

**ORIGINAL ARTICLE**

# A Preliminary Investigation into the Unique Features of Timber Application in Sarawakian Traditional Architecture

Dayang Damia Batrisyia, \*Nayeem Asif and Aliyah Nur Zafirah Sanusi

Department of Architecture, Kulliyah of Architecture and Environmental Design, International Islamic University Malaysia, Gombak, Malaysia

**ABSTRACT** - This study aims to assess the utilization of Sarawakian timber in contemporary architectural practices, focusing on its distinctive features. The issue addressed in this study pertains to the under-emphasis and limited adoption of Sarawakian distinctive timber features in contemporary Sarawakian architecture, influenced by various multifaceted factors. The research employed two primary methods for data collection: observation and interviews. Initially, significant architectural elements in heritage timber buildings were meticulously observed to comprehend the various types and forms of Sarawakian timber characteristics present in these structures. This observation unveiled the intrinsic qualities of timber in these buildings, elucidating their contributions to overall architectural style and design. Subsequently, expert interviews were conducted within relevant industries to gain deeper insights, particularly in understanding the challenges and limitations associated with employing timber as a building material in Sarawak. The research findings established a positive correlation between Sarawakian timber characteristics and its prevalent use in architectural applications, showcasing its versatility. The collected data, derived from both observation and interviews, provided a comprehensive understanding of the intricate relationship between Sarawakian heritage architecture and timber utilization. The study recommends that the Sarawak government consider implementing policies that endorse timber as a prominent building material, ensuring the authentic presentation of Sarawakian timber characteristics in architectural endeavors.

**ARTICLE HISTORY**

Received: 29 Nov 2023

Revised: 18 Dec 2023

Accepted: 15 Jan 2024

**KEYWORDS***Sarawak architecture,  
Timber architecture,  
Sarawak heritage,  
Sustainable material.***INTRODUCTION**

Timber is a building material that bears the characteristics of Sarawak. It is a type of wood utilized as a structural material in construction and for carpentry and other engineering purposes [1]. In Malaysia, timber is one of the longest-utilised natural resources in the construction industry. It is the most helpful building material since it has various valuable features such as low heat conductivity, relatively high strength, low bulk density, and, most importantly, raw material availability, especially in Sarawak.

Sarawak is endowed with an abundance of tropical woods, with more than 70% of its 124,450 square kilometres remaining forested. Forests provide a natural habitat for thousands of plant and animal species. Timber is one of the natural resources helping Sarawak's economy grow [2]. Therefore, timber is known as a resource that can be related to Sarawak since the early years. One piece of evidence can be seen when every traditional product of Sarawak was made out of timber, from ornamentations and buildings to some parts of the traditional attire of some ethnicities. Thus, the timber itself can reflect the characteristics of Sarawak, and the application of these characteristics in traditional Sarawakian timber architecture can be understood through the lens of wood identification, sustainability, and cultural influence on woodcarving motifs [3; 4]. However, nowadays, timber has been replaced with other materials, especially in building construction.

\*Corresponding Author: Nayeem Asif. International Islamic University Malaysia (IIUM),  
email: [nayeem@iium.edu.my](mailto:nayeem@iium.edu.my)

Hence, this research aims to discover the issues in using timber as building materials. Since building materials in Sarawak nowadays were replaced with other building materials, some issues must be causing these changes. The research will also discover how timber can be utilised as building materials in Sarawak, both in vernacular and modern architecture.

## LITERATURE REVIEW

This section is divided into two sub-topics. The first sub-topic focused on the application of timber as building materials. The second sub-topic discussed Sarawak's vernacular architecture. This topic will be divided into three sections: structural, non-structural, and ornamental.

### Timber as a Building Material

Timber has been utilised for a variety of reasons from ancient days. Whether it was Egyptian, Mesopotamian, or Hardpan civilisation, the uses for timber were discovered. Even now, it is considered the most essential construction material. People have a misconception about timber, believing that any wood is timber. However, wood includes every type of wood, whether it is burning, structural, or furniture. Any wood suitable for construction as a structural material is named 'timber'. As a result, it can be concluded that timber encompasses all kinds of wood, whereas wood does not encompass all sorts of timber. Various features must be considered to distinguish timber from wood or trees. For instance, the width of the tree trunks should not be less than 600mm<sup>3</sup> in girth. It should also be mechanically workable and have a low heat conductivity.

