

Criteria for Selecting Timber Species in Malay Woodcarving

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Abstract

Malay woodcarvers in Peninsular Malaysia and Southern Thailand observed three determining factors in selecting timber species for their carvings. The factors are availability of timber, physical characteristics and durability, and craftsmen's spiritual beliefs toward the timber species. Most carved building components are made from heavy hardwood species such as *cengal* and *merbau* because of their strength and durability and availability of sawn timber in large volumes. Motifs of flora, calligraphy, geometry, fauna and cosmic features are depicted on to the components as well as to crafts such as weapons, utensils, tools and furniture. However timber species with fine grains and lustrous surfaces and believed to possess strong spirit such as *kemuning* and *kenaung* are carved into hilts of weapons. These criteria address the intrinsic knowledge of the woodcarvers upon the beauty and meaning of tropical timbers and hence in the identity of the carving.

Keywords: woodcarving; hardwood species; vernacular architecture; crafts; spirit of wood

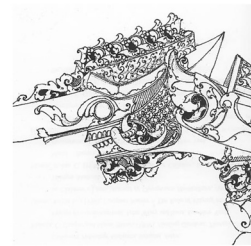
Introduction

Woodcarving is part and parcel of vernacular Malay architecture and craft in Peninsular Malaysia and Southern Thailand. Timber architecture, boats and canoes, hilts and sheath of weapons, musical instrument and utensils are adorned with carving motifs of flora, calligraphy, geometry, fauna and cosmic features (Figure 1.0). It is an art of partially removing wood from a board or a plank following specific motifs and orders (Ismail, 2001, 2002). It is a craftsmanship depicting the beauty of natural elements, geometry and Quranic calligraphy by incising or cutting the hardwood timber using sharp tools conforming to specific patterns and compositions. Most depictions are manifestation of physical beauty into abstract forms. Such skill is gained through apprenticeship whereby an apprentice imitates his master's work but gradually modifies the motifs and eventually produces his own manifestation on to the timber. This pattern becomes the trademark, both for the craver and his architecture or craft.

Apart from the skillfulness of the woodcarvers, significant of woodcarving is also due to the abundance of tropical hardwood species. Thus timber constructions such as house, mosque, palace, entranceway or gateway, tomb and pavilion, and boat are made from heavy hardwood species which are strong and durable and resist the attacks of fungi, powder-post beetles and termites.



Gravemarker



Hilt of *Tajung* kris



Ventilation panel of a palace door

Fig.1. Examples of Malay Woodcarvings

As such many palaces, aristocrat houses and mosques in Terengganu, Kelantan, Pattani in Southern Thailand last for more than 150 years against the hot humid tropical climate (Ahmad, 1997). For examples, aristocratic houses such as Kota Lama Duyong in Kuala Terengganu town (Mohd Hanif, 1996) and palaces such as Istana Jahar in Kota Baru town are equipped with varieties of relief and perforated carved components. These components served functions such as allowing sunlight into the interior, facilitating flow of breezes into the building, and aesthetically, adding beauty and

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creating character to the architecture. Generally, the carved components are depicted in three incision modes: relief, perforated or a combination of both (Ismail & Ahmad, 2001). Some of the components are wall panels, ventilation panels of door or window, door leaves, railings, gables and their boards, and fasciaboards that dominate the façade of the buildings. The degree of complexity in carving varies from one component to another; intricate ones include door leaves and wall panels, and simple carvings include bargeboard and fasciboard. The carvings also signify the status and ownership of the residents and display the skillfulness of the craftsmen. For example, a Terengganu nobleman house is distinguished by its large bargeboard whereas a large-latticed gable portrays a Perak house. As one gets closer to view the components, the distinction is further portrayed by the composition of the carvings and their motifs. As such, a typical elevation of the Terengganu house is adorned with perforated wall and ventilation panels of varying sizes carved in flora motifs; leaves, tendrils and flowers of local plants such as *ketumbit*, *getamguri*, *keraknasi*, *jari buaya*, and *bakawali*. But the carved panels at Perak houses are carved in different flora motifs including sunflowers and *ketola*, (a climber with yellow flower) and sometimes mixed with cosmic motifs. Within the differences in motif and modes of incision and layout, a common factor holds the architecture that is it is mostly constructed from heavy hardwood species particularly cengal (*Balanocarpus heimii*) (Ismail, 2002).

