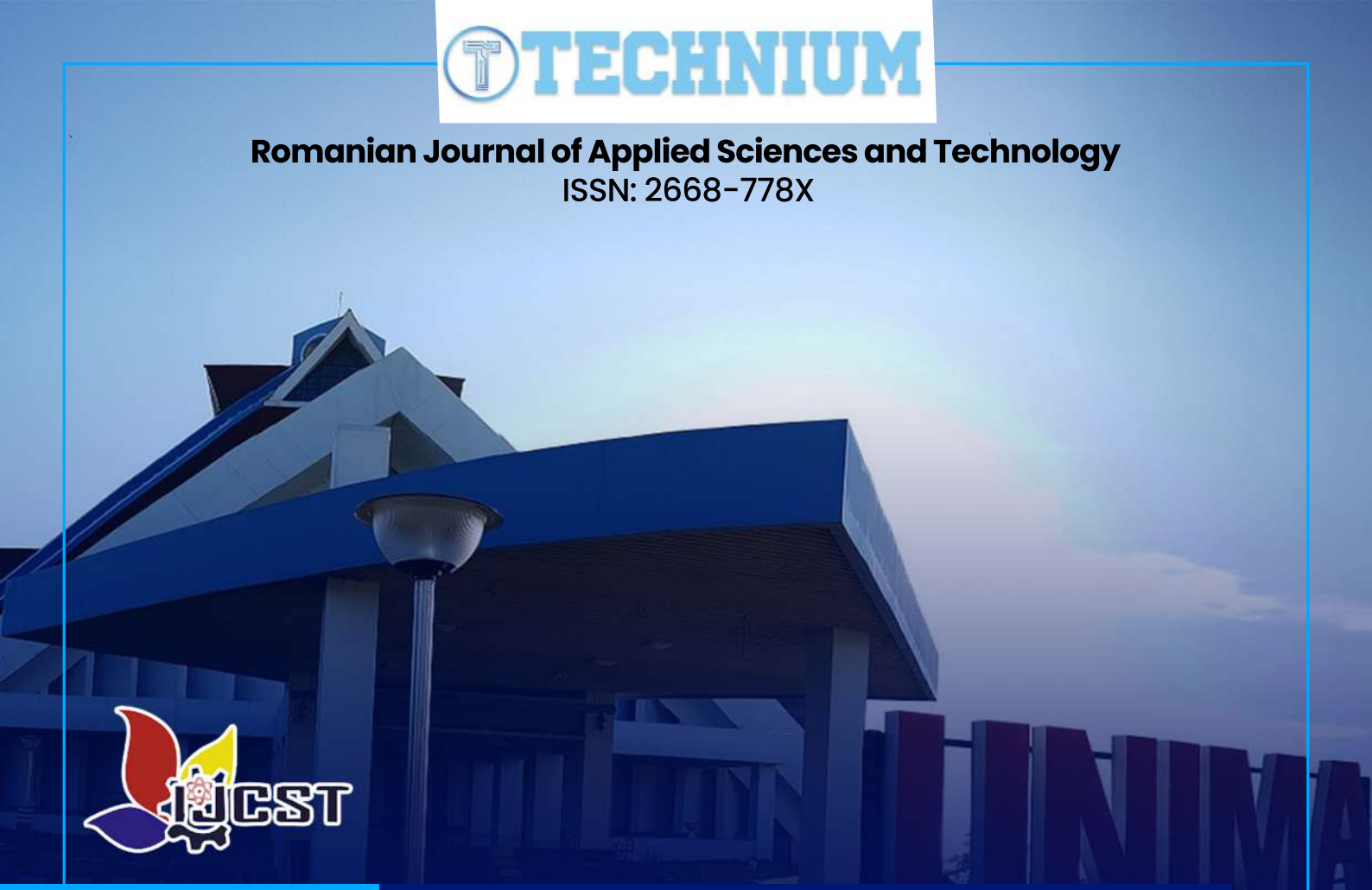
TECHNIUM

Romanian Journal of Applied Sciences and Technology
ISSN: 2668-778X



vol. 16 / 2023

The 7th International Conference on Science Technology

organized by
Faculty of Social Science and
Law Universitas Negeri Manado and
Consortium of International Conference
on Science and Technology

The Innovation Breakthrough in Digital and Disruptive Era

Technium: Romanian Journal of
Applied Sciences and Technology
Vol. 16, 470-474, October, 2023
ISSN: 2668-778X
www.techniumscience.com