### Sarawak's Vernacular Architecture

Sarawak, Malaysia's largest state, is home to 27 ethnic groups. Each of the 45 dialect groups has its own stories, beliefs, traditions, and civilisations. Different tribes, such as the Kayan, Kenyah, Lun Bawang, and Kelabit, make up the Orang Ulu, or 'people from upriver.' Each ethnic group have its style of architecture. The only similarity in this scope is the material used, which is timber [5; 6].

### Iban Longhouse

The Ibans have traditionally lived in longhouses and villages under one roof, and groups of longhouses typically band together under one leader. In the earlier days, the longhouse was generally rather big since it was desirable to have many fighting men for defensive purposes. Twenty to thirty families, if not more, would reside beneath one roof. Familial ties would relate to many [7]. Architecturally, a longhouse has three main parts:

1. The long interior communal room is called *ruai*.
2. The exterior corridor, known as the long open verandah, is called *tanju*.
3. The private room for each family is *bilek*.

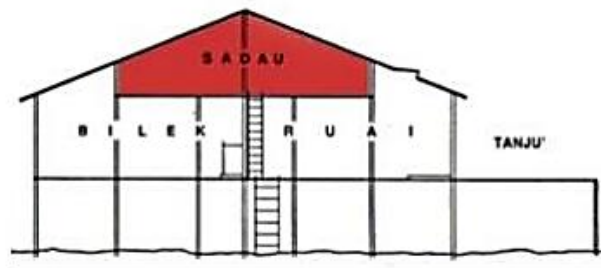
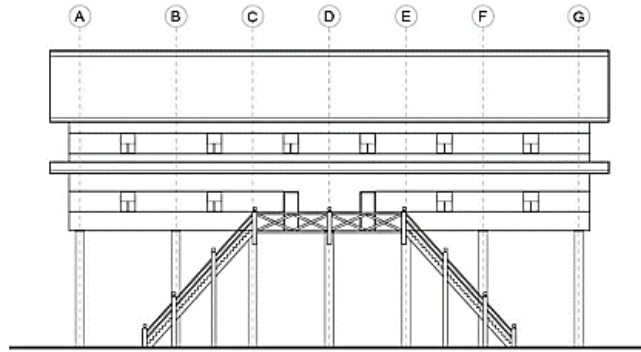


Figure 1. Section of the traditional Iban longhouse.

## Melanau Tall Longhouse

The Melanau tall longhouse is a unique form of traditional architecture in Sarawak, and it may be built up to 40 feet above the ground (Figure 2). Each tall longhouse has 20 to 30 living areas and may house up to 50 households simultaneously. The community's traditional culture influences the construction of this one-of-a-kind longhouse since it has played an essential role in their everyday lives from the dawn of time. These buildings were built at strategic locations, such as river mouths. Such locations were considered because they provided security from pirates and other tribes, particularly the Iban head-hunters.



**Figure 2.** Melanau Tall Longhouse Front Elevation.

## Structural Elements

The structure of the Melanau tall longhouse is made of natural materials known to be sturdy and weather resistant, such as Belian tree trunks (Borneo ironwood), nibong (palm) tree trunks and sago tree trunks. These materials are readily available from the surroundings and are primarily utilised for the major structural components of the dwellings. The Melanau traditional house has a strong and tall construction. It is built with a foldable roof awning. The roof is designed in raised and elongated shapes to enable the construction of an attic. This attic is typically used to hold a wide range of ornaments. According to [8], such a roof could withstand strong winds and heavy rain all year.



**Figure 3.** Melanau Tall Longhouse Mortise and Tenon Jointing between Column and Beam.

## **Non-Structural Elements**

The staircase is one of the most significant features of the non-structural element in Melanau's tall longhouse. Every rung on every staircase in the house must be in odd numbers for the Melanau. They think having an odd number of stairs, similar to belian tree trunks for flooring in the Serambi area, will bring blessings, good fortunes, and benefits to its occupants, including prosperity and good health. Even-numbered stairs are thought to bring hardships to its residents, including difficulties in life, such as becoming sick and other catastrophes [9].



