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STUDY OF PROCUREMENT MODELS IN THE CONSTRUCTION INDUSTRY

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Abstract - *Procurement is the acquisition of goods, services or works from an outside external source. It is favorable that the goods, services or works are appropriate and that they are procured at the best possible cost to meet the needs of the acquirer in terms of quality and quantity, time, and location ,The direct procurement model, has gained general contractor and owner support due to the combination of fierce competition and a weak economy. General contractors, Specialty contractors and owners are both looking for an edge to save time and money and have turned to direct purchasing for the solution. The practice of direct purchasing is not new to the construction industry. End-users have bought material and equipment directly from manufacturers, and recently general contractors increased their efforts to buy all the equipment and material for their projects, thus bypassing regular distribution channels. Several general contractors have aggressively marketed this procurement plan to owners as a time and cost saving alternative. Yet, it is unclear whether the owner actually receives the benefits that are projected in the approach of direct purchasing. The main objective of this project is to investigate various procurement models in order to determine the impact each has on the project owner.*

***Key Words*: Procurement, Speciality contractors, Direct Procurement, Procurement Models, Direct Purchasing.**

1. INTRODUCTION

The prevailing procurement model has obvious flaws and until they are resolved, this model will be under direct attack. The attacks can and will come from different directions. They could come from legislators or government, general contractors or brokers, specialty contractors or distributors and manufacturers or owners. The issue is not identification and neutralization of the attacker, the issue is that the current model is not satisfying the needs of the customer. The attacker is not to blame; lack of understanding of the problem is to blame.

It was such a situation that gave birth to research in 2010. A new alternative procurement model was having a cross industry impact, and the profit pools of the construction industry recognized its impact on the stakeholders. In the explosive economy of the 1990s, the construction industry boomed. Contractors thrived on commercial construction as telecommunication companies and internet ventures flooded the market with expansions and start-ups. The priority of owners in the fast-paced technology businesses was to beat their competitors to market. Construction projects accelerated beyond the usual fast pace required by owners, and general contractors had to employ strategies to accommodate these fast-tracked schedules.

General contractors met the faster occupancy challenge by immediately procuring long-lead items from the manufacturer during the initial planning stages of the project. This strategy ensured that long-lead items would be delivered in compliance with the fast-tracked schedules. During this period, the high volume of construction projects combined with the procurement of more complex, expensive, long- lead items provided general contractors with considerable buying power. GCs could secure faster availability of long-lead items and leverage their buying power to acquire lower prices than subcontractors. The practice of GCs buying material, which had historically been purchased by specialty contractors, gained acceptance and became standard practice for several GCs throughout the late 1990s.

Although the practice of GCs buying directly from manufacturers occasionally existed prior to the dot.com era, the lack of GC expertise and buying power usually proved detrimental to all parties involved. Additionally, with the downturn in economic conditions in the post- dot.com era, GCs were left with little buying power. Today, the situation hasn't changed. Having grasped the direct purchasing model, several GCs are marketing the model to owners by offering theoretical cost savings derived from the elimination of distributor and subcontractor mark-ups. Some owners are enticed by the perceived cost savings and encourage the GCs to purchase material. Currently, several powerful GCs have adopted direct purchasing as part of their primary business strategy. The trend of GCs buying direct is growing: some are looking to buy more than just long-lead items.

The design and building development process of a high-tech facility is extremely Complex. This complexity stems from diverse sources. The product definition is technologically complex because it is composed of a variety of interdependent facility systems, such as architectural, structural, mechanical, electrical, and piping systems. These

systems need to be flawlessly interwoven so that the facility meets the stringent performance criteria set by the production processes. The window of opportunity within which a high-tech facility is designed and built tends to be also extremely narrow. Practitioners often overlap the engineering, procurement, and construction phases in an attempt to compress the project delivery duration. Such overlap forces practitioners to make downstream design decisions based on incomplete and possibly unreliable upstream information.

In addition, owners seldom have a clear definition of the performance requirements for a high-tech facility when its design development process begins. Owners may therefore need to change the project scope and the design criteria several times during execution of the design-build process. These changes create additional uncertainty in the development process. Consequently, to be effective, design and building specialists have to continuously exchange information and collaborate.

