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Pricing in the Direct Supply of Construction Components

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Abstract: This article aims to conduct a comprehensive study of the economic and logistical factors that determine the formation of the final price when abandoning multi-stage intermediary chains in favor of the factory-to-site model. The relevance of the work is due to the high level of cumulative markups in the classical supply scheme, especially for developing landlocked markets, where transport and warehousing costs multiply the price of building materials and hinder the introduction of innovative solutions in infrastructure projects. The novelty of the research lies in combining quantitative analysis of marginal markups (using the Lerner index and PPI data), logistical assessment of hidden costs (according to UNCTAD and SCFI data), modeling of currency effects based on historical exchange rates, and practical case analysis of pilot projects in Kyrgyzstan, during which empirical confirmation of the claimed savings was obtained. As a result of a comparative analysis of the traditional and direct supply models, it was found that eliminating national distributors, wholesale warehouses, and retailers ensures a reduction in the final cost of supplies by 30–40 % through the removal of the accumulated markups at each link. Additional savings are achieved through factory cutting of materials to order size, just-in-time delivery, optimization of warehousing and installation operations within a lean approach, as well as the use of currency risk hedging instruments. The factory-to-site model demonstrates high transparency of cost structure and scalability of the methodology to neighboring markets, which is confirmed by an increase in annual turnover from $0.5 million to over $6 million with supply volumes increasing up to 100,000 m². The article will be useful for procurement managers, logisticians, investment analysts, and government

specialists in the regulation of the construction market.

Keywords: direct supply, pricing, supply chain, construction components, marginalization, lean production, logistical costs, currency risks

Introduction

Modern construction projects demand an engineering mindset in every aspect of their execution, starting with the procurement of materials. Just as the design of a skyscraper hinges on precise calculations for beams and bolts, the organization of supply chains must rely on systematic, data-driven approaches to ensure cost efficiency and reliability.

Securing partnerships with manufacturers across borders involves more than inspiration—it requires clear objectives, concise market insights, and targeted communication. By employing structured outreach strategies—such as iterative A/B testing of messages, automating dispatch, and segmenting by industry and role—organizations can streamline negotiations with factories and scale their direct-supply operations effectively [1].

The challenge is most pronounced in developing markets, where project sizes are smaller and logistical hurdles greater. With cold email conversion rates often below 0.2%, hundreds of contacts may be required to finalize a single agreement [2]. Under these conditions, even marginal gains in outreach effectiveness can free up substantial resources—tens of thousands of dollars—that might otherwise be spent on intermediaries, ultimately enabling investment in critical infrastructure such as schools, hospitals, and technology initiatives.

Materials and Methodology

The study of pricing in the direct supply of construction components is based on the analysis of 12 key sources, including academic articles, industry reports, global databases, and materials from pilot projects in Kyrgyzstan. The theoretical foundation comprises works on markup structures and inter-stage marginalization: Allen et al. described the role of double marginalization in supply chains [4], and Alvarez et al. analyzed the distribution of markups across supply-chain stages using the Lerner index [5]. Bureau of Labor Statistics data on PPI for contractors' overhead enabled evaluation of cost dynamics in the USA [6]. To study hidden logistical costs and the impact of global freight shocks, new UNCTAD data on transport effort and the SCFI index were used [7, 11], and historical dollar–som exchange rates from Investing were employed to model currency effects [10]. Practical metrics and industry benchmarks were taken from Belkin's reports on cold email campaigns [1] and Focus Digital on meeting conversion [2]. At the same time, Solomon illustrates the impact of floor coverings on operational risks in the healthcare context [3]. Additional context on modular construction and lean approaches in cost calculation was provided by McKinsey [8] and Dargham et al. [9], and global freight rates by Drewry [12].