Development of Structural Materials and House Construction in Merauke

Anton Topan*, *Biatma* Syanjayanta , *Saliki* , *Maichel* S. Wijaya Mita, *and Aldi* M. Amar Makruf

Department of Architecture, Universitas Musamus, Merauke, 99611, Indonesia

Abstract. The purpose of this research is to find out what factors have resulted in people's interest changing to be interested in the minimalist house model. This will be associated with several determining factors seen from the structural factors in the old building compared to the building model that is widely built by the Merauke Community. The structure of the Kancingan house for the people of Merauke consists of the wooden structure of this historical building. Along with the times, there has been a change in function from the aspect of building construction which was once considered a strong structure. This can be influenced by the cost, materials, culture and the level of difficulty in building. The author identifies through a case study of kancingan houses around the city of Merauke which includes a residential area where almost 70% of the houses have a kancingan structure. The result of this identification is to find out what causes people to prefer modern houses over kancingan houses.

Keywords: Home History, Architectural Development, Merauke, Structure

* Corresponding author: anton@unmus.ac.id

TECHNIUM

Technium: Romanian Journal of
Applied Sciences and Technology
Vol. 16, 470-474, October, 2023
ISSN: 2668-778X
www.techniumscience.com

1 Introduction

Rumah Kancingan is one of the buildings with historical architecture in Merauke. The historical architecture of Merauke referred to here is the form of architecture found in the Merauke City area which in the past was a Dutch housing and culture that was interrelated and had a lot of influence on all central cultural activities at that time. As a result of the development and progress of the times and technology, people's abilities are also increasing, patterns of thinking and habits of life are developing, this affects the field of architecture, especially historical buildings. The development of houses with a minimalist architectural style in urban environments formed from clustered housing only refers to the visual side, especially in solving the facade (Nandang, 2010). People have generally abandoned the order and rules in the basic concept of planning historical buildings, although sometimes there are efforts to blend modern and historical elements in order to try to preserve historical values. Due to changes in society today, old traditions tend to be abandoned. This is due to changes in mindset supported by social and environmental changes. Similarly, traditional houses are increasingly rare.

In urban areas in general, people are more comfortable building houses with modern concepts or living in housing. Not only in cities, but rural communities have also begun to change their dwellings

into modern buildings (Utomo & Subiyantoro, 2012). In connection with the explanation of the phenomena and facts of changes in the style of houses that exist in the Merauke community, the focus and scope of this research aims to find out what factors caused the shift in the loss of historical houses and will also be reviewed based on the community's background experience of structural knowledge and materials used.

2 Literature Review

The structure of the building is the parts that make up a house or building The structural parts of the building generally consist of foundations, sloofs, walls, columns, rings, and roof.

Columns are the main structure to carry the weight of the building and other loads such as live loads (people and goods), as well as wind loads. Columns serve a very important function, so that the building does not collapse easily. The load of a building starts from the roof. The roof load will pass the load it receives to the column. The entire load received by the column is distributed to the ground surface below. There are several types of materials that can be used as columns such as wood, reinforced concrete and steel. Column structure material is an important part of structural planning & construction.

Concrete structures are the material that is always chosen to build home construction. Not without reason, the use of concrete in the construction of buildings, especially residential houses is because of its long durability and its price which is certainly more affordable and follows modern developments.

3 Changes in the Use of Building Structure Materials

In general, the kancingan building structure is semi-permanent if not handled properly, because the material is made of natural materials, namely wood, which can be fragile and damaged if left unexposed to sunlight & rain.

However, in recent times, people in Merauke Regency have changed some materials in the building elements of their houses. Changes in the use of materials in each building are different. Some have changed the structural materials used. Starting from traditional to modern materials. The following is the development of structural materials.

3.1 Stud structure material (wood)

A wooden structure house is a house building using a wooden truss structure system, commonly referred to as a wooden house, its characteristics are that all components of the roof structure, beams and columns and walls used are wood, but in contrast to Kancingan House, Kancingan House has a wooden column structure and brick walls.

Wood is flexible, versatile and one of the most sustainable construction materials. This is because wood is obtained from felling trees, either in natural forests, industrial plantation forests (HTI) or other locations. Wood has been used as a building material for thousands of years. This versatile raw material is not only used for building construction, but is also widely used in the furniture and home decoration industries, in addition to other business fields.

The common woods on the market are Bus wood (*Melaleuca cajuputi*) and Rahai wood (*Acacia auriculiformis*). There are 2 (two) types of Bus wood, namely Red Bus wood and White Bus wood. The use of Bus wood as a construction material is usually categorized as durable class 2 wood but along with the development of knowledge, wood is categorized in codes E-5 to E-25 so it is necessary to check its properties to be adjusted to the wood code.

