

# Study on Sustainability of Prefabricated Traditional Stilt House in Munshiganj for International Export Policy

Dr. Rumana Rashid<sup>1</sup>; Mehnaz Tabassum<sup>2</sup>;  
Asma Siddika<sup>3</sup>; Shahrin Sultana Sinthia<sup>4\*</sup>

<sup>1</sup> Professor, Department of Architecture and Planning, Faculty of Architecture, Ahsanullah University of Science and Technology, Dhaka, Bangladesh.

<sup>2-3</sup> Asst. Prof. Department of Architecture and Planning, Faculty of Architecture, Ahsanullah University of Science and Technology, Dhaka, Bangladesh.

<sup>4</sup> Research Assistant, Department of Architecture and Planning, Faculty of Architecture, Ahsanullah University of Science and Technology, Dhaka, Bangladesh.

Publication Date: 2026/06/13

**Abstract:** Due to frequent floods, river erosion, and rapid urbanization, Bangladesh one of the most climate-vulnerable nations. Traditional construction methods are unable to provide affordable and adaptable dwelling solutions. Modular housing has shown promise on in terms of cost savings, quicker construction, and increased use, but its use in Bangladesh is still underexplored. Modular wooden stilt houses in Munshiganj already act as portable responses to seasonal displacement, but the large prefabricated façades limit their efficiency and portability. Humanitarian examples, such as Shigeru Ban's disaster shelters and modular housing initiatives, demonstrate the versatility of modular systems. cost-effectiveness, export potential, and material efficiency. By developing and proposing a standardized 4' × 8' modular panel system for façades, window, and door with an emphasis on material efficiency, cost-effectiveness, and export potential this study seeks to optimize these practices. The study's methodology included literature review, local housing surveys, material estimation, and a cost comparison of the suggested modular units and current practice. Result shows the 4' × 8' module allows an 8' × 12' house to be constructed using just 10 modules, while also reducing individual panel weight by 50%, making transportation and handling easier, and lowering construction costs by 18–24%. Compact packaging, easy installation, and scalability are guaranteed by the suggested design, opening up applications for everything from and export markets to disaster relief shelters. In conclusion, the proposed modular wooden panels rooted in Munshiganj's housing practices offer a resilient, affordable, and globally viable construction model for disaster-prone and low-income contexts.

**Keywords:** *Modular House, Flexible Module, Easy Construction, Transportation, House Export.*

**How to Cite:** Dr. Rumana Rashid; Mehnaz Tabassum; Asma Siddika; Shahrin Sultana Sinthia (2026) Study on Sustainability of Prefabricated Traditional Stilt House in Munshiganj for International Export Policy.

*International Journal of Innovative Science and Research Technology*, 11(6), 196-202. <https://doi.org/10.38124/ijisrt/26jun255>

## I. INTRODUCTION

Rapid urbanization, population expansion, economic shifts, elevated land costs, and limited land supply have generated a global need for cheap housing. The need for temporary homes and shelters is concurrently rising due to climate change and recurrent calamities (Perrucci et al., 2016). The rising demand for flexible and movable housing is outstripping availability, complicating the search for adequate accommodations for many individuals. Traditional inflexible construction methods are unable to meet evolving demands; novel approaches may offer viable answers (Djukanovic et al.,

2025). The exigencies of contemporary housing issues necessitate adaptive building solutions that are responsive to ever-evolving demands. A flexible system is essential for achieving long-term usability and user satisfaction by effectively addressing both anticipated and unforeseen changes in diverse demands (Estaji, 2014). Norman Foster states, "As an architect you design for the present, with an awareness of the past, for a future which is, by its nature, quite unknown" (Foster, 2007), emphasizing the necessity of creating adaptable spaces that can accommodate life's inherent unpredictability. The term "modular structure" denotes a comprehensive factory finish, typically achieving 95%,