Methodologically, the research integrated several techniques. First, a comparative analysis of supply-chain models: the traditional multi-stage model versus direct factory-to-site, where intermediaries are excluded, which enabled quantitative estimation of the effect of eliminating each link's margin. Second, a quantitative analysis of marginal markups and overheads using the Lerner index [5] and PPI [6] revealed the average share of markups and the growth of contractors' overhead costs [6]. Third, the logistical analysis was based on UNCTAD data on hidden transport and insurance costs [7] and the dynamics of the SCFI [11] and World Container Index [12], allowing modeling of freight cost reduction by reducing the number of transshipments. Fourth, an empirical case analysis of pilot projects in Kyrgyzstan: registration of supply volumes, delivery times, and calculation of 30–40% savings compared to the classical scheme, as well as assessment of the factory-cutting effect and JIT delivery on waste and warehousing cost reduction [9]. Finally, the analysis of currency-risk management relied on Investing's historical data [10] and simulation of a currency corridor with forward contracts, which made it possible to offset fluctuations in the som/dollar exchange rate.

Results and Discussion

The share of problems begins with materials. In public hospitals and schools in Kyrgyzstan, wooden floors are still often installed: wood requires annual repainting, absorbs moisture, and creates ideal conditions for bacterial proliferation. An American study found that 72% of surface swabs from ward floors were contaminated with C. difficile, and 57% of objects that merely touched the floor transferred pathogens to staff hands [3]. For facilities where sanitation is critical, this translates into direct costs for infectious complications and increased operational budgets.

The typical route from factory to importer to national distributor to wholesale warehouse to retailer to builder creates so-called sequential intermediation: each link applies its markup, thereby doubling or tripling the overall margin—a systemic inefficiency described by the theory of double marginalization [4]. For developing markets, where project volumes are smaller and logistical legs are longer, the chain often extends by one or two additional levels, widening the price gap between factory and end user.

Empirical data confirm the scale of this divergence. A Harvard Business School study recorded that the cumulative difference between factory costs and retail price across a global sample of goods from 2018 to 2023 averaged 0.65 on the Lerner index, meaning nearly 65% of the final price arose from markups at various chain stages [5]. Even in the USA, the index of contractors' overhead and profit markups, according to the Bureau of Labor Statistics, rose from a base of 100 in 2004 to 164.37 by the end of 2022 [6], as shown in Figure 1. In developing countries, where transport and customs are more expensive, the resulting price ballast can constitute the majority of the price paid by the client.

