

# Evaluating Predominant Construction Methods for Key Building Elements in Sri Lankan Residential Constructions

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## Abstract

The residential construction industry in Sri Lanka demonstrates a clear preference for specific construction technologies and materials used in building. This study explores the Construction methods of Sri Lankan residential buildings, focusing on the cultural and economic importance of housing as a reflection of social status. The research examines key building elements such as roofs, walls, floors, and foundations, uncovering significant trends in material selection and construction methods. The findings reveal a strong preference for traditional masonry techniques in external and internal walls, as well as concrete floors, indicating a standardized approach to these core components. In contrast, roof and foundation types exhibit greater diversity, suggesting more flexibility in their construction. The study emphasizes the enduring influence of local practices and resource availability, offering insights into the construction landscape in Sri Lanka and its balance between tradition and modernity.

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*Keywords:* Houses; Construction method; Culture; Use

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## Introduction

In Sri Lanka, a house is not merely a shelter but a significant symbol of social status, reflecting deep cultural and economic values (Senadeera et al., 2019). The construction of residential buildings is heavily influenced by the nation's economic limitations, particularly as an island with restricted access to materials. These constraints necessitate a reliance on local resources and skills, fostering a construction industry deeply rooted in traditional practices (Jayalath A. & Gunawardhana T., 2017; Dabare et al., 2023). Despite the availability of modern technologies, the small scale of personalized house projects often limits their application, primarily in pre-construction phases involving customized, on-demand items. Where, according to Pathiraja (2012) contributing to a broader understanding of how local practices align with the country's overall construction landscape. Hence, this study aims to identify recurring patterns in material selection and construction methods within selected key elements in Sri Lankan residential buildings.

## The objective of the study

To analyse the prevalence of specific construction methods of key building elements in residential houses across different regions of Sri Lanka.

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## Literature Review

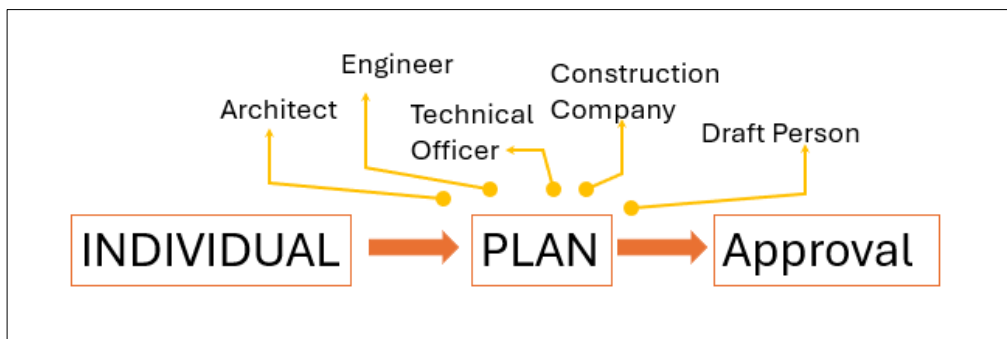
### *House in Sri Lanka*

Individualised house in Sri Lanka is rather a symbol of social status rather than a mere shelter (Hirudini and Yamada, 2024). Culturally, being an owner of a house or a building is considered succession. Literature states that there had been a time in the past where the social level was displayed by the use of materials in a building. Currently regulating the house construction process has generalised in the country. Having to obtain an approval to build a house is now the standard practice. The regulatory body would vary from Urban development authority to Pradeshiya sabha level (Senadeera et al., 2019). Council drawing being the valid document for approvals, laymen is provided with multiple options to obtain the design (Figure 01).

### *House Construction*

House construction in Sri Lanka is predominantly labour-driven, a characteristic deeply rooted in cultural and economic factors. Studies on Construction methods in developing countries highlight that material availability, cost, and cultural preferences play pivotal roles in shaping construction methods (Jayalath & Gunawardhana, 2017; Ofori, 2019). In Sri Lanka, despite the increasing availability of modern materials like cement and steel, traditional materials such as clay, wood, and coconut palm remain widely used, particularly in suburban and rural areas (Dabarea et al., 2023). Construction in these regions is often managed by the 'maha bass' or master builder, who, with the assistance of several helpers, oversees the building process. This tradition is favoured by both house owners and architects due to its simplicity, manageability, and the tactile, sensory experience it provides (Pallasmaa, 2017). Additionally, the phased nature of construction, often dictated by cash flow and material availability, allows for incremental building, fostering a deep connection between the owner and the construction process (Ching et al., 2014; De Silva, 1990).