provided and assembled as three-dimensional volumetric structural or service components that are interconnected on-site (Hodbe & Sober, 2019). Modular solutions serve as a scalable and efficient alternative to conventional methods, gaining popularity due to their cost-effectiveness, expedited construction, and design flexibility. They also minimize waste, optimize labor, facilitate customization, and ensure quality control through factory production (Maceika et al., 2024). Globally, several modular systems are being used to address both permanent housing requirements and emergency shelters following disasters. Countries particularly susceptible to natural catastrophes, influenced by geographical, climatic, and socioeconomic variables, including the Philippines, Bangladesh, Indonesia, India, Colombia, Mexico, Haiti, Somalia, Vietnam, Zimbabwe, and the United States (WorldAtlas, 2018). Modular adaptable and movable dwellings are significantly more effective for post-disaster refuge and relocation after disasters (Kizilova, 2025). Numerous nations have devised housing or shelter systems that effectively address natural calamities. In Bangladesh, especially in Munshiganj, recurrent floods and riverbank erosion frequently compel individuals to evacuate their residences. These conditions have resulted in the construction of moveable modular stilt dwellings, a tradition upheld for years. These movable modular buildings possess significant potential for further exploration and might be marketed outside the area and internationally. This article examines contemporary modular housing practices and recommends a well-designed module that is manageable, economical, and ideal for exportation.

## II. RESEARCH BACKGROUND

### A. Background of the Project

Bangladesh, significantly susceptible to climate change, has recurrent calamities attributable to its geographical characteristics. From 2015 to 2021, around 7.5 million homes were affected, and in the initial four months of 2024, 18.3 million individuals were harmed (The Daily Star, 2024). As reported by BDRS (2021), floods ravaged 404,501 acres of land, whilst river and coastal erosion impacted 327,286 acres, displacing millions of families. Munshiganj District, situated in central Bangladesh and traversed by significant rivers like the Padma and Meghna, is especially susceptible to flooding and riverbank erosion. Annually, floodwaters submerge the region, with 2.61% of the land exhibiting significant susceptibility to flooding (Islam, 2007). The powerful currents of the Padma and Meghna result in significant erosion, frequently obliterating residences and means of subsistence (Huda, 2020). In response, inhabitants have constructed portable or elevated dwellings to endure these severe circumstances. The notion of a modular wooden stilt home offers a significant answer as a moveable dwelling alternative applicable beyond its original location. It can also be established in other disaster-prone regions. This building technology facilitates rapid development and seamless construction, rendering it appropriate for several applications beyond just dwelling. The limited exploration of modular houses in our setting renders this a distinctive and novel instance.

Portable dwellings are essential for delivering rapid and adaptable shelter in emergencies. They provide prompt shelter for households displaced by natural catastrophes, which have resulted in over 218 million internal displacements over the last decade. In 2022, there were 32.6 million displacements, with 98% attributed to weather-related calamities (IDMC). The World Bank forecasts that by 2050, as many as 216 million individuals may be internally displaced as a result of gradual climate change (World Bank, 2024). As of the conclusion of 2024, 123.2 million individuals were forcibly displaced worldwide due to persecution, conflict, violence, and human rights abuses (UNHCR, 2025). For war refugees, portable housing provides secure, temporary living arrangements, whilst in urban slums, modular housing can enhance community development. Portable dwellings address immediate shelter requirements while improving resilience and adaptability.

This study presents a modular wooden stilt home design influenced by the adaptable housing methods of Munshiganj. It examines the capacity of movable modular homes to meet immediate shelter requirements while improving resilience. Through the enhancement and advancement of this method, these dwellings may effectively serve local communities and be modified for export to disaster-prone and housing-deficient areas both domestically and internationally.

### B. Aim and Objective of the Research

This research aims to create a sustainable and flexible modular wooden dwelling system influenced by indigenous traditions in Munshiganj. The research will improve the dwellings' mobility, affordability, and scalability for local requirements and prospective worldwide applications.

The research goals emphasize the analysis of existing modular practices, the identification of current issues in construction, the design and proposal of a standardized module, and the evaluation of feasibility and cost efficiency.