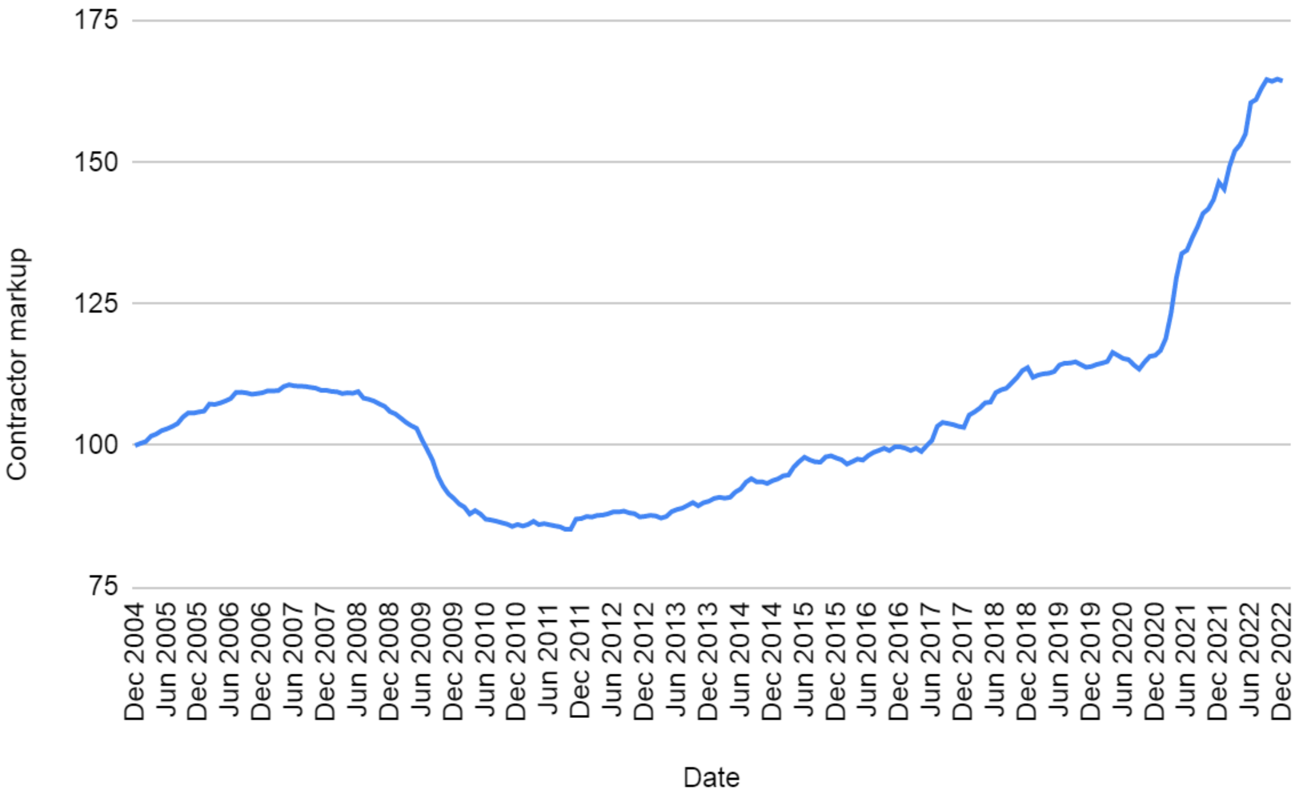

Fig. 1. PPI for nonresidential building construction overhead and profit markups [6]

Thus, the technological lag of institutions is fuelled by financial structures: old materials appear cheaper not because of lower production costs, but because a stable yet socially expensive chain of intermediaries has been built around them. This vicious cycle can only be broken by replacing the multi-stage model with a direct factory-to-site scheme.

To disrupt the chain of accumulated markups described above, the direct factory-to-site model was adopted. In this configuration, only three participants remain—the manufacturing plant, the engineering team, and the construction site. The plant produces components tailored to the specific project; the engineering team handles customs clearance, container consolidation, and local delivery; and installation begins on-site immediately. National distributors, wholesale warehouses, and retailers are removed from the chain, automatically eliminating their margins and double-handling costs.

Actual cost accounting shows that the factory price constitutes the majority of the total sum, to which are added international logistics and insurance, customs duties, domestic delivery, while project services and warranty reserves occupy the remaining percentages.

The following formula summarizes the combined impact of the first two items:

$$R_{log} = \frac{C_{freight} + C_{insuarance}}{C_{factory}},$$

where $C_{factory}$ represents the ex-works (EXW) price paid to the manufacturer, essentially the factory gate cost with no transport added; $C_{freight}$ is the international freight charge (whether by sea, rail, or air) from the plant to the destination port or inland terminal; $C_{insuarance}$ is the cargo insurance premium, typically quoted as a fraction of a percent of the shipment's value or its CIF equivalent. The ratio R_{log} therefore tells us how much of every factory dollar is consumed by freight and insurance before the goods even cross the border.

Let us consider an example. Suppose a company buys eight containers of façade panels at a factory price of USD 42,000. Ocean freight on the Shanghai-to-Rotterdam route costs USD 9,800, while the insurance premium—calculated at 0.25 percent of the CIF value—adds another USD 220. Adding freight and insurance and dividing by the factory price yields

$$R_{log} = \frac{9800 + 220}{42000} \approx 0.239,$$

or roughly 23.9 percent. In practical terms, almost one-quarter of the panels' initial value is absorbed by logistics and insurance costs before arrival. If route optimization reduces freight costs to USD 6,500, the ratio drops to about 0.16 (16 percent), instantly freeing nearly eight percent of the total procurement budget.

