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Eureka Journal of Business, Economics & Innovation Studies (EJBEIS)

ISSN 2760-4950 (Online) Volume 2, Issue 4, April 2026

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LEAN CONSTRUCTION AS AN INNOVATIVE GOVERNANCE MECHANISM FOR ENHANCING EFFICIENCY AND REDUCING RISKS IN HOUSING CONSTRUCTION IN UZBEKISTAN

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Abstract

One of the innovative governance mechanisms in the housing sector of Uzbekistan could be Lean Construction, which is widely discussed in Western literature but still underused in local practice. This study shows that full implementation of Lean principles is limited by local conditions, including weak planning, poor coordination, and lack of internal standards. Therefore, a simplified and practical approach is proposed, based on clear task definition, basic planning, and improved communication. The results suggest that even small changes in daily management practices can significantly improve project efficiency and reduce risks.

Keywords: Lean Construction, housing sector, Uzbekistan, project management, coordination, waste reduction, SMEs

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INTRODUCTION

Lean Construction is not a new concept, but it remains highly relevant for the construction industry, especially in countries like Uzbekistan, where the economy is gradually moving toward a more sustainable development model. Many studies have explored Lean Construction in different contexts. However, there are still very few practical cases focused on transition economies. In countries with limited digitalization and strong institutional constraints, it is not always clear how Lean principles can be effectively applied. This is particularly true for the housing sector. Most existing studies and real-world applications tend to focus on large infrastructure or industrial projects, while residential construction receives much less attention.

The construction sector in Uzbekistan has been growing steadily and plays a significant role in the national economy. It contributes up to 18% of GDP and continues to expand due to rapid population growth, which is close to one million people per year. As a result, demand for housing is constantly increasing, and investment in residential construction is expected to continue rising in order to accommodate this population growth. At the same time, the structure of the sector creates additional challenges. The construction industry in Uzbekistan is largely represented by small and medium-sized enterprises, which account for the overwhelming majority of market participants, including more than 56% of total construction output (Stat.uz). In many cases, these companies operate with limited managerial capacity, weak internal controls, and a lack of standardized processes.

As a result, many construction projects face issues such as poor coordination, insufficient risk assessment, and informal decision-making practices. This often leads to inefficient use of resources, increased material waste, and frequent project delays. The absence of clear operational standards further complicates project management, especially in the housing sector, where multiple stakeholders are involved. In this context, Lean Construction can be considered a

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highly relevant and practical approach. By focusing on process optimization, waste reduction, and better planning, Lean principles can help reduce managerial inefficiencies, improve resource utilization, and enhance overall project performance in the housing construction sector of Uzbekistan.

The aim of this study is to apply the concept of Lean Construction, adapt it to the realities of Uzbekistan, and show in a practical way how it can be used by small and medium-sized construction companies.

LITERATURE REVIEW

Many researchers have studied Lean Construction from different angles. However, their focus is not always directly applicable to countries like Uzbekistan. For example, Issa U. H. (2013) looks at Lean Construction mainly as a tool for reducing risks in construction projects. The author shows that better planning and process control can significantly lower delays and financial losses. This idea can clearly be used in Uzbekistan, where projects often face uncertainty and weak risk management. At the same time, the study assumes a relatively structured project environment, which is not always the case in small local firms. Li et al. (2024) focus on prefabricated construction and show how Lean improves efficiency and coordination. This approach works well in systems where processes are already standardized. In Uzbekistan, however, prefabrication is still developing, so full implementation may be difficult. Still, the general idea of improving coordination between participants is highly relevant. Meanwhile, Sundararajan and Madhavi (2023) propose Lean-based tools for managing housing projects, especially during crisis periods. Their work is closer to the housing sector, which makes it useful for this study. However, their model relies on a certain level of digital tools, which may not always be available in local construction companies.

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Bigwanto et al. (2024) connect Lean Construction with sustainability, especially in government projects. This is important because Uzbekistan is also moving toward sustainable development. Yet, large government projects usually have more resources and stronger control systems than small private developers. Joseph et al. (2026) analyze Lean in the context of waste management. They show that Lean helps reduce material losses and improve resource use. This is very relevant for Uzbekistan, where inefficient use of materials remains a common problem.

Garcés et al. (2025) provide a broad review and confirm that Lean improves both efficiency and sustainability. However, their analysis is quite general and does not consider the specific challenges of transition economies. Wibowo and Ammar (2025) also highlight the link between Lean and sustainable development goals. This supports the idea that Lean can be used not only for efficiency, but also for long-term development of the sector. Finally, Zeng et al. (2023) introduce a digital approach by combining Lean with BIM and logistics systems. While this is a strong model, it requires a high level of digitalization. In Uzbekistan, this can only be applied gradually.

Li, Fang and Wu (2020) show how Lean has been implemented in China. Their experience is useful because China also went through a transition period. However, the scale and institutional environment are different, so direct transfer is not possible.

Hamerski et al. (2024) and Agrawal et al. (2024) focus on planning systems like the Last Planner System. They show clear improvements in coordination and project performance. These tools can be adapted to Uzbekistan, but in a simplified form. And Ajayi and Oyedele (2018) study waste reduction in construction projects. Their findings are directly relevant, as reducing waste is one of the main challenges in local projects.