## III. LITERATURE REVIEW

Modular construction offers substantial benefits compared to conventional methods, with a 35% reduction in construction time and an average cost reduction of 22%, as reported by Gómez & Sánchez (2024). Modular buildings required 10 months for completion compared to 15.5 months for traditional methods, with costs of around \$120 per square foot vs \$154 for conventional builds. These advantages were pervasive across commercial, industrial, and residential sectors, highlighting the potential of modular methodologies. Modular and off-site manufactured (OSM) housing exhibits superior energy efficiency compared to conventional residences, reducing water use by 30%, gas usage by 80%, and utility costs by as much as 25%. These buildings utilize lighter materials, resulting in a substantial decrease in concrete and steel usage, as well as less invasive foundation work. Modules offer adaptability for future sites due to their reusable and relocatable nature. They provide considerable prospects for long-term cost reductions, with a lifespan ranging from 40 to 60 years or more, contingent upon materials and maintenance (Hodbe & Sober, 2019). Numerous nations have engaged in

modular building for residential and shelter purposes. Architect Shigeru Ban’s Paper Tube Shelters provide a modern, humanistic approach to modular housing, first conceived for disaster aid (Martin, 2021). Nigerian architect Blossom Eromosele created a modular dwelling concept influenced by traditional African architecture, aimed at assisting the 3.2 million internally displaced individuals in Nigeria (Antonia, 2025). The requirement for provisional refugee accommodation following catastrophes is a hurdle to enhancing community resilience in Indonesia. Kusbiantoro et al. (2024) advocate for folding modular dwellings as accommodations in disaster zones. The literature research indicates that, in contrast to worldwide modular practices, Munshiganj’s modular housing exhibits significant promise as a rapid, cost-effective, and versatile option for disaster-prone regions. Fabricated in 7–10 days with little labor and assembled on-site in 3–5 days, it functions as both permanent and temporary accommodation. Its mobility and durability further augment its appropriateness for export to other susceptible places globally. This study will provide an optimal modular size for housing and examine its viability as a sustainable solution in both local and global contexts.

#### IV. METHODOLOGY

This research will involve a complete literature assessment on modular housing in both global and local

contexts, with a detailed local housing physical survey in Munshiganj to assess its potential and limits in relation to the research objective. This design research will propose modular panels that are easily transportable, manageable, and easily assembled. The proposed design will be compared with existing practices to assess its efficacy, with potential for both local and worldwide export.

#### V. RESULT AND DISCUSSION

##### A. Existing Practice

In Munshiganj, modular homes are built in stages, with two types of foundations: RCC with brick soling and NCF for permanent buildings and stilt-based RCC pillars (about 2 ft) for temporary, movable ones. Iron plates, screws, and bolts hold the wooden columns to the piers, making it easy to take apart and move. Wood and plain and perforated galvanized iron sheets are the main things used. The standard house size is 8 feet by 15 feet, but it can be changed to fit your needs. It takes 7–10 days to make in a workshop, and another 2–4 days to put together on-site, based on the size and number of people needed. The design, materials, and cost of building these modular homes rest on the person who buys them. The total cost can be anywhere from BDT 250,000 to 30,000,000, based on the materials chosen.



Fig 1. Modular Wooden One Storied and Two Storied Houses of Munshiganj (Source: Author and online).

A standard 15-foot-by-8-foot house needs about 49.34 cubic feet of wood for the frame, doors, and windows (Table 1). Estimates are also made for the other elements that will be used for the walls, roof, and floors. The amounts of zinc plain sheets needed for the outside, corrugated iron sheets needed for the roof, and wooden floor panels needed are shown in Table 2. As soon as the supporting posts are put in place, the building facade is put up all at once instead of in pieces. After that, the roof is put on (Fig 1).

Table 1: Estimation of Wooden Frame and Structural Component Quantity for 15’/8’ Modular House (Source: Author).