Regrettably, the project delivery system of most high-tech facilities does not lend itself to an efficient handling of such complexity. Specialty contractors such as mechanical, electrical, and piping contractors detail the design (occasionally), build, start up, and maintain the facility systems. Suppliers fabricate the major pieces of equipment and specialty items installed in the facility. Specialty contractors and suppliers have a wealth of process and product design knowledge that they have primarily gained through past experience. Most of this knowledge remains essentially tacit, however, because contractors and suppliers seldom express it openly in manuals of practice or in regulatory codes that designers could easily access. Consequently, this knowledge could only be leveraged throughout the design effort by means of interaction between designers, specialty contractors, and suppliers.

Specialty contractors and suppliers are seldom involved when designers make critical decisions about the product definition of a high-tech facility. Instead, they typically get involved in a project by competitively bidding a design solution that has already been committed to (although evidence suggests industry practices are changing). Consequently, losses in efficiency are likely to occur during the fabrication and construction of the design solution. It also becomes more likely that designs are chosen that perform poorly. Frequently, the lack of interaction between designers and builders during early design also triggers a confrontational environment during the subsequent execution phase. Confrontation can consume significant financial resources and, ultimately, can delay the project delivery. Research and observation of current practices indicate that this is a pervasive problem in the project delivery system of most Architecture-engineering-construction products in the United States and overseas

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2. METHODOLOGY

2.1 Steps Involved

1. The following steps were taken in conducting this study:
   - Literature research on each procurement model in the construction industry
   - Books on procurement management, and other applicable topics
   - Construction and supply chain magazines
   - Supply chain-related research papers
   - News media internet sites

2. Pilot study by questionnaire survey with selected 30 companies
3. Study of details of the existing Procurement models in the companies.
4. Meetings with a task force of experts in the construction industry these owners and related professional provided feedback on research findings and valuable information from their experience and industry involvement.
5. To Analyzing the questionnaire.
6. Each model were identified and compared.
7. The research is to investigate each procurement models and methods, determine which practice provided the best value for project owners.
8. Formulation of result

3. ANALYSIS AND RESULTS

3.1 Model Evaluation

The main purpose of evaluating the procurement chain models was to determine how each model benefits the owner. The conclusions formulated through these comparisons were used to reach the final goal of establishing the value provided to the project owner in each procurement chain model. The comparisons focused on three main elements of a construction project that are important to the satisfaction of the owner:

- Time
- Cost
- Quality

SCPM and GCPM each embrace a different approach towards each of these goals, both with the intention of achieving the best value for the owner.

In the SCPM, time savings, cost reduction and quality are pursued without implementing vertical integration (See Appendix A) as in the case of GCPM. Each member of the procurement chain focuses on his or her core competencies to try and become more efficient at those competencies. For example, the core competency of the manufacturer is developing quality products that are demanded by the market, while the core competency of the distributor is establishing the correct combination of services and products to satisfy the demands of various customers. Depending on the nature of the product, the members of the SCPM are utilized to varying degrees to achieve maximum value for the owner. Some of the services provided by each member are shown in Figure 9. In the SCPM, service and knowledge of manufacturers, distributors and specialty contractors are the driving forces that provide maximum value to the owner.

The GCPM promotes a model which varies greatly from the SCPM. In the GCPM, the procurement chain is a form of vertical integration (See Appendix A). In vertical integration, the roles of supply chain members are forwardly integrated or backwardly

Integrated to compress the supply chain. Forward integration is when a member of the supply chain assumes the role of his or her immediate customer. In the GCPM, the GC desires the manufacturer to forwardly integrate their distributors and incorporate distribution into their business model as shown in Figure 8. Backward integration is when a member of the supply chain assumes the role of his or her supplier. The GC applies backward integration to the supply chain by taking on the procurement functions of the specialty contractors as shown in Figure 8. This attempt to vertically integrate the procurement chain causes the services of the specialty contractor and distributor to be lost in exchange for a presumed lower material price and time savings for the owner. The new service structure proposed in the GCPM is shown in Figure 1.

