

Literature review on material management construction essay



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Nowadays, many contractors are doing investment to construction project to earn their profits. Unfortunately, there are not all contractors able to earn the profit of the investment in construction projects. This is because some of the contractor does not proper management the materials. For examples, a contractor over order the material such as cements, bricks and reinforcement, the cost will increase and the profits will become low or deficit of the money. Therefore, a systematic material management is very importance in construction site to avoid over ordering and receive low quality materials at the same time can minimizing the cost and maximum the profits

Construction materials can be consisting as a major cost for any construction project. This is because 50% or more of the total cost of the project is for purchasing the materials or even storage the materials costs. Thus, efficiently material management is very importance because it will cost a lot of money. Therefore, the contractor should consider the time to order the material when they needs and the time delivery to the site. This is because if the material does not come at the schedule time will cause delay of the projects.

In additions, a proper site plan to put the material is very importance for construction site. For example, if the materials such as concrete batch plant putting too far from the build places, it will cause a lot of time for labours to bring the concrete to sites. This will delay the time to complete. Therefore, difference material should locate at the suitable location. This will help to increase the productivity of the construction projects.

Now, Almatad Sdn. Bhd is carrying out a housing project which is semi-detached houses and double storey terrace in Johor. The construction site layout has been prepared which illustrates the layout equipment, building materials and access roads for the erection of the building. As a new site manager of the project, I noticed that many problems are carrying out by the plans and those problems will cause the projects to be delay or increase the cost of the projects. Thus, I need to re-organize the layout of the site and improve the site accordingly.

2. 0 Literature review on material management

According to Arnold, J. R. and Chapman (2004), materials management can define as an organizing function responsible for planning and controlling the materials flow. This means that the materials management is a planned procedure that involves from the initial purchasing, delivery, handling and minimisation of waste of the material with the purpose to ensuring the quality, quantity and time of the requirement should meet accordingly.

Material management are the activities involved to plan, control, purchase, expedite, transport, store, and issue in order to achieve an efficient flow of materials and that the required materials are bought in the required quantities, time, quality and at an acceptable price. (Stukhart , 1995)

2. 1 Importance of material for a project.

Most of the organization are having the same problem which is related to the managing the flow of the materials. Therefore, the efficient management of materials is the main keys issue to determine the success of a completion of a project. In addition, the control to the materials is subject to the difference

company and should be handled effectively to complete the project. Building materials cost is the major cost for the project. The cost represented by materials changed and may include between 20 % and above of the total of the project.

According to the Stukhart (1995) and Bernold and Treseler(1991) studies, the materials cost can be around of 50% to 60% of the total of project cost. Materials are very important in the operations of the construction site since unavailability of materials can stop the construction work. In addition, unavailability of materials will affect the productivity and cause to the completion of the project.

Other than unavailability of materials, the excessive quantities of materials could also create the serious problems to managers in the construction site. This is because storage of materials can increase the costs of the project. In addition, when there are limited spaces in the construction site, the managers have to find other storage from other people to store the materials until they are needed. So it will require the re-handling of materials and the costs of the project. Some of the requirements must take to handle and store the materials properly when they are received. Thus, special attention should be given to materials after they purchased from the supplier.

According to Damodara (1999), there is obvious that materials can provide saving when it obtained at the lowest price to the company. In early construction industry, many construction companies experienced that the increase in costs and a decrease in productivity which due to inflation and economic problems. From the research of Stukhart(1995) we can concluded

that early construction industry were not using their resources efficiently and that the decrease in productivity is due to poor management in the construction site and materials.(Stukhart, 1995). Material management has been the main issue of concern in the construction industry. By the research of Baldwin t. al (1994) that is more that 40% of the time lost due to bad management in construction site, poor documentation of materials, lack of materials on site when needed and inadequate storage.

Therefore, the need for a proper material management system becomes mandatory. Many companies increased their efficiency of materials management to remain the competitive and protected for their future project. They try to reduced their overheads cost and improved their productivity strategies. The saving cost and improvement can run accordingly by materials management. The material available on site and management system is the main point to success a construction project.

