

Local Genius/Knowledge in Science and Technology in the Context of Early Malay Kingdoms in Peninsula Malaysia and Borneo

Zuliskandar Ramli^{1*}

¹ Senior Research Fellow at the Institute of the Malay World and Civilization, Universiti Kebangsaan Malaysia (UKM), Bangi)

*Corresponding author. Email: ziskandar@ukm.edu.my

ABSTRACT

The early Malay kingdoms in Peninsular Malaysia and Borneo were often associated with the proto-historical period, an era where people began to recognize writings in forms of ancient characters such as the South Indian, Pallava and Kawi scripts that is written in ancient languages such as Sanskrit, Pali, Ancient Malays and others. As such, the early Malay Kingdoms was associated with colonies from India. However, based on foreign sources and archaeological data, several pottery and iron smelting centers in Sungai Batu, Lembah Bujang and Santubong, Sarawak were discovered. The discovery revealed that the wisdom of the local community had contributed primarily towards the development of science and technology in the early period of the Malay Kingdoms in Malaysia. Furthermore, Santubong, Sarawak is a proto-historical archaeological site that is rich in archaeological discoveries ranging from iron smelting sites, structures – believed to be stupa – made of bricks, Chinese ceramics from the Tang, Song and Yuan dynasties as well as mysterious sculptures on large stones, in which the discovery was strengthen and supported by Tom Harrison, Stanley J.O'Connor and Cheng Te-Kun researches together with the theory proposed by J.W. Christie and F.E. Treloar. Findings from this study indicates that the existence of the early Malay Kingdoms in Peninsular Malaysia and Borneo did not happened overnight nor developed by colonies from India, but a product of evolution and transformation based on local wisdom of the Malay community in science and technology that existed from 5,000 to 6,000 years ago.

Keywords: *Local Genius, Early Malay Kingdoms, Prehistoric Period, Science and Technology.*

1. INTRODUCTION

The early kingdoms in Malaysia are believed to have existed since the beginning of the century AD based on archaeological evidence and foreign written sources that have been studied by archaeologist, anthropologists and historians. Without referring to the geopolitical boundaries today, the kingdoms that existed between the first century to the ninth century AD in the Malay Peninsular are Tun Sun, Pan Pan, Tan Tan, Fo lo an, Langkasuka, Kataha or Chieh Cha, Chih Tu, Kui Li and Lo Yueh, as well as the kingdom of Kutei, Po lu chung and Chu Po in Borneo (Wheatley 1964). Most of these early kingdoms existed in areas that are near to the coast, except for Chih Tu which is believed to be located in Tanah Merah, Kelantan.

The development of these maritime kingdoms in the Malay Peninsula and Borneo did not happen in a short time, but as a result of evolution and transformation of

the maritime communities that inhabit coastal areas and estuaries since 5,000 or 6,000 years ago like the archaeological findings discovered in Guar Kepah, Seberang Prai, Penang (Earl 1861; Van Stein Callenfels 1938; Ahmad Hakimi 2008; Zuliskandar 2012). In addition to this, a cultural shift had occurred in the settlement as the community initially practiced nomadic traditions and Hoabinhian culture but later changed towards a settled way of life in accordance with the tradition of the Neolithic society, where their main activities consist mainly of farming, fishing and activities related to livestock farming. During the Neolithic period, trade between the coastal and inland communities became active due to the daily needs of the community. The trading activity had become lively since 1,000 BC, that is during the late Neolithic and the beginning of the Metal Age, where trade was not limited between inland and coastal communities but spanned towards regional trade between the archipelago and mainland Southeast Asia (Smith & Watson 1984). The

development and advancement of the trade activity were the result of the skill and competencies of the Austronesian or Malayo-Polynesian cluster in international sailing activities that is believed to date back to the Metal Ages.

Trade between the archipelago and mainland Southeast Asia, particularly with Vietnam, is evident by the discovery of bronze artefacts consisting of drums, bells and bowls. Some of these bronze artefacts were discovered along with artefacts made from iron, such as socketed iron tools which is believed to be a product of the local community. These bronze artefacts are related with the Dongson culture in Vietnam, the place of origin where the bronze drums of the Heger I type were produced. Among the sites where the bronze object were discovered are located in the Klang district, Kampung Sungai Lang and Sungai Sedu in Selangor, Kampung Batu Pasir Garam in Sungai Tembeling, Pahang, Kampung Batu Buruk and Kampung Gaung in Terengganu, Kampung Pencu in Muar Johor and Pulau Banggi, Timbang Dayang, Sabah. The presence of the bronze artefacts in the archipelago is related with the trade activities in the form of intra-regional exchange, a trade relationship that is limited to regions in Southeast Asia (the islands of Southeast Asia that includes the Peninsula and also the mainland Southeast Asia). The spread of the bronze items is not the result of cultural diffusion or dispersion from mainland Southeast Asia towards the archipelago, but as evidence of the existence of trade relations between the archipelago region and mainland Southeast Asia. These bronze artefacts were also believed to be used as accompaniments items for the deceased, as it is believed that the items will be used by the decedent in the other realm. During the burial process, the bronze drum artefact will be placed together with other items such as earthenware, stone tools, beads made from glass or semi-precious stones, jewellery made of gold and iron tools (socketed iron tools) or monkey bones. This indicates that the bronze drums were highly valued during the period and were only owned by people who has the highest status in society, which is more likely to be the chiefdom or tribal chiefs.