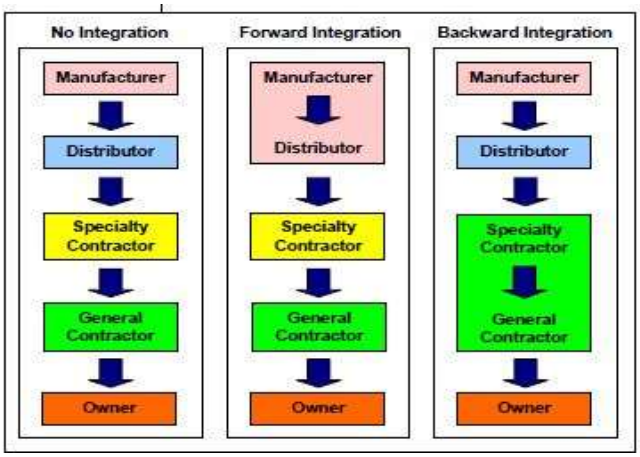

Fig -1: Types of vertical integration

3.2 Product Selection

A wider product selection gives the owner better control over installation time, product price and product standardization. When many manufacturers are available, the owner can shop for the best price, delivery time and brand of choice. The GCPM and the SCPM were compared to determine which model offers the best product selection for the owner.

The theory of the GCPM has general contractors directly purchasing products from manufacturers instead of distributors. This limits the choices available to the GC for three main reasons:

1. Many manufacturers do not sell directly to GCs or owners because their business model is to supply their products through distribution10. These manufacturers depend on distributors for sales, customer support, credit handling, inventory and other functions. This limits the access of GCs to many manufacturers.
2. The GC's decision to bypass distribution has limited their access to many manufacturers. Distributors offer quick access to hundreds of manufacturers. The GCPM theory is based on the premise that GCs will have to spend a significant amount of time and money establishing relationships with hundreds of manufacturers to offer the same product selection that is available in the SCPM.
3. Some distributors have a sales and service structure that caters to a certain market such as Original Equipment Manufacturers (OEM), Maintenance Repair and Operations (MRO), specialty contractors or other owners—and these distributors will not adjust their infrastructure to service general contractors because it has proven to be less profitable. These factors have resulted in poor access to products for GCs as shown in Figure 2.

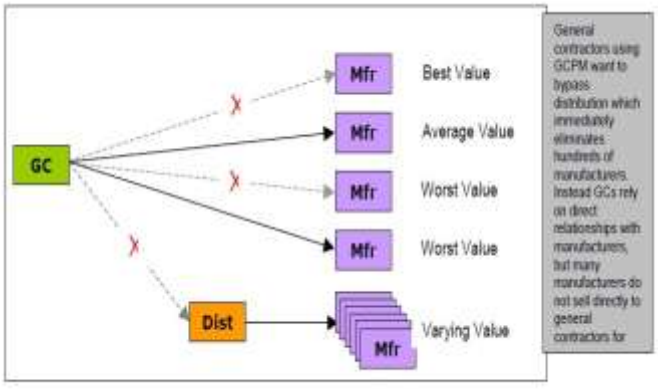

Fig -2: Product selection in the GCPM

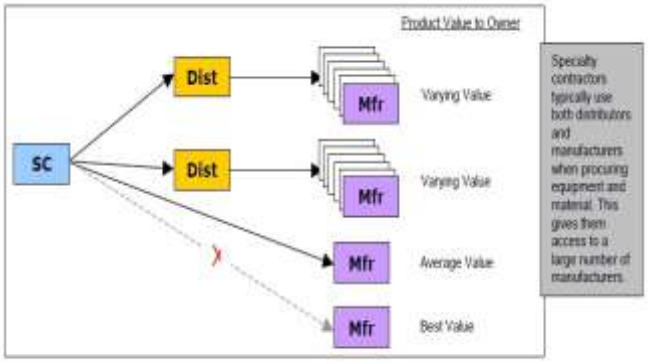

Fig -3: Product selection in the SCPM

4.3 Material Management

Managing material procurement can have a significant impact on the time and cost of a project. Material management is important for ensuring timely delivery of long-lead items, labor productivity and manpower coordination. Both the SCPM and the GCPM were evaluated to determine which model provides the best value through management of commodity material and build-to-order equipment.

