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GREEN SUPPLY CHAIN MANAGEMENT

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ABSTRACT:

In early environmental management frameworks, operating managers were involved at the organizational level. Specialized organizational units had the responsibility for ensuring environmental excellence in product development, process design, operations, logistics, marketing, regulatory compliance, and waste management. In recent times, Green Supply Chain Management (Green SCM) is gaining significance among manufacturers due to the following reasons:

- *Diminishing raw materials*
- *Deterioration of environment*
- *Overflowing waste lands*
- *Increasing levels of pollution*

In competitive world, it is not only about being environment friendly but also about better business sense and profits. The Supply Chain System (SCM) includes purchasing, inbound logistics, production, distribution (outbound logistics and marketing), and reverse logistics. The first three categories are part of the well-known value chain concepts. The last functional element, reverse logistics is one of the most recent areas of focus in the supply chain.

KEYWORDS : *Green Supply, Management, production*

INTRODUCTION:

WHY WE NEED GREEN SUPPLY CHAIN MANAGEMENT?

Government regulations and customer demands are making environmental responsibility an increasingly important factor in everything from materials procurement to distribution. Many companies share the current widespread concerns for the health of the planet. Hardly few of them, unfortunately, have successfully translated those concerns into action by adopting environmentally sustainable, green supply chain practices. Businesses worldwide continue to use toxic chemicals, wasteful packaging, and transportation practices that produce clouds of gases that may contribute to global warming.

However, from materials acquisition and manufacturing to packaging, logistics, and distribution, every stage of the supply chain offers opportunities to reduce waste and pollution.

BENEFITS TO THE INDUSTRY:

The business benefits of environmental improvement are getting progressively clearer. The more businesses and consumers take environmental issues seriously, the greater the gains to be made. There are two main types of business benefits

First, there are potential cost reductions. Environmental change often boils down to increased resource efficiency, which in turn leads to improvements to the bottom line.

Secondly, benefit relates to customer preferences and enhancing corporate reputation. More and more businesses and consumers are using environmental issues as a criterion in their purchasing decisions, so progress in this area can lead to increased sales and marketing activities.

GREEN HOUSE EMISSIONS:

Greenhouse gas emissions are fast becoming a key consideration for customers, regulators, and supply chain partners. Credible demonstration of assessing or reducing emissions can provide a competitive advantage,helping you win contracts and customers. Importantly, it also demonstrates a commitment to prevent climate change.

PAS 2050 is a publicly available specification which provides a consistent method for assessing the life cycle GHG emissions of goods and services. It does this by providing a set of requirements intended to benefit organizations, businesses, and other stakeholders by providing a clear and consistent method for the assessment of the life cycle GHG emissions associated with goods and services.

Green Design:

Green design is an important sub-topic to Green supply chain management. It is about designing a product or a service that encourages environmental awareness. Fiksel (1996) argues that organisations have definite potential to become eco-friendly towards product re-manufacturing. Heavy industries that have complex supply chains should take into consideration the benefits of reverse logistics (RL). Beamon (1999) acknowledged the development of ISO14000. This was introduced as a result of the Rio Summit on the Environment in 1992. There are growing pressure groups that calls for firms to encourage 'greening' in the supply chain.

There are several literatures that relate to Green Design. Barros et al.(1998) proposed a two-level location model on product recovery with the support of the Dutch government. Johnson (1998) examined the role of purchasing in reverse logistics system and design. In this study, twelve American

manufacturing plants participated and it appears that all of them were in favour of reverse logistics without government legislation having been imposed. Taleb and Gupta (1997) created applied algorithms to design a product recovery system. This study shows that 'core algorithms' and 'allocation algorithms' are the scheduling systems that would help reduce waste.

where reverse logistics "closes the loop" of a typical forward supply chain and includes reuse, remanufacturing, and/or recyclingof materials into new materials or other products with value in the marketplace. The idea is to eliminate or minimize waste (energy, emissions, chemical/hazardous, solid wastes). This figure is representative of a single organization's internal supply chain, its major operational elements and the linkage to external organizations. A number of environmentally conscious practices are evident throughout the supply chain ranging from green design (marketing and engineering), green procurement practices (e.g. certifying suppliers, purchasing environmentally sound materials/products), total quality environmental management (internal performance measurement, pollution prevention), environmentally friendly packaging and transportation, to the various product end-of-life practices defined by the "Re's" of reduction, reuse, remanufacturing, recycling. Expanding this figure, a number of organizational relationships could be found at various stages of thismodel, including customers and their chains, as well as suppliers and their chains, forming webs of relationships.

