management
- Procurement
- Product development and commercialization
- Manufacturing flow management/support
- Physical distribution
- Outsourcing/partnerships
- Performance measurement

a) Customer service management process

Customer Relationship Management concerns the relationship between the organization and its customers. Customer service is the source of customer information. It also provides the customer with real-time information on scheduling and product availability through interfaces with the company's production and distribution operations. Successful organizations use the following steps to build customer relationships:

- determine mutually satisfying goals for organization and customers
- establish and maintain customer rapport
- produce positive feelings in the organization and the customers

b) Procurement process

Strategic plans are drawn up with suppliers to support the manufacturing flow management process and the development of

new products. In firms where operations extend globally, sourcing should be managed on a global basis. The desired outcome is a win-win relationship where both parties benefit, and a reduction in time required for the design cycle and product development. Also, the purchasing function develops rapid communication systems, such as electronic data interchange (EDI) and Internet linkage to convey possible requirements more rapidly. Activities related to obtaining products and materials from outside suppliers involve resource planning, supply sourcing, negotiation, order placement, inbound transportation, storage, handling and quality assurance, many of which include the responsibility to coordinate with suppliers on matters of scheduling, supply continuity, hedging, and research into new sources or programs.

c) Product development and commercialization: Here, customers and suppliers must be integrated into the product development process in order to reduce time to market. As product life cycles shorten, the appropriate products must be developed and successfully launched with ever shorter time-schedules to remain competitive. According to Lambert and Cooper (2000), managers of the product development and commercialization process must:

- Coordinate with customer relationship management to identify customer-articulated needs;
- Select materials and suppliers in conjunction with procurement, and
- Develop production technology in manufacturing flow to manufacture and integrate into the best supply chain flow for the product/market combination.

d) Manufacturing flow management process:

The manufacturing process produces and supplies products to the distribution channels based on past forecasts. Manufacturing processes must be flexible to respond to market changes and must accommodate mass customization. Orders are processes operating on a just-in-time (JIT) basis in minimum lot sizes. Also, changes in the manufacturing flow process lead to shorter cycle times, meaning improved responsiveness and efficiency in meeting customer demand. Activities related to planning, scheduling and supporting manufacturing operations, such as work-in-process storage, handling, transportation, and time phasing of components, inventory at manufacturing sites and maximum flexibility in the coordination of geographic and final assemblies postponement of physical distribution operations.

e) Physical distribution

This concerns movement of a finished product/service to customers. In physical distribution, the customer is the final destination of a marketing channel, and the availability of the product/service is a vital part of each channel participant's marketing effort. It is also through the physical distribution process that the time and space of customer service become an integral part of marketing, thus it links a marketing channel with its customers (e.g., links manufacturers, wholesalers, retailers).

f) Outsourcing/partnerships

This is not just outsourcing the procurement of materials and components, but also outsourcing of services that traditionally have been provided in-house. The logic of this

trend is that the company will increasingly focus on those activities in the value chain where it has a distinctive advantage, and outsource everything else. This movement has been particularly evident in logistics where the provision of transport, warehousing and inventory control is increasingly subcontracted to specialists or logistics partners. Also, managing and controlling this network of partners and suppliers requires a blend of both central and local involvement. Hence, strategic decisions need to be taken centrally, with the monitoring and control of supplier performance and day-to-day liaison with logistics partners being best managed at a local level.

g) Performance measurement

Experts found a strong relationship from the largest arcs of supplier and customer integration to market share and profitability. Taking advantage of supplier capabilities and emphasizing a long-term supply chain perspective in customer relationships can both be correlated with firm performance. As logistics competency becomes a more critical factor in creating and maintaining competitive advantage, logistics measurement becomes increasingly important because the difference between profitable and unprofitable operations becomes narrower. A.T. Kearney Consultants (1985) noted that firms engaging in comprehensive performance measurement realized improvements in overall productivity. According to experts, internal measures are generally collected and analyzed by the firm including

- Cost
- Customer Service
- Productivity measures
- Asset measurement, and
- Quality.

External performance measurement is examined through customer perception measures and "best practice" benchmarking, and includes 1) customer perception measurement, and 2) best practice benchmarking.

Components of Supply Chain Management:-

There are following Components of Supply Chain Management:-

- Standardization
- Postponement
- Customization

Sustainability in management of green Supply chain:-

Green supply chain sustainability is a business issue affecting an organization's supply chain or logistics network and is frequently quantified by comparison with SECH ratings. SECH ratings are defined as social, ethical, cultural and health footprints. Consumers have become more aware of the environmental impact of their purchases and companies' SECH ratings and, along with non-governmental organizations ([NGO)s], are setting the agenda for transitions to organically-grown foods, anti-sweatshop labor codes and locally-produced goods that support independent and small businesses. Because supply chains frequently account for over 75% of a company's carbon footprint many organizations are exploring how they can reduce this and thus improve their SECH rating.