4.3.1 Managing Product Flow

In the SCPM, material management is often inefficient. This inefficiency has resulted in inflated material cost and an unproductive workforce. Specialty contractors primarily order commodity material in large quantities and have it stored on the jobsite or in their warehouse. Whatever material and equipment isn't installed is usually returned to the specialty contractor's warehouse and stored for future projects. This material management practice has increased the cost of material and the cost of labor for specialty contractors, and this problem has not been adequately addressed by most specialty contractors.

Many specialty contractors have money locked away in unused material that is stored from previous projects. Sometimes the material and equipment stored in the warehouse may never be used again. Also, since funds may be allocated to leftover material and equipment stock, the specialty contractor could have limited access to money which may lead to additional cost such as credit expenses. Another costly issue in the SCPM is labor productivity. The average time spent on handling material and other associated material management by electrical contractor's labor is 40%. Furthermore, over the period from 2000 to 2014 construction labor productivity declined a total of approximately 62%11. During this period, an average of only 47.7% of the labor's time was spent directly working on the project. Figure 18 shows the change in labor productivity from 2000 to 2014. Another study has shown that productivity growth in the construction industry lags

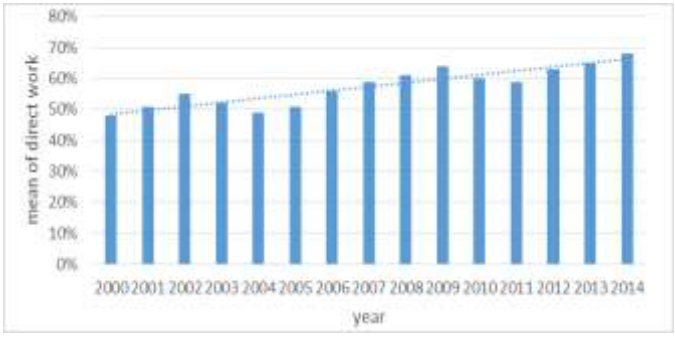

Fig - 4: The trend of construction labor productivity from 2000 to 2014

far behind other industries. Construction productivity growth increased 0.2% annually from 1987 to 1996 and -1.0% annually from 2000 to 14. On the other hand, other primary industries have experienced productivity growth of 2.7% annually from 1973 to 1996 and 3.9% annually from 2000 to 2014. This comparison of productivity growth is shown in Figure 5. Material management has not been properly addressed in the SCPM, and must be considered when developing the preferred procurement chain model.

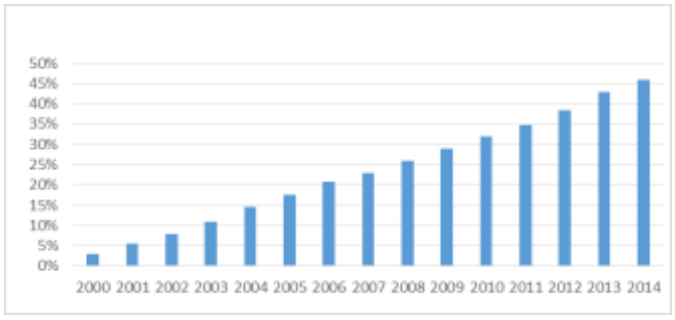

Fig -5: Cumulative labor productivity growth from 2000 to 2014

GCPM is an attempt to improve the construction supply chain, but the same material management issues arise in this model. General contractors store commodity material on the jobsite in bulk as in SCPM. Sometimes material and equipment management is even more difficult in GCPM because the specialty contractor and distributor are excluded from the delivery and storage process. This may result in excess time spent handling material and equipment because of poorly chosen storage locations, inefficient material organization, or shipping issues with build-to-order equipment. The excess time creates problems with labor productivity and increases material cost, both of which are often more serious than the issues which arise in the SCPM. In most cases, both the SCPM and the GCPM suffer from inefficient material management strategies which generate waste in the construction process. There is a substantial

need for material management improvement in the supply chain.

