

CONSTRUCTION INDUSTRY INSTITUTE

AN ANALYSIS OF
MULTISKILLED LABOR STRATEGIES
IN CONSTRUCTION

Construction Industry Institute

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An Analysis of Multiskilled Labor Strategies in Construction

**Prepared by
The Construction Industry Institute
Multiskilled Craft Capabilities in Construction Research Team**

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Executive Summary

Labor productivity, craft training, and the declining number of entrants into construction crafts present critical challenges for our industry today. One solution which may positively effect many labor issues is to better utilize the skilled workers currently in the industry through the development and use of multitasking. A review of studies over a 10-year period from the manufacturing area indicates that multitasking strategies resulted in process improvements and technological innovation.

The scope of this study included a detailed project analysis of a single domestic, grass roots, open shop industrial construction project and the exploration of currently used multitasking applications in construction. Benefits of multitasked labor utilization were demonstrated with regard to total project labor cost, employment opportunities for construction craft workers, and other industry labor issues. These benefits included conservative estimates of five percent total labor cost savings, a 35 percent reduction in required project work force, a 47 percent increase in average employment duration of each worker, and an increase in wage/annual earning potential for multitasked construction workers.

A system for estimating the potential project benefits of alternative labor utilization strategies was developed. All labor cost factors in the cost model were identified and developed by the industry research team. The cost model is used in conjunction with labor data from the project schedule to quantify the potential cost savings from a multitasked labor strategy.

Introduction

Definition of Multiskilling

Multiskilling is a labor utilization strategy where workers possess a range of skills appropriate for more than one work process and are used flexibly on a project or within an organization. Workers can be assigned to construction tasks based on their ability to perform the needed skill/task, not limited to traditional job boundaries. Based on the flexible application of skills that the worker already possesses or is willing to acquire, workers can be an effective and productive contributor to the output of several work processes, although they may not achieve mastery-level skill in all areas.

Labor productivity, training, and the declining number of trade entrants are critical needs facing the construction industry. Alternative labor utilization strategies and modified industry labor practices are needed if the industry is to address these growing concerns effectively.

Specialization strategies have been identified in other industries as a restricting factor in the implementation of new technology and in the development of process-based innovation. These studies indicate that when work boundaries are crossed, shared, merged, or eliminated, new opportunities for innovation arise.

Currently used craft delineations, in practically all sectors of the industry, have changed very little in their organization by the same craft groupings. As a result, little experimentation with alternative strategies has been tried. For example, existing training programs, skill evaluation systems for the purpose of determining pay, licensing practices, recruiting practices, company employee database systems, managerial work assignment practices, and company cultures make a major strategy shift in labor utilization difficult. These old craft/trade paradigms have proven to be resistant to change even.

One factor that limits the implementation of alternative labor strategies is the absence of a reliable model to predict the potential benefits or penalties associated with a change in labor utilization. Construction industry analysts and practitioners have focused their attention on skilled labor availability for many years now. Falling numbers of new trade entrants and low construction unemployment rates increasingly indicate that there are not enough skilled workers to meet rising demand. Part of the problem in meeting demand is the unstable and short-duration job assignments. New entrants into the work force are seeking better job stability. It is believed that the solution to the skilled labor shortage is to look for ways to better utilize the skilled workers already in the industry and to improve job stability.

Multiskilled labor utilization strategies have been successfully implemented in many industries and many countries. In these instances, a multiskilled work force has been identified as a contributing factor to economic development, improved international competitiveness, and increased profitability.

Research Objectives

The following key objectives were used by the research team to guide this study:

1. Investigate the extent to which multiskilling has been applied in the construction industry.
2. Develop a system of craft loading and project cost analysis to measure the impact of alternative multiskilling strategies.
3. Investigate the potential benefits or penalties and feasibility of using multiskilled labor strategies in the construction industry.
4. Analyze the study results, draw conclusions and make recommendations for industry action and future research needs.

Methodology

The scope of this research includes the development of a project level analysis system, the estimation of multiskilling project impacts, and the development of supporting evidence of current multiskilling practices. Two research techniques were incorporated in the study: (1) a detailed analysis of a single project application, and (2) a current practice survey of existing construction multiskilling applications. A project was selected that allowed the exploration of alternative multiskilling strategies unrestrained by complications imposed by subcontracting practices, or the consideration of jurisdictional lines and work rules. The current practice survey included project applications from all lines of contracting.

The following list of research tasks provides an overview of the research process:

1. Conduct an in-depth investigation of existing literature documenting the theory of multiskilling as well as previous applications of multiskilling (emphasis on construction applications).
2. Develop a system of labor analysis, and determine baseline worker hour requirements for the sample project.
3. Define alternative multiskilling strategies to be assessed in this research.
4. Repeat the labor analysis for each multiskilling strategy using the new craft descriptions defined for each strategy.
5. Develop an economic benefit model to measure project impact and conduct a comparative analysis of alternative multiskilling strategies.

6. Assess the impact of multiskilling on total labor cost, employment duration, and strategic human resource management policies.
7. Analyze results, draw conclusions and identify possible impediments to industry application.

Use of the CII Model Plant

The CII Model Plant was selected because of the availability of detailed project level data and wide industry consensus on the representative value of the project. The Model Plant is a virtual petrochemical processing facility developed in 1985 by CII member companies to provide, at that time, a standardized physical facility for productivity measurements. Since its development, the Model Plant has been used in two benchmark productivity studies and in an analysis of multi-functional equipment. The adoption of the Model Plant provides a proven base for analysis and provides clear boundaries to the scope definition of this research.

The Model Plant consists of nine separate areas including a refractionation unit, tank farm, compressor unit, two turbine generators, underground piping, pipe bridge, and a complete civil site package. The documentation from the Model Plant used to conduct this study includes: a detailed quantity survey, a work-hour labor estimate, a historic cost estimate for approximately \$70 million of the total \$85 million project value, a 78-week project schedule, and 87 representative drawings documenting all major components of the project.

Using the Model Plant as a basis for analysis, existing project data and project management tools were used to develop labor data representing current industry staffing practices. Opportunities for multiskilling were identified and theoretically implemented on the Model Plant project. A comparative benefit analysis was used to quantify project impacts and identify a possible “best strategy.”