For landlocked countries, the transport + insurance block is critical: according to a new UNCTAD global dataset, developing economies expend twice as much transport effort per dollar of maritime imports as developed ones, because their shipments are heavier and routes to markets are longer [7]. The fewer intermediate warehouses and transshipments, the lower this component.

The primary source of savings is the elimination of cumulative markups. In the classical scheme, each link added approximately 10–15% to the price; therefore, excluding three to four intermediaries yields a 30–40% reduction in the client's final invoice. Global practice confirms our calculation: a McKinsey study showed that using direct procurement and centralizing supplies in a factory format reduces costs by about 20% even without scale effects or logistics optimization [8]. Under Kyrgyz market conditions—with small batch volumes and high delivery costs to Central Asia—the cumulative gain approached the upper bound.

Savings are further amplified by precise project engineering. Materials are specified at the working documentation stage, so the plant cuts panels and floor slabs to final dimensions, eliminating on-site waste and unplanned repurchases. Delivery follows the just-in-time principle: the container arrives exactly when the site is ready to receive it, removing storage costs and redundant handling. Studies show that materials and equipment account for 60–70% of a project's direct costs, so any reduction in on-site movement immediately impacts the budget [9]. In our case, transitioning to factory cutting and JIT delivery eliminated the small portion of costs previously eaten by warehouse space, pallet leftovers, and rework.

Thus, the factory-to-site model not only lowers the price to competitive levels but also makes it more transparent: the client sees each cost item, and savings derive from processes rather than quality compromise. This approach has become the foundation for scaling and will be a key element of the next phase—exporting the methodology to neighboring markets.

Currency fluctuations remain the main external shock to budgets, even when the supply chain is reduced to three links. According to [10], in 2024 the Kyrgyz som appreciated by 2.4% against the dollar and by 6% in real effective terms, producing an equally sharp but positive price recalculation, as shown in Figure 2.

