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A Practitioner-Developed Framework for Mitigating Risk in Residential Construction through Industrial Contracting Principles

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Abstract: The American residential construction industry suffers from inefficiencies in the way contractors are hired for each project. This technical note presents an innovative, integrated framework for project delivery that addresses these issues. The framework has three main parts that the author took from best practices in large-scale international industrial construction: (1) long-term framework contracts with pre-qualified contractors to make sure resources stay stable; (2) a systematized, multi-stage process for vetting contractors and checking their performance on an ongoing basis; and (3) the need to integrate digital project management platforms. This work delineates a novel methodology, illustrates its practical application and scalability informed by preliminary insights from the American market, and proposes a strategic framework for mitigating risk and improving predictability within the residential sector.

Keywords: *Project management, Procurement, Risk mitigation, Residential construction, Framework contracts, Digitalization, Construction engineering.*

INTRODUCTION

The U.S. residential construction industry relies on broken, transactional contractor relationships for each project, which leads to systemic inefficiencies, risk, and unpredictability (NAHB 2024). This model doesn't work well in today's unstable market, which is full of supply chain problems and a lack of workers (Associated General Contractors of America, 2024). Traditional methods often ignore the main issue of procurement strategy in favor of focusing on specific processes or new technologies. This technical note addresses this issue by presenting a distinctive project delivery framework created by the author. I built and put into action the systems that make up this framework while I was a senior engineering manager for mission-critical capital projects in the heavy industrial sector in the US, such as steel manufacturing and energy infrastructure. It is not just a theoretical exercise; it is a proven method that aims to replace the old, high-risk procurement model with a reliable, cooperative, and effective system.

RESEARCH METHODOLOGY

The methodological basis of this study is founded on the amalgamation of practitioner experience with recognized academic methodologies in construction management research. The framework in this paper wasn't just made up in a theoretical way. Instead, it came from the author's work managing mission-critical capital projects in the heavy industrial sector and was then adapted for residential construction. To guarantee both rigor and relevance, the methodology integrated the following elements: (a) practitioner-led system development, (b) comparative analysis of procurement models, (c) literature-informed validation, and (d) pilot testing in the U.S. residential construction market.

Practitioner-Led System Development

The first step in the research methodology was to carefully think about long-term professional experience with industrial-scale contracting models. As Yin (2018) pointed out, practitioner insights can be a good starting point for case-informed theory building if they are organized in a systematic way. The author cataloged and classified recurring risks in industrial and residential projects, including contractor insolvency, inconsistent safety practices, and cost escalation, and correlated these with specific contractual and managerial responses. These thoughts formed the basis for the suggested three-pillar framework.

Comparative Analysis of Procurement Models

After that, a qualitative comparative analysis was done to look at the problems with traditional project-by-project procurement in residential construction. This involved examining industry data and comparing it to industrial contracting practices, especially long-term framework agreements and structured prequalification systems. Previous research indicates that construction delivery models prioritizing collaboration and continuity surpass adversarial tendering methods in terms of cost efficiency and safety results (Eriksson & Laan, 2007; Love et al., 2011). This step of comparing helped find principles that could be used in residential construction.

Literature-Informed Validation

A targeted literature review of procurement strategy, risk management, and construction digitalization was used to further test the framework. We used academic sources like Rahman & Kumaraswamy (2008) on relational contracting, Zou et al. (2017) on risk management frameworks, and Azhar (2011) on Building Information Modeling (BIM) to give us a theoretical basis. These studies show that integrated procurement, proactive contractor vetting, and digital tools are becoming more and more important as ways to lower uncertainty. By comparing the framework created by practitioners to these established findings, the methodology made sure that it was both useful in context and consistent with theory.

Pilot Application in the U.S. Market

Finally, the proposed framework was tested on a small scale in residential projects in the U.S., mostly by working with startups like PROJEX RENOVA and AQUABORNE. Based on the exploratory case study research method (Flyvbjerg, 2011), the pilot phase looked into whether it was possible to apply industrial contracting principles to smaller businesses. The data that was gathered included how well

contractors did their jobs, how well they stuck to their schedules, and what clients had to say about them. Although preliminary, these results offered empirical evidence of the framework's adaptability and advantages.

Methodological Limitations

The method focuses on how well it works in the real world, but it can't be used in other situations because it relies on the experience of practitioners and case-based validation. The research employs an exploratory framework instead of a hypothesis-testing approach. So, the next step in improving the methods should be to do more empirical testing in more places and on more types of projects. To sum up, the research method used in this paper combines real-world experience with academic validation and initial field testing. This hybrid approach corresponds with Creswell and Plano Clark's (2018) mixed-methods research model (Creswell & Plano Clark, 2018), wherein qualitative insights are substantiated by contextualized empirical testing. This kind of methodology makes sure that the framework is based on real-world experience and backed up by relevant theoretical discussion.