Overall, the literature shows that Lean Construction is effective in improving efficiency, planning, and resource management. However, most studies assume

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stable systems, strong institutions, and advanced technologies. In Uzbekistan, the situation is different. Many construction companies are small, processes are not always standardized, and digital tools are limited. Because of this, Lean cannot be applied in a full or complex form.

This study takes a more practical approach. Instead of copying existing models, it focuses on adapting Lean Construction to local conditions. The idea is to use simple tools that do not require high digitalization or complex systems. The emphasis is on basic process organization, clearer planning, reduction of material waste, and better coordination between participants. In this way, Lean Construction can be introduced step by step and used even by small and medium-sized construction companies.

METHODOLOGY

The research is based on a survey conducted among 180 respondents representing small and medium-sized construction companies. The majority of the firms included in the sample employ up to 50 people and operate in the housing construction sector.

The data collection was carried out in the city of Termez, located in the Surxondaryo Region. This region is characterized by ongoing economic development and growing construction activity, although it is mainly represented by small and medium-sized firms rather than large construction corporations. The survey aimed to assess several key aspects of the construction sector, including the level of digitalization, access to financing (particularly credit resources), and the overall organization of project management processes.

The results show that a significant share of construction activity in Uzbekistan is carried out by small enterprises and micro-firms, which account for around 50% of total construction output. In addition, a notable part of the sector operates informally, which further complicates standardization and management processes. Based on the survey findings, several structural challenges were

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identified, including weak planning practices, limited use of digital tools, lack of standardized procedures, and insufficient coordination between project participants.

These findings were used to identify the gap between existing management practices and Lean Construction principles. Since full-scale Lean implementation requires structured processes, digital tools, and trained personnel, it cannot be directly transferred to the context of Uzbekistan. Therefore, this work adopts an adaptive approach, focusing on the selection and simplification of Lean Construction elements that can be realistically applied in small and medium-sized construction firms.

RESULTS

The survey gives a general picture of how construction firms actually operate in the selected region. The sample includes different types of companies. About 47.8% are developers, 22% are design firms, and 25.3% are involved in related construction activities such as renovation or engineering services. The rest are contractors. One thing is very clear. The sector is dominated by small businesses. Most firms have fewer than 50 employees. Around 28.8% employ only 10–30 workers, and just 13.6% have more than 100 employees. This already shows a fragmented market, where large, structured companies are rare.

Experience is also limited. Many firms have been operating for only 3 to 5 years. Only about a third have longer experience. So, in many cases, companies are still developing and do not have stable internal systems. More than half of the firms (56%) are involved in residential construction. Others work in repairs, finishing, or infrastructure. Most of them deal with private clients, although some also work with the public sector.

When it comes to equipment, the answers are mixed. Around 62% say they use “modern” tools. But at the same time, the overall level of technology is described as average. This likely means that “modern” is understood in a relative way, not

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necessarily as advanced or digital. A similar situation appears in financial management. About 70% of respondents say that costs are calculated accurately. However, many also admit that budget overruns still happen. For 55%, this happens sometimes, and for 19%, quite often. So, there is a gap between what companies think they do and what actually happens in projects.

Money is a constant issue. Most firms say they do not have enough financial resources to introduce new technologies or improve management practices. At the same time, strict budgets make it even harder to try new approaches.

Human resources are also limited. Managers and site supervisors are mostly rated at an average level. Some training exists, but it is not enough. There is also a shortage of skilled workers and specialists who can work with modern tools.

The open responses confirm these points. Companies mention lack of investment, high cost of materials, difficult logistics, and administrative barriers. Many also talk about complicated permit procedures and limited access to credit. In some cases, even climate conditions, such as extreme heat, are mentioned as a factor that affects construction work.

Overall, the sector works under pressure. Limited resources, weak internal organization, and inconsistent management practices are common. Because of this, there is a clear gap between current practices and what is required for more advanced systems like Lean Construction. At the same time, the issue is not only technical. It is also about how work is organized on a daily basis. In many firms, processes are still based on experience and routine, not on clear systems.

In practice, management is often centralized. Tasks are given from the top and passed directly to site supervisors, sometimes without detailed explanation. Site teams then have to figure things out on their own. This creates confusion, mistakes, and delays.

This is where coordination becomes critical. Without proper communication, even simple tasks can go wrong. Site supervisors play a key role here. They need to follow the process, notice problems early, and make sure the work is done

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correctly. But in reality, they often lack time, support, or experience. There are also structural issues. Low wages, informal employment, and unstable teams reduce motivation and responsibility. Under these conditions, even well-designed systems do not work as expected.

So the problem is not just about money or technology. It is about how work is managed. Without basic organization and communication, no system will give results. For this reason, the focus should be practical. Instead of complex models, companies need simple habits: clear tasks, basic planning, and better coordination on site. Even small improvements in these areas can reduce delays, improve quality, and make the whole process more stable.