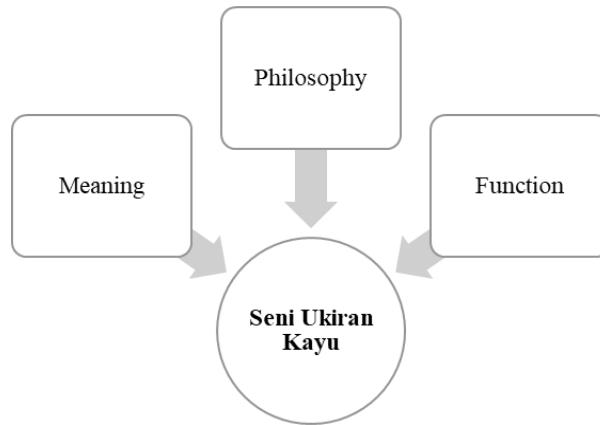
**Figure 4.** Melanau Tall Longhouse Main staircase.

## **Malay Traditional House**

The stairs in Sarawak Malay traditional houses are bigger and wider. The spacious staircase had a very welcoming mood for the guests. It can also be likened to the openness of the house's occupants to receive guests or neighbours who want to visit the house. The large and wide staircase has its philosophical value: on the day the house's occupant dies, it makes it easier for the remains to be unloaded for burial. The stairs of this house have odd numbers that carry symbols of the five pillars of Islam. This house is built based on desire or pleasure and Islamic and Malay customs; each design has meaning and philosophical value.

## **Ornamental**

According to Daud et al., [10], the art of Malay wood carving is one of the Malay arts and culture that includes three (3) aspects that influence the Malay community: status, beliefs and culture. These three aspects were mentioned in every wood carving through various philosophies, definitions and functions in Figure 5. In Malay traditional houses, staircases are one of the crucial factors since stilt houses bring the importance of staircases to enter the house. The main staircase was designed to convey certain meanings and philosophies through architectural characteristics and patterns shown [11].



**Figure 5.** Wood carving theory of Malay traditional house.

Figure 6 shows a stair carving in a Sarawak Malay traditional house with the ‘*itik pulang petang*’ motif. This motif describes sustenance. The duck carving shape depicts a duck climbing the stairs. According to philosophical values, it is similar to a human being or the house occupant going out in the morning to seek sustenance and returning in the evening to bring it back.



**Figure 6.** ‘Itik pulang petang’ motif [11].

Malays became fans of *khat* calligraphy after accepting Arabic writing and the Quran. *Khat* calligraphy composed the verses of the Quran with plant motifs. Islamic art contains more than just aesthetic values. It also contains a special and profound intellectual burden [12].

The *khat* calligraphy found in Sarawak Malay's traditional houses is applied in many places, such as screens, doors, and living rooms because it is believed to avoid elements that are not good for entering the living space. The selection of calligraphic motifs on the carvings of this house because of their beauty and aesthetic power meets the soul and taste of Islam. The informant believes that the calligraphic motifs contained in this house will always be blessed, protected by Allah S.W.T from misfortune, cheapened sustenance, and peaceful, and symbolise that the house's occupants are Muslims.

## METHODOLOGY

This research, as a preliminary investigation to the issue in hand, uses a qualitative approach in evaluating timber as building materials that reflect the characteristics of Sarawak. Literature review, observation, and expert interviews are the three methodologies utilized. The literature review will examine case studies and precedent studies to acquire relevant data, which will then be compared to ensure the research's




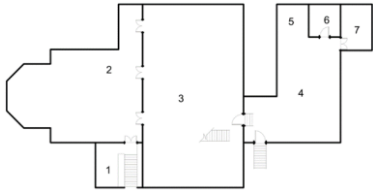
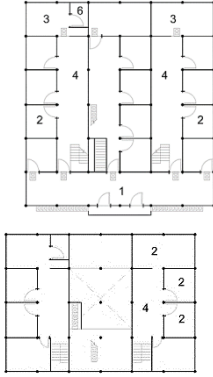
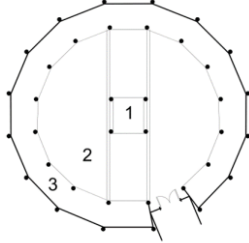






validity. Relevant research will be studied in case studies by picking connected issues related to the study objectives. The studies will be done in response to the second research objective: to analyse the existing use of timber as building materials that reflect the characteristics of Sarawak. A study of credible sources, such as published reports, journals, conference papers, thesis papers, and websites, is used in this strategy. A semi-structured interview was conducted with experts in the timber industry of Sarawak to get more information on timber as a building material in Sarawak, which will reflect the characteristics of Sarawak. The interview questions were designed in response to the first research objective: to identify issues that prevent people from using timber as building materials that reflect the characteristics of Sarawak. The interview session was conducted face to face, is expected to last for 2 to 3 hours, and will be digitally recorded and transcribed verbatim. A structured observation of modern architecture in Kuching, Sarawak, that uses timber as building materials was done to analyse the existing use of timber as building materials that reflect the characteristics of Sarawak.