Better materials management will help to increase the efficiency in the operation in construction site and reduce the overall cost from the total cost of the project. Top management such as project manager, site manager or architect should pay more effort to materials management. This is because available of the materials will affect the successful from their project. When the material is shortages, the high interest rates should pay, rising prices of the materials and competition with other companies.

There is a developing attentiveness in the construction industry that material management needs to be solved as an overall integrated administration activity.

2. 2 Benefit of material management

An effective material management system can bring many benefits for a company in construction industry. From the study of Construction Industry Institute (CII) we can concluded that labor productivity could be improved more than 6% and can produce 4-6% additional savings from the total cost (Bernold and Treseler, 1991). Among these benefits are:

Reducing the overall costs of materials

Better handling of materials

Reduction in duplicated orders

Materials will be on site when needed and in the quantities required

Improvements in labor productivity

Improvements in project schedule

Quality control

Better field material control

Better relations with suppliers

Reduce of materials surplus

Reduce storage of materials on site

Labor savings

Stock reduction

Purchase savings

Better cash flow management

2.3 On-site Material Management Functions

Chandler (1987) stated that, the function of site control of materials is to control their transports to the site in order to control the waste and ensure the material available on site in the right time. He also added that, materials control responsibilities can be separated into two areas of actions which is:

Action Prior to Site Delivery

This may include the following actions:

Continuous check on order pending delivery or call for division dates

Managing the change in the rate of work movement and evaluate its impact or materials

Deliveries schedule to adjust delivery dates accordingly.

Inform the supplier about delivery adjustments

Discuss and settle with the supplier to adapt to the agreed schedule.

Follow up the quantities and specification changes of the materials

Chasing a major project in a reasonable period of time before supply assurance.

Action after Site Delivery

Concerned for materials receiving, checking and payment. These activities and actions provide an important means for controlling the waste of material, and make the right supplier to eliminating the addition cost paid. However, whatever the actions of materials management is running, they need a cooperative involvement of both parties such as head office and the site functions that are primary controlled under the action of site management:

Materials Planning and expediting

Materials receiving and inspection.

Materials handling and distribution.

Inventory and inventory control

Materials handling and distribution

Quality Assurance and Quality control

Material Surplus disposal

2. 4 Process of the material management

There are few steps which can implement the material management to construction site which is planning, purchasing, logistics, handling, stock and waste control. Each process was state out its characteristic as important role for an effective materials management.

Planning

Materials planning include measuring, ordering and scheduling. It is emphasized that planning is a very important process to increase the productivity, profit, and assisting the time to complete the construction projects. The productivity of the construction project will be hanged if the material planning process is not implemented properly.

Purchasing

Purchase the materials and have the services from supplier to get the support of operations as the construction project from production to marketing, sales and logistics. For examples, a detailed material list and co-ordination of the purchasing and order of material are significant to assuring the material will available on construction site.

Logistics

Logistics is a concept that stresses movement of the materials and it involve planning, implementing, and controlling the movement and storage of all things from raw materials to the finished of the product to meet client requirements. During construction project, routing of the materials will affect the cost and time to complete the construction projects.

Handling

Handling of materials is the flow of the materials to the component that provides for their movement and location. Due to the rate of handling materials, there are some quality needs to be in considerations when designing a materials handling system. The selection of the materials handling equipment is important to enhance the production process, provide

the effective operation of manpower, increase production and advance the system to be more flexible.

Stock and Waste Control

Stock control can be categorized as a technique planned to be the cover and to ensure all materials or equipment are available when needed. Stock control includes raw materials, processed materials, assembly components, consumable stores, general stores, maintenance materials and spares, work in progress and finished products. It is very important as the construction materials were delivered as requested and with the progression by the proper management of stock control. At the same time, construction activities will generate a big amount of the waste and it will cause difficulty to the construction industry. However, with the planning of the material management which is effective will help to reduce the waste of material and increase the profit of the companies.

2.5 Challenging of Materials Management

There are few categories that are selected in Materials management:

The specification and measurement of the materials;

Where to locate and thus procurements progression when the instruction of stock is done dealings by the supplier;

Transaction to site and inspection of the order as off-loading, and storing onsite;

The executive and monetary process of payment;

The usage of materials in production on the job site and waste remove production.