Component	Quantity	Size (inches)	Length (ft)	Total CFT
Columns	16 pcs	3" × 4"	10 ft	14 CFT
Floor Frames	16 pcs	3" × 3"	8 ft	8.00 CFT
Roof Edge Beams	4 sides	3" × 4"	46 ft total	3.83 CFT
Roof Rafters	18 pcs	3" × 4"	8 ft	12.06 CFT
façade panel frame		2" × 2" / 2" × 2"		16.06CFT (Approx)
Ornamental Wood (Façade)	Trims, patterns	1" × 2" (avg.)	~50 ft total	1.25 CFT (approx.)
Wooden Door (7' × 3'6")	1 pc (2 panels)	1.5" thick panel	~24.5 sq.ft	3.06 CFT
Wooden Windows (2' × 3')	6 pcs (12panels)	1.25" thick panel	~36sq.ft total	~3.74 CFT
Subtotal	—	—	—	45.94 CFT
Wastage & Fitting (10%)	—	—	—	~3.4 CFT

Total Estimated Wood	—	—	—	~49.34 CFT
----------------------	---	---	---	------------

Table 2: Estimation of Others Materials for 15'8' Modular House (Source: Author).

Component	Area to Cover (sq.ft)	Sheet/Panel Size	Effective Coverage per Unit (sq.ft)	Quantity Needed (approx.)
Galvanized Plain Sheet (Facade)	$(2 \times 8 \times 8) + (2 \times 15 \times 8) = 368$ sq.ft	$3' \times 6' = 18$ sq.ft	~16 sq.ft (with overlap)	23 sheets
Corrugated CI Sheet (Chouchala Roof)	$2 \text{ slopes} \times (15' \times 8') = 240$ sq.ft	$3' \times 6' = 18$ sq.ft	~16 sq.ft (with overlap)	13-14 sheets
Wooden Floor Panels	$8' \times 15' = 120$ sq.ft	$1'-6" \times 7' = 10.5$ sq.ft	~10 sq.ft (after fitting/cut)	12 panels, 15cft

**B. Proposed Design**

Many of the panels that the artisans construct is more akin to prefabricated facades than true modular ones, as they encompass the entire side of the house. Conversely, a modular façade is composed of standardized units that can be affixed or removed as required, thereby facilitating expansion. The overall costs are increased by the difficulty of transporting, handling, and installing larger panels. We estimate that each 15-foot and 8-foot wall panel will weigh approximately 350 kg and 170 kg, respectively, based on the material composition, specifically the use of Loha wood for the frame and galvanized iron (GI) sheets as infill. In order to efficiently manage handling and assembly, the substantial weight and length of the panel present significant challenges in terms of packaging, transportation, and installation. Consequently, a larger transport vehicle and an increased personnel force are required. In order to enhance the efficacy and manageability of construction, a 4' x 8' façade module has been implemented, adhering to the same construction methodology. This module is a standard dimension that is almost universally used, and the majority of industrial materials are contained within it. Consequently, the material loss is minimal when this module is constructed industrially. Three types of standard modules were suggested for the design: the window module, the door module, and the facade module. His modular approach provides increased flexibility, simplified installation, and fewer transportation challenges. By maintaining the primary construction or installation process in a similar manner to the previous one, the addition or modification of a modular facade appears to be a much more convenient, efficient, and comfortable option. This system allows for the adaptation of the house size to the number of modules. For instance, an 8' x 12' house is composed of 10 modules, resulting in a scalable and practicable design.

