

# Supply Chain Management: Manufacturing in Blockwork System

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**Abstract** – Industrialized building system has been introduced in Malaysia as an initiative to promote the construction sector. One of the systems that are in use IBS is blockwork system which is an evolution of the use of conventional brick. Making the block has several parts or processes that must be taken to produce the component. Planning the layout of a manufacturing industry should be implemented taking into account all needs ranging from suppliers of raw materials until the final product to be distributed to customers. Supply chain management definitions focused on the physical movement of goods, i.e. total flow of materials from suppliers to end customers. From this we see SCM can help for designing the plant layout design. Workflow in and out of the raw material suppliers and the final product to the customer and facility management is necessary to ensure that employees or machine operator can perform the work safely and comfortably. The result shows that key management approach, proper planning and organized is the key facilitate the workflow of managing the layout of the production equipment and support services that are the backbone of a manufacturing industry.

**Keywords**—Supply chain management, Blockwork, Industrialized Building System

## 1. INTRODUCTION

Construction sector in Malaysia is viewed has changed because of the current technology has been enhanced to ensure the quality and safety of the construction can be increased at a maximum. Changes to conventional construction methods of modern construction with the latest technology can contribute to improve the quality of construction [1]. There is a need to accelerate the development of construction industry and to ensure that the level

of productivity of the construction industry is raised; thereby the need to import the construction technology from overseas especially from the United States of America (USA), the United Kingdom (UK) and Australia [2]. Industrialized Building System or IBS is a construction process that uses the technique, product or building component system involving prefabricated systems and on-site installation [3]. There are five categories in the Industrialized Building System (IBS), which in outline by the Construction Industry Development Board Malaysia (CIDB) and one of them is a block work system.

Blockwork System has several types of components under this category which is the unit reciprocal Concrete Stone 'concrete masonry unit (CMU), lightweight concrete blocks, etc. [4]. CMU block components used to build the column and load bearing walls. While the lightweight blocks were used to build the wall. There are two types of blocks of light Autoclaved Aerated concrete (AAC) and Cellulose Lightweight Concrete (CLC). Blockwork System is a construction with concrete or cement blocks that are larger than standard clay bricks or concrete bricks. To make them lighter and easier to work with them have a hollow core that also improve their insulation capacity [5]. It is available in a variety of different densities to suit the application. Facilities and their cost effectiveness makes them a popular alternative to replace clay bricks or concrete bricks though they require additional packaging for reasons of aesthetics and water resistance. They are often used to build interior divider walls and retaining walls [6]. Concrete blocks are manufactured to various workface dimensions in an extensive range of thicknesses, offering a wide choice of load-bearing capacity and level of insulation [7]. Categories block relatively synonymous with the method based bricks but its size is adapted from a guide to modular coordination in buildings (MS1064: part 8

co-ordinating sizes and preferred sizes for brick and block masonry) [8].

Blockwork System this will inevitably involve the construction of the plant in the process of producing the Industrialized Building System (IBS) component. Construction of the plant in terms of good management of the plant in producing high-quality products that are very necessary practiced in the practice of a factory. According to [9], infrastructures development and construction industry are usually cannot be separated and they are both actually linked together. One of the necessary elements in the factory management is the supply chain management. The focus of this paper is to perceive implementation supply chain management into manufacturing Blockwork System work flow.

## 2. SUPPLY CHAIN MANAGEMENT

The term supply chain management was originally used in the early 1980s [10]. Sinha, and Kotzab [11] defines supply chain as the chain of all process and organization that are involved in making product available to customers and supply chain management is a management of such chains, its design, process execution and control. According to Jones and Riley [12] Supply chain management definitions focused on the physical movement of goods, i.e. total flow of materials from suppliers to end customers. The goal of the supply chain framework is to create process and functions that are integrated across the supply chain to create a competitive advantage [13]. A more specific framework for a built-to-order supply chain considers four aspect: organizational competitiveness, development and implementation, operations and information technology [14]. Supply chain management (SCM) is a process of integrating/utilizing suppliers, manufacturers, warehouses, and retailers, so that goods are produced and delivered at the right quantities, and at the right time, while minimizing costs as well as satisfying customer requirements [15].

According to Othman et al. [16] majority of studies into the supplier integration phenomenon conclude that logistical concerns are the driving factor behind the success of the manufacturing industry. The integration of supply chain management systems has been the subject of significant debate and discussion [17]. Douglas et al. [18] defines supply chain management is the integration of key business process from end user through original suppliers that provide products, services, and information that add value for customers and other stakeholders. [19], indicates that the evolution of supply chain management theory is driven by rapid changes in global business practice. The supply chain encompasses all activities associated with the flow and transformation of goods (product and Services) from initial design stages through the early raw materials stages and on to the end user [20].

## 3. METHODOLOGY

Research method for this study was a literature review to look at the manufacturing development blockwork system. As a starting point research was conducted to identify the whole process of blockwork manufacturing. Then research efforts were focused onto those specific areas like raw material and equipment for the process manufacturing.