4.3.2 Managing Details of Build-to-Order Equipment

Build-to-order equipment can require extensive time for manufacturing and delivery. This required time period can potentially delay the project beyond the owner's desired completion time. The two procurement models approach this issue differently. Both methods intend to provide the owner with the fastest occupancy. The GCPM proposes that if the GC procures equipment early in the project, before the SC is selected; long-lead items can be delivered to the jobsite earlier – thus reducing the time span of the project. The SCPM proposes that if the SC procures equipment, the ordered equipment will be more accurate and reduce time-consuming rework and returns later in the project - even though the equipment will be purchased later in the project schedule.

The premise of the GCPM is that the GC is in a better position than the SC to procure long-lead items because the GC is selected before the SC and is therefore involved in the project earlier. Since the SC is selected later in the project, the GCPM can provide time savings to the owner. Yet, some problems are more likely to arise in the GCPM and one reason why problems often occur in the GCPM is because the GC procures equipment before the design is complete. In the GCPM, where the owner secures the services of a GC before the design specifications are complete, the GC often procures equipment shortly after he or she is selected in order to save time in the procurement process. This scenario is shown in Figure 6.

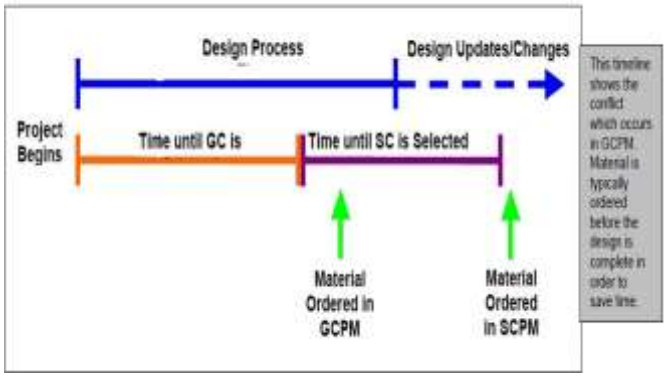

Fig -6: Timeline for design process, contract selection, and procurement

GCs rely heavily on the design specifications for ordering equipment because they do not have the same knowledge and experience specialty contractors possess. Therefore, since the design is not complete and the GC does not have the experience to analyze it fully, more time may be spent correcting problems with the build-to-order equipment after it is ordered. When procuring specialized equipment, there are many factors that must be considered during order placement, such as: accurate specifications, shipping requirements, equipment option selection and jobsite delivery coordination.

1. Accurate specifications: SCs have extensive installation experience and may notice inaccurate specifications or compatibility issues that the general contractor may overlook. The architect and engineering firm are not always 100% accurate in their design specifications, and sometimes they do not account for problematic installation requirements that are more apparent to someone with installation experience such as the specialty contractor. If a build-to-order product is ordered incorrectly, extra time is required to re-build or return the item. For example, on the West Coast, a general contractor ordered an HVAC system that was specified incorrectly. The HVAC system had to be modified which lead to over $300,000 in additional expenses.

2. Equipment option selection: SCPM is also beneficial to the owner because the SC can eliminate unnecessary options which may add time to the manufacturing process. This may also reduce the cost of equipment as well.

3. Shipping requirements: Some equipment requires special shipping conditions. This is becoming more prevalent, especially as the government and safety organizations press for more environmental regulations. Special shipping conditions are often necessary in the HVAC industry where concerns of dangerous mold are present. When shipping or storing certain HVAC equipment, moisture control must be administered to the unit before shipping in order to prevent mold or other damage. It is the purchaser's responsibility to ensure that all shipping requirements are specified before the equipment is shipped. For example, a general contractor in the Washington area procured an HVAC system without specifying the proper moisture regulations which were required for the project owner. This error resulted in a delay and additional cost so that the HVAC equipment could be tested once it arrived on the jobsite.15

4. Jobsite delivery coordination: On the jobsite there are many obstacles to avoid when moving equipment to its designated location. Depending on its size, equipment may need to be delivered in multiple pieces to pass through doorways or other obstacles. Appropriate machinery such as cranes or forklifts may need to be coordinated with delivery. Without proper installation experience, this coordination could result in lengthy and costly delays.

While researching various projects, major problems occurred in all four of these categories of equipment management in the GCPM model. The underlying cause of these problems was the GCs lack of installation experience and product knowledge. However, if projects are repetitive and the design is optimized and verified, then the GCPM is an option for procuring build-to-order equipment earlier in the project.