Components of Green supply chain management integration:

The green supply chain management plays a very critical role in the present scenario. Green supply chain management integration components are the third element of the four-square circulation framework. The level of integration and management of a business process link is a function of the number and level, ranging from low to high, of components added to the link (Ellram and Cooper, 1990; Houlihan, 1985). Consequently, adding more management components or increasing the level of each component can increase the level of integration of the business process link. The literature on business process re-engineering, buyer-supplier relationships and SCM suggests various possible components that must receive managerial attention when managing supply relationships. Lambert and Cooper (2000) identified the following components:

- Planning and control,
- Work structure,
- Organization structure,
- Product flow facility structure,
- Information flow facility structure,
- Management methods,
- Power and leadership structure,
- Risk and reward structure,
- Culture and attitude,

IV. STRATEGIES OF GREEN SUPPLY CHAIN MANAGEMENT

Risk-based Strategies

The simplest strategy of **Green Supply Chain Management** with regard to inter-organizational investment resource development is one of risk minimization. Firms adopting this strategy are proposed to do so in response ostensibly to stakeholder requirements. Such a strategy is ideal for the organization that retains minimal internal environmental management resources or has only recently begun to consider the introduction of a supply chain greening program. It is based on minimal inter-organizational engagement. Such efforts might involve the inclusion of basic clauses in purchasing contracts for suppliers to meet all relevant regulatory requirements. Most frequently used with this approach is the cascading of an established international standard such as ISO 14001 (King, Lenox, & Terlaak, 2005). The use of an existing performance standard, an approach used initially by the Ford Motor Company with its suppliers and now more frequently by other organizations for their supply chains, offers: (a) established environmental performance benefits (Melnyk, Sroufe, & Calantone, 2003), (b) third party or arms-length management of performance, and (c) a system recognized globally by other organizations. This third aspect improves the efficiency of uptake by suppliers because the system is recognized by the market and other industry members, reducing the ambiguity of desired performance levels and minimizing the need for customer involvement. From the perspective of competitive advantage, however, the benefits are limited because of the ease of implementation, a lack of uniqueness, and a growing use by other supply chains. A similar approach to basic certification schemes is the use of broad statements within purchasing guidance or principles to include 'supplier activities' among the organization's environmental responsibilities. Such systems

based on risk minimization only and managed in a climate of low relational investment only guarantee supply chain compliance with local or national regulations. The end result being that risk can be minimized and reputation enhancement is possible, but no additional innovation or complementary economic benefits are likely.

Efficiency-based Strategies

A more complex and developing strategy in recent years has been the 'eco-efficiency' or 'lean-and-green' approach to GSCM. This type of strategy derives environmental performance benefits for the supply chain beyond mere regulatory compliance through the requirement for suppliers to meet operations-based efficiency targets. Much of the environmental performance benefit arises from specific manufacturing practices that have been found to provide secondary environmental performance benefits. The point of departure for the efficiency based strategy from the risk-based strategy is the availability of dual economic and environmental performance benefits to the supply chain and the requirement for higher levels of engagement between customers and suppliers. The efficiency-based strategy ties environmental performance to operational processes in the supply chain, and this strategy allows the extension of performance requirements into the supply chain that maximize economic performance and provide secondary environmental performance benefits through waste and resource use reductions. It requires more comprehensive and supply chain specific performance specifications than the simpler risk-based strategy. It also requires a higher level of involvement between supply chain partners arising from the use of more complex interfirm performance requirements. Using this strategy to facilitate greater efficiency in the supply chain does not require the development of co-specialized resources specific to environmental performance. The necessity for collaboration on efficiency, however, provides a facilitating role for context-specific, complex problems such as waste reduction and recycling (Geffen & Rothenberg, 2000; Klassen & Vachon, 2003). product design, material substitution, or innovation. Product recalls because of a poor choice of low-cost but hazardous materials represent the inherent risk in focusing only on efficiency in the supply chain. The efficiency-based strategy is considered technically weak but more socially complex than the risk-based strategy.