The development of industrial ecosystems would be greatly supported by GSCM practices. Korhonen and Niutanen (2003) in their study of material and energy flows in the local forest industry in Finland suggested these flows were comparable to other economic and industrial systems. In the last two decades, the product-based systems perspective and the geographically defined local-regional industrial ecosystem have

GSCM PERFORMANCE MEASUREMENT SYSTEM:

The issues surrounding the green supply chain performance measurement system, or GSCM/PMS, form the core contribution of this paper. model based on one activity "Implementation and Operation of GSCM/PMS". The discussion begins with the major boundaries associated with managing this system, including "external pressures" and "internal controls/pressures". The next set of elements discussed, critical inputs to the system, includes various "metrics and measures", as well as the design of a GSCM/PMS. To aid the GSCM/PMS management, "tools" are also identified. Expected results represent outcomes of such a system and are discussed. Pressures and controls facing a GSCM/PMS Internal issues.

Pressures for internal controls for GSCM/PMS are largely cost and profit driven. Waste streams, costs for disposal, and the overall waste and excess from not recycling drive the needs. Internal controls are numerous, and include all forms of legacy systems, data management systems, linkages to other performance systems including those based on ISO 9000:2000, total quality management, and other industry-specific standards. Assessment of environmental programs, either reactive or proactive, are internal controls as are costs, employee interest, and activity toward green programs.

Organizational factors influence a firm's decision to adopt innovative practices. Many of these innovative adoptions may lead to improvements in environmental outcomes and overall business performance. Florida et al. (2000) conclude that two organizational factors, organizational resources and capacity along with organizational monitoring, play an important role in a firm's adoption of environmental practices. Related to the adoption of these typically innovative practices, numerous studies have examined the adoption of organizational innovations by firms (Womack et al., 1990; Osterman, 1994).

Many studies focus on the role of "organizational capabilities" in both

organizational innovation and organizational performance (Cohen and Levinthal, 1990; Teece and Pisano, 1994; Winter, 1987). These studies suggest organizations vary in their internal resource base and procedures, affecting their ability to respond to internal and external changes or challenges. Organizational capabilities include factors such as: organizational resources, organizational innovativeness and organizational monitoring systems. Organizational resources and capacity refer to overall level of resources and specialized environmental resources and capacities possessed by firms.Organizational innovativeness refers to firm's previous commitment and track record in

implementing advanced organizational practices. Organizational monitoring refers to the methods by which organizations measure, analyze, and monitor their

performance in key dimensions. In addition, Hemmelskamp (1999) concludes internal sources of information as well as certain external sources are important for environmental product innovation. It is within this scope and requirement that GSCM/PMS are needed and will limit much of the capability to introduce such an innovation within an organization, and increasingly across organizations.

OVERVIEW OF SOUTH AFRICAN CONSTRUCTION INDUSTRY:

In line with the global trend, the South African government acting both as a regulator and client is actively promoting an efficient and effective construction industry that uses resources efficiently, reduces waste and transforms the working environment of its people for better employment and productivity (CIDB, 2004; van Wyk, 2004 cited by Shakantu et al., 2007). Despite the pressure on the industry to reform, research reports indicate that construction remains confined to its old ways of doing business. Risk allocation is consistently disproportionate in the supply chain unlike what is obtainable in other industries. While most industries have undergone important transformations over the past three decades, the South Africa construction industry presents an obvious and glaring exception to such trends (Shakantu et al., 2007). The CIDB (2004 cited by Shakantu et al., 2007) posits that the South African construction industry is renowned for its inefficiencies as well as the reluctance of its participants to adopt significant improvements. The CIDB report claims that fragmentation reduces the efficiency of the industry and leads to much rework and wastage downstream. The review of the point is that construction projects in South Africa rely on a diversity of firms with poorly integrated professional and contractor organizations. Each individual firm performs a variety of wasteful activities within its own discipline which creates inefficiencies resulting in substantial delays and costs.

