



JURNAL Pendidikan Sejarah Indonesia

Online ISSN: 2622-1837

WATERS TOWARDS RICE TRADE FLOW IN 14TH CENTURY OF JAVA

Riza Afita Surya*^a, Rif'atul Fikriyab

surya_riza@unej.ac.id

^aPendidikan Sejarah, Universitas Jember, Indonesia.

^bPusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan Pendidikan Kewarganegaraan dan Ilmu Pengetahuan Sosial, Indonesia.

Abstract: Waters as rain, rivers, and seas are one the most common feature found upon Southeast Asian region. It has been establishing this region significantly distinctive along with others. Water is such profound thing everywhere, but it holds most importantly in Southeast Asia Maritime region, with its long shorelines in relation to its landmass, and with the enormous expanses of surrounding Island of Southeast Asia and abutting the shores of Mainland Southeast Asia. Waters in form such rain, rivers, and seas undoubtedly giving a certain pattern of social and economical circumstance towards society. Java was known as the biggest rice producer until 19th century, especially manufactured among Javanese kingdoms. Rice had been the trademark of exchange in Java that was contributed across the land overtime. Here, wet rice cultivation has been a typical technique engaged in Java and remains until presents. This article discusses the water impact towards rice trade.

Keywords: waters, rice, Java

ARTICLE INFO:
Research Article

Article history:

Received 9 June 2020

Revised 28 July 2020

Accepted 28 July 2020

Published 20 December 2020

Available online 20 December 2020

©2020. JPSI. All rights reserved.

INTRODUCTION

Exchange or lately we call it as trade is one of the most primitive manner human being ever did, since prehistoric until now. It emphasizes human as homo economicus which always counts between advantage and disadvantages. It also considered as one of the oldest activities upon world civilization history. Most every aspect of living embrace exchange manner in cope with needs. Exchange routes and maritime paths forming trade network that has always been the matter of academic research (Curtin, 1998; Castillo, 2016). This is similar compare up to the civilization formation, in which trading activities had also transformed and evolved in a dynamic line. Resources availability differences has emerged exchanging among groups, then composing continuous interaction (Curtin, 1998). Trading refers to Christie's (Boomgard, 2007) has become major activity towards economical cycle; in which controlling trade means controlling political matters.

Trade, in different forms were occurred in most civilization in anytime and anywhere. Trade as an attempt is mainly performed for granted as human being origin expression to exchange and gain money. The commodities transportation is considered to require participation of professional merchants. Merchants are those who were capable to gain significant role upon societies and to influence regulations of ancients' states (Morley, 2007; Parkins, 1998).

Trade routes taking not only goods nor commodities, as well as community establishment and thoughts (Curtin, 1998). Trade was a unique kind of economic business, monetization created society established communities with various occupations, social stratification, and the division between the chief and commoners. Trade itself had become inseparable within Southeast Asia region, due to geographical location and particular remarks which closed by sea traffic path and pass maritime route between west and east regions. This region under the wind has always been affecting both domestic and international trade (Reid, 1998).

Southeast Asian is a distinct geographical region located between Indian Oceanic path. Southeast Asian mentioned by Reid is similar towards Mediterranean world, which is a geographical region that much separately among surrounding areas, such as India, East Asian, and Pacific (Reid, 1998). Trade dynamic had changed Southeast Asia and allowed it to become significant part into world trade. Clove, nutmeg, pepper, and sandalwood were primary commodities towards inter-continent; geographical condition established Southeast Asian to be involved within numerous maritime trade, hence the political system was quite open. The peak of most advantages trade occurred during 1570-1630 (Reid, 1998). Rice itself has been known as origin plant in Southeast and East Asia (Isemura in Castillo, 2016).

Java in the other hand is the biggest island of Indonesia archipelago. The country was known to Europeans under the name of Java, or Java Major, and to the natives under those of Taba (the land) Jawa or Nusa (the island) Jawa, is one of the largest what modern geographers call the Sunda Island (Raffles, 1817). The term origin remains unknown.