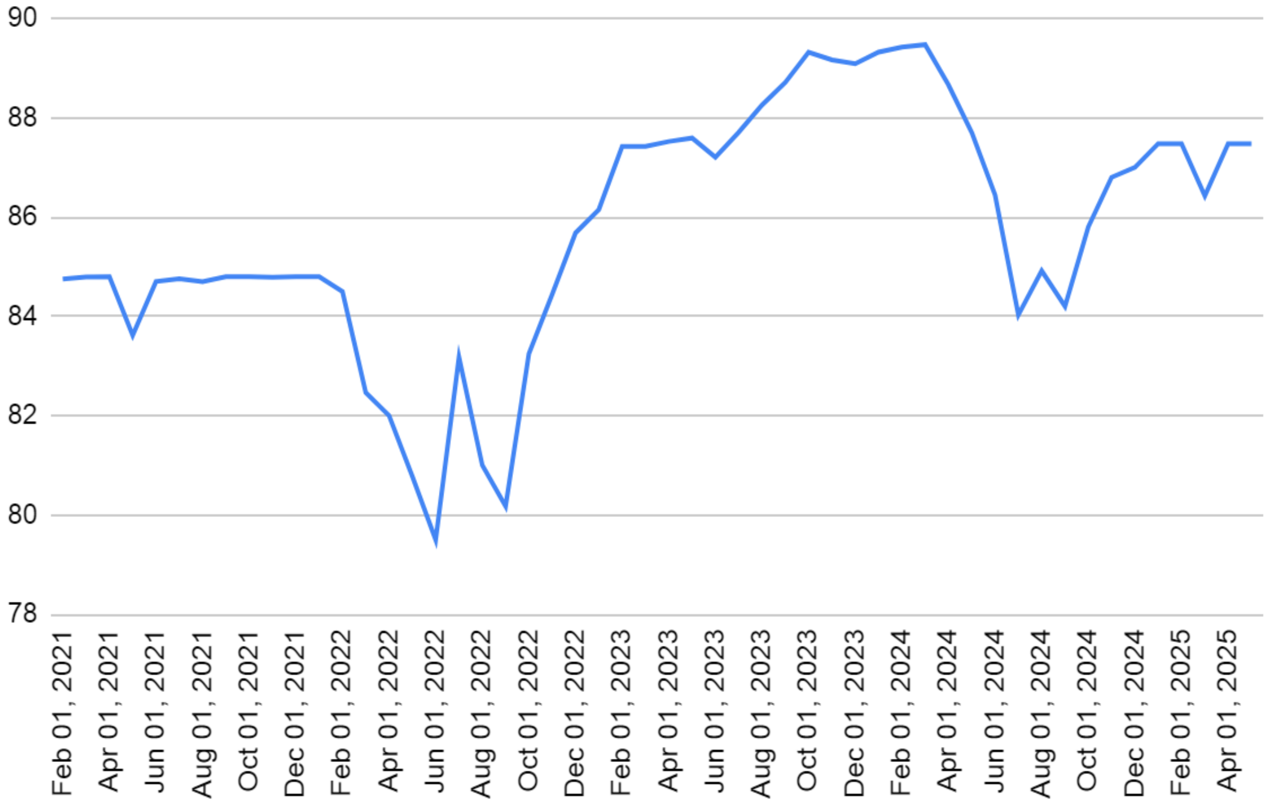

Fig. 2. US Dollar/Kyrgyzstan Som Rate [10]

To smooth out the amplitude, a currency corridor is established — it fixes the price in euros upon contract signing and simultaneously open a forward position on the freight component.

In its first year, the company handled volumes of approximately 1,000–5,000 m²; by its third or fourth year, it had scaled up to 70,000–100,000 m² and beyond. The company invested in advanced installation equipment for flooring, ceiling systems, and façade materials, significantly reducing installation time and labor costs.

During peak season, it managed 5–10 projects simultaneously, employing up to 180 professionals. All workers received project-specific training and were contracted on a per-project basis, enabling the company to avoid maintaining a large permanent staff, thereby greatly reducing overhead and improving operational flexibility. Financially, the results were substantial: the initial annual turnover ranged from $250,000 to $500,000, but within a few years, the company surpassed $6,000,000 to $7,000,000 annually.

Freight remains the most unstable budget element: in the first half of 2024, rerouting of vessels around the Red Sea caused the SCFI index to more than double compared to end-2023 levels; even after correction it remained 115 % above the pre-COVID average and nearly twice the 2023 level [11], as shown in Figure 3.