OVERVIEW OF NIGERIAN CONSTRUCTION INDUSTRY:

Amongst others, United Arab Emirate (UAE)'s oil fuelled growth, China's industrial/export driven growth and the resultant construction boom in these economies over the last decade, are all pointers to the high correlation between strong economic growth and the construction industry (Oluwakiyesi, 2011). Nigeria recently crossed the 7% growth rate, and has innate potential to record higher growth. This, coupled with healthy revenues from strong oil prices and increasing investors' interest in bridging the infrastructure deficit brings one question to mind- is Nigeria next in line for a construction boom? (as cited in Construction Industry report, 2011). Across board, be it road/bridges, rail, ports, or real estate, the opportunities are enormous but latent. In real estate for instance, the demand for commercial real estate in Lagos is ever rising – office rent in Lagos ranks 5th highest globally (according to Knight Frank Research as cited in Construction industry report, 2011). More than 70% of the households are single rooms, mostly in urban slums and rural areas. In rail transportation, about 77 million tonnes of goods is transported per kilometre of railway per annum - a far cry from frontier market average of 52.4 billion tonnes. In almost every yardstick of measuring infrastructural development, especially in transportation and real estate, Nigeria lags most peers in the frontier and emerging markets.

Nigeria's operating environment, no doubt, has major constraints, both from a policy and politics point of view. Notwithstanding, Nigeria compares quite commendably relative to the big emerging markets – India, China and Brazil in some key metrics employed by the World Bank to compare general business environment, for the construction industry.

One of such metrics is "dealing with construction permits" in which Nigeria ranks 167th (out of 183 economies) compared to India (177th), China (181th), Russia (182th), according to World Bank 2011 Ease of Doing Business Survey (The Global Competitiveness Report 2012–2013).

CONSTRUCTION SUPPLY CHAIN:

Past research investigates lean production models for application in construction supply chains (Tommelein 1998, O'Brien 1995). There is no doubt that improvements are needed in the handling and distribution of materials to the construction site. According to Muya et al., (1999) there are three types of construction supply chain:

- The primary supply chain which delivers the material that is incorporated into the final construction products.
- The support chain which provides equipment and materials that facilitates construction.
- The human resource supply chain involves supply of labour.

According to Xue et al., (2005), construction supply chain management can be defined as the coordination of inter organization's decision making in construction supply chain and integration of key construction business processes and key members involved in CSC, including client/owner, designer, general contractors, subcontractors, suppliers, etc. Its ultimate goal is to improve construction performance and client value at less cost.

CONCLUSION:

Growth in organizational performance measurement from stand-alone operational systems to include strategic and inter-organizational (supply chain) requirements has been discussed. Competitive forces have caused organizations to look externally to determine how to sustain long-term competitive advantage. Inter-organizational performance management systems play a role. Part of this broadened focus of competitiveness necessarily begins to focus on the natural environment. Stakeholders (internal and external) over the last few decades have caused organizations to explicitly consider the environment in their strategic and operational planning and execution. This pressure has extended across the supply chain and is responsible for the increased growth and interest in GSCM.

To aid GSCM implementation and introduction, there is a need to at least plan for and conceptualize performance measurement systems and their requirements. This issue leads to the major contribution of this paper, which is the introduction of various topics and concerns of GSCM/PMS ranging from the various internal/external pressures, types of metrics that need to be developed, potential designs of GSCM/PMS, as well as tools and results of a GSCM/PMS. These systems have yet to fully exist and operate within many organizations, yet their development and introduction may be inevitable as further integration and pressures cause organizations to seriously consider them for their long term well-being. To aid practitioners and researchers a number of emerging areas of research have been identified.

Future studies must address the business and environmental results of a GSCM performance measurement system and their impact within the organization, industry, and society at large. If studies indicate no immediate differences, further studies should address when and if they will make a difference. Industry-specific research is needed to address which where the performance measurement systems work best.

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