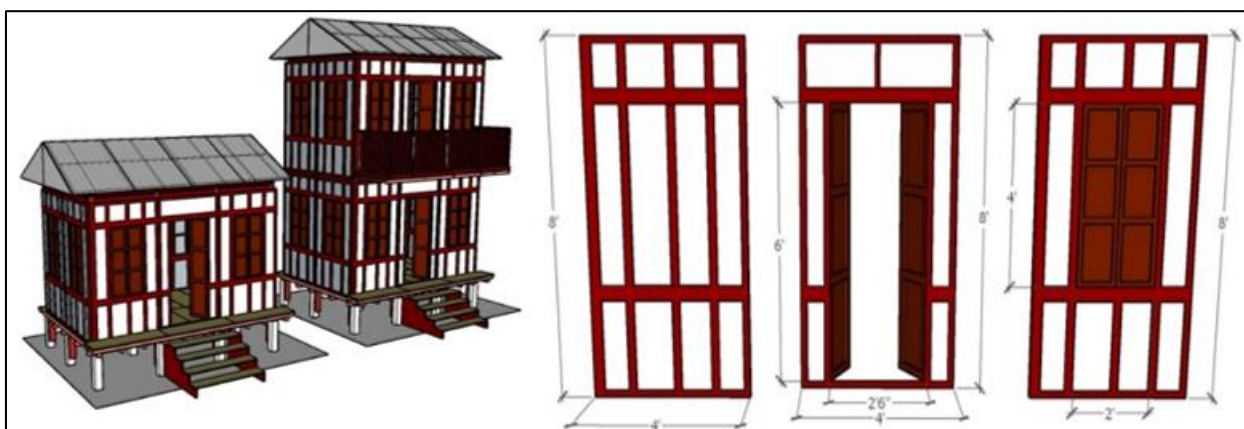


Fig 2: 4'8' Modular Panel Integration in the Munshiganj Modular House (Source:Author).

The prefabricated modular wooden façade panels are depicted in Figure 2. On the left side, a single infill unit, measuring 4' x 8', is divided into smaller sections by vertical and horizontal wood members. A 2'6 x 6' wooden double-leaf door, the central panel is the complete 4' x 8' door unit. The right panel is a window module (4' x 8'), featuring a 2' x 4' window in the upper half of the 8' side and six tiny wooden shutters. This is illustrated in Table 3 below for an 8' x 12' modular dwelling.

Table 3: Material Estimation of Proposed Modular Buildings Components (Source: Author).

Item	Quantity	Size (inches)	Length (ft)	Total
Wooden Poles	10 pcs	3" x 4"	10 ft	$10 \times 0.833 = 8.33$ CFT
Wooden floor Members	14 pcs	3" x 3"	12 ft	$14 \times 0.75 = 10.5$ CFT
Wooden Beams	4pcs	3" x 4"	40 ft	$40 \times 0.08325 = 3.33$ CFT
Each modular façade panel frame	4 pcs short bar; 4pcs long bar	2" x 2"; 2" x 2"	4 ft; 8ft	$4 \times 0.111 = 0.444$ CFT $4 \times 0.222 = 0.888$ CFT =1.33CFT
Roof Rafters (Chouchala)	14 pcs	3" x 2"		8 CFT

Window (single, Double shutter)		2 ft × 4 ft × 0.083 ft		~1.33 CFT
Solid Door Panel		6 ft × 2.5 ft × 0.125 ft		~1.88 CFT
Floor wood volume		8' x 12' x 1.5"	-	~12 CFT
CI sheet for Chouchala roof	~120 sq ft roof			6-7 sheets
Galvanized plain sheet each panel		4' x 8' module		1 sheet per module

**C. Wood and Other Material Optimization**

Comparing the existing modular or prefabricate home dwelling design to a standardized modular panel design shows material efficiency, structural optimization, and modular rationalization improvements. The prior plan projected wood requirements at 49.34 CFT, but the updated design needed 46–47 CFT. This means 2.5–3 CFT are lost. Vertical structural member reduction is a major improvement. Reducing columns/wooden poles from 16 to 10 optimizes load distribution and eliminates superfluous supports. The floor framing system has been rationalized by enhancing span efficiency with fewer members cover a wider floor area, lowering wood consumption while preserving functionality. Optimization of roof structure is another great development. Previously, rafters were 3"×4" with 18 parts, but the new design uses 3"×2" with just 14 pieces. Sectional downsizing and quantity reduction reduce dead load and material volume without changing the chouchala roof shape. Façade modularization changed the most. Old façade panel frames used 16.06 CFT of wood owing to non-standardized framework repetition. Each modular façade frame in the new design uses 1.33 CFT, demonstrating a move toward lightweight replaceable panels. This increases transportability, prefabrication, and waste reduction. Additionally, openings are simpler. Door and window wood volume has decreased from 6.8 CFT to roughly 3.2 CFT, suggesting superior dimensional control and panel optimization. Refinement of thickness and support spacing reduced floor wood volume from 15 CFT to 12 CFT. Improved slope sizing and surface computation efficiency have led to a decrease in roofing sheet usage from 13-14 corrugated sheets to 6-7 sheets. The updated design advances the research’s goal of resource-optimized, light weight, easily handled modular building by making the dwelling system structurally efficient, materially affordable, and modularly flexible (see Table 4for comparative analysis).