With the existence of internal trade and intra-regional exchange, many supplier ports and collection centre existed around the Malay Peninsula, Borneo and the archipelago in general. The importance and popularity of the commodities in Southeast Asia had attracted the attention of international traders from India, China and the Middle East, where the ports benefited from them and enlarged rapidly. Due to the ability and intelligence of the Austronesian cluster in the sciences of navigation, the Malays themselves were responsible for initiating trade between east and west, not the traders from India. This is based on the statement that the eastern coastal area of Africa – especially Madagascar – is believed to have been visited

by Malay or Austronesian sailors since the beginning of the century AD or during-before the century AD (Blench 1994). The highly dynamic trading activity in the Indian Ocean between traders from Rome, India and Southeast Asia had already taken place at that time, therefore it is not impossible for Malay sailors or traders to have set foot in the coastal areas of Africa and Madagascar who then traded and settled in the area (Zuliskandar 2011). The wealth accumulated from the inter-regional trade relations had enabled the early kingdoms to be formed and tribal chiefs or chiefdoms to later accept culture from India as well as adopting the monarchical institutions from them. Due to the acculturation process, only the appropriate Indian culture were selected and then adapted to the local culture that is evident by the practices of Buddhism and Hinduism in the period of the early kingdoms which are very different from the practices that existed in India.

The existence of early kingdoms in Malaysia and the archipelago is generally associated with an era known as the Proto-historical period. The Proto-historical period is an era where people had known and wrote in forms of ancient characters such as Pallava, Nagiri or Kawi which were written using ancient languages such as Sanskrit, Pali, Ancient Malay, Ancient Javanese, Ancient Cam or Ancient Khmer. The acculturation of Indian culture and the transformation of knowledge of the indigenous people have led towards the development of early kingdoms, where trade was the major activity that generated the state's economy regardless whether the trade was domestic or international. Although the development of science and technology of the archipelago society had begun since prehistoric times in terms of cultural evolution, but the development happened rapidly during the proto-historical period that was driven by the transformation of knowledge and local wisdom of the Malays at that time which was the result of cultural clashes from the archipelago and India. This is evident based on the contribution of the Kedah Tua Malay kingdom and also the remains in Santubong, Sarawak which has similarities in the context of the diversified archaeological data and the development of science and technology.

Based on archaeological data and written sources, the two sites that serve as entreport ports, namely Kedah Tua and Santubong, have been inhabited by coastal communities since prehistoric times. Since the 5th or 6th century AD, the ports of Kedah Tua and Santubong were important ports in supplying forest products, marine products, precious metals and slaves for the international market. Among the previous commodities since prehistoric times in the aforementioned areas are iron products and earthenware, while beads became the main commodities for these two areas in the 5th or 6th century AD. In addition to the bead-making technology, the local community were also successful in building

technology, where they built temples using bricks that were produced by themselves.

2. THE DEVELOPMENT OF CULTURE, SCIENCE AND TECHNOLOGY IN THE LATE PREHISTORIC PERIOD

The late prehistoric period was a period where society had used tools made of metal consisting of bronze and iron or is more commonly known as the Metal Age. A cultural change had occurred in the Neolithic period where society had become more skilled in farming since 2,500 BC (Smith & Watson 1984; Soejono 1984) which is evident based on the discovery of rice in Gua Cha, Kelantan that is given an absolute dating of 810 ± 80 BP (Adi 2007), skilful in manufacturing earthen pottery (especially the coastal communities), more sophisticated stone tools, skilled in making garments from wood bark and straight burial methods with accompanying items for the deceased were practiced. The earthenware were widely used in the Metal Age as the artefacts had been discovered in all burial sites that was found through archaeological research. In addition to this, the burial custom for individuals of higher status in the society had also changed, such as the slab stone tombs found at Changkat Menteri (see Photo 1), Sungkai, Slim River and Ladang Sungai Klah (Collings 1937a; Evans 1928, 1931). *Sampan* burial were also practiced in the Metal Age as it was found in Pulau Kelumpang, Matang, Perak (Evans 1928a, 1928b, 1929, 1932; Nik Hassan Shuhaimi & Asyaari 2003), Kampung Sungai Lang, Selangor (Peacock 1964, 1965) and several sites in Sabah and Sarawak. Furthermore, there is also a burial tradition in jars (*tempayan*) that was found in Kampung Seberang Limbongan in Besut, Terengganu which is the only discovery in Peninsula Malaysia (see Photo 2). Most of the jar burials are found in Borneo, especially in Sarawak. Another culture that developed from prehistoric times is the Megalithic culture which is widespread and can be seen in Melaka and Negeri Sembilan, as well as the remnants of the Kelabit community in Sarawak and Kota Belud in Sabah (Harrison 1973; A. Jalil & Othman 1989).