Likewise, non-architectural components such as gravemarkers are carved from heavy hardwood species. They resist the fungus and insect attacks and stand in its original arabesque form for more than 150 years, for example, gravemarkers at Raja Langgar cemetery in Kota Bharu, Kelantan (Farish & Khoo, 2003). They are carved in a form called *gunungan* (mountaintop) in Langkasuka flora motifs which denotes status of the royal and spiritual distinction ((Farish & Khoo, 2003).

Similar flora, fauna and calligraphic motifs are manifested on weapons, furniture, utensils, and musical instrument. Hilts and sheaths of kris, badek (small dagger), and spear are some of the weapons that are intricately carved on timber such as kemuning (*Murraya paniculatum*), leban (*Vitex pubescens*), sena (*Pterocarpus indicus*), and nibong (*Oncosperma tigillarum*). These timbers are heavy and medium hardwood species with high densities ranging from 560 to 880 kg/m³ (Smith, 1999) that is similar to the cengal and balau species. However the differences are in their luster, color and grain size. For example, kemuning has a lustrous yellow to dark brown appearance and very fine grain relative to the cengal which is less lustrous, darker brown and coarser grain (Nik Rashiddin, 2000). The differences and similarities in timber species in Malay woodcarving can also be recognized in utensils and tools. Coconut scrapers are carved from bacang (*Mangifera foetida*) and leban (*Vitex pubescens*), food

containers from cengal, ladles from leban and coconut shell, and biscuit moulds from cengal.

This study presents the criteria of selecting tropical hardwoods practice by Malay woodcarvers in the creation of their carvings. The investigation is based on three research questions: (1) What are the types of architectural and non-architectural components in Malay woodcarving? (2) What are the timber species utilized by Malay woodcarvers for architectural components and crafts? and (3) What are the factors practiced by the woodcarvers to select appropriate timber for their carving?

Method

The investigation gathered information from three sources or informants:

1. Report of measured drawings from Universiti Teknologi Malaysia on timber architecture such as palace, house, mosque and tomb. Five houses, two palaces, three mosques and a tomb were referred to determine the timber species of the architecture. The drawings were analyzed to determine the types of carved components existed in Malay vernacular architecture.

2. Interviews with two woodcarvers, one from Bachok in Kelantan and the other from Kampung Raja in Terengganu, on types of architectural components and timber crafts, types of timber species, and reasons of selection by them. Information on small and intricate crafts such as keris, dagger and utensils are carefully observed and discussed with the woodcarvers. These carvings are either carved or collected by them during their long involvement. In addition, an observation on raw planks and blocks of timber is done at the woodcarvers' workshops that stored the timbers.

3. Interviews with residents or caretakers of the houses to determine the timber species of the building.

4. Literature on timber classification and its characteristics including references from Forest Research Institute Malaysia. The characteristics include density, durability, grain texture, and chemical contents are gathered from the scientific literature.

Information from the drawings, interviews and literature are triangulated to obtain the types of carved components in architecture and crafts, types of timber species and reasons of their selection.

Results

From the measured drawing analysis of the 11 buildings, it is found that the Malay architecture in Peninsular Malaysia possessed more than 20 carved components—see Table 1.0. The craftsmen utilized similar timber to construct the buildings as well as their carved components, and most buildings (four houses, one palace, three mosques, and a tomb) are made from cengal, a heavy hardwood species, because its is strong and durable. These buildings are in the states of Terengganu, Kelantan, Negeri Sembilan and Perak. Similar timber is used for the construction of boats in Terengganu and Kelantan (Ismail 2001; Nik Riashiddin, 2000). Only one house in the state of Pahang is made from merbau which is also a heavy hardwood species. The very reason heavy hardwood species are utilized for building construction and their carved components is its durability against attacks of insects and fungi. Surprisingly, a house in the state of Johor is made from medium hardwood, *kapur*. This is an odd example

because the timber is less durable than the heavy hardwood species.