Innovation-based Strategies

The innovation-based green supply chain

Innovation-based Strategies

The innovation-based green supply chain management strategy is distinct from the management strategy is distinct from the efficiency-based approach because of its use of a supply chain environmental performance strategy that is more environmentally specific. Organizations are increasingly aware of the potential for narrow purchasing policies to in-source components or services from suppliers that may be legally non-compliant with environmental regulations or who themselves procure goods in an environmentally irresponsible way (Bowen et al, 2001). Some organizations have begun to guarantee more comprehensive product life-cycle considerations for consumers of their products. Once a supply chain begins to consider

specialized processes, technologies, or complex performance standards for suppliers such as chemical avoidance, the level of knowledge exchange and relational investment begins to change. Moving from an efficiency-based GSCM strategy to a greater level of innovation or integration of environmental performance in supply chain and product design requires specialized environmental resources (Lenox & King, 2004). Keeping up-to-date with environmental legislation changes and training suppliers in environmentally relevant process changes requires more dedicated environmental resources, specialized personnel, and design.

Closed-loop Strategies

Closed-loop strategies are a more recent type of GSCM strategy and represent the most complex and collaborative form of this type of activity. Often referred to in its simplest form as 'reverse logistics,' closing the loop involves the capture and recovery of materials for either re-manufacture (high-value) or recycling (low value) (Kocabasoglu et al, 2007). These materials can arise during production, as returned goods, post-use, and at end-of-life. The closed-loop strategy ties or integrates environmental performance to the whole supply chain. Very few examples of coordinated recycling or closed-loop activity in the supply chain currently exist however. Prominent examples include Kodak's return and re-manufacture of its disposable cameras, Hewlett Packard's retrieval of used printer cartridges, and BMW's end-of-life vehicle requirements for suppliers (Guide et al, 2002). The motivation for a closed-loop strategy remains low for basic reasons of poor and distributed control over the reverse supply chain, lack of available infrastructure, and the inability of supply chains to believe that such activity is economically viable. Designing and successfully using a closed-loop strategy presents one of the most complex endeavours for a single organization to undertake within its supply chain (Richey et al, 2005). Goods need to be managed for quality considerations and aggregation of collection and sorting activities allows for the creation of economies of scale. Such a high level of integration, coordination across partners, and socially complex knowledge requires years of development effort. Socially complex, collaborative relationships provide the basic foundation for a closed-loop supply chain strategy.

Accounting of Green Supply chain: -

ACCOUNTING of green Supply chain is a recent and most important concept. **Accountancy** is the art of communicating financial information about a business entity to users such as shareholders and managers. The communication is generally in the form of financial statements that show in money terms the economic resources under the control of management. It is the branch of mathematical science that is useful in discovering the causes of success and failure in business. The principles of accountancy are applied to business entities in three divisions of practical art, named accounting, bookkeeping, and auditing. Accounting is defined by the AICPA as "The art of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of financial character, and interpreting the results thereof." Early accounts served mainly to assist the memory of the businessperson and the audience for the account was the

proprietor or record keeper alone. Accounting that provides information to people outside the business entity is called financial accounting and provides information to present and potential shareholders, creditors such as banks or vendors, financial analysts, economists, and government agencies. The relationship between shareholders and management is one between principals and agents. The agents (management) should, in a world with asymmetrically distributed information, respond to the need for transparency of different stakeholder groups (principals). Accounting, whether it is management accounting or financial accounting, creates the needed transparency and accountability.

Accounting principles of green supply chain:-

The accounting principles that have been developed in the past refer mostly to the information processing of the single (isolated) firm, and are proposed by rulemaking bodies, like the EU (4th Directive), IAS (IRFS guidelines), SEC (NYSE prescriptions), GRI (Global Reporting Initiative, stressing sustainability reporting), Official sources for these principles began with the American Institute of Certified Public Accounts (AICPA), whose Accounting Principles Board issued 31 formal opinions. AICPA has been replaced by the Financial Accounting Standards Board (FASB). There are following **Accounting** principles of green Supply chain:-

ACCOUNTING ENTITY CONCEPT: -

Accounting entity concept is an important concept in green supply chain management under this concept an economic unit, which may be a person, business, government, organization, or part thereof, is being accounted for.

GOING CONCERN CONCEPT: -

Until reasonable facts indicate otherwise, it is assumed that the accounting entity will exist long enough to use assets and fulfill commitments. Liquidation value may be ignored. The green supply chain management accounting follow this concept.

TIME PERIOD CONCEPT:-

To be useful, accounting information must be current and presented in equal understandable time units called accounting periods. The green supply chain management accounting is based on time periodic concept.

COST PRINCIPLE:-

Income Statement and Balance Sheet accounts must be recorded at cost, as evidenced by their objective fair market value at time of acquisition. Called historical costs, these figures, to the dismay of some, are generally not adjusted to current market value.