Figure 1 Stone slab tomb excavated in Changkat Menteri



Figure 2 Jar (*tempayan*) burial in Kampung Seberang Limbongan, Besut, Terengganu

The cultural development in the late prehistoric times is in line with the social system development of the society with the presence of a tribal leader or chieftom who is in charge of an area or village. Physical remains in the form of stone tombs and burials with objects such as the bronze drum as well as burial in boats is believed belonging to the tribe chief as various artefacts were found in tomb such as bronze drums, bronze bells, bronze bowls, tools made of iron, earthenware, beads and ornaments made of gold that were buried together with the deceased. Based on the findings, it can be concluded that the late prehistoric society were already skilled in the technology of smelting and iron making which is evident by the monkey bones and socketed iron tools. The creation of big and small sailboats which were used to navigate the oceans are said to have started since the Metal Age based on the ability to produce boats of this type by using iron tools. It is also known that the sailboats were used as the main means of transportation in rivers and estuaries in the Malay Peninsula since 5,000 years ago which has resulted in the river routes being actively used and further strengthening the importance of river routes for the societies development in the Neolithic Age (Chandra Muzaffar et al. 2001; Nik Hassan Shuhaimi 2002). Along with the cultural development in the Metal Age, several supplier ports became the hub for intra-regional trade, while the inter-regional trade existed in 500 BC.

Based on archaeological data, a number of iron tools had been unearthed since 1908 in several locations such as in Sengat, Tanjung Rambutan and Batang Padang, Perak (Evan 1927). Iron tools have also been discovered at several other sites in the country, namely at Ladang Sungai Belata, Klang and Kampung Sungai Lang (Evan 1927); Bukit Chuping, Perlis (Evan 1931; Collings 1937b); Lembah Tembeling, Raub and Kuantan, Pahang (Linehan 1928); Kampung Batu Buruk, Kuala Terengganu (Peacock 1965a), Kampung Penchu, Muar, Johor (Adi Taha 1983), Kampung Seberang Limbongan in Besut and the latest discovery was reported found in Kampung Jerangsang, Jerantut, Pahang (Yunus &

Jamaidah 2012). These findings were categorized as Metal Age tools or late prehistoric tools but archaeologist were unsuccessful in discovering the site for smelting and manufacturing the iron tools. In spite of this, two iron smelting centres dating back to the 2nd century AD were found in Sungai Batu which located in the Lembah Bujang regions and another iron smelting site in Santubong, Sarawak. Both of these sites were believed to have been developed since the end of prehistoric times which attest to the local wisdom of the native community in the technology of smelting and manufacturing iron using furnaces.

With the development of coastal ports, manufacturing sailboats that is capable of crossing the ocean, the production of better quality earthenware, the creation of bronze and iron tools such as axes, sickles, knives and spear points and *tulang Mawas* (iron implement) (see Photo 3 and Photo 4) as well as possessing commodities desired by traders such as forest products, gold, tin, iron and spices; had permitted the Metal Age society to develop in terms of social status, culture, science and technology. Although the development is considered to be relatively late compared to the civilizations in the Middle East, India and China, but the importance of local wisdom in the development at that time is undeniable. The prosperity of the local economy was the catalyst for this development which was the result from the active trading activities at the time and the ability of local sailors as well as traders who are well versed in the maritime sciences had open up trade between east and west.

Based on the artefacts discovered such as bronze drums, bronze bells and bronze bowls as well as a variety of bead types made of semi-precious stones and glass had permitted several locations of early supplier port to be identified. Among them are Klang, Kampung Sungai Lang and Jenderam Hilir in Selangor, Batu Buruk in Kuala Terengganu and Kampung Gaung in Jertih, Kampung Pencu, Muar and the area around Sungai Tembeling, Pahang. These locations possesses commodities in forms of metals such as gold and tin ore which are in demand at that time as it was needed to produce bronze products. Therefore, it is not surprising that tin ore was the most sought after commodity for traders in mainland Southeast Asia. Leong Sau Heng (1990: 17-38, 1993: 1-9) states that since 1,000 BC, that is during the beginning period where metal was used or in the late Neolithic period, several collection centres or small-scaled business centre that collects trading merchandises had already existed.