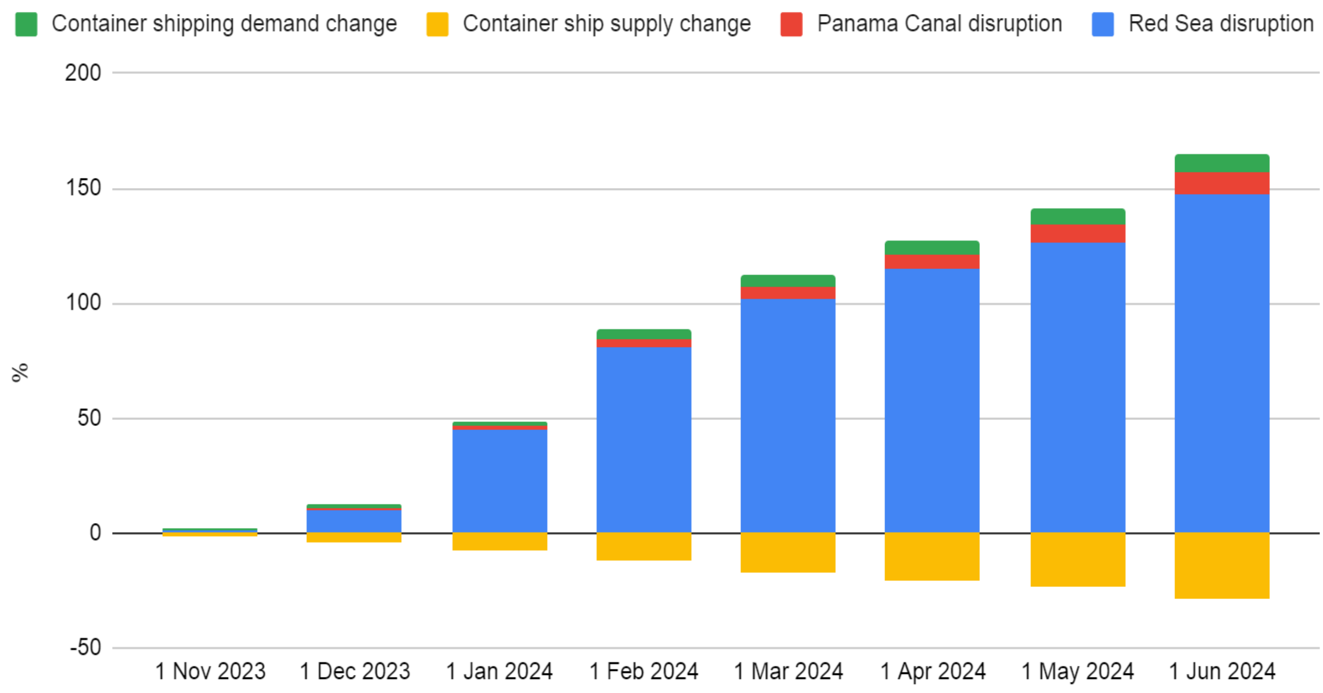

Fig. 3. China Containerized Freight Index: Impact of Panama Canal and Red Sea Disruptions [11]

For a container of façade panels on the Shanghai to Rotterdam route, rates reached $2,837 for a 40-ft box [12]. When shipping inland, freight-and-insurance costs for developing economies double per dollar of goods shipped—this is the hidden transport effort identified by UNCTAD across more than 170 countries [7].

On-site savings continue through dedicated installation assets. By investing in vacuum lifters and precision panel saws, the company accelerated the installation of HPL façades and large-format slabs and reduced labor inputs. Moreover, transitioning to a lean workflow decreased the share of non-value-adding operations.

Before commencing price formation, it is crucial to adopt an engineering mindset: every cost item must be calculated with utmost precision, as though one were sizing a skyscraper's load-bearing columns. One should begin by analyzing factory production costs, understanding that only international logistics and insurance, customs duties, domestic delivery, and project services with warranty reserve will be added thereafter. Such calculation prevents hidden markups and excessive expenses inherent to the classical factory, importer, distributor, wholesale warehouse, retailer, and builder chain.

The direct factory-to-site model reduces the number of links to three: the plant, the engineering team, and the construction site. Eliminating national distributors, wholesale warehouses, and retailers yields savings by removing the cumulative marginal markups of each intermediary. This effect is particularly pronounced in developing markets, where longer logistical legs and smaller project volumes traditionally extend the supply chain by one or two additional links and increase the price ballast.

To further enhance savings, it is recommended to specify materials at the working-documentation stage: the factory cuts panels and floor slabs to final dimensions, eliminating waste, unplanned repurchases, and storage costs. Just-in-time delivery—when the container arrives precisely as the site is ready to receive the shipment—eliminates redundant handling and storage fees. Since materials and equipment account for the majority of a project's direct costs, any optimization of on-site movement is immediately reflected in the final price.

When determining the ultimate cost, currency risks cannot be ignored. Fixing the price in euros at contract signing and opening forward positions on the freight component smooths out exchange-rate fluctuations. The volume effect is achieved through demand aggregation: combining multiple projects into a single container batch reduces freight cost per unit. Nevertheless, freight remains the most volatile line item. For developing economies, hidden transport costs double the freight and insurance per dollar of goods, making the minimization of intermediate transshipment critical.