Process of purchasing and supply of materials, the challenges often occurs when the materials is not equivalent as the ordering purchase, the skipped list out ordering materials, timing of materials arriving, quantities of materials, lack of training and adequate management, lack of Just In Time strategy, lack of communication and relation between contractor and supply chain companies are the main impediments.

In construction site the challenging are obvious which are specifically as:

Miscarriage to order stock on time which postponements the projects;

Mistaken time delivering which interrupts the work schedule;

The amount ordering more than the needs;

Wrong materials or fault in track of materials leads double work;

Scamp on materials from delivery into production;

Double handling of materials because of inadequate material.

The key to success of a construction management process is to be effective in construction. The main problems lead to ineffective are fault timing of materials received by the site or inadequate quality, improper information for materials arrival to the site stock, missing materials, unavailability of storage space, and waste of labour for materials searching on site.

3. 0 Comment and evaluate the existing site layout relation to the positioning of the material on the construction site

Timber

Concrete batching plant

Access

Double Storey Terrace

Semi-detached houses

Temporary Road

Materials

Scaffold store

Temporary building

Waste materials

Store

Reinforcement

Materials

Store

Figure 1: Existing Site Layout

3. 1 Evaluation of Existing Site Layout (Figure 1)

From the existing site layout plan, many material or place are located wrongly as below.

Concrete batching plant is putting too far with the material which is cement and aggregate. It normally must put near to the build place because concrete batching plant is for mix the cement and aggregate to form the concrete. Therefore, if store it at a distance from site, it will take time to transfer the mix concrete to the building places.

Waste material should not located at behind of the temporary building. This is because the temporary building used for project manager and others consultant to have meeting or discussion session and to make decision. If the waste materials located behind of it, the sound or odour will disturb the individual which is inside the temporary building.

Store should have a check point to have record through the transferable of the materials and instrument of the store. Without the check point, the instrument will easy to be lost and hard to search for the needed. With the check point, it will be easier for the employee to have checking record of the material or instrument. Therefore, the contractor could save up some portable cost as when the needs to rebuy the new instrument or materials which are lost founded through the record in the statement.

Entrance to the site or offices was too long as when the truck originates during working hours it will disturb the labour performance as in their works.

Security of the site does not be considered in the site plan, this means the stolen easy to be happen without any security at the site

Each store does not name it accordingly. So when the worker need find some instrument will take times.

4.0 Identify possible problem that may face by site manager relating the materials management on the site

There are many problem faces by site manager relating to the materials management on the site which is:

Limited space and cost

There are limited spaces allowed on construction site for the location of the materials or store. In addition, budget for build the store and materials places is limited. Therefore, Site manager need to solve the problem according their experiences.

Late or early delivery the material on site

Materials does not delivery in right time will cause problem to site manager. If the materials delivery early, site manager need to arrange a place for put the materials. In another way, if late delivery materials to site, it will cause delay of the work as plan by site manager.

Delivery wrong materials, wrong quality and wrong quantity

If the materials delivery on site without any checked by site manager, when the materials is needs to be used only satisfy that the materials in the situation of wrong materials wrong quality and also wrong quantity, it will cause delay of the work and increase the cost of the projects.

Theft or spoil when the material is needed.

When the materials does not put or keep accordingly, it will cause theft or materials spoils happen. Therefore, the site manager needs to take extra cost to purchase the new materials or instruments.

Waste material increase

When the materials does not keeping in the safety place, the materials will be spoils then increase the waste materials. As example when the cement just located at site without any cover, when rain the cement will spoils.

Poor site layout

When the site layout does not plan accordingly, it will cause many trouble to the site manager and workers. For examples, the concrete batching plant located far from the site, it will take time for worker transfer the concrete to the site so it may cause delay of work as time table.

5. 0 Proposed new site layout to improve the existing site layout

Waste materials

Reinforcement

Timber

Joint shop

Temporary Road

Aggregate

Store

Concrete batching plant

Double Storey Terrace

Semi-detached houses

Security

Check

Access

Car

Park

Temporary building

Check

Point

Materials

Materials

Scaffold store

Instrument

Store

Safety Equipment Store

Figure 2: New Site Layout

5. 1 Suggested Improved Layout (Figure 2)

As a site manager, I will suggest the new site layout as shows in Figure 2 which is have some changes of the position from existing site layout plan and addition new locations, which is

Concrete batching plant moves to the site and will have a temporary aggregate storage to put cement and aggregate. This will help to increase the work daily because the labour no need to move the concrete from far to the site. At the same time, when have the rain, the cement can just located at the aggregate stored without scared the cement will be damage.

