1.0 Executive Summary

Changes in customer expectations in the construction industry regarding project delivery, time, cost, and quality have forced the stakeholders to search for new operational models. Advances in non-construction industries in the areas of procurement and business management have improved the national productivity by an average of 2.7% per year from 1987 to 1996 and 3.9% per year from 1996 to 2000.[1] The construction industry's productivity, however, has not followed suit. The productivity in the construction industry has only increased by a mere 0.2% per year from 1987 to 1996 and -1.0% from 1996 to 2000.[1] One source of this static productivity increase in the construction industry is the procurement chain management system. The current practice of procurement is no longer satisfying the market requirements. Due to the urgent need for improvement of the current construction procurement model, a variety of alternative models are being practiced throughout the industry.

This research was commissioned by the Electrical Contracting Foundation (ELECTRI'21) to investigate the prevailing, existing, and alternative models of procurement. In order to adequately assess the strengths and weaknesses of each model, a neutral comparison of each model was conducted. After thorough investigation, a common problem was discovered in each procurement model being practiced:

None of the existing and alternative models are offering an efficient, streamlined approach to procurement.

It is the opinion and finding of this research that a new procurement process needs to be developed to achieve better

- Time
- Cost
- Quality.

[1] Faruqui, U.; Gu, W.; Kaci, M.; Laroche; M.; and Maynard, J. (2003). Differences in productivity growth: Canadian-U.S. business sectors, 1987-2000. Monthly Labor Review April 2003, 16-28.

This can be accomplished only through direct collaboration of all the stakeholders in the procurement chain to produce a horizontally integrated procurement process (See Appendix A).

A horizontally integrated procurement process would address the challenges presented by Gene Dennis, the ELECTRI'21 COUNCIL Chairman. Two of these challenges are

1. Systems thinking – Taking a holistic approach as to how this and other research will impact the entire industry.
2. Productivity improvement – Strive for a quantum leap of 50% improvement in productivity over the next 5 years.

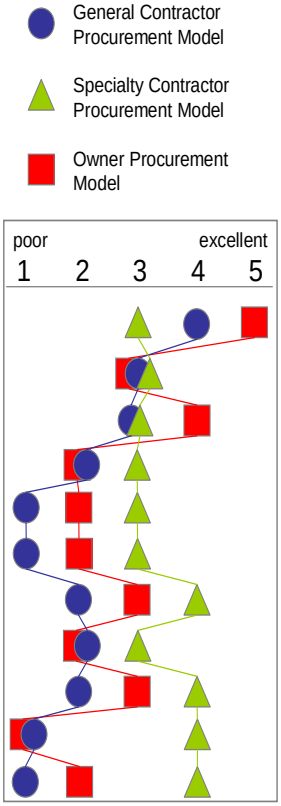
These challenges are directed at improving productivity in the construction industry. This improvement will directly impact the owner because they will experience lower project cost, faster occupancy, and higher quality construction projects as productivity increases.

Depending on the situation the project owner is facing, each model provides a certain level of value. Overall, the Specialty Contractor Procurement Model (SCPM) and the Owner Procurement Model (OPM) generally provide the highest value to the owner. The General Contractor Procurement Model (GCPM) does have some positive features, but does not provide the same value as SCPM or OPM. Table 1 and the quality function deployment (QFD) diagram in Figure 1 show a comparison of each model.

	Definition	Cost	Time	Quality	Customer Benefits
Specialty Contractor Procurement Model (SCPM)	Specialty contractor procures material and equipment for the project owner.	Material and equipment costs are similar between SCPM and GCPM.	Procurement occurs once specialty contractor is selected.	The overall quality in this model is above average. Problems and delays occur less frequently than in GCPM or OPM.	This model offers high value for project owners with relatively low risk.
General Contractor Procurement Model (GCPM)	General contractor procures material and equipment for the project owner.	Material and equipment costs are similar between SCPM and GCPM.	Procurement can occur before SC is selected.	The overall quality in this model is average. Problems and delays occur much more frequently than SCPM or OPM.	This model offers average value to the project owner with relatively high risk.
Owner Procurement Model (OPM)	Project owner procures material and equipment.	Material and equipment costs are slightly less expensive than SCPM or GCPM.	Procurement can occur before the GC or SC is selected.	The overall quality in this model is average. Problems and delays occur more frequently than SCPM, but less frequently than GCPM.	This model offers highly variable value to the owner depending on the type of project owner.

Table 1. Basic comparison of the three procurement chain models.

	General Contractor Procurement Model	Specialty Contractor Procurement Model	Owner Procurement Model
Early Procurement of Long-Lead Items	4	3	5
Time until Occupancy	3	3	3
Price of Product	3	3	4
Labor Management	2	3	2
On-site Material Management	1	3	2
Material Flow (Kitting, JIT)	1	3	2
Order Accuracy	2	4	3
Communication	2	3	2
Warranty Fulfillment	2	4	3
Cost of Returned Material	1	4	1
Expediting Orders	1	4	2



In this quality function diagram, each procurement model is compared to show the advantages to the project owner. Each row represents a different procurement issue experienced on a construction project. Each column represents one of the three procurement chain models used to address each issue. The effectiveness of each procurement model in addressing each procurement issue is shown in the matrix and is represented by a number on a scale of 1 to 5. A visual representation of the matrix is shown on the right. The outcome of the construction project for the owner will vary depending on how each issue is handled. Choosing the most suitable procurement model will have a dramatic affect on the success of the project.

Figure 1. Comparison of the three procurement chain models using a modified Quality Function Deployment (QFD) diagram.

The primary issue is that the prevailing, existing, and alternative procurement chain models are not satisfying the needs of most project owners. In order to improve procurement chain management in the construction industry, a new model should be instituted that utilizes the benefits of horizontal integration (See Appendix A). Through horizontal integration of the procurement chain, the project owner and each member of the procurement chain will be able to complete a construction project at lower cost for everyone involved.