



REVIEW PAPER ON STUDY OF GREEN SUPPLY CHAIN MANAGEMENT IN CONSTRUCTION

¹Prof. Supekar Gorakshanath. S., ²Prof. Khating Ashwini A.

¹Head of Department, ²Assistant Professor

¹Civil Engineering, Jaihind College of Engineering, Kuran, India,

²Civil Engineering, SGOI, College of Engineering, Belhe, India.

Abstract : The aim of most supply chain optimization problems is to minimize the total cost of the supply chain. However, since environmental protection is of concern to the public, a green supply chain, because of its minimum effect on nature, has been seriously considered as a solution to this concern. This paper addresses the modeling and solving of a supply chain design for annual cost minimization, while considering environmental effects.

Green Supply Chain Management increased revenue and reduced cost. It increased Asset Utilization. It has social benefits like reduced community impacts, Noise reduction, Traffic Congestion Avoidance, Health, safety and Security. It also helps to reduce waste and increase energy efficiency.

As a result of global warming, organizations have been improving their sustainability and environmental performance in terms of reducing their carbon emissions, minimizing waste generated from the industry, conserving natural resources, and reducing energy consumption. Green Supply Chain Management (GSCM) is one of the applications in which organizations should implement essential environmental aspects. Although GSCM some construction firms, some firms are not aware of the benefits of its practices to their companies and the society.

Index Terms - Supply chain management, green construction, sustainability material

I. INTRODUCTION

As a sector, construction extracts a heavy toll from the natural environment. The industry consumes enormous quantities of raw materials, produces prodigious amounts of waste and is responsible for a major proportion of global carbon emissions. Environmental sustainability in construction is a pressing concern for the industry and society globally (Kibert, et al., 2000). In response, sustainable or green supply chain management (GSCM) has much to offer. Complementing the burgeoning literature on GSCM in different sectors, practitioner and research interest in GSCM in construction is developing. However, the challenges for the construction sector are in some ways different from other industries and a systematic review of the application of GSCM in our sector is unavailable.

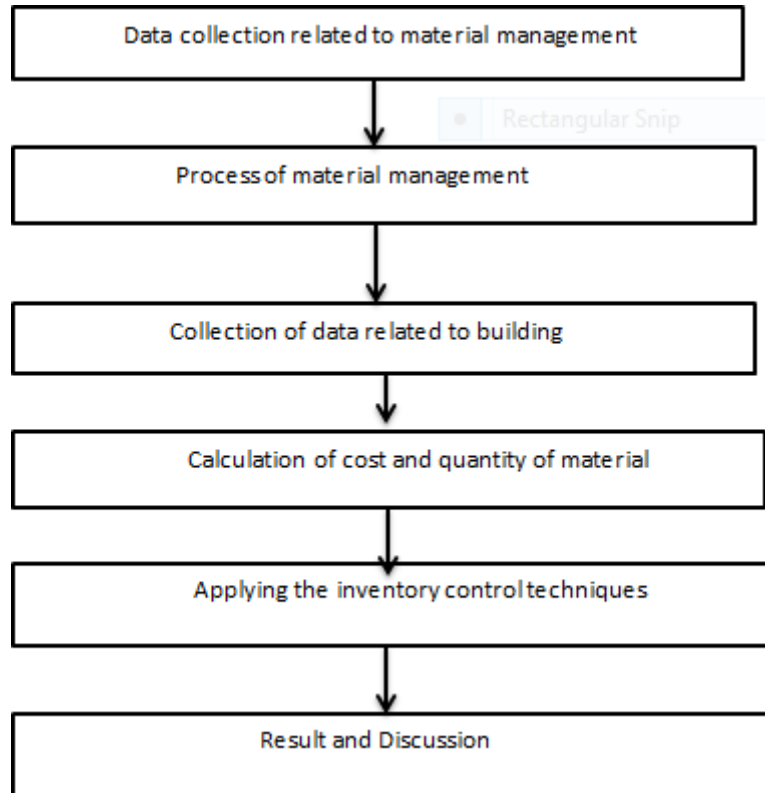
Management of materials and information flows are key strategic priorities for construction companies. A good performance in these areas can provide them with significant benefits and allow the adding of greater value for clients. Supply Chain Management (SCM) can be a very useful approach for construction companies on this regard. This is especially attractive if we consider that the construction activity is a process characterized by high levels of fragmentation and where the effective integration, coordination and management of the chain, from suppliers to final clients, is a necessary condition to obtain good results. This paper presents the main results of a diagnostic study about the relationships between the participants of the supply of construction in Chile. It also provides a general methodology for the application of SCM in construction. Finally, it discusses about its main application problems and their causes, its benefits and the requirements for its effective application in this sector.

The supply chain is a network of organizations involved, from the supplier of the supplier until the client of the client, on the different processes and activities that produce value in the form of products and services for the final client. Its major components are the suppliers' network, the transformation unit and the clients' network. The effective management of the supply chain is necessary for successful competition in today's global markets. SCM is a philosophy that describes how organizations should manage their supply chains to achieve strategic advantages. Its goal is to synchronize the client requirements with the materials and information flows along the supply chain, until reaching a balance between the client satisfaction and the cost.

II. OBJECTIVE

- 1) It reduces the cost and time and also it improve profitability.
- 2) GSCM aims to integrate environmental parameter within the supply chain management.
- 3) It also helps to reduce carbon emissions and improve environmental performance of organization.
- 4) A goal of green supply chain management is to improve efficiency by coordinating the efforts of the various entities in the supply chain.

