



Construction Industry Institute®

Global Procurement and Materials Management

Construction Industry Institute

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Global Procurement and Materials Management

**Prepared by
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Global Procurement and Materials Management Research Team**

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Executive Summary

Materials management is a complex and comprehensive process involving people, organizations, technologies, and processes that manage the definition, sourcing planning, quantification, supplier qualification, purchasing, supplier QA/QC, expediting, transportation, logistics, and control of materials and associated information across the life cycle of a capital project. Materials and related services account for a large percentage of a capital project's total installed cost (TIC). Implementation of a comprehensive materials management program contributes to predictable project outcomes, reduced costs, improved productivity and quality, and a safer working environment. Such factors make the study of the materials management process crucial for project success.

CII first developed Special Publication (SP) 4, *Project Materials Management Handbook*, in 1989 to describe this process. In 1999, this handbook was superseded by an updated overview of materials management, Implementation Resource (IR) 7-3, *Procurement and Materials Management: A Guide to Effective Project Execution*. Over the past decade, materials management concepts and techniques have continued to evolve, and global conditions have changed. The primary purpose of the research described in this document was to update IR 7-3 to reflect the current effective practices in this field. To accomplish this goal, Research Team 257 undertook an extensive literature review, two surveys, and nine case studies. Prominent subject matter experts were also consulted. A total of 54 of the 97 major construction organizations queried took part in the team's surveys and case studies; such high participation confers credibility on the study's results and conclusions.

The implementation resources developed by the team provide specific guidelines, processes, and recommendations for the implementation of an effective materials management program, based on current industry practices. They also examine enabling technologies, management organizational structures, and emerging issues that have an impact on materials management programs. In the process of updating the materials

management handbook, the team decided it would be more useful as an electronic tool—an e-guide through which the user can easily navigate to important information through hyperlinks and bookmarks. Current and foreseen issues affecting global procurement and materials management were also investigated. This publication summarizes the results of these research effort.

The research clearly shows a dramatic increase in the maturity, formality, and systematization of materials management by CII member organizations. Globalization is now well established and complex, presenting both opportunities and challenges. And, while IT systems that are designed for materials management will continue to improve real-time coordination and course correction for projects, these systems require better integration. Given the increasing size, variety, and complexity of global projects, materials management will maintain and expand its role in the early phases of capital project planning.

Introduction

Problem Statement

Materials management is a complex and comprehensive process that involves people, organizations, technologies, and processes that manage the definition, sourcing planning, quantification, supplier qualification, purchasing, supplier QA/QC, expediting, transportation, logistics, and control of materials and associated information across the life cycle of a capital project. The process is complex, often involving thousands of materials procured worldwide and delivered to domestic and international locations, using all modes of transportation. These must be carefully coordinated to maintain the critical path of a project schedule. Implementation of a comprehensive materials management program contributes to more predictable project outcomes, reduced costs, improved productivity and quality, and a safer working environment during construction. Proper implementation of materials management during the planning and construction phases will facilitate smoother start-up and initial operations of the facilities constructed.

CII first developed Implementation Resource (IR) 7-3, *Project Materials Management Handbook: A Guide to Effective Project Execution*, in 1989, and updated it in 1999. Over the past decade, concepts and techniques for materials management have continued to evolve with the changing global environment, resulting in the need for another update. Research Team 257 undertook the effort to update the handbook and authored IR 257-2, *Global Procurement and Materials Management: An eGuide to Effective Project Execution*. The team also produced a second implementation resource, IR 257-3, *The Materials Management Planning Guide*, to help materials management personnel coordinate their efforts along the critical path of any project.

Purpose and Objectives

The primary purpose of this research project was to update CII's landmark materials management resource, IR 7-3, *Procurement and Materials Management Handbook*, to reflect state-of-the-art and best practices in this field. This updated handbook provides specific guidelines, procedures, and recommendations for the implementation of a modern materials management program.