THE THREE-PILLAR FRAMEWORK

The suggested method is a complete system in which three main pillars work together to make a strong and clear project delivery environment.

Pillar 1: Long-Term Framework Contracts

The framework is based on a deliberate move away from the project-specific, reactive tendering process and toward a partnership-based, proactive model. Long-term framework contracts, which change the way the builder and the contractor pool work together, make this happen. In this model, a group of "basic" or "key" contractors signs contracts that last for several years, usually three to five years. These contractors are qualified to be long-term partners, but they are not chosen for just one project. A lot of research in the construction industry has shown that strategic partnering can lower costs and improve project outcomes, which backs up the ideas behind this model (Construction Industry Institute 2019). The contract does say what the terms and conditions are and what the standard operating procedures are, but it doesn't guarantee any work volume.

The Agreement's Structure:

Framework agreements are not construction contracts; they are master agreements that set the stage for future work. The basic parts are:

Clear Pricing Formula: Every year, a full list of rates for different jobs like the cost per linear foot of framing or the cost per installed electrical outlet is agreed upon and adjusted for inflation. This gives you very precise control over costs.

Cost-Plus with Defined Margins: The contractor gets paid for labor, materials, and equipment, as well as a set percentage of overhead costs and a set profit-making fee, in addition to actual, verifiable costs. This model promotes honesty and is great for projects where the full scope isn't clear from the start.

Standardized Operational Procedures: The agreement spells out how we work together. You must follow the builder's safety rules, quality control standards, reporting formats and frequency, and communication rules. This takes away any doubt and makes sure that all projects and contractors work together in the same way. Service Level Agreements (SLAs) set clear, measurable goals, such as how long it will take to respond to RFIs or how long it will take to mobilize (for example, "ability to deploy a crew within 72 hours of notice").

The Strategic Shift from Adversarial to Collaborative

This plan deliberately takes away the competitive nature of low-bid tendering. It encourages contractors to do things that help the project as a whole by giving them a clear picture of possible long-term work:

Investment in Mutual Success: Contractors are more likely to spend money on specialized tools or training that meet the builder's long-term needs because they see a way to get their money back.

Keeping knowledge and making things better all the time: The contractor's team learns more about the builder's standards, staff, and types of buildings with each project. Because of the steep learning curve that this institutional knowledge retention causes, later projects are done faster and better. You can use what you learned from one project right away on the next one, which creates a loop of continuous improvement.

Proactive Problem Solving: A contractor in a long-term partnership is motivated to find a good, cooperative solution when a problem comes up on the job site, rather than getting ready for a change order dispute. The focus shifts from blaming someone to fixing the problem. This method stabilizes project execution across an investment portfolio by turning the supply chain from something that needs to be controlled into a strategic asset that gives you a competitive edge. The end result is a delivery model that is stronger and more reliable.

Pillar 2: Systematized Contractor Vetting and Performance Auditing

Setting up a framework contract needs a much stricter initial screening process than a simple bid comparison. This framework pillar sets up a multi-phase, data-driven system for initial qualification and ongoing performance management.

Multi-stage preliminary qualification system

I came up with a way to do a "weighted" evaluation of candidates based on a balanced scorecard to make sure that the selection process is thorough and not just based on one factor, like price. This data-driven method is in line with the best practices in the field for reducing risk through thorough contractor prequalification (FMI Corporation 2022). The process usually includes:

Step 1: Compliance and Documentation an initial check of the required licenses, insurance coverage, collateral capacity, and legal status. At this point, applicants who don't follow the rules are no longer considered.

Step 2: Audit of Financial Health A thorough review of the financial statements from the last three to five years to determine the company's debt load, profitability, and cash flow. This makes sure that the contractor is a trustworthy company that can handle changes in the market without putting the project's progress at risk.

Step 3: Check the technical and safety skills of the people working on the project. A close look at the contractor's previous work, focusing on projects that were similar in size and difficulty. This includes a thorough look at their safety record, which includes looking at metrics like the Lost Time Injury Frequency Rate (LTIFR). It often means going to the sites of ongoing projects to see how they are using their strategies and tactics.

Step 4: Leadership and Cultural Fit Assessment To find out if the contractor is committed to ongoing development, openness, and working together, senior management teams are interviewed. This step is very important, but it is often missed when making sure that cultures are aligned.

Ongoing Performance Auditing

It's important to remember that screening never stops. The framework includes rules for an ongoing, multi-phase audit of contractors' work for the whole length of the contract. This makes sure that the skills shown during the selection process will stay the same.