In SCPM, procurement is delayed until the SC is selected. This delay allows time for the design to be completed. Once the SC is selected, the SC inspects the design specifications and notifies the GC or owner of any discrepancies. The SC may also provide suggestions to optimize the design. This is a planning measure that results in substantially less procurement problems later in the construction project. The reduction in procurement errors is a result of the more extensive knowledge transfer existing in the SCPM. SCs often share their collective installation experience within peer group settings – and this installation information is also shared with distributors and manufacturers. This method of knowledge transfer is highly effective because specialty contractors are the only members of the procurement chain who are directly involved with material installation. This direct involvement provides them with the most application experience of anyone in the procurement chain.

4.4 Design Optimization

An advantage of the SCPM that is not available in the GCPM is the design optimization offered by specialty contractors. The GCPM does not utilize this advantage because, in order to save time, equipment is procured before the specialty contractor is selected. After equipment is ordered, the design can no longer be revised without incurring major expenses if equipment has to be returned or rebuilt. Since the architect and engineering design firm do not have the installation experience of specialty contractors, SCs may find ways to optimize the design or detect design flaws that have been overlooked.

The design optimization provided by specialty contractors can occur informally during the specialty contractor's procurement process, or formally through a design optimization method referred to as value-engineering. Value-engineering is a strategy used by owners to give specialty contractors the opportunity to evaluate the proposed design for the project and offer money saving revisions. A project on the West Coast was studied to determine the savings achieved with value-engineering. The results of this study show that the owner was able to save 13% on a 58 million dollar project16. This saved the project owner more than 7 million dollars. If this design optimization were applied to a GCPM, there would no longer be a time savings component. The specialty contractor would already be involved in the project, design specifications would have been set – and equipment would have been purchased under the premise that time can be saved by procuring equipment before the specialty contractor is selected. Design optimization can provide a major cost and time savings to a project owner, so the owner must weigh the benefits of design optimization for his or her design specifications when deciding which procurement model to choose.

4.5 Summary

The evaluation of GCPM and SCPM provided evidence that SCPM is favorable over GCPM, but that the supply chain in general is still fragmented and inefficient. GCPM was an attempt to resolve waste in the supply chain, but has proven to be even more inefficient than the predominant model, SCPM. GCPM promotes the practice of vertical integration (See Appendix A) in order to address the fragmented nature of the supply chain. The vertical integration strategy employed in the GCPM has resulted in restricted product selection, minimal or non-existent price savings, and risky time-saving strategies when compared to the SCPM. On the other hand, supply chain members of the SCPM are isolated in nature and are not integrated which is also inefficient. There are some exceptions as manufacturers and distributors become integrated through electronic data interchange (EDI), but the majority of relationships are governed by adversarial relationships in which each company focuses on their bottom-line. Both GCPM and SCPM primarily focus on the direct cost and availability of product and neglect the benefits of properly managing the product and labor. The lack of proper management is not intentional but is instead a lack of horizontal integration.

Horizontal integration is essentially achieved by exploring the needs of customers and suppliers and then restructuring the operational model to meet these needs. Many times companies only focus on the price of a product. Sometimes, companies will take support and customer service into account when choosing a supplier as well. While these issues are important, collaboration between supply chain members can yield savings which surpass the factors directly associated with the product. In horizontal integration, supply chain members come together to discuss their needs beyond the scope of product. When this occurs, the customer-supplier relationship can be utilized to address issues such as labor productivity, billings, material management, and other factors which are usually forgone in favor of securing the best price on material and equipment. This model can potentially impact the construction industry by improving labor productivity, reduction of cost, and improving delivery and quality of construction projects.

