ROLE OF ASCE IN CICE IMPLEMENTATION—RECOMMENDATIONS

By The Task Committee on Productivity

ABSTRACT: The Business Roundtable, an association of some 200 construction company owners, instituted a study called the Construction Industry Cost Effectiveness (CICE) project. CICE is the first industry-wide effort to define productivity problem areas. Five major areas in which construction cost reductions are possible were identified: project management, construction technology, labor effectiveness, labor supply and training, and regulations and codes. A Task Committee on Productivity of the Construction Division of ASCE was formed to review recommendations presented in the CICE study. The Task Committee recommendations on ASCE's role in implementing solutions to construction productivity problem areas are presented.

INTRODUCTION

In 1979, the Business Roundtable, an association of some 200 construction owners, embarked on a massive research effort called the Construction Industry Cost Effectiveness (CICE) project. The study was divided into five broad areas, namely,

1. Project Management
2. Construction Technology
3. Labor Effectiveness
4. Labor Supply and Training
5. Regulations and Codes

These were identified as being major areas in which construction cost reductions were possible. The study topics were investigated by various teams using the talents available from owners, contractors, private consultants, and universities. The results of the CICE project were reported in 23 individual reports and a summary report. The reports included more than 200 recommendations for consideration by owners, contractors, designers, government and universities to help reduce the costs of construction.

The Business Roundtable CICE project represents a major effort, but it is only a beginning toward improving the efficiency of the construction industry. Much of the success of the project depends on the effective, voluntary implementation of the recommendations presented in the reports. These recommendations cover a broad spectrum and their implementation calls for a concerted effort by various parties to see that actions are taken. To investigate the appropriate action to be taken by ASCE, a Task Committee on Productivity was created by the Construction Division. The Task Committee's recommendations are presented in this article.

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ASCE Committees

The functions of the ASCE Construction Division are carried out largely through the efforts of its standing technical committees. These committees include: Construction Equipment and Techniques, Construction of Nuclear and Power Generation Facilities, Contract Administration, Inspection, Specifications, Social and Environmental Concerns in Construction, Construction Management, Estimating and Cost Control, Tunneling and Underground Construction, and Application of Small Computers in Construction. Each committee has a role in implementing the recommendations presented in the CICE reports.

Although the Task Committee determined that each of the technical committees has a role to play in the implementation of the CICE recommendations, specific actions of each committee were not considered to be within the scope of the Task Committee. Each technical committee should consider its general and specific role in terms of the CICE recommendations.

Productivity

The task committee concluded that productivity as it pertains to the Construction Division of ASCE is not clearly defined. Although productivity is classically defined as reflecting the ratio of the "outputs" to "inputs," it was felt that a more succinct definition would be more desirable. The Task Committee recommends a broad definition of productivity that could be generally applied by ASCE. The highest productivity occurs with the delivery of a quality construction product that achieves total cost effectiveness through the optimal use of resources. The term "resources" is broadly defined to encompass materials, equipment, labor, money, and time. It is implicit in the definition that productivity entails the efficient use of resources through management. The scope of productivity includes the conceptual and engineering phases of projects through the use of the product by the owner. Thus, the definition of productivity should apply to the full range of ASCE endeavors and is not restricted to the Construction Division.

With this definition of productivity serving as a guide, the Construction Division of ASCE should seriously assess how it can play an active role in implementing the CICE project recommendations. This can best be achieved through the various technical committees. Each committee should review its charge and objectives with the intention of defining how improving construction productivity can be a part of its ongoing effort.

Implementation of the CICE Recommendations

The Task Committee reviewed all of the recommendations presented in the CICE project reports. The recommendations include a variety of topics and clearly exemplify the broad scope of the problem of productivity in the construction industry. In general, the topic areas include the design-construction interface (value engineering, constructability analysis, risk analysis, etc.), construction as impacted by owner deci-

sions (type of contract, changes, incomplete drawings, exculpatory clauses, etc.), the role of technology in the construction industry (transfer of technology, computer applications, modeling construction operations, etc.), cost control (life cycle cost tracking, procurement, etc.), problems related to human resources (training, motivation, safety, absenteeism, etc.), and the role of educational institutions in improving construction productivity.