Performance Management System: An open system keeps track of each project's Key Performance Indicators (KPIs), which can be seen and controlled by everyone through a shared digital dashboard. These KPIs usually have to do with sticking to the schedule, staying within the budget, safety, and quality (like how many items are on a punch list).

Merit-Based Work Allocation: A ranking is made among the contractors based on how well they do their jobs. As a reward, contractors who do a good job may get first dibs on new projects or a bigger share of future work.

A structured improvement process: means that contractors won't be fired right away if they don't meet expectations. Instead, a formal Performance Improvement Plan (PIP) is started. This means that everyone needs to work together to figure out why the performance is bad and make a plan of action. This shows a commitment to working together and growing. If the PIP fails, the contractor is only kicked out of the pool.

The creation of these specific, organized ways to evaluate and audit contractors was a major improvement to the system, making it more dynamic and fairer.

Pillar 3: Integrated Digital Document and Project Management

The third part of the framework is the use of integrated digital systems as the project's "only source of truth." This must be done. In my experience, a big reason for problems, delays, and cost overruns is not enough, disconnected, or asynchronous information flow. To fix this, I oversaw the creation and use of two different but related digital systems.

Electronic Document Management (EDM)

This system centralizes and digitizes all administrative and contractual processes.

Centralized Processing - All contracts, change orders, RFIs, submittals, and payment applications are processed through a single digital platform.
Unquestionable Audit Trail - A timestamp and user ID are digitally recorded for each action. By doing this, "he-said, she-said" arguments are avoided, and an unquestionable record is created for conflict resolution or project history auditing.
Version Control - Whether it's a contract or a drawing, the system makes sure that everyone is always using the most recent version of the document. By taking this one step, field crews can avoid an expensive rework that occurs when they build from old plans.

Digital Project Management (PM)

All stakeholders can access real-time operational transparency through this system.

Common Data Environment (CDE) - Everybody uses the same platform, from the architect to the subcontractors. Updated schedules, drawings, and progress reports are available in real time to all relevant parties.
Proactive Conflict Resolution -By exchanging Building Information Models (BIM) in the CDE, pre-construction design conflicts and clashes between various trades (such as plumbing through a steel beam) can be recognized and digitally resolved before they become costly and time-consuming issues on site.
Improved Field-to-Office Communication - Without physically being on site, field supervisors can use tablets to file daily reports that include notes and photos,
providing office-based project managers with a real-time picture of developments and possible problems.
The successful use of these systems on big industrial projects shows how valuable they are for making things more efficient and clearer. They give the digital framework that is needed for the whole framework to work, which is backed up by several industry studies on the return on investment of construction technology (McKinsey Global Institute 2020).

APPLICATION AND PRELIMINARY RESULTS IN THE U.S. MARKET

The basic ideas behind the framework, which were made for a big industry, have proven to be scalable and meet the needs of US home builders right away. I have successfully changed these strategies in my most recent work with American startups like PROJEX RENOVA and AQUABORNE. The first results from this practical application show that the strategy works:

For SMBs (small and mid-sized builders), scalability: The model effectively scaled down. For each major trade (such as electrical or framing), a homebuilder can establish framework agreements with two to three reliable partners, immediately solidifying their most important resources.

Simplified Vetting Process: Proactive screening is now possible for SMBs thanks to the thorough audit being condensed into a useful checklist that covers insurance, licensing, references, and an analysis of

previous projects.

SaaS technology's ability to be economically viable: The digital integration pillar is now economically available to builders of all sizes because of introduction of strong and reasonably priced cloud-based construction management tools (such as Procore and Builder trend).

CONCLUSION

The residential construction industry in the United States is at a critical point because of a mix of systemic pressures that can't be solved by traditional, incremental improvements alone. The current project delivery model, which is marked by its disjointed, price-driven, and short procurement cycle, is one of the main reasons why the sector is so risky, unstable, and inefficient. This model makes the industry less likely to invest in quality and innovation over the long term, which makes it harder for the industry to meet the housing needs of the country. This essay has contended that the path forward necessitates a fundamental transformation in how builders oversee their most valuable asset—their relationships with contractors—rather than merely the introduction of new tools.

