

## **Improving Efficiency of Materials Management Using CDPM Methodology**

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### **Abstract**

Materials management professionals must consider the need for quality improvement in the areas of materials requirement and planning, purchasing, shipping, receiving and inventory. Customer Driven Project Management (CDPM) can prove its point, if integrated with materials management. CDPM is the integration of quality management environment and project management system. To achieve effective materials management, the top management must recognize and give priority to the importance of customer satisfaction. This effort involves segregation of all the steps in materials management and applying CDPM to each phase independently. This approach can improve the quality standards of managing materials. This paper attempts to integrate the CDPM and materials management. The resulting structure tries to look at the materials managing problems from customer point of view and gain a better understanding in increasing the efficiency of materials management.

### **Keywords**

Materials Management, Customer Satisfaction, CDPM.

### **1. Introduction**

Materials management is the management system for planning and controlling all of the efforts necessary to ensure that the correct quality and quantity of materials and equipment are properly specified in a timely manner, are obtained at a reasonable cost, and, most importantly, are available at the point of use when required.(CII 1982). Materials management is an important element in project management. Materials represent a major expense in construction, so minimizing procurement costs improves opportunities for reducing the overall project costs.

Customer driven project management CDPM is one of the tools of quality. It focuses on the development and improvement of a project from customers' point of view, giving the customer more importance and control over the proceedings of the project. In Customer Driven Project Management, the presumption is that the customer value comes primarily from the growing confidence that the customer gains in a project relationship that the project team is working in the interest of the customer. According to Barkley and

Saylor (2001) customer driven project management provides a management approach adaptable to the new world of e-commerce, the internet, rapid change, rising complexity, and rabid competition. The working of customer driven project management involves focusing on a specific project, developing teamwork in customer-driven teams, and using the CDPM improvement methodology. Customer driven project management seeks a disciplined, structured, people-powered approach to project success. Barkley and Saylor 2001 expresses their opinion that customer driven project management advocates giving all people involved in a project the power and the skills to analyze customer satisfaction issues, discover opportunities for improvement, and institute improvements.

## **2. Materials Management in Construction Industry**

Ineffective materials management can result in increased costs during construction. The CII report (1982) states that the cost of materials and equipment usually runs about 60% of total project costs with construction labor costs at about 25%. Efficient management of this major increment can result in substantial savings in project costs. If materials are purchased early, capital may be held up and interest charges incurred on the excess inventory of materials. Materials may deteriorate during storage or get stolen unless special care is taken. Delays and extra expenses may be incurred if materials required for particular activities are unavailable. Insuring a timely flow of materials is an important concern of material management. Materials management consists of seven integrated functions as applicable to a typical industrial construction project. These functions are materials take-off, purchasing, quality management, expediting, shipping, receiving, warehousing, and issue (Jortberg and Haggard 1993). Effectively managing these functions can improve the efficiency of materials management process and save cost and time.

### **2.1 Materials Take-off**

Materials take-off is identifying what materials are needed and how much. It can be executed initially from plot or flow sheets, and then it gets updated, as more definitive design information becomes available. After takeoff is completed, a consolidated bill of materials is created and entered in a computer system.

### **2.2 Purchasing**

It is extremely important that the purchasing function be fully integrated into the overall materials management system. It is also important to define the purchasing responsibilities of both the owner and the contractor. Plemmons and Bell 1994, defined purchasing as the establishment of forms and procedures to purchase materials, developing standard bids, price and contract negotiation, preparing and administrating purchase orders, and executing close out activities, including surplus disposal, addressing claims and back charges, and records storage.

### **2.3 Quality Management**

Construction quality relies on accurate, clear statements of quality control requirements, arrived at by translating user needs into specifications and project quality plans and programs. CII studies indicated that quality is one of the most important functions of materials management. Customer involvement has been viewed as one of the best quality assurance mechanisms.

### **2.4 Expediting**

The primary goal of expediting is to ensure that materials are delivered to the construction site on time. Three types of expediting have been recognized, proactive, reactive, and status reporting. Two approaches can be taken in deciding the type of expediting. The first approach is to choose one expediting type for the entire project. The second and probably the more appropriate approach is to use a combination of the three expediting methods where different materials require different expediting methods.

## **2.5 Shipping**

The primary objective of transportation is to transport materials to the construction site in the most timely, most cost effective and safest manner possible in order to complement construction schedule requirements.

## **2.6 Receiving**

CII states, a large percentage of the most costly materials related problems occur after the materials have been delivered to the site. In order to ensure timely completion of a construction project, proper accounting for the receipt of materials is imperative. The use of computers in generating receiving reports allows receiving personnel to quickly document the status of received materials.