III. FLOWCHART



Materials

1. Bamboo
2. Reclaimed wood
3. Cork
4. mycelium
5. Ferrock
6. Sheep wools

1. Bamboo

The various advantages of bamboo are as mentioned below:

- a) **Tensile strength:** Bamboo has higher tensile strength than steel because its fibers run axially.
- b) **Fire Resistance:** Capability of bamboo to resist fire is very high and it can withstand temperature up to 4000 C. This is due to the presence of high value of silicate acid and water.
- c) **Elasticity:** Bamboo is widely preferred in earthquake prone regions due to its elastic features.
- d) **Weight of bamboo:** Bamboos due to their low weight are easily displaced or installed making it very easier for transportation and construction.
- e) Unlike other building materials like cement and asbestos, bamboo poses no danger to health.
- f) They are cost effective and easy to use.
- g) They are especially in great demand in earthquake prone areas.



2. Reclaimed Wood

Building with reclaimed wood is the most environmentally responsible way to reduce the amount of lumber in landfills and save trees. On top of that, the history of reclaimed wood adds plenty of character. Reclaimed lumber is processed wood retrieved from its original application for purposes of subsequent use. Most reclaimed lumber comes from timbers and decking rescued from old barns, factories and warehouses, although some companies use wood from less traditional structures such as boxcars, coal mines and wine barrels. example for siding, architectural details, cabinetry, furniture and flooring.

3. Cork



In recent years, cork flooring has become much more prevalent in homes and commercial spaces. One of the most sustainable building materials, the harvesting of cork does not harm the tree. And the bark from each tree can be stripped up to 20 times during its life cycle. Not only is it highly renewable, but cork also has hypoallergenic properties, fire retardant qualities and is resistant to liquids. As a building material, cork is in high demand now. It is used for flooring, rigid insulation, exterior finish, floor underlayment, acoustic wall coverings and countertops

4. Mycelium

Mycelium's are the root like fibers found on mushrooms. Mycologist Philip Ross originally experimented with fungi and mycelium for his art installations. Combined with pasteurized sawdust, Ross realized that mycelium could be formed into nearly any shape to be used as a surprisingly sturdy building material. The mushroom-based building material can withstand extreme temperatures, making it an organic and compostable alternative to home insulation, Styrofoam and even concrete. The process of producing with mycelium brings a huge reduction in using fossil fuels. The energy required for fabrication is small and there is a massive reduction in construction waste as the product is 100 percent biodegradable and can be used as soil. Bio fabrication is a carbon neutral building process and can eliminate artificial insulation used in walls, use of particle board and other non load bearing structures. Mycelium products can provide other benefits such as termite proofing (it can attract termites but when eaten cause a fungus spore to activate within the termite killing it and creating a fungus whose spores repel other termites).

5. Ferrock



Another concrete alternative, ferrock is created with steel dust, or ferrous rock, left over from industrial processes, usually sent to the landfill. When combined with carbon dioxide, an iron carbonate is formed. This viable alternative to cement can be mixed and poured to form driveways, pathways, staircases and more

6. Sheep's Wool



In place of chemical-laden insulation, sheep's wool is a great natural alternative. It insulates homes just as well as conventional insulation, but requires less energy to manufacture. One of the most eco-friendly ways to insulate your property, sheep's wool can both increase energy efficiency and soundproof your office.

IV. ABC ANALYSIS

The ABC analysis is used to identifying material items that has a high impact on overall inventory cost. In this method materials divided into three Groups. A class, B class & C class. A Class materials which require the highest consideration, B Class materials which require medium consideration, and C Class materials which require the least consideration such that the control mechanism be focused on selective class of materials.

The Pareto principle states that 80% of the overall consumption value is based on only 20% of total items. In other words, demand is not evenly distributed between items: top sellers vastly outperform the rest. The ABC approach states that, when reviewing inventory, a company should rate items from A to C, basing its ratings on the following rules:

The ABC (Always Better Control) inventory control technique is based on the principle that a small portion of the items may typically represent the bulk of money value of the total inventory in construction process, while a relatively large number of items may from a small part of the money value of stores. The money value is ascertained by multiplying the quantity of material of each item by its unit price. As curtained by multiplying the quantity of material of each item by its unit price.

Procedure for ABC Analysis

- Make the list of all items of inventory.
- Determine the annual volume of usage & money value of each item.
- Multiply each item's annual volume by its rupee value.
- Compute each item's percentage of the total inventory in terms of annual usage in rupees

- “A” Category – 5% to 10% of the items represent 70% to 75% of the money value.
- “B” Category – 15% to 20% of the items represent 15% to 20% of the money.
- “C” Category – The remaining number of the items represent 5% to 10% of the money value.
- The relative position of these items show that items of category A should be under the maximum control, items of category B may not be given that much attention and item C may be under a loose control
 - "A class" inventory will typically contain items that account for 80% of total value, or 20% of total items.
 - "B class" inventory will have around 15% of total value, or 30% of total items.
 - "C class" inventory will account for the remaining 5%, or 50% of total items.

V. CONCLUSION

The research aimed to identify several aspects related to GSCM in the construction industry in the India by performing two different methods to different links of the supply chain. However, the aim of the research had to be modified in order to focus only on the contractors' side considering the low response rate obtained on the suppliers' questionnaire. Thus, the main objective of the dissertation was partially accomplished. Only one side of the supply chain was evaluated therefore further research about how suppliers are responding and how effective GSCM could be undertaken. In terms of large contractors, the information gathered on the interviews helped to the understanding of how the first link of the construction supply chain is dealing with environmental issues and more specifically with GSCM. The reason behind the low response rate on the suppliers' side might be the size of the companies sampled. In fact, most SMEs have fewer resources dedicated to these types of initiatives and are less pressurised by external forces to implement them. In terms of the environmental impacts caused by construction, it can be concluded that large contractors have a good degree of awareness.

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