**Figure 01: Options and practices to obtain a legitimate house plan in the existing practice**



Source: By Author

Commonly used construction types in defined building segments - According to (De Silva, 1990) Tradition and practice leaves the unwanted or practices that are not preferred by the community, but the ones that are carried forward can survive and are referred by the community. Wickramaratne and Kulatunga, (2020) Divides building into seven components for the purpose of the discussion, similarly for the purpose of this study a house was divided into five sections, Roof, External walls, internal walls, floors and foundation. Main argument of the division is that the non-structural components are easy to be replaced by the developing novel technologies and the structural elements are found to be the most likely components where change occurrence in minimum in the house construction.

## Methods

This study was developed using a literature to establish the commonalities in the construction types on different segments in house construction. An online questionnaire survey, based on the prominent selected topologies (indicated in Table 01) and the option of providing information on any other

typology was used to collect data from random sample of 100 participants. Collected data was evaluated using SPSS providing a descriptive statistic to provide the data overview, cross tabulation to explore relationships between selection of types and finishes with the urban, municipality and pradeshya sabha bias and Chi square test to evaluate the significance. Summarised findings are graphically interpreted.

## Results and Discussion

The analysis of construction methods for Sri Lankan residential buildings focused on five key elements: roof type, external walls, internal walls, floor type, and foundation type. The data collected through a questionnaire survey provided insights into the most commonly used construction techniques across different regions, classified under the jurisdiction of the Urban Development Authority (UDA), Municipal Councils (MC), and Pradeshiya Sabhas (PS).

### Summary of Responses

The survey covered various construction typologies for each segment. Respondents provided details on the construction of their house, selecting from predefined options based on the most common Construction methods derived from literature and field observations. The five segments (Table 01) and their respective construction options included:

- Main Roof Type: Gable roof, flat roof, lean-to roof, hip or mixed roof, and others.
- External Wall Construction: Brick, cement block or rubble wall; concrete walls cast on site; steel framework and external panelling; and other.
- Internal Wall Construction: Brick or cement block; concrete walls; partition boards; timber partitions; and other.
- Floor Construction: Brick or rubble layering; concrete; timber; steel; and other.
- Foundation Type: Rubble foundation; concrete strip foundation; pile/mini pile; concrete raft/slab; and others.

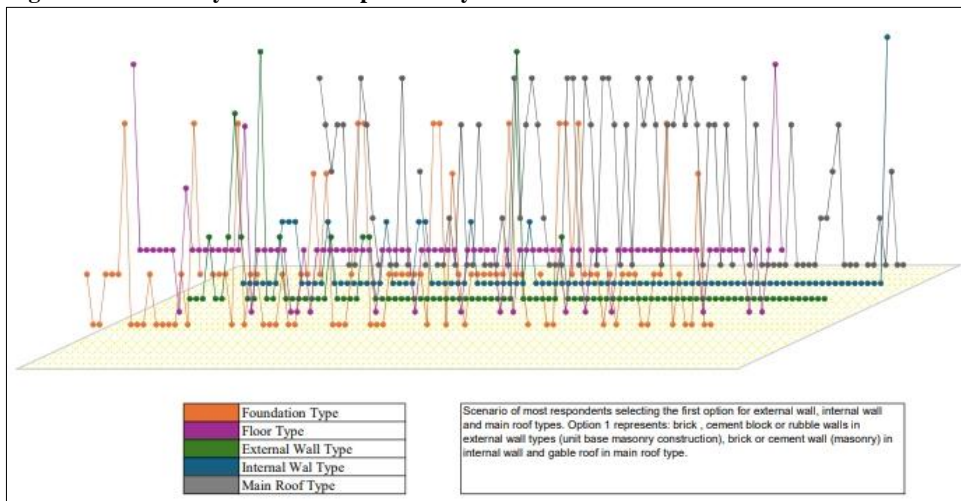
**Table 01: Structure of the Questions and test units**