## **2.7 Warehousing**

Roger 1994 defined warehousing as the implementation of advanced techniques and technologies to optimize all functions throughout the warehouse. Efficient warehousing can yield to 15-30% increase in space utilization, accurate retrievable data, reduction of manpower, and improved customer services. Proper warehousing has a strong influence on the control of waste. CII defines five levels of storage of materials, i.e. materials that require extraordinary protection, materials that do not require controlled temperature/humidity but do require indoor protection, materials that require moderate protection from the environment, materials that require minimal protection from the environment and, materials which are practically insensitive to the environment.

## **2.8 Issues of materials**

Issuing materials require an accurate record about what, when and where material was used and who signed for it. This is usually accomplished by means of a warehouse requisition. Timely reverse issue of unused or surplus materials to the warehouse is necessary to minimize unnecessary buying of materials available and to control certain items such as electrical cables.

These are the materials management functions and if effectively managed can cause a difference in the overall materials management process. A greater efficiency can be achieved in the entire process by integrating the eight step process of the CDPM of quality.

## **3. The Eight Step Process Approach**

Integration of the total quality management environment, project management system, and customer-driven project management structure establishes the foundation for the application of the customer-driven project management (CDPM) approach. CDPM is applied to perform and improve any project, irrespective of the size. The CDPM action involves focusing on a specific project developing teamwork in customer-driven teams, and using the CDPM improvement methodology. The customer and supplier must target a common focus for the project and its processes. Perpetual improvement of quality and productivity must be pursued by both the customer and the supplier. CDPM uses an eight step process while applying both project management and total quality management tools and techniques.

Some of the principles of customer driven project management are:

- Pursue a TQM environment for project performance
- Orient everyone to perform and improve
- Join all key players on the team
- Encourage cooperation and teamwork
- Create and maintain a continuous improvement system.
- Train and educate everyone
- Make the customer the driver
- Nurture supplier and customer relationships
- Nurture leadership at all levels

The eight step phases of the customer driven project management improvement methodology are:

### **Step 1: Define the Quality Issue**

During this phase, the customer needs and expectations are developed. This phase defines the “what” of the project. The focus and priorities of the project are determined in this phase. The mission of the project is clarified, and specific customer requirements are detailed enough to establish priorities. In addition, critical processes are identified that contribute to the success of the project.

### **Step 2: Understand and Define the Process**

This phase thoroughly examines all the specific processes required to totally satisfy the customer. During this phase, the “how” of the project is determined. This phase establishes performance outputs and opportunities for improvement. It is important to understand all the processes required for the project. This includes current and required process performance. This phase involves determining input requirements with specific suppliers and output expectations with all customers and includes all internal and external suppliers and customers. It also may include establishing performance expectations based on benchmarking information. In addition, any potential problems, shortfalls, and improvement opportunities are identified at this time.

### **Step 3: Select Improvement Opportunities**

The third phase involves the listing of all improvement and the selection of high priority opportunities. It is critical to focus on the processes with significant impact on total customer satisfaction.

### **Step 4: Analyze the Improvement Opportunities**

This phase uses disciplined analytical tools and techniques to target specific improvements in the selected processes. This phase involves knowing the extent performance of all processes, the variations in the processes, and the underlying or “root” causes of problems. This phase provides the objectives for the project and project processes.

### **Step 5: Take action**

This phase relates most closely to the traditional project management phases of concept, definition, and production. During this phase, actions are taken to explore alternatives, state the project concept, define the

project deliverable, demonstrate and validate the project, and develop and produce the project deliverable. This includes preparing the scope of work, project work breakdown structure, schedule, and budget. The customer-driven project lead team ensures that the necessary human resources and financial, contracting, and other support systems are in place. Ultimately, this is the phase in which the necessary deliverable is produced and deployed to the customer.

### **Step 6: Check results**

During this phase, the improved processes are measured after the improvement action is taken. The project and project process outcomes based on indicators of customer satisfaction are judged by the customer-driven management project lead team.

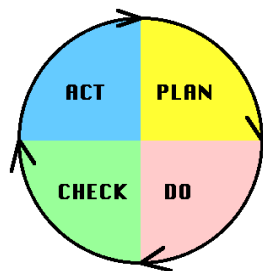
### **Step 7: Implement the improvement**

After validating the project process, the team ensures that the new process steps or project deliverables become a permanent part of the appropriate systems. This usually involves supporting the deliverable. This process includes all or some of the following: customer response, training, documentation of administrative procedures, maintenance and operations, people and/or organizational development, maintenance, supply, transportation, facilities, and computer services.

### **Step 8: Monitor results**

The customer-driven team stays in business over as many cycles as needed to monitor performance, solve problems, and continuously improve the deliverable. This is a long term function. It requires the use of customer-driven project management improvement methodologies for understanding, analyzing and accomplishing continuous improvement. It involves benchmarking and metrics. It ensures that the customer and supplier do not have to “reinvent the wheel” relationship between customers and project suppliers. Eventually, there may be a time for project closeout.