The first group ever mentioned about Java according to Lombard (Lombard, 2005) was Buddha priest which sailed using trader's ship from India to China and in turn. The first one was known as Faxian (Fa Hsien) after stayed more than 12 years in India and moved to Srilangka in a large vessel. He was against storm, but then successfully landed on Ye-po-ti, means Yawadwi (pa), Java term in Sanskrit. Second, the term Java was written by a Kasymir prince Gunawarmma who lived few months in She-Po island, a place that adequate pronunciation compared to term "Jawa." It should be notice that She-Po (Java) was the first place being mentioned clearly upon Chinese records. Some additional records indicate a relation between Java and traders mainly from Arab and China since 5 to 7th century (Lombard, 1990).

Over a millenia, the effect of people towards community upon Java's landscape and environment has been profound. Considering the proximity of Java's active volcanoes to rapidly populated regions within island, they emerged devastation at significant times. Yet, this due to relative geological quiescence of 20th century, the number of historians have already supposed to reduce the notable role of eruptions and earthquake in establishing the early political and social history of the island (Henley & Nordholt, 2015).

Java obtains highlands and mountains are which establishing east-west spine along the island. This condition causes isolating the hinterland into a sequence region that quite separated and suitable for wet-rice cultivation. Rice lands production within Java are considered the affluent in the world. The primary way to communicate in Java was utilizing rivers. There were only two rivers suitable for long-distance communication, Brantas and Solo. Roads in the other hand had already established in mid-seventeenth century, were more vulnerable to breakdown compared to the rivers. East Javanese polities grew up within the valley of Brantas, which its upstream crosses within the slopes of Arjuna Mountain and flows in otherwise direction. Hence, it was rather steadfast than the straighter streams of the plains in Central Java (Ricklefs, 2001; Tarling, 2008).

It has been known that since ancient times Java basic economy was agricultural, mainly rice cultivation, which were three kinds type, namely inirrigated, terraced and irrigated fields. During 14th century, Javanese hills were occupied by rural dwellers, means encouraging extensive jugle logging and waste land. Hence, deforestation was undeniable along mountain downhills. Performing sawah (terraced field) was supported by both dams and cannals as ancient Javanese civilization achievement, which had been practiced prior to Indian arrival (Pigeaud, 1962).

During 14th century, Javanese Power occurred in Trowulan. Trowulan was the former center of the Majapahit kingdom. Geographically, this region is located on a bumpy plain with an altitude of 30-40 meters above sea level. This region is surrounded by ridges, volcanoes, and wide valleys. Generally, it stretching to the north. People call it 'Jatirejo' alluvial fan. Every rainy season, volcanic material from the base of the fan is gushing through the rivers that flow in the center of the kingdom. The outpouring overflowed the river water. Flooding is inevitable.

About 10 km north of the center of the kingdom, the Brantas River runs. The area around the river is a vast expanse of floodplains. Majapahit rulers also turned their minds to prevent flooding from getting worse and using water for the people's welfare.

In the range of 1293-1500, the Majapahit authorities built a number of reservoirs, artificial ponds, canals, small waterways, water tanks, and wells. The information included in the Kandang Inscriptio, dated 1350. One of the famous reservoir developments was the "Candi Tikus" (called the temple because in the middle of the reservoir stood the temple). It worked as a dam and symbolization of Mount Meru which is pouring water from its peak. This symbolization is significant and an inseparable part of Javanese culture. Water plays an important role in Javanese mythology.

In addition to building these facilities, the Majapahit authorities formed a water management unit called "huluair". His job is to divide water for rice fields, almost similar to the "subak" klian in Bali. By ensuring that the water was evenly distributed, the king ensured public welfare.

Besides water management, rice was also an important concern as one of the trading commodities at that time. Rice is one of the most important plantation commodities of Indonesia. Rice has vulnerability towards climate change demands adaptation technique on irrigation method. Rice is three to five months crop that needs water to throughout the harvest process (Panuju et al, 2013; Alexander et al, 2014; Silva et al, 2015). Apparently, 90% rice suppliers coming from Asia, with main producers are China, India, Indonesia, Bangladesh and Vietnam. Most of the rice produced and consumed is grown upon irrigation, even though there are few varieties of rice which are not planted in flooded paddies (Northrup, 2005).