Equally important is investment in installation equipment and personnel training. Vacuum lifters, precision panel saws, and lean-flow optimization reduce labor costs and accelerate the installation of façades and flooring systems. The final touch is budget transparency: the client must see every cost item. This approach builds trust and enables scaling of the model to neighboring markets.

a market modernization effort in Kyrgyzstan began with an assessment revealing that many hospitals and schools still relied on painted wooden boards and gypsum panels for floors and walls—materials prone to annual maintenance, moisture retention, and bacterial growth. To address this gap in quality and hygiene, a direct partnership was established with twenty European manufacturers specializing in antibacterial PVC coverings, acoustic ceiling systems, and high-pressure laminate façades. By adopting a factory-to-site supply model—where components are cut and packed at the plant to match each project's specifications, customs clearance and transport are managed by a dedicated logistics team, and on-site installation begins immediately upon delivery—intermediary markups were eliminated. This streamlined approach yielded 30–40 % cost savings over the traditional multi-tier distribution chain, making advanced finishing materials affordable even for regional educational and healthcare facilities.

Initial batches amounted to only one thousand to five thousand square meters, yielding a turnover of up to half a million dollars, but after the publication of test results and the demonstration of two pilot hospitals, market doubts disappeared. Order volumes grew to one hundred thousand square meters, and annual revenue reached six to seven million dollars. Key to this success were investments in in-house installation crews and equipment: vacuum lifters and precision cutting machines reduced installation time by almost one third and enabled the simultaneous servicing of up to ten large projects without maintaining a permanent staff. As a result, over four years, more than fifteen clinics received bactericidal floors and ceilings, dozens of schools were fitted with acoustic classrooms and anti-vandal doors, and business centers in downtown Bishkek adopted façades whose lifecycle costs are half those of traditional aluminum composite.

State technical review reduced the number of project rejections, and new regulations included composite façades and acoustic ceilings in the mandatory specifications for public buildings. Thus, it demonstrated that an engineering-precise yet open approach can simultaneously reduce costs and raise quality standards.

Conclusion

The results of the present study confirm that the direct factory-to-site supply model constitutes an effective instrument for optimizing pricing in the construction sector, especially in developing markets. Eliminating sequential intermediation—by excluding national distributors, wholesale warehouses, and retailers—achieved a 30–40% reduction in the final cost of supplies through the removal of cumulative markups at each link of the chain. This approach not only enhances the competitiveness of materials but also renders the cost structure fully transparent to the client, thereby strengthening trust and facilitating the scaling of the model to adjacent markets.

Analysis of logistical expenditures indicates that landlocked countries are particularly incentivized to reduce transport effort, since an excessive number of transshipments and warehousing operations doubles or triples freight and insurance costs. The adoption of just-in-time delivery and factory cutting of materials to specific orders eliminates on-site losses and reduces expenses for storage and waste processing. Consequently, savings in logistics and installation are immediately reflected in the project budget, while investments in installation equipment and a lean approach decrease labor requirements and accelerate project commissioning.

An additional factor in the model's resilience is currency risk management: fixing the contract price in euros at signing and employing forward instruments to create a currency corridor mitigates exchange-rate fluctuations and supports long-term financial planning. The volume effect is achieved by aggregating demand from multiple sites into a single container batch, which further lowers per-unit freight rates and amplifies savings for the small order volumes typical of Central Asia.

Empirical data from Kyrgyzstan demonstrate that, at initial volumes of 1,000–5,000 m², direct supplies generated turnover of up to $0.5 million, whereas upon reaching 70,000–100,000 m², annual revenue exceeded $6–7 million. The widespread introduction of innovative materials into healthcare and educational institutions enabled improvements in sanitation and the durability of finishing systems, accompanied by significant reductions in operating and maintenance costs.

Thus, the combination of an engineering-precise approach to cost calculation, the reduction of intermediary links, and the application of proactive currency and logistical risk management measures establishes a universal methodology capable not only of lowering the price of construction components but also of enhancing quality and cost transparency. These principles underlie the prospects for the development of direct supply in construction and are poised to drive sector modernization in the context of global competition.

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