4.6 Alternative Procurement Chain Model

Horizontal integration is defined as a collaborative reduction of cost amongst the stakeholders of any activity chain. The horizontal integration model is best practiced in the automotive industry, specifically Toyota. When applying horizontal integration, all of the participants in the supply chain use their expertise to reduce non value-added activities and reduce the work in process (WIP). While price and availability of product will always be important, there are other pressing issues which have a much greater impact on the bottom-line for supply chain members. The supply chain practices in the construction industry have resulted in poor productivity. Electricians spend 40% of their time

handling material and equipment. Productivity of construction labor has declined 2.0% from 2000 to 2014 while productivity growth in other primary industries increased 44.4% over the same time period17. Order placement is still handled with hundreds or thousands of individual purchase orders18. Equipment and material is shipped to the jobsite in a manner which prevents agile movement around the construction site. Many contractors still store material in bulk on the jobsite for labor to mill through and then carry to the installation location. There are many more prominent issues with the procurement chain which need to be addressed, but are not. For the right price, material is sold while productivity is overlooked. This is a result of a fragmented construction supply chain where members don't fully understand their customer's needs. If these issues are addressed, the project owner and other supply chain members will experience profitability which exceeds the savings obtained by beating each other into price submission.

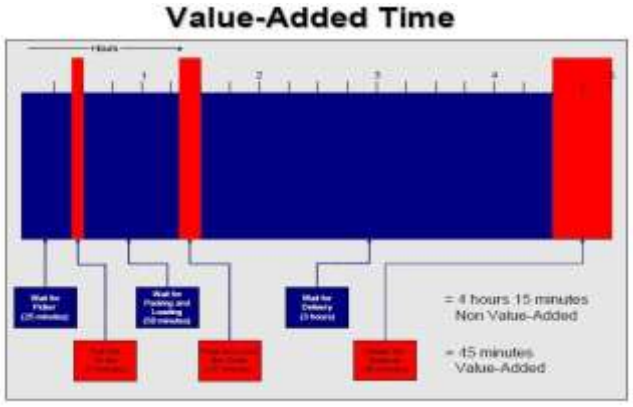

Fig -7: **Timeline diagram representing** the value and non-value added time in a simplified order fulfilment process

The alternative model is one of horizontal integration (See Appendix A). Collaboration is the key when attacking cost throughout the supply chain. While each member of the supply chain is attacking the surface of the problem - cost, the real source of the problem lies underneath. As members fight for lower prices, the real problem underneath grows larger causing prices to go even higher. The heart of the problem is productivity. If all members of the supply chain work together as a unit instead of individuals, each member of the supply chain will become more profitable.

Horizontal integration (See Appendix A) has already been tested between distributors and specialty contractors. Material management strategies have been implemented through distributor-specialty contractor relationships including material kitting, just-in-time (JIT) delivery, on-site inventory management and blanket purchase orders.

1. Kitting: Kitting is the method of bundling material into a unique package for different jobsite locations or different components of the job. For example, on some projects, all the material that is being installed in a specific room is kitted and delivered to the designated room. Previously, material would be delivered in a stockpile on the jobsite and the workers would have to search through the stockpile for specific material or equipment.

2. Just-in-time (JIT): JIT is the method of delivering material and equipment as it is needed. JIT reduces the amount of material and equipment on the jobsite, which in turn saves time searching through stockpiles. An added benefit is that a JIT system prevents material damage from prolonged exposure to the construction environment.

3. On-site Inventory Management: Some distributors will support a jobsite trailer which functions as a remote jobsite distributor. This trailer will house the material needed for the project. Generally, the on-site inventory provides a buffer of material for emergency warranty fulfilment and change orders.

4. Blanket purchase orders: Instead of the SC writing a PO for each order, some distributors have established monthly billing to account for all the purchases made during a specific time frame. The time-based or project-based PO has improved the efficiency of labor on the jobsite because POs no longer have to be created for each order, allowing material needs to be fulfilled faster.

These measures can lower project cost and can shorten the project schedule by reducing the amount of labor required for material handling. The labor reduction for the specialty contractor is shown in Figure 8. This labor reduction gives the specialty contractor an opportunity to offer the project owner a lower price.