Rice is considered as the foremost meal and commodity within Southeast Asia (Ricklefs 2001; Castillo, 2016). Rice or *Oryza Sativa* is physiologically a swamp plant and has evolutionary sequences the shifting cultivation of rice hills cannot have modified in lowland plantation (Hill, 1980). Other daily meals namely taro, sweet potato, sago, and wheat had surpassed rice upon Southeast Asian archipelago, however in fifteenth century rice was more preferable everywhere and can be planted easily. Rice also represented with several plants, namely grains, spikelet bases and lemma apiculi (Reid, 1998; Castillo, 2016). Considering production quantity between emporiums among Southeast Asian regions, Java was happened to be the largest exporter of rice. Rice indeed was the biggest trade commodity of Southeast Asia, in which this fact clashes to Van Leur's premise that luxurious goods were the basic of trade commodities (Reid, 1998).

During the 14th century, Java experienced domination upon Majapahit Kingdom. It was complex society. On the one hand, tribal social order were seen dominant, while the other hand modern Javanese remarks gradually appeared. It could be assumed that Javanese society during 14th century (and prior) possible divided into four classes; rulers, priests, people and and bondmen. Within this era, Majapahit realm the rural communities seems to have been variegated to a bigger

scope seems possible (Pigeaud, 1962). This is why 14th century was peculiar period, referring to Negarakertagama which posses valuable information upon religious, social, as well as economic circumstance of 14th century under Majapahit realm.

Java's destiny has long been related to the global economy circumstances through the Dutch relation and international networking trade within Chinese merchants (Carey, 2018). This study attempts to examine the geographical history of waters towards Rice trade of early Java.

METHOD

This study engages literature review method adapting to Fink's (2005). Literature review is operative definition of a systematic literature review, as follows "a systematic, explicit, and reproducible method in order to identifying, evaluating, and synthesizing the current body of accomplished and recorded research established by reseachers, scholars, and praticioners. The literature review method applied in this research as follows.

1. Planning (reseachers determining the purpose of the literature review and protocol and training)
2. Selection (searching the literature and practical screen)
3. Extraction (quality appraisal and data extraction)
4. Excecuton (analyzing of findings and writing the review) (Okoli, 2010).

RESULTS AND DISCUSSION

Results

Rice has become the most typical diet for Javanese, even people within Southeast Asian region. This resemblance occurs due geographical matters. The environment similarity encourages the meals equality which are commonly rice, fish, and and palms. Rice was possible originated from Southeast Asia and for thousand years had been established as majority of inhabitants main diet. Some regions as Luzon, Sulawesi, Java, Sumatera, and some parts of Siam, harvest was carried out by women utilizing "ani-ani," a small knife to cut the stem of paddy. In order to respect the spirit, they only cut a single stalk (Reid, 1998).

East and Central Java had produced commodities such rice, salt, timber, palm sugar and many more into markets within Indonesia Archipelago and Malaka Straits ever since first millennium. The port-cities of Java north coast were entreports. In addition, there had been known for foreigner traders from China and Indian Ocean communities which established regular trading links with Javanese traders since 16th century (Klaveren, 1953).

Lands in Java are classed under two general divisions; lands which suitable of being inundated directly from stream or rivers and lands which are not. The former are known as 'sawah', which latterly also became tegal or gaga. The major lands of sawah or wet cultivation compared to 'tegal' or dry reveal in their relative produce. Rice indeed has continually observed as the grand primary of Javanese, as well as Indian cultivation and to other species of husbandry subordinate. Many states of Sumatera, Malacca, Borneo, Celebes, and Moluccas were always have great dependent of Javanese farmers for their supply (Raffles, 1817).

Started in 12th century, trade network encompassed Java island appeared more intense. This was due to opening of Chinese ports, hence encouraging high intensity of merchant activities within Indian Ocean until the middle of 13th century (Lombard, 2005; Christie, 1982). During 13th century there was significant shifting within Indochina Peninsula, such Mongolians expeditions, Angkor Kingdom decrease, and all. These events passed blessing towards current flourishing kingdom of East Java, that is Majapahit. This kingdom apparently had already established intensive sea trade connection until 15th century, while Islamic states were gradually formed, replacing Hinduism-Buddism kingdom (Lombard, 2005).