The Task Committee reviewed each CICE recommendation to determine whether the Construction Division could or should play a role in its implementation. Through this procedure, it was determined that the recommendations fall into one of four categories. The first category, the one most applicable to the Construction Division, consists of recommendations that are in a topic area which is within the objectives of existing technical committees. The second category consists of recommendations which can best be addressed by joint committees established between the Construction Division and other ASCE divisions. The third category consists of recommendations that are clearly within the scope of the Construction Division but for which there currently is no standing technical committee. The fourth category consists of recommendations which are not within the scope of the Construction Division.

For Current Construction Division Technical Committees.—The number of recommendations that fall within the scope of existing technical committees is extensive. A full listing is not practical, but a sampling of recommendations as they pertain to specific committees is presented in Table 1.

The Task Committee encourages each technical committee to consider other CICE recommendations for committee action.

For Joint ASCE Division Action.—The second category consists of topics to be considered for action by joint committees of the Construction Division and other ASCE Divisions. Since joint committees do not currently exist, the Executive Committee of the Construction Division should assess the need for considering action on the related CICE recommendations. Appendix I summarizes some of the recommendations that should be considered by joint committees.

The primary focus of the joint committee(s) should be the design-construction interface. The concern is that the cost of construction is adversely impacted by the lack of effective communication between the designers and the constructors. Greater interaction between the Construction Division and other ASCE Divisions (for example, Structures and Geotechnical) should be fruitful in reducing the costs of project delivery.

For New Construction Committees.—The third category consists of topic areas which the Task Committee felt were clearly within the scope of the Construction Division but that are not currently within the scope of any of the existing technical committees. The recommendations in this category are considered to be very important to the Construction Division. Appendix II summarizes typical recommendations to be addressed by one or more new committees in the Construction Division.

A review of these recommendations indicates the need for a greater emphasis, within ASCE, on the "human" component of the construction process. Although a number of technical committees may be formed

TABLE 1.—Typical Recommendations to be Addressed by Technical Committees

Technical committee (1)	Recommendation (paraphrased) (2)
Construction equipment and techniques	Introduction of latest technology to construction equipment
Construction of nuclear and power generation facilities	Dissemination of information about the regulatory process Adverse impact of changes QA/QC procedures for effective implementation
Contract administration	Impact of lump sum versus cost plus contracts Risk analysis Model clauses for scheduling
Inspection	Financial problems associated with code enforcement QA/QC procedures for effective implementation
Specifications	QA/QC manuals and procedures Model clauses for scheduling Adverse impact of changes
Tunneling and underground construction	Introduction of latest technology of construction methods Adverse impact of changes
Social and environmental concerns in construction	Transfer of technology Concerns for construction permits
Construction management	Resolving communication problems The need for teamwork on projects Use of models for materials management Promote construction management as a profession
Estimating and cost control	Owners should use risk-analysis techniques to a greater extent Project managers should have adequate training and experience to make estimating and cost control decisions Cost estimates should be brought up-to-date with design development Test conceptual estimates with detailed estimates Adverse impact of changes
Application of small computers in construction	Promote use of computerized estimating techniques Increased use of data processing for statistical analysis Nonrestrictive scheduling models
Technical council on codes and standards[a]	Distribute information concerning the permitting process
Construction research council[a]	Advancement of technology in the construction industry Define industry's needs for research and development

[a]Through the Construction Division representation.

to address this topic, the Task Committee believes that a more appropriate approach would be the formation of a standing technical committee on human resources. The "Committee on Human Resources" could fill a void that currently exists in the Construction Division.

For Action by Others.—The fourth category contains recommendations which are not currently within the scope of the Construction Division or any other ASCE Division. The Task Committee determined that there were a number of recommendations in this category. In fact, of the 23 CICE project reports, the following 10 were not within the scope of the Construction Division.

C-1 Exclusive Jurisdiction in Construction
C-3 Contractor Supervision in Unionized Construction
C-4 Constraints Imposed by Collective Bargaining Agreements
C-5 Local Labor Practices
C-7 The Impacts of Local Union Politics
D-1 Subjourneymen in Union Construction
D-2 Government Limitations on Training Innovations
D-3 Construction Training Through Vocational Education
D-4 Training Problems in Open Shop Construction
D-5 Labor Supply Information

The recommendations included in the five D reports are related to both unionized and open shop construction. The Task Committee felt these issues can best be dealt with by other construction-related associations.