According to their functions and aesthetic purposes, the components are categorized into three types: structural, elemental, and decorative. As the name suggests, the structural components support the load of the building which include *tiang seri* (main post), stringers of stairs, brace, walls, cross beam, king post, and bargeboard. For example, the *tiang seri* supports the floor and roof loads distributed by the joist systems. And the king post takes the load from a pair of rafters and a ridge beam and distributes it to the roof beams called *alang*.

The elemental components include ventilation panels of door and window, wall, door leaf, window leaf, railing and *mimbar* (mosque pulpit). These components are functional architectural elements, for example, door leaf for security and passage of exit and ingress. Perforated ventilation panels on doors and windows serve as passage for air movement and entry of sunlight into the

Table 1. Timber Architecture and Carved Components

Building Types	Location	Year built	Function	Timber species	Carved Components
Kota Lama Duyong	Kuala Terengganu	1920	Nobleman house	Cengal	Walls, railings of window, verandah and staircase, ventilation panels of window and door, barge boards, gate, buah buton, lamp base
Rumah Tele	Kuala Terengganu	1868	Palace	Cengal	Ventilation panels of wall, window and door, railings of verandah and staircase, newels, gable-end boards, partitions
Istana Tengku Long	Kuala Terengganu	1880	Palace	Cengal	Walls, Ventilation panels of door and windows, railing of windows, door leaves,
Rumah Kampong Bolok	Pahang	1920	House	Merbau	Footings, walls, window railings, stringers, ventilation panels of door and window, kingpost
Rumah Penggawa Noh Osman	Kelantan	1930	House	Cengal	Walls, Ventilation panels of window and door, door leaves,
Rumah Cik Yah Ali	Negeri Sembilan	1870	House	Cengal	Footing, post, walls, stringer, railings of verandah
Rumah Engku Abdul Kadir	Johor	1935	Nobleman house	Kapur	Ventilation panels of window and door, fasciaboard, railing of window, ends of cross beam, brackets, gable, and window leaves
Telok Manok Mosque	Pattani, Thailand	mid 17 th century	Mosque	Cengal	Som, buah buton, kingpost, pulpit, wall, door leaves, ventilation of door and windows, barge-boards, cross-beam, stringer, brace
Kampong Laut Mosque	Kota Bahru	Early 1800s	Mosque	Cengal	Main post, brace, king post, brackets, door leaves, walls, pulpit
Langgar Mosque	Kota Bahru	18??	Mosque	Cengal	Barge boards, kingpost, post, walls, ventilation panels of window and door
Tok Pelam tomb	Kuala Terengganu	Late 1900	Tomb	Cengal	King post, gravemarkers,

house. Obviously, the arabesque carvings add beauty to the architecture. For instance, the mimbar in Kampong Laut Mosque is profusely decorated with perforated and relief carvings of floral motifs (Ismail, 2001). It is most significant components in the mosque where people's attentions are focus during a sermon delivered by an iman.

The decorative components are the least in numbers among the three components which include *som*, *buah buton* and lamp base. These carvings serve to beautify the exterior and interior of the architecture, and they are attached to structural members of the building. Som is the decorative component located at the ridge ends of a pyramidal roof. To give an example, Telok Manok Mosque has a som at each corner of its roof. It also has a large buah buton, a cubical feature in lotus motif, attached to the bottom end of its kingpost. It becomes a decoration for the mosque interior and to be observed by the people.

The categorization should not be viewed as discrete format since one component can serve more than one

purpose. For example, a gable is a structural component for vernacular house in Perak, Terengganu and Kelantan, and it is carved in relief or perforated flora motif that enhances the beauty of the house's façade. For instance, the gable of Kelantan's house utilized motif of a palm leaf, *Borrassus flabellifer*, a common palm in the South-east Asia (Ismail, 2002). Perforated ventilation panel of door or window also serves dual functions, facilitating air movement as well as decorating the façade of the building.