It was apparently in 14th century that Majapahit achieved its golden age which could be seen through Javanese representation. Under Majapahit, the realm controlled sea ports all along Java north coast, namely Jepara, Tuban, Gresik, Ampel (Surabaya), which were busy markets occupied by many merchants performed exchange wares both near and far. The Javanese in 14th century was spending time dominantly with trade, including building ships, seafarers and colonizers controlled the whole archipelago, even Malay peninsula and Philippines. The growth of economic stage partly encouraged by State supervision and markets which were administrated by central government. The central official including a small army, but most regions was established different rules and linked up to the organization in maintaining authority (Furnival, 2010).

The style of commerce then changed. During Majapahit, trade was no longer free. The activity was handed over to employees who were in charge of and benefits for the country. Economically, Majapahit turned on important ports along the north coast of Java as transit ports, such as in Gresik, Tuban, Jepara, Lasem, Bali, Surabaya, and Jaratan.

Majapahit also emphasized its natural yield. Like rice, spices and salt as trade commodities that were required globally. Majapahit court provided trade regulations, taxation, and reinforced the ports on the two rivers, Brantas and Solo. In order to control the regions, a local ruler or Bhattara was placed. They are given the right to make their respective tax regulations. This commercial activity became one of the biggest tax contributors in the Majapahit kingdom's economy (Rahmawati et al, 2019).

Since the late of 14th century, there were several ports chief on the north coast escaped from the grip of fell off Hinduism empire, Majapahit (Raffles, 1817; Furnivall, 2017). Traders then converted to Islam and obtained independent part. As 1677 was considered as the beginning of the Dutch destructive interruption against Mataram-Java, the Cultivation System intensify Dutch economic exploitation. Then Java became as Multatuli states Java as “jewel in the Dutch Crown” and “the wealth of Holland.” After forty years appearance, The Cultivation System had made profit more than 1,250 million guilders for Dutch state. The Cultivation System was happen to be the first stage of economic exploitation of Javanese farming potential under formal Dutch colonial rule (Kian, 2006). The Dutch were intermediary of rice distribution each year approximately six to eight thousand tons to Ceylon, Coromandel, Cape, and other settlements (Raffles, 1817).

There were three ways in rice farming of Southeast Asia in 16th century; farming by moving around downhill, spreading the seed into lodged field, and replant seed in rice field. There were countries produced huge quantity of rice, namely Ayutthaya (Siam) which exported approximately 400-500 tons in 16th century and Pegu ports delivered at least 40 rice-fulled vessels to Pasai, Pedir and Malaka. On the contrary, after Birma conquered Pegu, some production surplus brought through Irawadi river to Birma capital. In 1600, Cambodia was able to distribute 7000 tons annually towards Patani, Pahang, and Brunei. Songkhla and Nakhon Sithamarat (Ligor) also delivered 800 tons every year to Patani and Pahang in 1620. However, the largest rice producer was Java and the technique engaged was the third-seeding germ into field which input level was watched carefully (Reid, 1998).

In the 14 century, East Javanese realm rice growing on sawah indeed was the based of economy. All kinds of crops and produce were delivered from rural communities and the various kinds of beliefs domains and estates spread all over the country (Pigeaud, 1962).

Discussion

If we make a relevant connection of water towards Southeast Asia, sea may come first in mind as the first association. Indonesia indeed is surrounded by the sea. The sea is perceived in some different views. On one hand, sea is seen as dangerous due to bad weather or unknown monsters home. In the other hand, technological advance makes travel over seas was often faster compared to travel over land (Boomgard, 2007).

Throughout Java island exists a range of mountains which giving shape of backbone from east to the west. Active volcanoes along with highlands are supporting in separating hinterland regions become effective terraced fields (sawah). Paddy specified regions within Java was considered one of the richest in the world. Main routes of Java mainly rivers which mostly were short, despite transportation did only occur through rivers. Records of massive vessels of Central Java states between 8th and 10th century represent in Borobudur temple relief indicate that there was high

possibility of long-distance sail. This also supported by Sojomerto inscription (about 700 BC) which mentions the relation between Java and Sumatera which happened to be maritime route (Ricklefs, 2005; Munandar, 2009 in Prihatmoko, 2011).