Table 4: Comparative Material Analysis (Source: Author)

Component	Previous Design	New Proposed Design	Improvement Achieved
Total Wood Volume	~49.34 CFT	~46–47 CFT	Reduced by ~2.5–3 CFT
Columns / Poles	16 pcs	10 pcs	Reduced vertical members
Floor Members	Shorter span system	Optimized longer span	Fewer members required
Roof Rafters	18 pcs (3"×4")	14 pcs (3"×2")	Section + quantity reduced
Façade Frames	~16.06 CFT total	1.33 CFT per module	Lightweight modular panels
Door & Windows	~6.8 CFT	~3.2 CFT	Opening optimization
Floor Wood Volume	~15 CFT	~12 CFT	Thickness optimization
CI Roofing Sheets	13–14 sheets	6–7 sheets	Nearly 50% reduction

**D. Proposed Modular Component Weight Comparison**

A comparative weight study of the proposed modular façade/floor panel system vs conventional elongated single-panel construction reveals distinct ergonomic and structural benefits of the modular method. Conventional extended panels (8–12 ft, generally comprising more continuous sections) necessitate larger framework and continuous sheet sheathing, hence augmenting self-weight and dead load. Consequently, transportation and installation often need 3–4 personnel (Table 5).

The suggested solution, by comparison, segments the same surface into standardized 4'×8' modular modules utilizing efficient 2"×2" frame. Each module needs around 1.33 cubic feet of wood and one galvanized sheet. For an 8'×12' home, this amounts to around 13.3 cubic feet of framing lumber and 10 sheets. The weight of each module varies from 70 to 150 kg, contingent upon the type of lumber and the density of the frame (Table 5).

Table 5: Comparative Weight Chart (Source: Author).

Parameter	Proposed Modular Panels	Existing Elongated Single Panels
Panel Size	Small standardized modules (e.g., 4'×8')	Long continuous panels (8'–12'+)
Frame Section	2"×2" lightweight members	2"×3" / 3"×3" heavier members
Avg. Weight per Panel*	~25–35 kg	~60–90 kg
Handling Capacity	1–2 labor sufficient	3–4 labor required
Transport Efficiency	Easy, stackable modules	Difficult, bulky transport
Installation Time	Faster (plug-in modular)	Slower (single large lift)
Structural Load Impact	Lower dead load	Higher dead load
Replacement / Repair	Individual panel replaceable	Full panel removal needed

*E. Cost Comparison*

Comparing the woodworking expenses between present practices and the proposed modular units, emphasizing the disparities to justify the potential and financial viability of the new modular sizes (Table 6 and Chart 1).

Table 6. Cost Comparison of Different Modular Size Components (Source: Author).

	Criteria	Azobe wood- 3500tk/cft	Koroi wood- 600tk/cft	Mahagony wood- 2000tk/cft
Current construction	Structural post, beam	62,405	10,698	35,660
	Floor and roof Frame	72,216	12,036	40,120
	Floor	52,500	9,000	30,000
	Façade frame	56,210	9636	32,120
	<b>Total cost</b>	<b>243,331</b>	<b>41,370</b>	<b>137,900</b>
Modular construction	Structural post, beam	41,976	6996	23,320
	Floor and roof Frame	66,600	11,100	37,000
	Floor	43,200	7200	24,000
	Façade frame	47,880	7980	26,600
	<b>Total cost</b>	<b>199,656</b>	<b>33276</b>	<b>110,920</b>