## RESULTS

Observation on the characteristics of timber products used in Sarawakian architecture.

**Table 1.** Comparative analysis of Sarawakian architecture

Rumah Melayu	Rumah Melanau	Rumah Barouk
		
<p>• <b>Floor Plan</b></p>		
		
<p><b>KEY</b></p> <ol style="list-style-type: none"> <li>1. Veranda</li> <li>2. Luar (Living Area)</li> <li>3. Tengah (Sleeping Area)</li> <li>4. Dapur (Dining Area)</li> <li>5. Kitchen</li> <li>6. Amenities</li> <li>Open Washing Area</li> </ol>	<p><b>KEY</b></p> <ol style="list-style-type: none"> <li>1. Serambi (Communal Area)</li> <li>2. Bedroom</li> <li>3. Kitchen/ Dining</li> <li>4. Living</li> <li>5. Balcony</li> <li>Amenities</li> </ol>	<p><b>KEY</b></p> <ol style="list-style-type: none"> <li>1. Fireplace</li> <li>2. Ceremonial Area</li> <li>Raised Platform</li> </ol>

• Description		
 <p>The windows are typical Malay Traditional House with tall double-leaf doors that swing horizontally. There were railings at the inner part of the windows. The outside spaces' railing pattern is more complicated than that of other space railings.</p>	 <p>The windows were made from a rectangular timber framing opening with a single-leaf window that opens vertically. The window leaf was tied to the window frame at the upper part of the window mechanism. The lower part of the window leaf will be held using a stick to keep it open.</p>	 <p>Rumah Baruk does not have windows since the roof structure acts as an opening. Some roof parts can be swung vertically and held with a stick to create an opening.</p>
 <p>Rumah Melayu uses a traditional timber staircase with carved timber as railings.</p>	 <p>Rumah Melanau staircase was carved from circular timber with smaller diameter timber as railing.</p>	 <p>Like Rumah Melanau, Rumah Baruk also has a similar staircase concept.</p>
 <p>Ornamentation was mostly carved based on floral pattern</p>	 <p>Most of the ornamentation is based on human pattern</p>	 <p>The Bidayuh community likely produced ornamentation based on hornbill</p>

Expert interviews on issues in applying timber products in contemporary Sarawakian architecture. The responses were recorded verbatim, and the following table presents excerpts of significant comments that lead to answering the objectives of the study.