Of the various materials commonly used in building materials, the following are the advantages of using wood as a construction material

- Easy to work with because it can be made or shaped as desired, and easy to nail, bolt or glue.
- The process and duration of the work is faster because many local craftsmen are proficient in it
- Easy to obtain, because it is a natural resource that is still widely available and can be recycled again by reforestation.
- More economical because the price is relatively cheap compared to other building materials
- The strength of wood is quite high with light weight, even solid wood will be durable and long-lasting.
- Good resistance to electricity and chemicals.

Technium: Romanian Journal of Applied Sciences and Technology
Vol. 16, 470-474, October, 2023
ISSN: 2668-778X
www.techniumscience.com

- Wood is a natural thermal insulator that is very effective in isolating cold and heat, and is also a good noise absorber.
- Certain types of wood have beautiful textures and wood grain that have more value to be used as decoration elements.
- Safer and more flexible in the event of an earthquake so that houses made of wood will remain in their original condition, not easily cracked, and not easily shifted

Rumah Kancingan is a Dutch heritage house inhabited by the people of Merauke until now. Kancingan Wood Structure Material is the main structure of this building. Until now it is still firmly standing as a house for the people of Merauke to live in, there are also several damaged houses, seen from the structure of the kancingan which looks fragile and crumbling because it is not properly maintained by the owner of the house from the previous year until now.

The construction of kancingan houses is still in great demand by the people of Merauke, because the costs are not too expensive and the prices are affordable. One of them is that many kancingan buildings are built into residential houses, rental houses to small shop houses on the outskirts of Merauke city.

Fig. 1. Residential House

Fig. 2. Wooden House Structure

3.2 Concrete Structure Material

A concrete structure is a structure that consists of concrete material. Concrete is the most commonly used material for making building structures, such as floors, walls, and columns. Concrete structures are one of the most commonly used structures in the world. Concrete is the material that is always chosen to build home construction. Not without reason, the use of concrete in the manufacture of building construction, especially residential houses is due to its long durability and its price which is certainly more affordable and looks modern.

In the home construction process, many things need to be considered to get quality construction results. Starting from the construction budget, construction implementation time, construction implementation techniques, to construction labor. In addition, one of the other crucial things that greatly determines the results of construction is the selection of construction materials. One material that is often used in home construction is reinforced concrete. Reinforced concrete is a type of concrete in which steel reinforcement is embedded. This aims to increase the strength of the concrete. This type of concrete is very popular not only in Indonesia, but also around the world. Reinforced concrete with its various benefits is a wise choice of material for the construction process of your dream home.

Reinforced concrete has many advantages. This type of concrete has a greater tensile strength than ordinary concrete, because in the manufacturing process, concrete is embedded with steel reinforcement. This combination makes reinforced concrete able to withstand tensile forces as well as strong compressive forces. Reinforced concrete also has properties that are resistant to vibration. This allows the house to last longer and reduce maintenance costs.

Reinforced concrete materials consist of sand, gravel, steel reinforcement, and cement and water as binders. The materials that make this type of concrete are easily available in Indonesia, and the production

process is also relatively easy. In addition, reinforced concrete is also easy to shape according to your wishes and construction needs. Reinforced concrete is often used as a choice for general construction materials, such as for the construction of buildings, bridges, dams, tunnels, irrigation facilities, retaining walls, tanks, and so on. Apart from being used for general construction, this material is also suitable for use in home construction as a substitute for wood, bamboo, and other materials. Reinforced concrete is commonly used in building structures due to its strong properties. Therefore, this material is often used for foundations, tie beams, concrete slabs, columns, beams, and shear walls. Not only that, you can also use reinforced concrete for home
furniture. One of the most common uses is for concrete table leaves, concrete garden benches, and decorative boundary walls in the garden. By using a concrete base, you can add a beautiful industrial touch to your home.

Construction planning can help you provide enough time for home construction. In addition, don't forget to be careful in choosing the concrete that you will use. For strong, durable, and quality construction

Technium: Romanian Journal of
Applied Sciences and Technology
Vol. 16, 470-474, October, 2023
ISSN: 2668-778X
www.techniumscience.com

results, make sure you use Merah Putih Beton products that are designed for a variety of applications according to consumer demand. This product is available in various quality options and can be used for the construction of various constructions and infrastructure and other developments.