Leong Sau Heng (1990: 31) further explains that the presence of several collection centres of goods during the prehistoric period indicates that trade activities in the form of intra-regional exchange had already existed in the late prehistoric times. He also clarified that the

trade activity was only small scaled as the archaeological remains that served as indicators were only found on one archaeological strata only. By using archaeological remains as data, it was discovered that in the early days where trade was becoming active in the region, the barter system or exchanging goods were practiced and occurred rather frequently between the Malay Peninsula, Borneo and the regions in the archipelago with mainland Southeast Asia.

Soejono (1984) had also explained that bronze objects were also found in islands located in the eastern part of the archipelago. These bronze items were found in a location that is near to a locality that is rich in economic resources such as spices, sea products and forest products. He further added that the bronze drums found in the archipelago were previously used a barter goods in the early trade history of the region.

The intra-regional trade relations were not only marked by the spread of bronze goods, but also by the relationship between the Kanalay pottery tradition in the the east, the Philippines, and the Sa-huynh pottery tradition in the west, the South China Sea coast (Smith & Watson 1984). According to Solheim II (1984: 37) the Sa-huynh pottery was from northern and southern Vietnam and based on chronometric dating, the Sa-huynh-Kanalay pottery was produced around 1,200 to 1,500 BC.

The ability of Malay sailors and traders in sailings activities, the arrival of traders from India, China and Arab-Persia, the acculturation of Indian culture as well as changing the status of tribal chiefs from chieftom to king had allowed coastal areas that had been developing energetically in trade since the end of prehistoric times to transform from a large village to a government city. With Funan as an economically prosperous kingdom since the beginning of the century AD, the small kingdoms under its auspices had allowed the small kingdoms to benefit and continue to persist even when the Malay kingdom of Śrīvijaya came into existence



Figure 3 The *Tulang Mawas* (Mawas Bone) findings in Raub, Pahang



Figure 4 Socketed axe findings in Bukit Jong, Pahang

3. INTERNATIONAL TRADE AND THE FORMATION OF EARLY KINGDOMS

The trade activities contribute majorly in the formation of early kingdoms and the establishment of city and states. Historians and archaeologist such as Hall (1985), Kathirithamby-Wells (1990), Leong Sau Heng (1990), Nik Hassan Shuhaimi (2002) and Zuliskandar (2012) demonstrates that trade was the contributing factor that influenced the formation of early kingdoms and city-states. Based on archaeological data and written sources from Greece and China, it is believed that the Malay kingdoms in the archipelago have existed since the first century AD and continued to developed until the 5th century AD. There were several early kingdoms in the Malay Peninsula and Borneo in the 5th century AD, among them were Tun Sun, Pan Pan, Langkasuka, Kedah Tua, Lo Yueh, Chih Tu, Pu Long Chong, Kutei and Chu Po (Refer to Map 1).

Leong Sau Heng (1990, 1993), Nik Hassan Shuhaimi (2002), Christie (1990), Kathirithamby-Wells (1990) and Hall (1985) as well as other scholars have clarified that the emergence of several early kingdoms and city-states were due to the rapidity of trade activities in the early century AD. Prior to achieving the city-state status, the place was a city because it served as a trade centre. Previously, the place was just a strategically located village. If this phenomena is viewed based on the sequence of events, a well-positioned village that is related particularly with trade activities will soon develop into a city (trade centre where some of these cities later evolved into city-states) (Abdullah Jumain 2001). However, I think that the contributing factors are not just limited to strategic location and trade activities, but also the commodities available in the area which enable business in the locality. For example, the Kedah Tua kingdom has commodities such as iron, tin, forest products and pottery, Chih Tu has forest products and gold, while Santubong is similar to Kedah Tua and Chu Po in Sabah which is associated with the production of earthenware.

The transformation that occurred is physical in nature, that is from a village to a commercial centre or

city, which then proceeds to a kingdom or city-state. In addition to this, the changes should also involve the social system of society as well as the status of their leaders. This is based on the fact that when the locality was an ordinary village or merely an ordinary trading centre, the place was under the leadership of a local chief or *penghulu*. The leadership in a commercial centre or city is still govern by chiefdom (Leong Sau Heng 1990). Only by implementing the monarchical institution, the status of a trade centre will change to a kingdom or city-state. This is evident based on the linguistic data analysis from the inscriptions of the Śrīvijaya kingdom in the 7th century AD, where the person who became the king in the Śrīvijaya kingdom was a local leader of *Datu* status.

Christie (1990) explains that none of the earliest countries in Southeast Asia are totally indigenous. This is due to the fact that (i) the early city-states had existed in the era where trade relations between Southeast Asia with countries outside Southeast Asia, especially India (ii) the concept of monarchical institutions was not local in nature but originated in India, and (iii) the concept of a kingdom that is related to the monarchical institution originating from India is a continuation of the local form of leadership with chiefdoms tradition (Abdullah Jumain 2001). It is clear that the period where India influence had spread in the region was preceded by an era in which trade relations with the Indian subcontinent had already occurred and verified by the discovery of pottery from India known as the 'Indian Roulatted Ware Bowls' in Java, Perlis and Khlong Tom (Cristie 1990).