**Table 2.** Comparative discussion on experts' opinion

Respondent 1	Respondent 2	Respondent 3
<p>• <b>Status of timber building materials industry in Sarawak.</b></p>		
<p>Timber from the natural forest is declining because of specific policies.                      However, at the same time, the government want to promote 1 million acres of planted forest.                      They want to have this planted forest as a resource to substitute timber from natural forests.                      The government wanted to achieve 1 million acres by 2020, which they haven't                      The latest figure, 2016/17, already covers about 400,000 acres, far from the target. The target shifted to 2030 or 2025.                      The government want to cut down the supply of natural forest, and they want to supply more from the planted forest.</p>	<p>Timber is still very popular as a building material in Sarawak.                      Supply becomes more limited and expensive.                      Quality in terms of durability, grain design and the maturity of the wood served as building materials.                      Famous timber for building materials, e.g., light hardwood timber, is hard to find.                      Few species become extinct and are listed under the Red List of the International Union for Conservation of Nature.                      In Sarawak, more species are listed as Protected Plants under the Wildlife Protected Ordinance 1998 and Forest Ordinance 2015.</p>	<p>In general, as in Malaysia's context, the status of the timber building materials industry is decreasing.                      However, this is due to the need for more sources.                      Local loggers prefer to export it overseas instead of to our local market.                      Since exporting timber overseas will get higher prices compared to the local market.                      Timber for building construction needs to be concerned about these two things. 1. the moisture content in timber 2. juvenile and matured timber.                      Generally, the timber industry is declining due to timber sources needing to be more systematic and timber for the local market being low-quality timber.</p>
<p>• <b>Opinion on the declining usage of timber as building materials.</b></p>		
<p>Some species of timber, especially 'Belian', are getting scarce. It takes about 100-200 years to grow to a merchandise size.                      Quality of new timber declining.                      Juvenile wood strength could be better for building materials.                      The diameter is getting smaller.                      Price (too expensive).</p>	<p>There is a decline of suitable timber species in the forest.                      Forest opening for the development leads to less of a source of timber.                      Expensive.                      Less hardwood timber for building or low-quality timber.                      Policy to reduce the usage of timber for building materials.</p>	<p>The supply of quality timber needs to be more systematic.</p>
<p>• <b>Relation between timber as building materials and Sarawak identity</b></p>		
<p>Gives an opinion that to use timber as building materials, sometimes, the government must intervene through the policy.                      "Last time they mentioned, if the government implement the policy, saying that each house must have 5 or 10 or 20% of timber materials if not, that house will not be approved" R1.</p>	<p>The facts are that timber and stone play crucial roles in Sarawak's ethnic tradition and culture.                      Today, these practices are very rarely observed in the said community due to the changes in faith and religious belief.                      Even if there are, making the said materials has no bringing in terms of original purpose and meanings.</p>	<p>West Malaysia and East Malaysia have different timber products.                      These types of timber will decide the pattern stroke. That is why the timber ornamentation in West Malaysia is different from East Malaysia.                      Since the latitude is different, even the flora and fauna species differ. These were how it started to get its identity that shows the Sarawakian identity.</p>



## DISCUSSION

### Expert' insight on the challenges and prospects in Sarawak's timber industry

When examining Sarawak's timber industry reveals a consensus among three key respondents on its shared challenges and distinct viewpoints. All respondents agree on the industry's decline, pointing to specific policies, limited supply, and a preference for exporting timber overseas for better prices as primary causes. They also express shared worries about the decreasing availability and quality of timber, emphasizing the critical issue of species extinction.

However, subtle differences emerge in their perspectives. Respondent 1 emphasizes the government's role in addressing these challenges through policies, advocating for mandatory timber usage in house construction. In contrast, Respondent 2 focuses on cultural implications, noting the diminishing practices related to timber and stone due to changing faith and religious beliefs. Respondent 3 introduces a regional perspective, highlighting the distinct timber products between West and East Malaysia that contribute to Sarawak's unique identity. These diverse viewpoints capture the multifaceted challenges faced by Sarawak's timber industry, touching on economic, cultural, and environmental dimensions.

### Characteristics of timber products used in Sarawakian architecture.

When looking at the observation done on three types of vernacular houses of three different ethnicities in Sarawak, we can see many differences. These differences are mainly due to the surrounding context and their beliefs. However, there were also similarities. The most obvious similarities were the building materials. Since 70 percent of Sarawak's territory is forested, all ethnicities use timber as building materials. The other similarity was that all vernacular houses were built on stilts, either on flatland or near the river.

The Malay community in Sarawak is known to be Muslim. This was why Malay vernacular architecture in Sarawak differed slightly from other ethnicities, especially in ornamentation. Malay ornamentations focus more on flora; however, Melanau and Bidayuh ornamentations focus on stories which include human and fauna species.

### Issues in applying timber products with local identity in Sarawakian architecture.

According to the expert interview, there were a few challenges associated with applying timber products in Sarawakian architecture. The characteristics of Sarawakian timber slightly evolved due to shifts in religious beliefs with the advent of Christianity and Islam, leading to the gradual loss of knowledge and skills required for the original concept. Despite these changes, modified timber products were still being produced.

The recommendation is to use timber products to showcase the originality of Sarawakian architecture, rooted in timber as the primary material historically. However, the main challenge lies in the availability of these timber products. Respondent 1's insight on the government's role is in agreement, acknowledging that the planned transition to a planted forest as a substitute for timber from natural forests faced challenges but is still ongoing.

To sustain the use of timber as a building material reflecting Sarawakian identity, authorities and the Sarawak government should consider implementing a policy. This could start with government buildings incorporating a percentage of timber with Sarawakian characteristics. Given the designation of the Sarawak Delta as a National Geopark Heritage, such a policy could contribute to the conservation of the cultural significance representing unique Sarawak flora and fauna.