Answer Options	1	2	3	4	5
<b>Questions</b>					
<b>Main Roof Type of the House</b>	Gable Roof	Flat Roof	Lean to roof	Hip or mixed roof	None of the above
<b>What is the construction if External Walls?</b>	Brick, cement Block or Rubble wall	Concrete walls casted on site	Steel framework and External Panelling (Metal, timber or light weight material)	other	NA
<b>What is the construction of Internal walls</b>	Brick or Cement Block	Concrete Walls	Partition Boards	Timber Partitions	Other
<b>What is the construction of Floor/Floors</b>	Brick or Rubble Layering	Concrete	Timber	Steel	Other
<b>What is the foundation</b>	Rubble Foundation	Concrete Strip Foundation	Pile / Mini Pile	Concrete raft/Slab	None of the above/no idea

*Source: By Author*

The summary statistics (Figure 02) revealed that the mode for most variables was the first option, indicating that gable roofs, brick/cement block external walls, and brick/cement block internal walls were the most commonly selected construction types. Similarly, concrete floors and concrete strip foundations emerged as the most frequently used materials for floor and foundation construction, with minor deviations for these variables.

**Figure 02 : Summary of the Descriptive analysis**



Source: By Author

*Cross-Tabulation and Statistical Analysis*

To further examine the relationship between the construction methods and the location of the house, a cross-tabulation was performed based on the governing authority (UDA, MC, or PS) responsible for the area in which the house was constructed. The analysis aimed to determine whether there was a significant association between construction methods and the city type, under the hypothesis that more developed areas with better access to modern technologies would exhibit different construction preferences. Table 02 presents the p-values from the Pearson Chi-Square test and the Likelihood Ratio test for each of the five key construction segments. The results indicate the following:

**Table 02: P-value Summary**

Crosstabulation with City Types	Main Roof Type	External Wall Type	Wall Internal type	Wall Floor Type	Foundation Type
UDA, MC or PS					
<b>Pearson Chi-Square</b>	0.605	0.042	0.803	0.264	0.697
	P Value > 0.05 : not statistically significant	P Value < 0.05 : statistically significant	P Value > 0.05 : not statistically significant	P Value > 0.05 : not statistically significant	P Value > 0.05 : not statistically significant
<b>Likelihood Ratio</b>	0.557	0.078	0.797	0.223	0.609
	Independent Variables	Independent Variables	Independent Variables	Independent Variables	Independent Variables

Source: By Author

External Wall Type showed a statistically significant relationship with city type (p-value = 0.042), suggesting that external wall construction materials may vary depending on the region. All other variables, including roof type, internal wall type, floor type, and foundation type, did not show any significant association with the city type, with p-values greater than 0.05. This suggests that the Construction methods for these elements are largely independent of regional governance or technological availability.

The results highlight a strong preference for traditional construction methods across most building segments, with gable roofs, brick or cement block walls, and concrete floors being the dominant choices. The significant relationship found in external wall construction suggests that there may be some regional variation in material use, potentially influenced by local availability or economic factors. However, the lack of significant associations in other building components implies that construction methods are relatively consistent across urban and rural areas.

## Conclusion

The study reveals a clear and significant pattern in the construction methods used for different building elements in Sri Lankan residential buildings. Specifically, 88.9% of external walls, 90.1% of internal walls, and 79.0% of floors are constructed using a dominant single method. This strong preference, where more than 75% of users consistently choose the same construction technique, indicates a significant bias toward these methods, regardless of the city in which the house is built.

As a result, the findings suggest that 85% of the population in Sri Lanka prefers masonry external walls (such as brick, block, or bubble), brick or block internal walls, and concrete floors for their homes. However, the choice of roof type and foundation type shows a more moderate distribution, without a clear preference for a single construction method.

This trend highlights a standardized approach in the core elements of Sri Lankan residential construction, particularly in walls and floors, while leaving more flexibility in roof and foundation choices. Elements like walls and floors, reflects the entrenched reliance on traditional construction methods in Sri Lanka, despite the increasing availability of modern technologies. As the studies by De Silva (1990) indicated, the user experience and acceptance by the society of such methods as better practices may be the main reasons to this selection. However, this strong dependency on the rooted practices may have contributed to decrease the adoption speed on new technologies as well. Given the varied climatic and geographical conditions within the country, it is recommended to adopt different and much effective technologies, especially to walls and floors to deliver comfort in the dwelling rather than the mere construction itself. The findings suggest that while some areas may adopt newer materials for external walls, the core Construction methods remain deeply rooted in local traditions and resource availability.

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