The specific objectives of this research included the following:

- Identify materials management techniques that reflect current practices, including modern methods that have replaced previous practices.
- Identify materials management practices that have become mainstream usage.
- Identify emerging practices and procedures that have influenced the materials management process in recent years, including global procurement, the outsourcing of logistics functions, and comprehensive supplier involvement.
- Investigate functions that have become more integrated into the materials management process, such as supply chain processes or supplier integration techniques.
- Identify efficient technologies for managing the materials acquisition and management process.
- Interface with prominent industry consortiums such as the Procurement Executives Group (PEG) to incorporate the most current practices for materials management.

Methods to Achieve These Purposes

The research team took a three-pronged approach to the task, delineated as follows:

- search for existing data
- two surveys of contractor and owner organizations
- case studies with a series of in-depth interviews with contractor and owner organizations and subject matter experts.

The research team also conducted an extensive review of relevant research, including previous studies on materials management, the supply chain process, suppliers' roles in the EPC process, and global procurement practices. This effort consisted of an extensive literature review of library and Internet searches.

The team conducted a Phase I survey to take a preliminary snapshot of industry practices related to global procurement and materials management processes. The survey was distributed to all CII-member organizations, and the responses enabled the team to identify outdated, mainstream, and new practices across the industry. Subsequently, a Phase II survey was developed and sent to the Phase I survey respondents and to organizations with representatives in the Procurement Executives Group. The objective was to collect more details on effective global procurement and materials management practices, implementation barriers, and enabling technologies. A section of the Phase II survey queried respondents about presumed current and future issues as identified by the research team.

Organizations with a proven record of successful implementation of procurement and materials management programs were identified and selected for participating in the case studies. The research team interviewed nine owner and contractor organizations to obtain diverse points of view. The team conducted both face-to-face and telephone interviews, enabling team members to gather further insight into the implementation differences among organizations in the construction industry.

Assumptions and Scope Limitations

The following assumptions and scope limitations apply to this research:

- The organizations participating as sample populations in the surveys and case studies constitute a fair representation of the larger CII membership.
- The research findings are generally applicable to materials management for construction projects as executed by CII membership.
- The research findings may not be applicable across the industry as a whole because the research team was not able to survey all organizations operating in the construction industry.

Data Analysis

The initial survey was sent out to gather a preliminary snapshot of materials management practices across the industry. After the results were analyzed, a second survey and case studies were conducted. This subsequent research was aimed at garnering further insight into modern management techniques and learning which issues practitioners view as posing the greatest challenges in the near future.

Phase I Survey

The Phase I survey was sent to the CII community in December 2007. By February 2008, the team had received responses from 53 organizations—27 owners and 26 contractors—constituting a 46.5 percent response rate. However, the survey results were based on 49 rather than 53 complete responses (25 from owner organizations and 24 from contractor organizations) because some organizations reported that they did not have any materials management structure. These companies lacked these functions either because they relied on the EPC contractor to monitor the materials management process or because they were consultants who did not perform any materials management functions.

This preliminary survey started with general questions related to the company's materials management personnel and organization. It further addressed the different components of materials management. It followed up on these issues with specific questions related to the materials management functions. Finally, it addressed some specific topics including outsourcing, automated systems, performance assessment (metrics), and current and foreseen issues.

The survey results showed that most organizations have a procurement or materials management department. The term *supply chain management* appeared to be less commonly used than these terms. Other names for procurement and materials management were also mentioned, such as purchasing and supply. Overall, the research

showed a lack of consistency in naming these functions across the industry. However, the functions included in the materials management process were consistent, regardless of departmental naming conventions. Depending on companies, some functions were not under the materials management umbrella—for example, subcontracts (or contracts) or inspections.

The research team took the opportunity to compare the results of its survey to those of the survey conducted in 1999. The comparison revealed a dramatic increase in the use of certain management practices and technologies.

The survey results also showed that the materials management groups were involved earlier in project planning than they used to be. Eighty-eight percent of materials management groups surveyed participate in the front end planning of new projects, and 82 percent of the surveyed organizations assign materials management responsibility for a project during the planning phases. On the other hand, only 49 percent of the surveyed organizations assess project design needs prior to final design to ensure spares compatibility.

The majority of the organizations surveyed appeared to have a sophisticated supplier quality management system. The following concepts and techniques are largely implemented in these systems:

- inspection plans
- supplier quality evaluations before selection
- supplier databases
- design quality reviews
- materials management process audits.