## CONCLUSION

The study assessed the utilization of timber products in Sarawakian architecture as a means to showcase the distinctive Sarawakian identity. While the use of alternative building materials is not discouraged, there is a recommendation to preserve the essence of Sarawakian architecture from traditional to

contemporary structures by incorporating timber. This integration of timber in contemporary architecture could redefine the identity of Sarawakian architecture.

This study can serve as a reference for researchers looking into the characteristics and challenges associated with applying timber products in contemporary Sarawakian architecture. Additionally, for a comprehensive understanding of the historical elements that influenced Sarawakian architecture, it is essential to delve deeper into the arts and culture of each ethnicity before the modifications occurred. Given that design inspiration could come from various sources, researching Sarawakian architectural features from materials beyond timber is also highly recommended.

## REFERENCES

- [1] Bazmi S. and Nitesh D. A. (2016). "Timber from Architecture Perspective," 2016.
- [2] Pakhriazad, H.Z. and Hasmadi, M. (2010). "International Journal of Marketing Studies [www.ccsenet.org/ijms](http://www.ccsenet.org/ijms) 92 A Study on Trend of Logs Production and Export in the State of Sarawak, Malaysia," [Online]. Available: [www.ccsenet.org/ijms](http://www.ccsenet.org/ijms)
- [3] Azmin, A.K., Abdullah, F., Sanusi, A.N.Z., Yusof, Z.B., and Asif, N. (2021). "Sustainability Of Malay Wood Craftsmanship Symbolism In Deciphering Malaysia's Architectural Identity," in *Proceedings of DARCH 2021-1st International Conference on Architecture & Design*, International Organization Center of Academic Research. doi: 10.46529/darch.202105.
- [4] Mendoza, R. C. , Romano, A. D., Dulnuan, E. D., Bulong, M. P., Malabrigo, P. L., and Habito, C. D. L. (2022). "Wood Identification: A Tool for Preservation of Indigenous Architecture of Traditional Houses in Ifugao, Philippines," *International Journal of Wood Culture*, vol. 2, no. 1–3, pp. 53–88. doi: 10.1163/27723194-bja10004.
- [5] Yusuf, A. B. H. (2020). "Identity for Traditional Sarawak Malay House. Preliminary Research Findings In The Roof Design". Available: <https://api.semanticscholar.org/CorpusID:235739325>
- [6] Yakub, M. F., Vermol, V. V., Anwar, R., and Hassan, O. H. (2015). "Developing Sarawak Motif Elements of Ventilation Pattern Through Ceramic Stoneware Materials," in *International Colloquium of Art and Design Education Research (i-CADER 2014)*, Singapore: Springer Singapore, pp. 469–476. doi: 10.1007/978-981-287-332-3\_49.
- [7] Lin, F.C.H. (2020). "The History of Architecture in Sarawak Before Malaysia," *Fabrications*, vol. 30, no. 2, pp. 287–289, May 2020, doi: 10.1080/10331867.2020.1758296.
- [8] Gapor, S.A., Moriat, R., Rahman, H. F. A., and Saruan, M. A. M. (2022). "Physical Evolution of the Last Melanau Communal Dwelling in Kampung Sok, Matu, Sarawak, Malaysia," *International Journal of Environment, Architecture, and Societies*, vol. 2, no. 1, pp. 55–72. doi: 10.26418/ijeas.2022.2.1.55-72.
- [9] Bahauddin, A. (2018). "The Melanau Tall Longhouse (Mtl), Sarawak, Malaysian Borneo," 2018.
- [10] Daud, N.I.M.K., Arbi, E., Faisal, M. (2012). "Pengaplikasian ukiran kayu melayu dalam seni bina di Malaysia The application of Malay wood carving on contemporary architecture in Malaysia,".
- [11] Hussain, S.A.S. and Halim, W.N.B.A. (2022). "Penerapan Nilai Falsafah dalam Rekaan Seni Bina Rumah Melayu Anjung Layar Sari, Kampung Spaoh Betong, Sarawak," *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, vol. 7, no. 3, p. e001341. doi: 10.47405/mjssh.v7i3.1341.
- [12] Zakaria, I. and Long, A. S. (2013). "Titik Temu Antara Falsafah dan Kehidupan Praktis," *International Journal of Islamic Thought*, vol. 3. doi: 10.24035/ijit.3.2013.003.