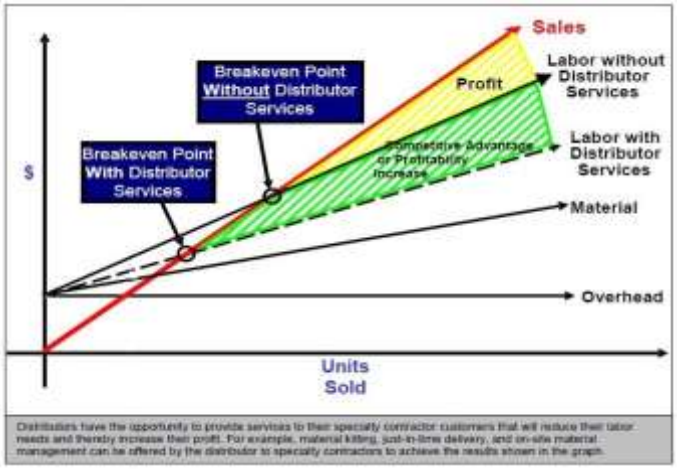

Fig -8 : Labor reduction through horizontal integration of distributor and specialty contractor

There are several obstacles which must be overcome to achieve this unity between members of the supply chain. One obstacle which must be overcome is the established

ideologies which every member of the supply chain has built up over time. Most people act according to principles which they have learned. These principles may have been instilled by company culture, leadership, personal experience, or other defining circumstances. This has prevented companies in pursuing uncharacteristic relationships with each other. Furthermore, there are antagonistic relationships between entities in the supply chain which would cause these companies to never consider the possibility of becoming a team. Another issue which arises is that companies do not have a complete understanding of the needs of their customers.

Therefore, an exclusive or semi-exclusive relationship with each other would not be beneficial to the customer since they could go elsewhere for the same product or service. Trust and loyalty are important issues when pursuing horizontal integration.

The project owner will experience the best value when horizontal integration is implemented throughout the procurement chain. Instead of procurement chain members concentrating on price, they will be able to develop exchanges that benefit both parties involved beyond the issue of price. Over the last 10 years the construction industry has fallen dramatically behind the nationwide increase in productivity. Therefore, there are wide-open opportunities for members of the construction industry to embrace new methods for improvement and become more profitable.

3. CONCLUSIONS

Depending on the situation the project owner is facing, each model provides a certain level of value. Overall, the SCPM and the OPM generally provide the highest value to the owner. GCPM does have some positive features, but does not provide the same value as SCPM or OPM. Each model can be summarized as follows:

Specialty Contractor Procurement Model

The traditional subcontractor purchasing model (SCPM) in which material transfers from manufacturer to distributor to subcontractor offers the most value for the owner for the majority of projects. Subcontractors, via their distributors, have access to the largest number of manufacturers – thereby having access to the greatest product selection. General contractors often run into problems with manufacturers due to the refusal of these manufacturers to bypass distributors and sell material directly.

General Contractor Procurement Model

The general contractor purchasing model (GCPM) can potentially offer a greater time savings if the design specifications are correct and "time until occupancy" is at a minimum. Problems arise when "time until occupancy" is a pressing concern and projects begin with incomplete or incorrect design specifications due to the rushed nature of the project. Cost savings and product selection did not provide better value than the SCPM to the owner.

Owner Procurement Model

The Owner Procurement Model (OPM) appears to be viable for repetitive projects with little variation in design, but the scope of this research did not provide the details necessary to draw a conclusion on this model's value to the owner. The key to the owner procurement model is that the owner must have an in depth knowledge of the work that the specialty contractor performs. The OPM model has been successful for big-box retailers, chain-stores and utility companies. Big-box retailers and chain-stores typically reuse design plans for many of their stores – having perfected the design and equipment specifications on earlier projects. Electrical utility companies often have the expertise, through years of purchasing electrical equipment, to purchase equipment for electrical contractors. In addition, utility companies often have long-term partnerships with electrical contractors. The contractor can then influence the purchasing patterns of the utility company.

Horizontally Integrated Procurement Model *(*HIPM*)*

The project owner will achieve the best value by utilizing a procurement chain that is horizontally integrated. The savings attained through increased productivity can substantially outweigh the direct cost of material or equipment. This is the desired future state of the procurement chain. 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 which utilizes the benefits of horizontal integration. 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.

Every owner must look at how each of the 3 categories is impacted by the model he or she selects. The advantages that each model offers a project owner depends greatly upon the type of project, as well as the actions of the parties involved in the project. As procurement chain members begin adopting the horizontally integrated structure, the project owner will find that the best value can be achieved through the Horizontally Integrated Procurement Model.

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