REALIZATION PRINCIPLE: -

With accrual accounting, revenue is recorded when earned, and costs are recorded when incurred. For a retailing business, point of sale easily establishes when earned, for manufacturing and construction businesses, the process is more complicated.

THE MATCHING PRINCIPLE: -

When determining income, expenses must be matched with the revenue they generate. According to the principle, expenses are recognized when obligations are (1) incurred (usually when goods are transferred or services rendered, e.g. sold), and (2) offset against recognized revenues, which were generated from those expenses (related on the cause-and-effect basis), no matter when cash is paid out.

OBJECTIVITY PRINCIPLE: -

To be reliable, accounting information must be objective. Objectivity requires unbiased opinions of verifiable events concerning business transactions.

MATERIALITY: -

Accounting principles need not be followed when the effect of this action is immaterial and would not effect the reader's interpretation of the accounting information. The green supply chain management accounting conciders the materiality concept.

FULL DISCLOSURE:-

All relevant material facts must be incorporated into financial statements. Some information, such as a contingent liability, is easily communicated with a footnote, while other information, such as the effect of inflation, requires more complex procedures.

CONSISTENCY: -

Accounting methods used to determine income and value balance sheet items must be consistently applied.

CONSERVATISM: -

Estimates requiring subjective analysis should not overstate revenue and asset Values or understate expenses and liabilities.

STABLE DOLLAR ASSUMPTION:-

Historical costing assumes a stable dollar. Because the dollar is not stable, larger corporations, at FASB's request, voluntarily prepare information on the effects of inflation on their financial statements.

Accounting standards for green supply chains: - There are following three proposed accounting standard for accounting of green supply chain.

- Reciprocity in information access: those that deliver information to the system should be able to retrieve an equivalent amount. In contrast with centralized and atomic supply chains (in which information is centralized or dispersed, respectively), transparency is best served in cooperative supply chains; they render open access to information concerning supply-chain operations, strategy and results.
- Equivalent cash flows: provision of assets (supply-chain investments) should be matched with an equivalent amount of assets (cash flows) in return.
- Matching risks and returns: the bigger the opportunities for individual firms, the bigger the contribution should be in risk sharing and risk management.

Problems involved accounting of green Supply chain:-

In this areas there are following in accounting of green Supply chain:-

- Technical: achieving efficient transmission and reception of data;
- Semantic: increasing precision of message transfer;
- Effectiveness: level of behavioral influence.

Supply-chain governance:-

There are three types of supply-chain governance can be discerned: the centralized supply chain, the cooperative supply chain and the decentralized (atomic) supply chain. In a centralized supply chain, all information about the strategic and operational issues is concentrated at one of the firms within the channel. Moreover, the central governing firm not only controls the operational processes and strategy, but also the information flows to the contributing firms. The profit from supply-chain activities is captured by this central governing firm, because of its dominant position and power. An example of this governance system is the EUREP-GAP quality system that supermarkets have imposed on the horticultural and agricultural producers.

H. BREMMERS

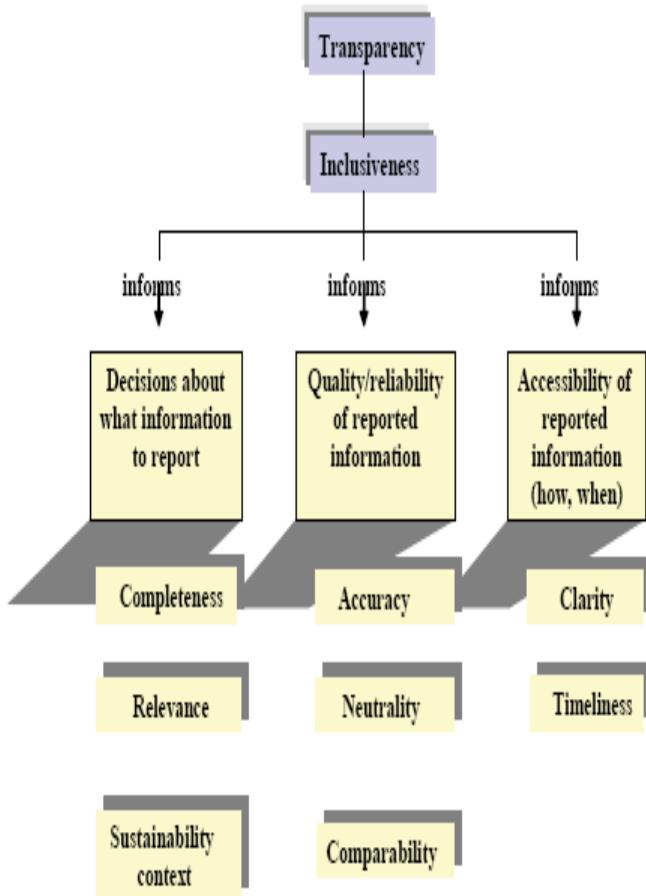


Figure 1. Reporting principles (source: Global Reporting Initiative 2002, p. 23)