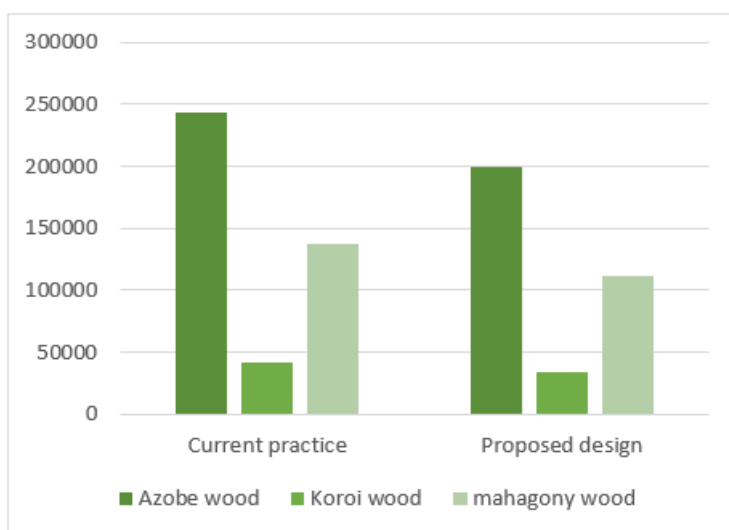


Chart 1. Cost Comparison Between Current Practice and Proposed Modular Design (Source: Author).

Table 6 and Chart 01 illustrate total wood expenses in contemporary and modular building based on wood type. Overall, modular construction yields cost reductions in various types of wood, ranging from 18% to 24%. Koroi wood is the least expensive among all types of wood, with current prices at TK 41,370 and modular prices at TK 33,276. Cost savings in the modular process are primarily achieved via substantial material economy and simplicity. By employing appropriate wood preservation procedures and processing processes, locally sourced efficient woods can serve as viable substitutes for costly imported timbers.

*F. Transportations and Export*

The proposed modular housing solution enhances efficiency and cost-effectiveness in packaging and shipping. The structure's design has detachable components, allowing each section to be flat-packed or bundled into small pieces, so minimizing both volume and weight. In Munshiganj, local truck rental fees begin at Tk 1,000 and escalate based on cargo capacity and trip distance. Standard choices comprise 7-ft (1 ton), 9-ft (1.5 ton), and 12-ft (2 ton) pickups, although transportation to Dhaka often incurs a fee ranging from Tk 1,500 to Tk 6,000 one way. Supplementary costs may occur

due to tolls or ferry crossings. In Bangladesh, inland truck transportation typically costs between \$0.06 and \$0.12 per kilometer for vehicles ranging from 16-ton trucks to bigger trailers. Air freight fees are generally determined by the dimensions and mass of the shipment. For example, air freight expenses to Europe or the US vary from \$6.30 to \$8.00 per kilogram, but sea freight is a more cost-effective alternative for substantial cargoes, particularly when goods are transported in 20' or 40' containers. Customizing shipments based on dwelling size eliminates excess bulk and optimizes shipping costs. Additionally, modular packaging enables the aggregation of several smaller pieces into one bigger shipment, hence reducing the per-unit cost. This technology facilitates the efficient transportation of dwellings over various distances and circumstances, both inside Bangladesh and internationally.

## VI. CONCLUSIONS AND RECOMMENDATIONS

This study examines whether a locally grounded modular housing system might provide an adaptive, economical, and resilient housing option in erosion-prone Munshiganj. The findings suggest that modular construction utilizing indigenous materials and regional building expertise may meet vulnerable communities' socio-economic and environmental needs. Its real-world application makes this result practicable. The suggested housing plan shows how cost-effective manufacture, transportation, and quick assembly might help displaced populations in disaster-affected and riverine areas. The concept balances semi-permanent structural stability with temporary foundation solutions to keep homes secure and movable during flooding and land degradation. Its user-centered configurational flexibility shows how familial, economic, and geographical demands may be met incrementally. These contributions leave some questions unanswered. Technical validation is needed for modular joints and sheet materials' harsh climate endurance. Social acceptability, policy integration, and large-scale manufacturing logistics also need more study. Thus, structural performance assessment and scalable implementation frameworks integrating community acceptance with institutional housing initiatives may be the subject of future study.

### ACKNOWLEDGMENT

This project is supported and funded by Ahsanullah University of Science and Technology (AUST). The authors sincerely acknowledge and express their gratitude for the invaluable support that has enabled the successful completion of the research.

