

A Call for Cost and Reference Models for Construction Supply Chains

IGLC-11 White Paper: Supply Chain Management Thrust Area

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Two papers at IGLC-10 (Vaidyanathan (2002) and Taylor and Björnsson (2002)) reported significant industry efforts to implement supply chain concepts in project environments. To this author's mind, these papers demonstrate the maturation of supply chain management as a field of research and practice in construction. We are moving from tentative early steps in research (O'Brien and Fischer 1993) and calls from industry leaders for supply chain reform (e.g., Egan 1998) to a level of understanding that allows us to make targeted improvements to practice.

Despite our improved understandings, construction supply chain management is not a solved problem ready for widespread deployment. While there are an increasing number of case studies of supply chain practice (and several associated tool sets for process mapping), we have not yet developed a set of standard tools, models, and representations that allow us to generally describe, analyze, and prescribe improvements to a given construction supply chain. In particular, we need to move towards development of a *reference model*. I am inspired here by the Supply Chain Operations Reference-model (SCOR, Supply-Chain Council 2002) developed for the manufacturing industry. According to the Supply-Chain Council, a process reference model contains:

- Standard descriptions of management processes
- A framework of relationships among the standard processes
- Standard metrics to measure process performance
- Management practices that produce best-in-class performance
- Standard alignment to features and functionality

The goal of a reference model is to establish shared representations and models that allow analysis and guide managerial improvements.

Given our current level of understanding, we are ready to start integrating various supply chain research in process mapping, organizational structures, buffer management, etc. and move towards development of reference model(s) for construction. Hence, this white paper particularly invites submissions for IGLC-11 that work towards that goal. Potential paper topics include:

- Description of canonical supply chain structures that generalize existing case studies and that support further research and empirical study
- Related to canonical models, development of standard approaches (likely more than one) and frameworks to represent supply chains and measure performance
- Theory that guides the points above and/or development of prescriptive production models
- Generalization of product design examples that support the integration of design decisions with supply chain production (design for supply chain management)
- Cases and theory that explore the interaction between organizational arrangements and supply chain production capabilities

The last point, relating organization arrangements to supply chain production, is an especially important area for further examination as it is well understood that costs, contracts, and institutional SOPs are significant barriers to adoption of new systems. In particular, there is a need for *cost models* that allow explicit assessment of supply chain performance under alternate operating methods. As noted by Davis (1993), “without an adequate analysis tool, opportunities for change might be lost for want of a credible argument.” Similarly, cost models can inform design of contracts and provide an explicit rationale to compensate firms for behaviors that support system performance (in manufacturing, see Cooper and Slagmulder 1999; Tsay et al. 1999).

In construction research, there is a general paucity of case studies that focus on costs. We need new case studies that explore different aspects of supply chain coordination from a cost perspective. I suggest four general categories for classification of costs, incentives and organizational arrangements:

1. Win-win methods for part of the supply chain. What aspects of supply chain behavior can be changed such that all affected parties benefit? Reducing lead-times for engineered-to-order components is a potential example where benefits accrue to all firms.
2. Implementation of low cost methods where the benefits outweigh the costs. Improved management of time and inventory buffers by contractors is a potential example where the costs of implementation can be low for all parties and the benefits large.
3. Reconfigure the structure of the supply chain to improve performance while eliminating or reducing the role of certain parties. Taylor & Björnsson’s (2002) paper in IGLC-10 provided an example.
4. Compensate those who incur costs in a reconfigured supply chain to assure improved system performance. This is perhaps the thorniest issue for implementation of supply chains as under current contracts, firms generally have limited or conflicting incentives for effective collaboration.

This suggested categorization is a starting point; modifications and other frameworks are useful contributions. However, provision of context is necessary to support further development of cost and reference models.

In summary, I believe we are at an exciting time in construction supply chain research where we can start to move beyond case-by-case description to more general theories and understandings – cost and reference models in particular. If you are working on construction supply chain management research, I would appreciate it if you could contact me about your current project(s). I will relay the information to Ruben Vrijhoef who can update the information on the construction supply chain management web-pages (<http://cic.vtt.fi/lean/cscm/index.html>).

Notes:

- Several of the IGLC thrust areas, such as buffer management and reducing lead times for engineered-to-order products, support broader initiatives in supply chain management. Please see the white papers in these areas for more information.
- Information technology to support supply chain management is also an area of interest. See O'Brien (2001) for a complementary paper on enabling information technologies for supply chain management.

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