In a cooperative supply chain, the partners have an equal (or better ‘equivalent’) say and have the right to be informed on overall chain performance. Surpluses are distributed to the partners in concordance with their contribution to chain efforts. The cooperative supply-chain governance system is the ideal image of a well functioning, sustainable supply chain, because centralized governance (hierarchy) could just as well take place within the individual firm. On the other end of the continuum,

the atomic supply chain uses market price as the only coordination mechanism. Under these rules, accounting is dispersed over different firms and a collective information system is non-existent. Only in the cooperative supply chain, a collectively designed and controlled information system is viable. Especially in cooperative supply chains that are not governed by decisive (legal) property rights, an integrated or supplementary reporting structure will be necessary, since

intellectual, social and physical assets are for a large part not controlled by a single firm, but are common property. Although such a supply-chain governance structure is a channel structure rather than a cooperative in legal sense, its governance resembles the legal cooperative governance in many aspects. Analogous problems are present: performance measurement, redistribution of benefits and joint governance (member influence). Effective vertical coordination and policy disclosure make the development of special standards for supply-chain accounting necessary. There are following legal technical devices were evaluated:

- Integrated environmental permit for the supply chain as a whole;
- Integrated environmental report for the supply chain as a whole;
- Electronic environmental reporting;

V. CONCLUSIONS AND FINDINGS

Green Supply chain management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of green -product and green -service packages required by end customers. During 1980's and 90's, there has been a rapid industrialization of agriculture in the developed economies around the world. Accounting is the language of commerce. Accounting of green -food Supply chain is a recent and most important concept. Accountancy is the art of communicating financial information about a business entity to users such as shareholders and managers. For accounting in supply chains to be effective and efficient, not only technical conditions, like electronic reporting devices, are a prerequisite, but also the availability of (normative) accounting standards. Like all accounting standards, supply-chain accounting standards should mainly come from practice, as well as from theoretical reasoning. We found that the devices we proposed are supported by a considerable number of companies. Not only do they improve transparency and cooperative decision making, but they will, if adopted, also reduce the administrative burden of the companies cooperating in supply chains. Concepts, cases and empirical findings of these approaches in green -food supply chains have been demonstrated. Second, understanding the complex systems of green -food chains requires more investments in retrieving empirical data for testing propositions and developing appropriate models. The experiences from past research can be and should be further explored. The identified research gaps a discussion points are shared among an international forum of researchers. International cooperation among researchers will enhance progress in this research field. The workshop and conferences are highly valued in this respect.

Directions for Future Study

There are many issues that require further Study, which needs to be of 'best practice' case studies, and larger field studies that map the field and its progress. We also need to extend existing theories and principles of competitive advantage, operations management resource-based view of the firm and others. Some suggested research areas and issues follow. As raw material costs increase and environmental protection legislation

becomes increasingly stringent, a focus on one firm's green operational excellence is becoming the norm in organizations.

To attain even greater cost savings from waste reduction, meet comprehensive social and environmental responsibility targets and find new products with smaller ecological footprints, firms are now extending their goals for environmental performance into their suppliers' operations. This type of activity is an effective mechanism for firms to improve their record on corporate social responsibility, lower reputational risks, reduce wastes, and improve supply chain response-time to new environmental regulations.

VI. TEXT CITATIONS

- A. Gereffi has shown that many chains are characterized by a dominant party who determine the overall character of the chain, and as lead firm(s) become responsible for upgrading activities within individual links and coordinating interaction between the links.
- B. In Canada, Alberta has recently created AVAC, a public institution; to encourage the formation of value chains in agri-food systems. Supply chain formation within agri-food system is driven by the desire to improve competitiveness.
- C. Porter (1980) identifies, through industry life cycle perspective, four stages for the chain development: birth, expansion, efficiency, and self-renewal. Some of generic characteristics for each stage of chain development is discussed in the presentation.
- D. According to Lambert and Cooper (2000), operating an integrated supply chain requires a continuous information flow.
- E. A.T. Kearney Consultants (1985) noted that firms engaging in comprehensive performance measurement realized improvements in overall productivity.
- F. Bowersox and Closs states that the emphasis on cooperation represents the synergism leading to the highest level of joint achievement (Bowersox and Closs, 1996).

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