### FUNDING

This research was funded and supported by Ahsanullah University of Science and Technology (AUST) through the AUST Internal Research Grant (AIRG). The authors gratefully acknowledge the financial and institutional support provided for the successful completion of this research.

### REFERENCES

- [1]. Perrucci, D. V., Vazquez, B. A., & Aktas, C. B. (2016). Sustainable temporary housing: Global trends and outlook. *Procedia Engineering*, 145, 327–332. <https://doi.org/10.1016/j.proeng.2016.04.082>
- [2]. Djukanovic, M., Alegre, A., & Teixeira Bastos, F. (2025). Prefabricated solutions for housing: Modular architecture and flexible living spaces. *Buildings*, 15(6), Article 862. <https://doi.org/10.3390/buildings15060862>
- [3]. Estaji, H. (2014). Flexible spatial configuration in traditional houses: The case of Sabzevar. *International Journal of Contemporary Architecture "The New ARCH"*, 1(1), 26–35. [https://www.academia.edu/8008763/Flexible\\_Spatial\\_Configuration\\_in\\_Traditional\\_Houses\\_the\\_Case\\_of\\_Sabzevar\\_2014\\_?auto=download](https://www.academia.edu/8008763/Flexible_Spatial_Configuration_in_Traditional_Houses_the_Case_of_Sabzevar_2014_?auto=download)
- [4]. Foster, N. (2007). A green agenda [Video]. TED. [http://www.ted.com/talks/norman\\_foster\\_s\\_green\\_agenda.html](http://www.ted.com/talks/norman_foster_s_green_agenda.html)
- [5]. Hodbe, A. S., & Sober, R. (2019). Design of modular housing. *International Research Journal of Engineering and Technology (IRJET)*, 6(9), 734–738. <https://www.irjet.net/archives/V6/i9/IRJET-V6I9153.pdf>
- [6]. Maceika, A., Bugajev, A., & Šostak, O. R. (2024). Evaluating modular house construction projects: A Delphi method enhanced by conversational AI. <http://dx.doi.org/10.3390/buildings14061696>
- [7]. Huda, M. F. (2020). Traditional house of Munshigong. Heritage Bangladesh Foundation. <https://www.heritagebangladeshfoundation.com/heritage-building>
- [8]. Islam, M. S. (2007). Flood vulnerability of natural resources of Munshiganj using remote sensing data and GIS techniques (Master's thesis). Bangladesh University of Engineering and Technology (BUET), Dhaka. <http://lib.buet.ac.bd:8080/xmlui/bitstream/handle/123456789/2276/Full%20Thesis%20.pdf?sequence=1&isAllowed=y>
- [9]. Martin, Y. (2021). Research: Shigeru Ban. <https://martinyblog.wordpress.com/2016/06/10/research-shigeru-ban/>
- [10]. Kizilova, S. (2025). Portable housing facing global challenges: Sustainable development solutions. *E3S Web of Conferences*, 614, 04001. <https://doi.org/10.1051/e3sconf/202561404001>
- [11]. Natural disasters: 1.83cr affected in Bangladesh over last four months. (2024). *The Daily Star*. <https://www.thedailystar.net/environment/climate-crisis/natural-disaster/news/natural-disasters-183cr-affected-bangladesh-over-last-four-months-3690736>
- [12]. Bangladesh Disaster-related Statistics (BDRS) 2021: Climate Change and Natural Disaster Perspectives
- [13]. World Bank Groundswell Report (2024)
- [14]. UNHCR. (2025). Global trends: Forced displacement in 2024. UNHCR, The UN Refugee Agency. <https://www.unhcr.org/global-trends>
- [15]. Antonia Piñeiro. (2025). Nigerian Architect Blossom Eromosele Designs Refugee Shelter Inspired by Traditional African Huts.
- [16]. Kusbiantoro, K., Lesmana, C., & Gunawan, I. V. (2024, July). Designing folded modular houses as refugee shelters at disaster sites. *IOP Conference Series: Earth and Environmental Science*, 1361(1), 012014. <https://doi.org/10.1088/1755-1315/1361/1/012014>