

SUPPLY CHAIN DISRUPTION

Results of 2017 Research Conducted by MCA, Inc. for ELECTRI International

Summary letter ECs can use for simple presentation to customers

Like any process, buffers are put in place in the construction supply chain to reduce risk and ensure the predictability of the final outcome.

Every buffer requires energy to maintain and ensure its role as a risk-reducer. Just as a “Windkessel” is used in the pipeline to reduce pulsation and hence ensure smooth outflow of the liquid, buffers in the process of material supply and construction procurement chain are put in place to ensure the smooth final assembly of the construction project.

The buffers will become less necessary if the input and outcomes are more predictable. In the case of the electrical material supply channel, the role the electrical contractor plays is that of the final “Windkessel” of the pipeline. If the correctness of the following could be ensured, the role the electrical contractor plays in reducing the impact of these risks will be diminished.

- 1. Engineering**
- 2. Drawings**
- 3. Timing**
- 4. Schedule**
- 5. Delivery**
- 6. Coordination among the trades**
- 7. Human resource risks and variation**
- 8. Safety**
- 9. Weather**
- 10. Inspections and government regulations**
- 11. Building operation, maintenance, and usage**
- 12. Project dysfunction**
 - a. *Conditions / overall oversight*
 - b. *You don't know until you get to it*
- 13. Qualified workforce**

The electrical contractor is the final buffer to reduce the risk to the owners and users, and ensures correct installation in spite of many degrees of freedom impacting the jobsites.

ELECTRI International commissioned MCA, Inc. to study the impact of owner-supplied or GC-supplied material and equipment. The investigation focused on evaluating the value transfer throughout the construction supply chain to the end customers. The research found this value transfer is highest in terms of time, cost, and quality, when subcontractors purchase material and equipment themselves.

Assuming the electrical contractor is well equipped to manage the risks, including all of the above-mentioned degrees of freedom impacting the jobsites, then material purchased through the existing channels will result in the lowest energy required to supply the material. If these buffers, that is the electrical suppliers and electrical contractors, are removed from the procurement chain and the input and outcome stability is not ensured, the cost of owner or GC purchased material to the final project will be much higher.



The research studied and quantified three options for owner/GC direct purchases, based on the original models developed in the 2003 Procurement Chain Management research MCA had conducted for ELECTRI:

- ◆ Subcontractor procures the material, adds profit to it, and carries the labor, warranty, timing and correctness risk
- ◆ GC/owner procures the material. The subcontractor includes a budget item for added labor and other risks
- ◆ Subcontractor and GC/owner work together to reduce structural costs by collective reduction of the risk and collaborative approach for procurement and labor management

Medium Project Example	Fixtures	Switchgear
Purchase Price	\$2,000,000	\$2,000,000
Subcontractor Markup	\$300,000	\$220,000
Total Material Cost for Model 1	\$2,300,000	\$2,220,000
Subcontractor Risk Factor for Direct Purchases	21%	23%
Cost of Covering Sub's Risk for Indirect Purchases	\$400,000	\$460,000
Total Cost for Model 2	\$2,400,000	\$2,460,000



The risks carried by a subcontractor when the owner or GC buys direct lead to additional cost, time (duration), and quality implications for a project. The table above only accounts for the labor cost risk. **The additional elements comprising each risk are listed below:**



COST

- Material handling
- Labor to resolve post-purchase material issues, such as damage, incorrect, or non-matching parts
- Insurance cost



TIME

- Additional time (duration) not built-in for coordination of gear & fixtures
- Additional time (duration) needed to handle/move material onsite when it could have been accomplished externally
- Additional dedicated time and space needed for onsite fixture & switchgear storage, that could have been done externally with VMI

These factors add an average of 19% to the overall project schedule duration when material is purchased direct.



QUALITY

- Expected go-backs for covering product or installation defects
- Anticipated additional work for lack of product knowledge at purchase

These factors add an average of 34% to the cost of occupancy and usage by the owner.

There have been considerable "Winds of Change" in the construction market over the past two decades, including shifts in the Market, Industrialization, and Disruption. Because of this, more and more customers believe direct purchases of material will lower their end-cost of construction. Contrary to this common belief, the cost of material has less impact on the cost of construction if the services provided by the distributors are not taken into account. As generations of distribution evolve, the price as well as perceived advantages of direct purchasing have very little to do with the final installed cost.

Additional detail and statistical analysis are available in the final report published by ELECTRI International.