The study also used qualitative methods in the form of an interview. The findings were discussed with focus group methods to verify the results of the study so that it could benefit to the manufacturer.

## 4. BLOCKWORK PROCESS

In an operation such as plant-based manufacturing system blockwork, workflow is a key factor in ensuring that the production process can be implemented on time and keep the quality of the product. There a few process in manufacturing plant for produce a product for blockwork system. Figure 1 shows a block diagram of the production process for the production of CMU blocks.

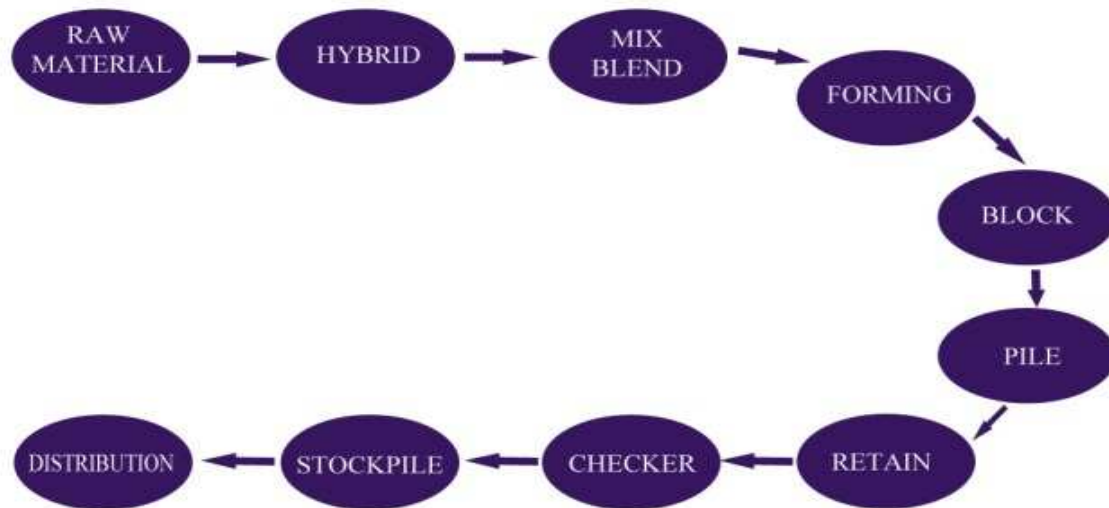


Figure 1. Block Diagram for Blockwork Manufacturing

Based on this block diagram are available, there are some parts of the main processes to be followed to produce a working system based on this block. Among the important process is the raw material, blending material, forming, curing and distribution to customers.

#### 4.1 RAW MATERIAL

The raw material is important in any manufacturing process of any product. Many manufacturing assembly processes have to deal with effective material handling within their supply chains [21]. Similarly, the process of making the block work there are the raw materials used. The raw materials for the manufacturing process consists of cement and sand that form a mixture of compounds with water. Raw materials are sourced from suppliers that are close to the place of manufacture. This is important to reduce the cost involves the delivery of raw materials to reduce the cost of the end product.

#### 4.2 BLENDING PROCESS

At this stage the raw materials of cement, sand and water will mix in the ratio that has been determined to form a compound. The mixture of raw materials will be brewed using two methods, which are manually or using mixer.

#### 4.3 FORMING PROCESS

At this stage, the raw materials were completed in stir until smooth will be put into forming machines. For this process there are several kinds of forming machine which is used according to the type of

block that you want to remove them for the type of interlocking blocks.

#### 4.4 CURING PROCESS

At this stage, the products are produced through forming machine will be arranged on the shelves while for drying and hardening of the product. Drying and hardening process takes 1 day or 2 days to dry out and harden before being collected for the purpose of distribution.

#### 4.5 DISTRIBUTION

The last process is the block will be taken to a collection point after the curing process is carried out. Stockpile is the last place before it will be distributed to customers for the construction process.

#### 5. DISCUSSION

Blockwork system is a process in which it requires a good layout and work regularly in order to save the cost of manufacturing and production in addition to saving the last time manufacturing. There is many factors related to supply chain management in manufacturing sector start from raw material until end of product. According to Sinha and Kotzab [11] production execution or manufacturing execution is that stages in the supply chain in which resources are used to transform input component into semi-finished or finished goods. One of approaches in manufacturing process based on product property and factory layout.

Facility layout and design is an important component of a business's overall operations, both in terms of maximizing the effectiveness of the production process and meeting the needs of employees [22]. The results showed that the workflow in the manufacturing process for the blocks requires a good layout starting from raw material delivered by the supplier up to the

distribution to customers. As noted in the manufacturing process of the block there are a sequences process start with raw materials from suppliers, the blending process, forming process, curing process and end products. Figure 2 shows the diagram for manufacturing blockwork from raw material to end product.