The information on types of timber species for making crafts as non-architectural components is summarized in Table 2.0. Nineteen timber species from heavy and medium hardwood types are obtained from the dipterocarp forest (7 species), secondary and beach forests (6 species), and house compound (6 species). Heavy hardwood species extracted from hill dipterocarp forest including cengal, merbau and balau are the favorite timbers for boat components, utensils, tools and furniture. The obvious criteria for selecting these timbers are strength and durability. However, medium hardwood

Table 2. Timber Species for Non-architectural Carvings

Components	Sources of Timber		
	Dipterocarp Forest Species	House compound Species	Secondary and beach forests Species
<i>Weapons</i>			
Hilts of keris, badek, kerambit	kemuning, kenaung	kundang	
Sheath of keris			sen
Hilts of spear			nibong
<i>Boats & Canoes</i>			
Oar	cengal, meranti	bungor	penaga laut, jambu laut
Tool box	cengal		sen
Cepu	cengal		
Caping perahu	cengal		
Bangau & Okok	cengal		
<i>Utensil, tools & furniture</i>			
Ladle	kemuning	coconut shell	
Coconut grater	cengal	nangka, bacang	sen, leban
Rehal	medang, meranti		leban
Biscuit mould		ciku, rambai	tembusu, sen
Sengkalan		nangka, bacang	sen
Cepu	cengal		tembusu, sen
Dulang		ciku, bacang	sen
Pengandar	cengal, balau		penaga laut
Plough	cengal		penaga laut
Tugal	cengal		
Table & chair	cengal, meranti, kapur	kundang	leban
Bed headrest	cengal, meranti, medang		sen, leban
<i>Miscellaneous Items</i>			
Gravemarker	cengal, merbau		
Quail trap			bamboo, fern
Bird cage	cengal		bamboo
Congkak	kapur,	nangka, bacang	leban
Tongkat khutbah	cengal, merbau		nibong

species such as medang, kapus and meranti with lower strength and less durable are also carved into utensils, musical instrument and furniture. Interestingly, medium hardwood species such as bungor (*Lagestromia speciosa*) is used to make dug-out-canoe oars whereas penaga laut (*Calophyllum inophyllum*) for making seaboard oars. Secondary forest species such as sena (*Pterocarpus indicus*), leban (*Vitex pubescens*), and tembusu (*Fragrea fragrans*) are used in making weapon sheaths, tool boxes, and utensils. In term of density, these timbers are classified as medium hardwood and are not favored by the woodcarvers to make house components (Nik Rashiddin, 2000). Two heavy hardwood species, kemuning and kenaung, extracted from the hill dipterocarp forest are specifically used for hilts of keris and dagger. The components are small and their carvings are intricate. Judging from the physical form of the hilts, the woodcarvers must have reasons why these timbers are used for their carvings.

Factors Influencing Timber Selection

From the reports of measured drawing, interviews with woodcarvers and references from Forest Research Institute Malaysia suggest that the Malay woodcarvers apply three factors in selecting appropriate timber for their carvings. The factors include availability of timber, its physical characteristics and durability, and the craftsmen's spiritual beliefs towards the timber species. The hierarchy of selection depends on the type of carved components, for example, the making of house components such as door leaves or ventilation panels is clearly determined by the availability of timber which should easily be obtained in large volume. On the other hand, the Malay craftsmen choose only kemuning or kenaung for making keris hilt and sheath because of their fine interlocked grains and deep yellow sapwoods intertwined with dark brown heartwood. In addition, these timbers are regarded as possessing good spirit that must be respected and that will accompany the weapon.

Availability of Timber

Tropical rain forests of Peninsular Malaysia produce a variety of quality, durable timber grown in the low-lying undulating land and hills of the Main Range (Appanah, & Weinland, 1993). The trees are categorized as dipterocarp (species with resin) and non-dipterocarp (species without resin) producing large volumes of wood (Smith, 1999). A virgin hill forest could produce 3 to 4 trees per acre of heavy, medium and light hardwood species such as cengal (*Balanocarpus heimi*), balau (*Shorea spp.*), merbau (*Intsia palembanica*), and seraya (*Shorea curtisii*). They can reach more than 60m in height with diameter 1.2 to 1.5m (Appanah, & Weinland 1993). Their densities range from 560 to 900kg/m³ and they have stiffness to resist bending applied by external loads, flexible enough to bend and to regain normal shape, and with hardness that manageable to cut and incise with sharp tools (Farmers, 1987). The heavy hardwoods are