DISCUSSIONS

Lean Construction cannot be applied in its full, standard form in the given context. The conditions on site, the way work is organized, and the level of management simply do not support complex systems. For instance, tools like the full Last Planner System rely on structured planning and active coordination between multiple levels of management. In practice, this rarely happens. Planning is often done informally, tasks are passed down quickly, and site teams are expected to figure things out on their own. Because of this, complex planning systems become unrealistic.

A more practical approach is to simplify planning. Instead of detailed schedules, it is more effective to focus on clear task definition. Each task should be simple, understandable, and assigned to one responsible person. Short on-site discussions can replace formal meetings and help align expectations in real time.

Coordination is a key issue. Without it, even simple tasks fail. Communication tends to be unstructured, which leads to delays and confusion. Small changes, such as having one clear communication channel and quick daily check-ins, can already improve the situation. Waste management also needs to be adapted to local conditions. Material losses are often linked to poor storage and extreme

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weather. Under high temperatures, materials can be damaged, and workers lose focus, which increases the risk of mistakes and rework.

Logistics is another weak point. Deliveries are not always well coordinated, which leads to either shortages or excess materials on site. Both cases create unnecessary costs. Simple planning of deliveries and smaller batch supply can reduce these losses.

Labor productivity is directly affected by environmental conditions. Heat reduces concentration and slows down work. This factor is rarely considered in planning, but it has a real impact on performance. Adjusting work schedules and workload can help reduce errors and improve efficiency.

Another major limitation is the lack of internal standardization. Work is mostly based on personal experience, not on documented processes. General regulations exist, but they do not translate into daily practice at the company level.

Instead of complex procedures, a simplified form of standard work can be introduced. This may include short checklists or basic task descriptions. The goal is not to create heavy documentation, but to make work more consistent. Recording problems is also important. A simple log of issues, actions taken, and outcomes can help teams avoid repeating the same mistakes. Over time, this creates a basic internal system without additional pressure on staff.

Therefore, the focus should be on simple, practical steps. Not full systems, but small changes in planning, coordination, and standardization. These elements are easier to implement and more aligned with real working conditions.

Based on these considerations, a simplified management framework is proposed, which reflects the key practical elements of Lean Construction adapted to local conditions (**Figure 1**).

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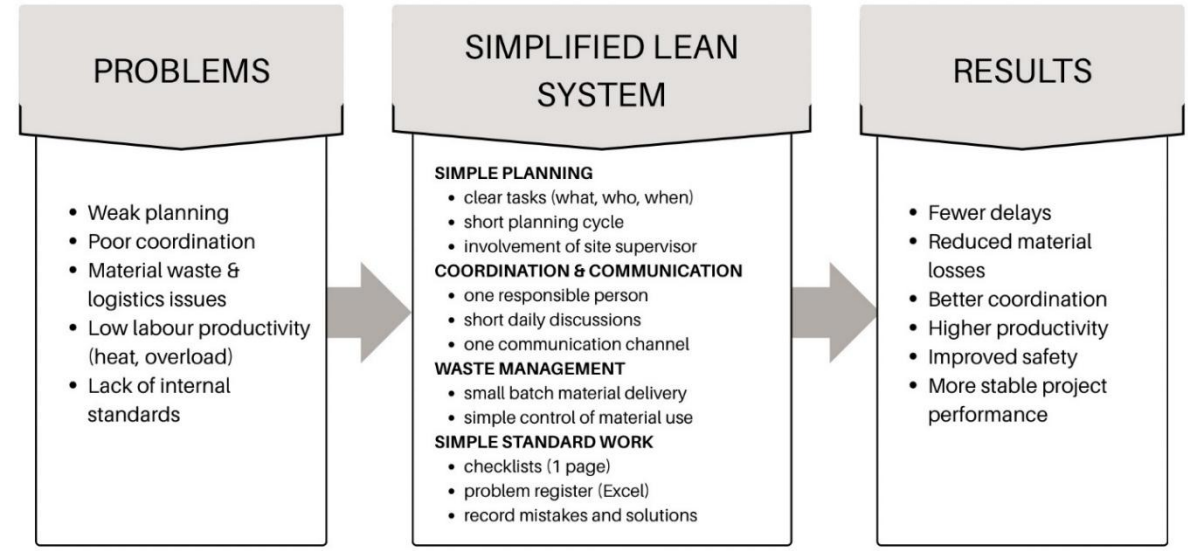

Figure 1. Simplified Lean Management Framework for Small Construction Firms

Source: Developed by the author.

Such an approach makes Lean Construction more realistic and applicable, especially where resources and management capacity are limited.

CONCLUSION

Lean Construction is a strong concept, but it cannot be applied in its full form under current conditions in Uzbekistan. Its principles need to be adapted to local realities, including the level of development, management practices, and cultural context. The focus should be on simple steps such as clear planning, better communication, and basic standardization, which can serve as a foundation for further development.

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Starting with small, practical changes in daily management can gradually lead to more stable, efficient, and predictable construction processes. Over time, this creates value not only for end users, but also for construction firms by improving performance, increasing revenue potential, and supporting long-term business sustainability.

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