Advantages of Concrete Compared to Other Construction Materials

- Concrete has the strength to withstand high pressure
- Raw Materials for Concrete Making are Abundant in Indonesia
- Affordable Maintenance Costs
- Can be up to more than 10 years durable

Fig. 3 Bloreb House

Fig. 4. Concrete Structure

3.3 Steel Structure Material

Choosing the type of steel construction for a building is very important before starting the design and construction process Because building a building, be it a building or a residence, is an activity that incurs large costs. Not only for materials and design fees by architects, but also paying labor wages. Therefore, when you want to build a building, you need to do the planning first. One of the important things is choosing what construction to use. Generally, Indonesian people use wood construction as a foundation. However, as time goes by, steel construction is now more widely used.

Steel does have many advantages when compared to wood. However, what makes this construction more and more widely used is because it is sturdy and has a high level of efficiency. This time, we will discuss steel construction which is very suitable for buildings, even houses. Steel construction is a construction system that relies on steel as its foundation. Steel construction for tall and spacious buildings because it proves to be more sturdy and also safe Not only that, steel construction is also easier to assemble and speeds up the construction process so it is widely used.

In building construction, time efficiency is very important, because it can help reduce construction costs. So, it is natural that for the construction of large buildings whose designation is this type of construction

business is a mainstay. The steel structure in the building is a promising long-term investment and if dismantled the selling value remains high.

If you plan to build commercial buildings such as shop houses, boarding houses, restaurants, factories or warehouses, or want to use it to build housing, there are several things to know, especially you should know what are the benefits of steel construction in building construction. Here are some of the benefits of steel construction:

- It is faster in terms of workmanship so that it can reduce the cost of construction labor. Steel structure construction can save months of work.
- Saving architectural costs, for the use of steel structure you don't need to wrap it again with betton

to make it look good, just paint it.

- The structure is stronger and more durable, therefore not only has a function as a building, steel structures can also be used as your long-term investment considering the price of steel that will not drop much even if it is demolished.
- It is suitable for commercial buildings such as shophouses, restaurants, and boarding houses. Because the construction is fast, the building can also be used faster so that profits can be obtained immediately.

Well, those are some of the benefits of steel construction. If you want to build a residential or commercial building, steel structure is the right choice. Although you have to spend more in terms of purchasing materials, steel construction for buildings provides benefits that are equivalent to these costs. Steel structures are more often used for tall buildings such as hotels, shops, offices and warehouses. For the construction of steel material structures in residential houses is still minimal in the city of Merauke.

Technium: Romanian Journal of
Applied Sciences and Technology
Vol. 16, 470-474, October, 2023
ISSN: 2668-778X
www.techniumscience.com

Fig. 5. Regent's Office

Fig. 6. Steel Structure

4 Conclusion

The development of structural materials in Merauke Regency has undergone changes that are adjusted by technological developments and needs in the use of structural materials. The community initially chose to use materials sourced from nature that were well utilized, until entering the modernization era using materials of much better quality. The selection of materials is also based on function and needs, as well as considering the process of workmanship that is easy and efficient and can save time and costs.

References

1. Doloksaribu, Budi, and Dewi Sriastuti Nababan. "Experimental Study of the Strength of Truss Structure Using Merauke Bus Wood." Mustek Anim Ha 10.3 (2021): 112-116.
2. 2. Irnawan, Dody, and Silvia Yulita Ratih Setyo Rahayu. "Changes in Javanese Community Interest in Traditional Joglo Limasan Model Houses into Modern Houses (Case Study of Kemloko Village, Godong, Grobogan, Central Java)." KODEPENA TECHNOSCIENCE JOURNAL 1.1 (2020): 37-45.
3. 3. Studio, Architect. "Definition of Columns and Types of Columns in Buildings." (2021).
4. 4. No, Member of IKAPI. Concrete Technology and Building Materials. Media Sahabat Cendekia, 2019.
5. 5. Setiawan, Agus. "Steel Structure Planning with LRF D Method." (2008).
6. Hartanto, Tri. "ADVANTAGES AND DISADVANTAGES OF USING REINFORCED CONCRETE AGAINST WOOD IN TRUSS CONSTRUCTION." Journal of Civil Engineering and Architecture 9.13 (2011).
7. 7. Safrin Zuraidah, S. T. STEEL STRUCTURE ELEMENTS. SCOPINDO MEDIA PUSTAKA, 2022.
8. 8. Saefudin, Arief. "Utilization of wood as a building structure material." Menara: Journal of Civil Engineering 2.1 (2007): 14-14