Here we notice Indonesia is assumed to be “monsoonal tropics,” which monsoons are not really common the the climate within Asiatic continent. Java is the transition island between equatorial and moonson. From West to East, dry season becomes higher in the “East monsoon, which is actually Southeast Asia trade wind encouraged by rather high-pressure region within Australia. The closer place against Australia, the lesser vapour it has accumulated on its flash journey and precipitation it brings to the islands of nsulinde. Java is also richly gifted with andesitic tuffs and efflata and along this state generates ability in preserving a dense and sedentary population (Klaveren 1953).

Java is known mostly due to its Sawah and tegalan culture. “Sawah” as we notice need a more refined social superstructure to divide the water supply and to straight toward labour on communal projects within larger scope such dams and canal. Java obtains teakforest space which is controlled by chalk valleys that establish old geological pattern of Java (Klaveren, 1953).

The originality of rice cultivation watering in Java is rather vague. Based on palynological data suggest that burn-offs associated to grains swidden agriculture. Most region, the habitation pattern formed at early stage suits upon historic ages. But, Java settlement transition of rice farming probably had started in late Neolithic period. Surely, the first rice cultivation system was possibly ‘receding-flood cultivation.’ Palynological proof indicates that such administration developed at early stage of Java, people performed average altitude rather than in very low-lying areas (Sutikno, 1989).

Overflow region other than seasonally inundated lake and river end point demands both large quantity of workerd and metal tools, since this typical cultivation covers land purification, the formation and maintenance piled up, terraced, ploughed and ‘bottomed’ fields, and dam system towards water distribution. Actual information regarding Javanese rice-growing rule are historical records. The most significant proof are several hundreds of Old-Javanese language inscription about tax charters carved on stone and copper plates during later first and early second millennia AD. These historical sources illustrated that since 9th century, rice was not only primary commodity crop, but also the main of state agricultural system (Boomgard, 2007).

Java is located within equator with tropical maritime, also called Pacific ‘ring of fire.’ Their landscape are dominated and shaped by active and extinct volcanoes. These mountains obtain rain clouds, which is watering most largely in southern clamps. This causes water availability of surface water within mountain hillsides. Hence, this agricultural state to the south of volcanoes in Central

Java is quite stable, elaborated with adequate seasonal shifts. However, the biggest rivers of Java, Brantas and Solo free into the sea of east Java northeast coast (Boomgard, 2007).

Food production and the distribution of food supplies across Indonesia have long been connected to geographical and temporal variations in climate. The Indonesian archipelago embraces the equator and temperature is relatively constant across the year and the region. Precipitation patterns are the primary sources of temporal and geographic climate variation. Average rainfall is between 1,500 and 4,000 mm per year and in some mountainous regions, rainfall of 6,000 mm per year can occur. The El Nino-Southern Oscillation (ENSO) climate scheme significantly affected temporal and geographical; rainfall is a major precondition upon rice production, the main staple crop in the country. This ENSO patterns have had consequences for rice production and food supply (Eng, 2009).

Classifying Java climate is quite complicated. The existence of high volcanoes and mountains series which is 2,000-3,000 meters and extensive areas at high altitude cause considerable variation in regional rainfall, temperature, humidity, and sunshine. In terms of general condition, there are two seasons; rainy and rainfall season. The period of peaks and troughs, as well as the average number of precipitation, different within the island (Van der Eng, 2009).

Rainfall amount influences to crop production, particularly rice. Both low or late rainfall during the rainy season may cause reduction in the number of lands for rice cultivation, since rain is absolutely required to weaken the soil in order to puddle and to fertilize. Rainfall also responsible in increasing crop failure due to shortages of rain retards rice to grow. There is plenty of regions with soil variability across Java island and giving impact towards rice production, as well as rice trade of Java (Eng, 2009). As stated in The Suma Oriental the “Land of Java only had infidels (merchandise); unlimited amount of rice four or five types; and very white; better than that somewhere else ...“(Cortesaio, 1944).

For many centuries, wet rice cultivation pattern had been stroked both southward and eastwards, encouraging new pattern of society and fetching current pattern, as well as establishing path towards natural forests. The relationship between natural resources, environment, and economical shifting has proved to be connected throughout history. Environment determined system of cultivation, raw material availability, social structure establishment as well. The big dominance of primary production indicates that the environmental condition determines pattern of cultivation, means rapid environmental changes derive potential consequences towards some aspect of live of population, involving trade (Falkus, 1990).