Overview of CICE Recommendations

In reviewing the CICE report, the Task Committee found that a few major topics were not covered. This occurred, in part, because the Business Roundtable's primary interest is in the area of industrial construction, i.e., the Business Roundtable consists of owners who are principally involved in large industrialized construction projects. Construction productivity as it pertains to public works projects has not been addressed in any of the reports or in the recommendations. In addition, problems associated with managing and constructing small projects are not included in the CICE project reports. However, research indicates that the functions small firms perceive as having a high potential for productivity improvement are similar to the functions perceived by large organizations.

Other topics such as laws impacting the construction industry, contract disputes, litigation, subcontract administration, unit price contracts, contractor qualifications, have also been excluded from consideration by the CICE effort. Thus, the Construction Division must recognize that the CICE report recommendations, while serving as an excellent guide for improving productivity, are not to be construed as an exhaustive listing of construction productivity concerns.

Conclusions

The Business Roundtable's CICE project represents a major undertaking: the first such industry-wide effort to define productivity problem areas. The reports mark a beginning point in resolving some of the productivity problems in the construction industry. Essentially, these reports have identified problem areas. The effort to resolve these problems lies ahead. Although some recommendations have been made by which productivity improvements may be realized, much additional work is required if ultimate cost reductions are to be significant.

ASCE can be instrumental in defining productivity problems and finding solutions to those problems. These topics may be complex and may require a concerted effort between the Construction Division and other divisions within ASCE. The standing technical committees must evaluate their own roles relative to the recommendations outlined in the CICE reports. In addition, the Task Committee on Productivity recommends that a standing committee on Human Resources in Construction be established to address some crucial areas identified by the CICE project efforts.

Acknowledgments

Members of the Task Committee on Productivity are: D. A. Day, Chairman; D. S. Barrie; J. W. Hinze, Editor; E. Koehn; D. W. Musser; D. A. Novice; and H. R. Thomas.

Appendix I.—Typical Recommendations to be Addressed by Joint Committees of the Construction Division and Other Divisions of ASCE

Owners are urged to require a post-project review of actual costs versus estimated costs to determine areas where the estimating data base should be modified.

Owners should strongly consider requiring designers, constructors, and vendors to have formal QA/QC programs and procedures as one prequalification for bidding or negotiating work.

Owners should strongly consider tracking the cost of critical items over the entire life of the facility to get a more precise reading on the results of the quality level achieved during design and construction.

Owners should consider the adverse impact on cost and schedule of proposed changes to drawings and specifications and fully evaluate their effect before making changes.

Owners should consider the need for modern, cost-effective, management systems to plan, execute, and control their projects.

Owners should develop the terms of the contract to embody the interests of both owners and contractors, and to recognize the goals of each and the ability of each to control and reduce specified risks and costs.

Owners should recognize their stake in the construction industry and support research and development efforts to cut construction costs.

There should be a greater emphasis on value engineering and constructability analysis.

There should be more concerted efforts for addressing the industry needs in construction curricula.

The industry must find the means for providing financial support for construction educational programs.

Appendix II.—Typical Recommendations to be Addressed by a Standing Committee on Human Resources in Construction

Contractors should establish effective safety programs.

Owners should function with the contractor as a safety team member during the planning and execution of a construction project.

Owners should enthusiastically support labor motivation programs.

Owners should provide opportunities for recognition for efficient work practices.

Owners should require contractors to make periodic reports on absenteeism and turnover.

Owners should work with contractors to identify and alleviate irritants ("dissatisfiers") within the control of owners that may contribute to absenteeism and turnover among contractor employees.

Provide open communication lines. Consider project orientation, newsletters, suggestion boxes, bulletin boards, etc.

Fully explore the many ideas and modern methods now being proposed for improving the quality of engineered construction through motivational techniques.

Owners and contractors should provide incentives for employees to earn bachelors and masters degrees.

Owners, contractors, and educators should encourage the use of practitioners in construction education.