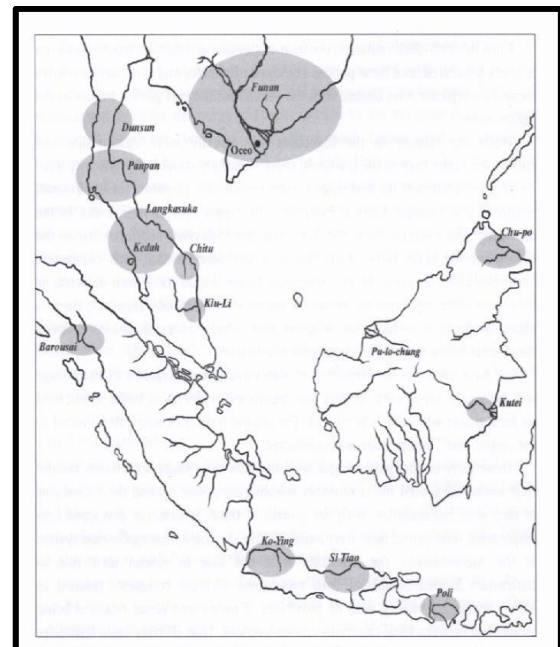


Figure 5 Locations of the early kingdoms in Malaysia and the archipelago before the 5th century AD

The growth the of early kingdoms or city-states in Southeast Asia – which is closely linked with trade –

did not occur in a short period of time or spread spontaneously at once in the regions of Southeast Asia. The existence of these early city-state or kingdoms were the result of a society that evolved and wanting to accept change and new culture, where the process consumes a large amount of time. In addition to this, the growth of these early kingdoms were also seen being in parallel with the development of trade zones in Southeast Asia.

At the end of the last century BC, the trade zone in Southeast Asia was concentrated in the northern part of the Malay Peninsula and the southern coast of Vietnam. Malayo-Polynesian sailors and traders were the agents who initiated the relationship in which during the 2nd century AD, routes through Southeast Asia became important as there were barriers in the land routes that connects China with the Middle East via the Silk Road (Hall 1985).

In the second and third centuries AD, routes by sea were becoming more important. Slightly above the northern region of *Segenting Kra* (Kra isthmus) is also a strategic place where sailboats from the Bay of Bengal frequently visit the locality. The goods from the ship were unloaded, then required minor land travel, and were loaded back into another ship to be taken to the south-eastern territory of the Chinese state coast; or vice versa. In addition to this, there were also other trading zones around the Java Sea in the second and third centuries. The trade involved agarwood, sandalwood and various types of spices from the Sunda islands, Maluku, the east coast of Borneo, Java and the southern coast of Sumatra. Ko-Ying which is located to the north of the Sunda Strait was vital as it connects or trades the local produce to the international traders by sea.

Malay sailors were pioneers in transporting spices from Ko-Ying to Funan. They have also traded forest products obtained from the Indonesian archipelago which further diversified the types of goods brought from east to west or vice versa. In the coming centuries up until the fifth century AD and so forth, the southern coastal part of Sumatra had also become important due to its position which is situated near the sites that supply spices. The Straits of Malacca were also important due to its location as it connects the south-eastern part of the Java Sea where the surrounding islands are rich in spices. With the increasing importance of the Straits of Malacca, the south-eastern cost of the Sumatra island had also followed suit. Malay traders established trade relations with the eastern part of Borneo, Java, other islands to the east, the northern part of the Peninsula, the Chao Praya area and also Irrawaddy (Hall 1985).

4. ACCULTURATION OF INDIA CULTURE AND THE TRANSFORMATION OF KNOWLEDGE OF THE INDIGENOUS SOCIETY

The acculturation process of Indian culture has been previously discussed by most scholars involved in the classical historical research in Southeast Asia. The extreme opinion that Quaritch-Wales had postulated on this matter is based on the Theory of Colonization that he has put forward (Quaritch-Wales 1940). Followers of this theory not only treat Kedah Tua as a kingdom under Indian colonies, but include all the early Buddhist or Hindu kingdoms that existed in Southeast Asia which they deemed as Hindu colonies (Majumdar 1944; Nilakanta Sastri 1949). All of these assumptions are based on the findings of structures in the form of temples and religious sculptures which they believe to have strong Indian elements that date back to the Amaravati period which is roughly in the first century AD.