durable species that resist attacks from termite, powder-post beetles and fungi which would lessen their structural properties including flexibility, stiffness and hardness. The knowledge of selecting a suitable durable species with straight and solid bole, without decayed heartwood, is a crucial step in the process of building construction and carving. Some woodcarvers would only select a tree without dead branches or large buttresses. The purpose of this practice is to avoid selecting the tree that bad spirits might reside in. The logs are brought to sawmill and cut into boards, planks, and posts. These timber members are suitable to make large building components such as door leaves, bargeboards, tiang seri, kingpost, wall panels, and ventilation panels as well as small members include railings and buah buton,. The same timber species are used to make the structural building components such as posts, beams and floorboards as well as the carved components. It is common to find an entire house made from cengal, balau or merbau in the states of Terengganu, Kelantan, Perak and Pahang. For example, a house in Kampong Bolok in the state of Pahang was constructed wholly from merbau; beginning from the footings, posts, beams, stringers, floorboards, walls, rafters, purlins and upward to include the kingposts.

The timbers are air-dried under a shed or under the houses allowing prevailing winds and/or the sun to dry them while protecting them from the rain. No preservative treatment is applied to the timber since the resins of most dipterocarps are able to resist the powder-post beetles, termites, and fungi attack (Farmers, 1987). The drying (seasoning) process may take months or even years for some timber species particularly kemuning, kenaung and sena. A long period would ensure a gradual extraction of moisture content from the timber to a state of minimum shrinkage where the moisture content is less than 12%. Kiln-dried timber is not practical to work on since the fast drying process intensified the toughness and hardness of the fibers which later caused difficulty in cutting and incising.

Medium hardwoods form the forests such as medang (*Litsea grandis*), kundang hutan (*Bouea macrophylla*) and keladan (*Drybalanops oblongifolia*) are sometimes used for carving door leaves, furniture such as bed and cabinet, and musical instruments such as kenong and kompang. These timbers are more prone to attacks from powder-post beetles and fungi and thus they are placed where they will not come into contact with moisture.

Apart from obtaining timber from the forest, the craftsmen would optimize timber choice by harvesting readily available fruit trees grown in the house compounds and orchards. They would cut large branches or sometimes the trunk of matured trees including ciku (*Achras zapota*), jackfruit (*Artocarpus heterophyllus*), rambai (*Baccaurea bracteata*), belimbing (*Averhorra belimbi*), bacang (*Mangifera foetida*) and kundang (*Bouea macrophylla*). Since these timber pieces are relatively small, the woodcarvers would carve them into

household tools, utensils and musical instrument in relief motifs of flora and geometry. The tools and utensils include coconut grates, ladles, food containers, biscuit moulds, and *rehal* (a cradle to place the Quran during readings). The practice of consuming timber from cultivated trees suggests that the Malay craftsmen are attentive to their environment where they live.

Timbers for carving are also extracted from the secondary and coastal forests where a mixture of heavy, medium and light hardwood species grow naturally. Leban (*Vitex spp.*), a heavy hardwood, and sena (*Pterocarpus indicus*), a light hardwood, are the common species obtained from the secondary forest for making sheaths of badek or kris and for carving some house utensils. The craftsmen living in coastal villages would harvest timber from penaga laut (*Calophyllum inophyllum*) and kelat jambu laut (*Syzygium grande*) from the beach forest. They are carved for such elements as boat oars and grave-markers. Hence, the Malay craftsmen optimize the use of timber found within or adjacent to their living environments

Physical Characteristics and Durability

In woodcarving, the physical characteristics that govern the suitability of timber are durability, color, grain and texture, and luster. Before working on the timber, first and foremost, the craftsmen must select a timber piece that is free from all defects, namely, knots, pith flecks, resin streaks, brittlehearts, checks and splits, decay, bowing and cupping (Nik Rashiddin, 2000; Norhaiza, 2003). Durability of hardwood is directly related to density; high density generally suggests strong resistance against fungi decay and boring insect attacks. Therefore, chengal, balau, resak and merbau are the preferable species for most house components including structural, elemental and decorative types (Watson, 1928). The buildings that are made from these species are known to last for more than 150 years. Likewise, boats made from cengal would resist the attacks of the shipworms which damage the timber by tunneling in the wood. The resistance is possibly due to the silica deposits in its storage tissue (Desch, 1981).