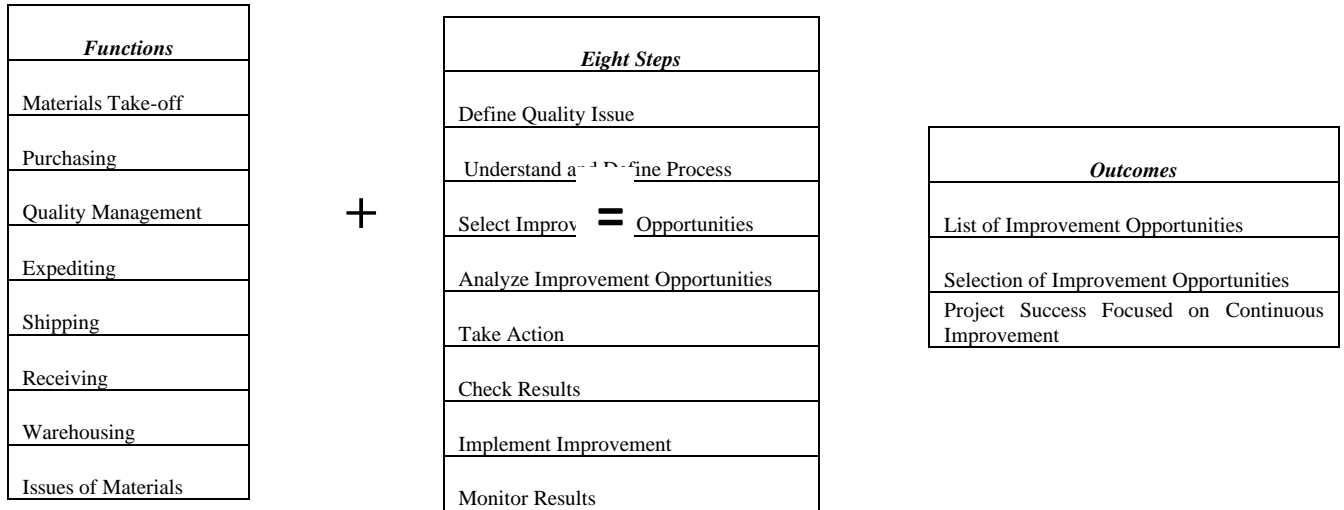
The eight phases of the customer driven project management improvement methodology correspond with the “plan, do, check, and act” or Deming cycle. According to Barkley and Saylor 2001, the plan has the following phases: define the quality issue, understand and define the process, select improvement opportunities, and analyze improvement opportunities. The “do” is the take-action phase; “check” involves checking results. The “act” involves implementing the improved process and monitoring results. Figure 1 illustrate the Deming cycle.



**Figure 1: Deming Cycle**

## **4. Integration of CDPM with Materials Management**

The ideology of CDPM can be used to improve the materials management functions. This can enhance the efficiency of materials management. The materials management functions described above are evaluated based on the eight steps of CDPM methodology. Each function in materials management is evaluated through the eight steps, as well as considering the Deming cycle. For each of the materials function the eight steps are followed before coming to a conclusion. Firstly, the quality issue is defined for the function, followed by defining the process. The next step is to select the improvement opportunities from the available alternatives. The selected opportunities are then analyzed to forward to the next stage of taking action. After the implementation of the selected opportunity the results are checked for improvement. Then the next criterion is to implement the improvement and finally to monitor the results.



**Figure 2: Eight step structure for improving materials management functions.**

Figure 2 shows the structure in which the materials management functions can be integrated and evaluated using the CDPM eight step process. The outcomes from this process will give the list of improvement opportunities for performing each of the materials management functions. Based on the list of the improvement opportunities found, a selection can be made to improve the function. The overall criteria focus on continuous improvement of the materials management system. In the above structure, each of the materials management function is subject to evaluation through the eight step process resulting in finding a list of improvement opportunities for improving the process. Then for each of the function the most suitable improvement opportunity is selected.

## 5. Conclusions

Materials management is a very important field, constituting a major part in terms of cost and time of any construction project. The improvement in the efficiency of the materials management functions will contribute in improving the overall efficiency of the materials management system. This structure of the eight step process of CDPM methodology can substantially improve the materials management system and hence the overall project performance. The CDPM approach presents a new technique of evaluating a system and improving it continuously based on the principle of total quality management. The evaluation and selection of the optimum opportunity for every function through the eight steps of CDPM forms a solid base for improvement in quality of the project. This structure of integration of CDPM with materials management functions focuses on materials management problems from customers' point of view and help in increasing the efficiency of the system.

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