The Indianization theory was popularized by Coedès whose view was more moderate but deemed that the Indians consisting of Brahmans and merchants had played a more important role in the acculturation process of Indian culture. The Indianization concept is based on the development of culture organized or founded on the concept of monarchy from India which is characterized by the practice or worship of Hinduism or Buddhism, mythology from the Puranas literary texts and the preservation of the Dharmasastras, as well as the expression of such cultural values in Sanskrit. Furthermore, the Indianization process is judged based on Indian literary texts such as the Arthashastra text, Jātakas (stories about sailing), Rāmāyana (relating to Java and Sumatra) and Niddesa, Pali texts dating to the first century AD. In addition to this, the discovery of Buddhist or Hindu temples and statues are treated as evidence of the Indianization process in Southeast Asia (Coedès 1968). The same idea was also adopted by Hall (1955) in discussing the spread of Indian culture to Southeast Asia.

Van Leur (1955) and Bosch (1930) did not fully agree with the Indianization theory and were more inclined to see the more significant role played by the Malay traders and kingdoms in the acculturation process of Indian culture. Malay traders who were accustomed with large ships have been frequenting ports in India since the first century AD (Miksic 1998), thus the role where the Malays had invited the Brahmans to Southeast Asia as a request from the local kingdoms must be taken into account. In addition to this, there were also missionaries from the archipelago who travelled to India in order to learn the teaching of Buddhism or Hinduism which they then return and spread the teachings to the local community, especially the upper class. It is very clear that during the 7th

century AD, Palembang, Molayu (Jambi) and Chieh Cha had become a stopover for missionaries from China to learn Sanskrit before continuing their journey to Nalanda, India as recorded in the writings of I-Ching (Wheatley 1964).

The architecture and visual art in the archipelago also exhibits a local identity that are different from those found in India. Although the basic form is similar, but local elements are still applied in the construction of temples in the archipelago as the local architects are skilled and had mastered the Śilpaśāstra manuscripts (Bosch 1930). In addition to this, another added element in the temple construction is the use of reliquaries and relics in which this element is only found in temples in the archipelago (Lamb 1961; Soekmono 1974). These evidences are able to refute the opinions suggested by western scholars who stated that the temples in the early kingdoms of the archipelago were built by Indian traders, where this hypothesis is commonly used in the case of Lembah Bujang, Kedah (Jacq Hergoualc'h 1992; Sullivan 1958; Wheatley 1964).

As the local elements are apparent in the architecture of the temple in Lembah Bujang, Lamb (1961) had pointed out several elements in the temple architecture which he identified as local elements. Among them is the use of base linings, wooden poles and roofs made of palm leaves (*daun nipah*) or some of them uses tile roofs (Lamb 1961). These elements are also linked as being one of the local elements in the construction of temples in Lembah Bujang by local researchers (Nik Hassan Shuhaimi & Othman 1992; Mohd Supian 2002) while some connections are also linked with the rough art sculptors in their style which indicates that the carver is unskilled and were possibly made by local craftsman (Mohd Supian 2002). Based on the latest archaeological research in Sungai Mas, there are several new data that shows additional links with the local elements, that is the discovery of jars and *makaras* made of granite which reveals sculpture elements of the Kedah Tua Malay community. If we were to make a comparison with Sumatra and Java, the differences is apparent based on the stone carving of the *makara* as the carvings in Kedah, Sumatra and Java had their own identity and every important element that should be on the *makara* is processed by their own ingenuity. The use of jars is associated with the traditional element of Malay houses where it is used as a place to store water that is intended for washing the feet before entering the house.

The transformation of knowledge in the society of Kedah Tua can be seen based on the use of the Sanskrit language in the inscriptions that was found in Lembah Bujang. The inscriptions is dated between the 4th to the 7th century AD and signifies indirectly the mastery level of the Sanskrit language with Pallava characters in the 4th century AD or earlier by the local community. By mastering the Sanskrit language, the Śilpaśāstra

manuscript can be understood and mastered by local architects who are interested in referring to the text to build temples and religious sculptures in the Lembah Bujang. In the early stages of temple construction, natural stone was used as the main building material for the temple, which indicates clearly that they were already skilled in the technique of cutting large stones into smaller blocks during the period. In addition to this, the innovation in the temple construction in Lembah Bujang is evident by the use of pillar base and wooden poles which provides support for the roof section. The base of the pillar is also used on most of the temples built by the local community in Lembah Bujang.

The use of brick as the main building material for temples in Lembah Bujang was fully practiced in the 6th century AD or as early in the 5th century AD. A study conducted on ancient bricks in Sungai Mas (Site 32/34) shows that the bricks were made by using local raw materials obtained from the Sungai Muda basin. This portrays the role played by the local community during that period where they had already mastered the technology to produce bricks (Zuliskandar 2012; Ramli & Rahman 2013, Ramli et al. 2018). Similarly, in the production of Indo-Pacific glass beads, Sungai Mas is one of the centres for the production of the aforementioned glass beads in Southeast Asia (Francis 2002). Scientific studies show that monochrome glass beads in Sungai Mas possesses a distinct chemical content which differs from the chemical content of glass beads from Arikamedu, Khlong Thom and Palembang (Zuliskandar 2008; Zuliskandar et al. 2011; Ramli et al. 2017). Sungai Mas had been producing their own beads in a time where glass beads were considered as the most important commodity as it was used as jewellery, medium for religious ceremonies and most importantly as currency. Sungai Mas had produced these Indo-Pacific beads between the 6th and 13th centuries AD (Zuliskandar et al. 2011).