All storage should name according to the type of thing they put, therefore it won't be mixed up with other materials and easy to find out the equipment or instrument when needs. The storage from new site layout all already named accordingly such as aggregate storage, instrument storage and safety equipment storage. Aggregate storage is just for temporary for putting the cement, piles and aggregate. Instrument storage is for putting

machine and instrument. Safety equipment storage is for putting some safety equipment such as signboard, helmet, safe boots and others.

Reinforcement and timber can be located together besides of the joint shop. Therefore, the labour can easy take out timber and reinforcement to do the joint without carry from far places. It helps to save time and increase the daily work.

Addition a car park for parking. Therefore, the labour can park their car in safety places without any extra fee and will perform will when work because no need scare the summons when parking outside.

Addition a security check in the main entrance. It is necessary to have a proper guard in the entrance to keep track of all visitors to the project. Therefore, the safety of the internal site and the materials will be protected.

Addition a check point as the guard for material, instrument, safety equipment and scaffold. The main duty of the check point is received and checks the materials according to quality and quantity which order by the site managers. In addition, it also helps to record and distribute the materials or instrument according to the needs of the site.

6. 0 Suggestion/recommendation that will give strong impact on the material management process in the future based on the case study

The suggestion that will give strong impact on the material management process is the top management of contracting companies should encourage their development using materials management systems in their

construction project. They can make some reward for their employee to attend training courses of construction materials management. So they can save more effort and time to achieve more exact results.

Besides, the site manager should arrange the waste materials accordingly by recycles and without recycles. For examples, some waste materials from reinforcement can recycle. Therefore the site manager should correct it at a place and sell the recycle factory. This method can help site manager to cover back some cost even is less but at the same time will decrease the waste materials from construction.

In additions, concept of Just In Time (JIT) should apply in materials management. The JIT idea originates from the manufacturing sector. It helps to smoother the manufacture process through the efficient management of materials such as providing the right materials with right quantities and quality, just in time for production in manufacturing sector. By applying the concept of JIT, it can help to improve the movement of materials from the suppliers to the construction site. With the JIT management system, the materials maybe delivered to site according schedule or just the day before.

Health and safety should be provides according to the health and safety handbook. Even it is costly to provide that safety equipment but it is very importance to the worker determined their safety. So that when they are working, the accident can be secured accordingly. In addition a successful construction project is having the zero accident in construction site. So the health and safety is very important in construction site.

The temporary facilities should provide accordingly to the project. The project manager should select the temporary facilities some as offices, canteen, and rest room for worker and other. It should estimate the size according to the site space and the needed of the people. In addition, a proper management of temporary facilities will increase the productivity in construction site.

7.0 Conclusion

In conclusion, material management is the main key for success a construction project. This is because the cost of materials is represented more than 60% or above cost from the total cost of project. Therefore, with the effective management of the materials, the company can save more than 6% or above of the cost from a project. Therefore, the materials management method must apply in construction site to guide the materials. With the proper arrangement of the materials will help contractor minimum the cost and maximum their profits.

Besides, the proper site plan is very important to the construction site. The location of the materials, storage and other temporary facilities should located according the efficient of the construction work. This will help the employee complete their work as schedule by the site manager without any addition of unnecessary work. When the productivity is high, the project cans completion of the time given by the client or early from the completion date.

In addition, the top management should give their employee attending the course regarding materials management. This will helps them arrange the

materials accordingly to increase their future project and arrange the site layout according to the needs of construction project.

Health and safety also is a part of importance in construction site to provide zero accident. It should follow according to hand book of health and safety. This is because the construction site is the risky site, when the health and safety can be determined on site; the worker will feel secured and confident to perform their work as well as possible.

Successful management of construction resources has to be based on updated information and processed utilizing a well-designed construction resources management system.