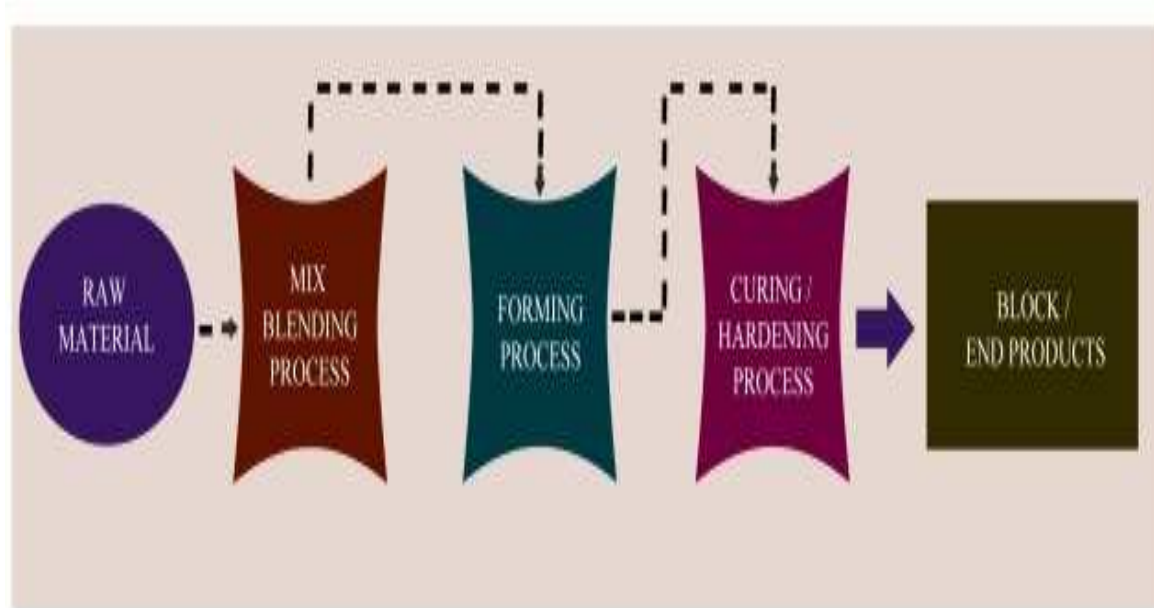


Figure 2. Workflow of Manufacturing Blockwork Process

The study found a number of aspects that are important in generating a workflow for a great block manufacturing plant. Among them is the design of plant layout where a great design should be made initially to avoid any problems during the process of producing the product. In addition to flow in and out of the raw material suppliers and the final product to the customer and facility management is necessary to ensure that employees or machine operator can perform the work safely and comfortably. By increasing the efficiency of the

management of a manufacturing industry it will help each manufacture produces the product at a specified time on request of the customer. In addition, in this study the findings of a focus group conducted found that for the implementation of the manufacturing process of the block is in line starting from raw materials. Machines are placed in a line so that raw material and end product can be moved in a line. Figure 3 shows a design drawing for block manufacturing.

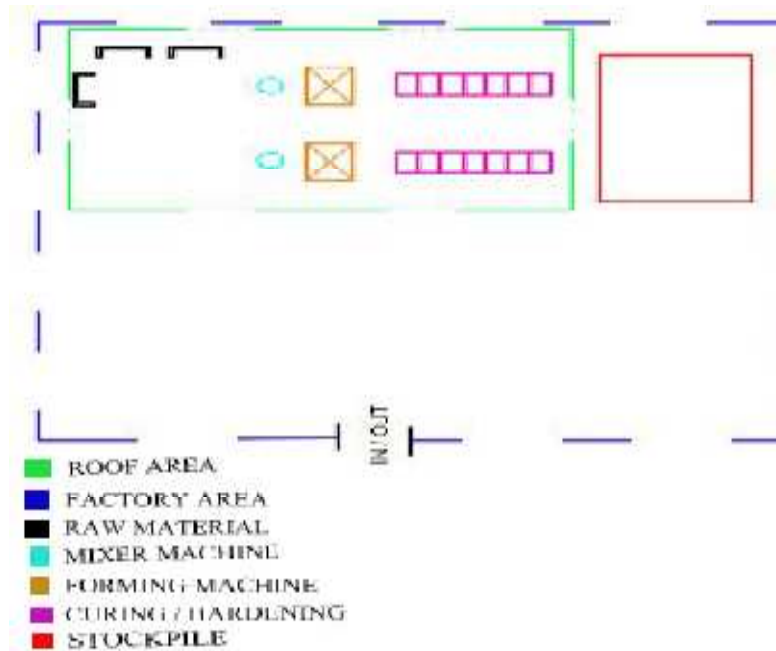


Figure 3. Design for Blockwork Manufacturing

## 6. CONCLUSION

The research focused on the workflow for blockwork manufacturing process with implementation of supply chain management. The result shows that key management approach, proper planning and organized is the key facilitate the workflow of managing the layout of the production equipment and support services that are the backbone of a manufacturing industry. Well planning layout for blockwork manufacturing will facilitate the process reception of raw materials to produce high end products to customers need

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