It is clear that the transformation of knowledge by the Malay community in Kedah Tua is driven by the acculturation process of Indian culture into the local culture. This cultural acculturation process was driven by the trade activities that was very active at that time where the local authorities had benefited from this opportunity to absorb the Indian culture by implementing the monarchy concept practiced by the Indians and subsequently mastering the Sanskrit language and its script as well as science and technology. Lembah Bujang prospered between the 5th century to 13th century AD. The acculturation process of the Indian culture is in line with the transformation of knowledge of the Malay community in Kedah Tua at that time.

5. SANTUBONG: A PROTO-HISTORICAL PORT IN SARAWAK

Santubong is Proto-historical archaeological site which is rich in archaeological remains where findings such as ancient ports and iron smelting sites, structures made of bricks which is believed to be a stupa structures which is associated with the discovery of Chinese ceramics from the Tang, Song and Yuan Dynasties as well as mysterious carvings on large rocks. Based on the records of Zhu Ying and Kang Tai written in the 3rd century AD, Santubong was known as Pu lo chong in that period where one of the main products of the port were camphor and other forest produce (Wheatley 1964). If we were to examine the function of the Santubong port, it is seemingly similar with the Kedah Tua port at that time. Both of the ports produce iron as one of the commodities in developing the state's economy as well as producing pottery as well as forest and sea produce. Santubong and Kedah Tua are also centres for the manufacture of monochrome glass beads – or better known as the Indo-Pacific beads – from the 6th century AD to the 11th century AD. This is based on the discovery of the large amount of beads together with the raw materials during the archaeological exploration and excavations that was carried out.

Santubong generally refers to the area around Mount Santubong, a mountain peak which is located in the delta of the Sarawak River that functions as a guide for ancient traders who intends to trade in the region. Kampung Santubong, a traditional Malay fishing village, is located on the banks of the river. There are many theories regarding the origin of the name 'Santubong'. Based on the local Iban and Malay dialects, the meaning of the name is 'coffin', in Chinese is 'Mountain that can be seen from afar'; in the Kheh dialect is 'king of the forest' while in the Hokkien dialect is 'mountain of wild pigs'.

There are two major local legends associated with Santubong. The first narrates the story of two beautiful princesses who descended to earth from heaven, the abode of those who possesses mystical powers. The older princess, Puteri Santubong, is a skilled weaver, while her younger sister, Puteri Sejinjang, pounded rice. They live and work together in harmony, swearing not to quarrel, until they fall in love with the same person. They then started fighting with each and eventually disaster came upon them. As punishment for breaking their oath, both of them turned to stone and eventually became Mount Santubong and Mount Sejinjang, the two mountains facing each other at the entrance of the Sarawak River. Legend has it that the special features found on the mountain were caused by the blows from the weapons or tools composed by the two princesses. Santubong's face was crushed by the pestle used by Princess Sejinjang to pound rice, while Sejinjang's head

was hit by a blow from Princess Santubong's weaving tool.

The second legend is related to Datu Merpati, a Malay nobleman and traveller who came from 'Kayangan', in which the Malays considered him to be the descendant of Datu Merpati. Originally known as Radin Depati, he fled to Johor with his brother, Radin Urei Sri after he lost in a battle. While in Johor, Radin Depati married Dayang Suri, the daughter of a local ruler. While they were sailing towards Santubong, they faced storms and rough seas and they had to land in Sambas (Kalimantan), where Radin Urei Sri married a powerful queen. They then continued their journey to Tanjung Datu in Sarawak, where Radin Depati changed his name to Datu Merpati and his wife, Permaisuri Datu. They eventually arrived in Santubong after being attacked by crocodiles in their journey. However, Datu Merpati managed to kill the leader of the crocodile float and his head was placed on a large rock, which is now known by the locals as Batu Buaya.

After travelling in province of Johor to Brunei, Datu Merpati and Permaisuri eventually settled in Tanjung Datu, while their son – Chipang – ruled in Batu Buaya. Other interpretations mentioned that Santubong and Sejinjang are said to be the princesses of Datu Merpati. Although this legend is not clear, it has parallels in Malay history, such as the *Salasilah Raja-Raja Brunei* and the *Tarsilah Raja-Raja Sambas* which also mentions that the royal families of the Johor, Sambas and Brunei kingdoms were brothers by marriage between them.