In some heavy hardwoods there is no color distinction between sapwood and heartwood, but in the majority the heartwood is more deeply colored (Desch, 1981). On exposure to the air, cengal and balau are light brown to dark red-brown and become darker as they age. On the contrary, the merbau's sapwood is pale yellow sharply defined from the dark red-brown heartwood. Generally, the final finish of the carved timber components made from these heavy hardwoods is finished with sandpaper. In carving house components, the craftsmen is less critical towards the timber color but very selective when carving weapon hilts and sheaths, furniture and musical instruments. As such only kemuning and kenaung with bright yellow sapwoods and dark brown heartwoods are chosen for the hilts of kris, badek and *kerambit* (a small knife). These weapons are considered auspicious tools

and used only for ceremonial events or special occasions.

Grain and texture are two distinct characteristics of timber; the grain refers to the direction of the fibers, and texture applies to the relative size, and the amount of variation in the size of the cells (Desch, 1981; Smith, 1999). The cengal timber is easy to cut and incise because it has straight fibers and it does not give rise to ornamental figuring. It has fine and even texture and is thus suitable for almost all carvings, from large features such as boat's figurehead, to a building's wall panels, to small objects such as rehal. The merbau has a more interesting appearance than the cengal or balau since it has interlocked and sometimes wavy grain and a coarse texture with large vessels and coarse rays (Farmers, 1987). But it is more difficult to incise since it is denser and has a higher hardness, thus it is used for large building components such as posts and seldom used for small crafts such as house utensils. Often Malay craftsmen carefully select tension wood from twisted trunk or branches of the kemuning tree. The timber will have spiral or interlocked grain, and when quarter sawn it will reveal striped figuring of yellow sapwood interlocked with dark brown heartwood. This figuring is favorable for the kris hilt particularly the tajung type found in Kelantan and Pattani in Southern Thailand (Nik Rashiddin, 2000).

Lustrous woods such as merbau, kemuning, tempinis (*Sloetia sideroxylon*), kenaung have cell walls that reflect light, particularly on quarter-sawn surfaces (Desch, 1981). The luster is a natural asset that craftsmen would seek to exhibit in carved furniture and small crafts such as keris hilt and sheath, walking sticks, and picture frames. The luster, however, does not last long without finishing coat over the timber surface. For example, craftsmen apply several layers of shellac or varnish to a keris hilt to retain the lustrous surface of the kemuning.

Spirit of Wood

Apart from tangible characteristics of timber, the Malay craftsmen also select timber based on its spiritual possessing, either a benefiting or cursing value (see Farish & Khoo, 2003 pp. 20-45). Kemuning and kenaung are regarded the most auspicious species because the craftsmen believe that they possess strong spirits that will accompany a weapon such keris, badek, kerambit or spear. A few craftsmen in Kelantan believe that this spirit is compatible with the iron blade (Nik Rashiddin, 2000). Hence, these timbers are reserved for creating weapons' hilts and sheaths. As work begins, a craftsman cannot be definite on what style of keris hilt that a piece of kemuning or kenaung will finally become. Gradually, during the incision process, the timber reveals its grain, texture, and luster and only then the craftsmen know the hilt style the timber will become. The motifs on this hilt would be similar to large architectural components such as leaf of getamguri and jaribuaya, flower of ketumbit and keraknasi, these are shrubs or weeds commonly found in the Malay house gardens (Syed Ahmad, 1992;

Ismail & Ahmad, 2001).

Conclusion

Malay woodcarvers recognized and understood the physical characteristics and spiritual qualities of hardwood species in the creation of their carvings. The knowledge and skill of selecting the appropriate timber for a carving is part of the process of the woodcarving that is learnt from apprenticeship system. By applying the criteria of selecting the timber, the making of woodcarving is one of the arts and crafts of the Malays that stand out in its own stature. In addition, application of these criteria result in optimizing the usage of the timber grown in the dipterocarp forests, secondary forests, coastal forests, orchards and house compounds.

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