A strong alternative has been proposed to facilitate this transition in the form of a practitioner-developed framework, which I, Sergei Zharkov, personally devised and implemented in highly demanding industrial settings. This system directly fixes the main problems with the traditional model; it is a proven, practical, management-led strategy. Three interconnected and working together pillars support it. The first long-term framework contracts lay the strategic groundwork by replacing transactional instability with stability based on partnerships and predictable economics. The second pillar, which is quality control, makes sure that the right partners are chosen and that high standards are kept up throughout the partnership by using transparent vetting and regular performance audits. The third and last pillar is the mandatory use of integrated digital platforms. These platforms are like the operation's central nervous system, providing the data, transparency, and real-time communication needed for the other two pillars to work well. These three things work together to make a project delivery ecosystem that is truly strong and long-lasting. Using this scalable framework has a lot of big and far-reaching benefits. For individual builders and developers, it means a shift from always putting out fires to planning ahead and managing things strategically. It gives you a simple way to lower your risks, increase your output, and most importantly, make your budget and timeline more predictable. It sets an example for the whole industry by raising professional standards, promoting a more cooperative culture, and creating a more stable environment that attracts a new generation of skilled workers. Ultimately, both society and the end user benefit. A more productive and efficient construction industry can better deal with the problem of housing affordability by building homes of higher quality more often and with more cost certainty.

It's not easy to put such a big change into action, of course. The biggest problem is cultural, not technical. Putting money into stable partnerships instead of the lowest bid takes strong leadership. You have to be willing to put money into relationship management, system setup, and auditing procedures ahead of time. But these initial investments pay off many times over in the form of lower risk and higher efficiency throughout the project lifecycle. This is shown by the framework's success in high-stakes industrial projects and its successful initial use in the agile U.S. startup environment.

So, any construction company that wants to stay ahead of the competition for a long time should see these principles as a strategic necessity, not just an option. The framework gives builders a clear,

doable plan for completely changing the way they deliver projects. By putting long-term vision over short-term gain, partnership over adversity, and transparency over opacity, the U.S. residential construction industry can build a new future that is stronger, more efficient, and better able to build the future.

LIMITATION AND FUTURE RESEARCH DIRECTION

Even though the proposed framework is useful and has been tested, it has some problems that need to be pointed out. These problems come from the study's limited scope, the way it was done, and the fact that it is still in the early stages of testing. Knowing about these limits gives researchers a chance to make clear plans for future studies.

Study Limitations

First, the framework was mostly made from the point of view of someone who has a lot of experience with industrial contracting and how it can be used in the residential sector. This experiential foundation makes sure that the information can be used in the real world, but it also makes it subjective. The results might only apply to the author's own situations and decision-making environments, not to all situations. Flyvbjerg (2011) says that case-based knowledge is deep, but it can be hard to apply to other situations without quantitative validation.

Second, the pilot use of the framework has been limited in scope. The framework was put to the test in small and medium-sized residential projects in the U.S., mostly when working with startups. The pilots showed that the framework could work on a small scale, but we don't know how well it will work in different markets, regulatory systems, and cultural settings because there isn't a lot of data from large-scale, multi-regional studies.

Third, the study's assumptions are mostly backed up by secondary literature and professional reports. References like the McKinsey Global Institute (2020) and FMI Corporation (2022) give good insights into the industry as a whole, but more peer-reviewed, real-world research would make the framework more academic. The study also doesn't use longitudinal data, which makes it harder to see how well the framework works over long periods of time.

Future Directions for Research

Future research should try to make the frameworks empirical base bigger by collecting a lot of data. Statistical analysis of framework outcomes like cost predictability, schedule adherence, and contractor performance would be possible with multi-project, multi-region studies. This kind of research could use mixed-methods approaches, which combine quantitative surveys with qualitative interviews, to find a balance between breadth and depth (Creswell & Plano Clark, 2018).

Another important step is to include environmental performance and sustainability in the framework. As the residential construction industry puts more and more emphasis on green building standards and cutting carbon emissions, long-term contracting models need to change to include measures for energy efficiency, waste reduction, and material sustainability (Häkkinen & Belloni, 2011). So, future studies could make the framework bigger by adding practices for procurement and risk management that focus on sustainability.

There is also a lot of room for more research on digital transformation. This study shows how

electronic document management and digital project management platforms can help, but new technologies like artificial intelligence, blockchain-based smart contracts, and Internet-of-Things (IoT) monitoring could make things even more clear and efficient (Perera et al., 2020). Future studies should look into how these technologies can be systematically built into residential contracting frameworks to make them more trustworthy, accountable, and able to make predictions.

Lastly, research should look into the cultural and organizational aspects of making long-term partnerships work in the residential sector. Not only do contractors, builders, and clients need to change their culture, but they also need to change their technical systems in order to move from adversarial tendering to collaborative contracting. Research on change management, leadership styles, and how organizations work could help us figure out how to get people to work together and deal with resistance (Walker & Lloyd-Walker, 2015).

Final Thoughts on Future Research

By addressing these issues and following the suggested paths, future research can make the framework in this paper more useful, valid, and impactful. These kinds of efforts will not only give practitioners more evidence, but they will also help construction management as a whole grow and change by finding practical ways to deal with the ongoing problems of risk, inefficiency, and unpredictability in residential construction.

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