Although there are no concrete evidence from written sources that mentions Santubong was once a trading port that produced products from smelting iron, archaeological evidence indicates otherwise where Santubong was one of the ports that produced iron during the Proto-historical era. In Sungai Jaong, a site located about 2 kilometres from Kampung Santubong, there are archaeological findings in the form of iron slag associated with various ceramic fragments from the Tang Dynasty (618-906 AD) and Song Dynasty. In addition to this, ten sandstones that were carved with anthropomorphic and geometric motifs were also discovered in this site. With the numerous iron slags found together with ceramic fragments from the Tang and Song Dynasties indicates that this site was once an iron smelting site that is believed to be inhabited around the 10th century AD.

Excavations at Bongkissam also found similar archaeological remains, namely iron slag and ceramic finds from China. The most important discovery at the site was a stone platform that is believed to be a Buddhist stupa, and a relic. Several more Buddhist artefacts were found on Bukit Maras which is on the slopes of Mount Santubong, overlooking Bongkissam.

Several artefacts such as the remains of cast iron and ceramic fragments of the Song Dynasty were also discovered at the Sungai Buah site, which is accessible by crossing the river from Santubong. Other sites in the Santubong area includes Tanjung Kubur and Tanjung Tegok, where many ceramic artefacts from the Song Dynasty were found. Based on archaeological evidence, Santubong may have participated in international trade that connects with the India, Middle East, Southeast Asia and China network. Buddhist and Hindu relics discovered in Santubong indicate that this district was Tanjung Puta, which had established trade relations with Indian traders and early kingdoms in Southeast Asia. This is also related to fact that the south-western region of Kalimantan was part of the Srivijaya kingdom based in Palembang which ruled in the 7th to 13th century, as well as being part of the Majapahit kingdom in the 14th until the 15th century AD.

6. IRON SMELTING SITE IN SANTUBONG

Evidence that Santubong is one of the areas that produced iron products is proven based on the iron slags discovered in the site which can be dated between the 10th century AD to the 14th century AD when compared to other archaeological data such as ceramic finds. There are two school of thought regarding the type of iron work done in the site. Tom Harrisson, Stanley J. O'Connor and Cheng Te-Kun were the first archaeologists who conducted study on this site made the assumption that iron industry was done on a large scale and was export-oriented. They also proposed the idea of the iron smelting method employed here utilizes methods from India and China as they believed that the cylindrical pottery fragments were iron smelting pottery. They also believed that iron ore was obtained from the interior, and those who worked to smelt the iron were foreign labourers. Iron produced in Santubong was exported mainly to China during the Tang and Song Dynasties.

The second theory which was introduced by J. W. Christie and F. E. Treloar suggested that the melting bowl were essentially wind passages that was used to force the wind through the furnace (tuyères), and this method is still practiced by the Kayan and Kenyah people of Sarawak. Christie argues that the iron slag may have resulted from the concretion of natural iron ore, where the primary function of Santubong was actually as a place where the iron produced earlier were exported. Christie argues that these iron furnaces were produced in areas where the required resources were plentiful and readily available. In addition to this, this humble industry were actually pioneered by local communities living in the inland area. He also considered that the iron was likely to be produced in the nearby supplier ports. It is also possible that the industry

had declined as iron workers moved upstream in search of areas rich in iron ore deposits.

One obvious fact about Santubong is that there is a tomb located near Bongkissam which belongs to Sultan Tengah, the first and last Sultan of Sarawak who was assassinated at Batu Buaya in 1641 AD. He was appointed as Sultan by his step brother, Abdul Jalilul Akbar, the 10th Sultan of Brunei in 1598 AD. The tomb was repaired and rebuilt in 1995. possesses

7. CONCLUSION

The existence of early kingdoms in the Malay Peninsula and Borneo did not happened overnight and was not developed by colonies from India. Its existence was the result of evolution and transformation of the Malay communities living in the coastal areas and river estuaries since 5,000 to 6,000 years ago. With the existence of trade between the coastal communities with the inland communities followed by trade in the form of intra-regional and eventually inter-regional exchange had permitted the coastal communities to grow in terms of socio-cultural and economy. Local wisdom in science and technology has existed since the end of prehistoric times where their main product was based on iron as well as earthenware. Abundant iron sources and the discovery of iron smelting furnaces have also been found in Lembah Bujang and Santubong indicates that the pre-Buddhist community in Kedah Tua and Santubong were advanced in iron technology as well as skilled in making clay pottery. With the existence of a kingdom or city-state that is ruled by a king who possesses the highest status in society, developments in the field of knowledge, science and technology occurred simultaneously with the socio-cultural development of society. It is a known fact that Kedah Tua and Santubong in the 6th century AD had already built temples by utilizing the wisdom of local people who were also skilled in the technology of brick production. Kedah Tua and Santubong are also recognized as the leading production centre for the monochrome glass beads in Southeast Asia besides Kuala Selinsing which is located in Matang, Perak.

AUTHORS' CONTRIBUTIONS

Conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing – original draft preparation, writing – review and editing, project administration and funding acquisition was done by the author, Zuliskandar Ramli.

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