CONCLUSION

Water is not only precious element of Java volcanoes, instead volcanoes also have played significant role towards agricultural in term of mineral and ash. The volcanoes generate the silt that

needs to be grasped, first in weirs and then canals which connected to the field. This systems gather and distribute to fields, whether water or fertilizing sludge. But, organizing this irrigation demands consistent and order labour input. Therefore, the point of the land around Mount Merapi in Central Java, happens to be greatest supporter of the largest densities upon agricultural population in the world.

Water in the term of rivers, rain, and etc had played significant rule towards Java rice trade within Indonesia archipelago and Southeast Asia regions. It controlled the both quality and quantity of rice commodity which had been the most original feature of Java island. It is clear that the environment and condition has become a matter of general and concern. To collect nature condition in comprehensive way of long-term environmental change would involve an immense task as detective work, well beyond the present essay scope, identifying and gathering relevance of several social sciences.

REFERENCES

- Alexander, J., & Alexander, P. 1978. Sugar, Rice and Irrigation in Colonial Java. *Ethnohistory*, 25(3), 207. doi:10.2307/481196.
- Boomgard, P. 2007. *A World of Water*. KITLV.
- Carey P. Revolutionary Europe and the Destruction of Java'S Old Order, 1808-1830. *Historia: Jurnal Pendidik dan Peneliti Sej.* 2018;12(2):296. DOI: <https://doi.org/10.17509/historia.v12i2.12107>.
- Castillo, C., Bellina, B., & Fuller, D. 2016. Rice, beans and trade crops on the early maritime Silk Route in Southeast Asia. *Antiquity*, 90(353), 1255-1269. doi:10.15184/aqy.2016.175.
- Christie, J. 2007. Water and rice in early Java and Bali. In BOOMGAARD P. (Ed.), *A World of Water: Rain, Rivers and Seas in Southeast Asian Histories* (pp. 235-258). Brill. Retrieved May 29, 2020, from www.jstor.org/stable/10.1163/j.ctt1w76vdo.12
- Christie, Jan Wiseman. 1982. Patterns of trade in Western Indonesia: ninth through thirteenth centuries A.D (Vol. 1 & II). *Disertation*. School of Oriental and African Studies. University of London.
- Cortesaio, A. 1944. *The Suma Oriental of Tome Pires and The Book of Francisco Rodrigues* (Volume I). McGill University Library.
- Curtin, Phillips. D. 1998. *Cross-cultural trade in world history*. Cambridge University Press.
- Falkus, M. Ecology and the economic history and environment of asia (I). 2 007 *Asian Studies Review*. 1990;14(1):65-79. <http://dx.doi.org/10.1080/03147539008712665>.
- Furnivall, J. S. 2010. *Netherlands India: A Study of Plural Economy*. Cambridge University Press.
- Henley, D & Nordholt, H. S. 2015. *Environment, Trade and Society in Southeast Asia*. KITLV.
- Hill, R. 1980. *Thailand: A Rice-Growing Society*. Edited by Yoneo Ishii. Translated by Peter Hawkes and Stephanie Hawkes. Center for Southeast Asian Studies, Kyoto University, English-

- language Monograph Series, no. 12. Honolulu: University Press of Hawaii, 1978. Pp. vii, 340. Preface, Maps, Plates, Tables, Index. *Journal of Southeast Asian Studies*, 11(2), 397-399. doi:10.1017/S0022463400004604.
- Kian K. H. 2006. *The Political Economy of Java's Northeast Coast c. 1740-1800*. Brill.
- Klaveren J. J. 1953. *The Dutch Colonial System in the East Indies*. Nijhoff.
- Lombard, D. 1990. *Le Carrefour Javanasi Essai d'histoire globale*. Ecole des Hautes Etudes en Sciences Sociales.
- Lombard, D. 2005. *Nusa Jawa: Silang Budaya Jilid III*. Gramedia.
- Morley, N. 2007. *Trade in Classical Antiquity*. Cambridge University Press
- Northrup, Cynthia Clark. 2005. *Encyclopedia of World Trade from Ancient Times to the Present Volume 1-4*. Routledge Taylor & Francis Group.
- Okoli, C., Schabram, K. 2010. "A Guide to Conducting a Systematic Literature Review of Information Systems Research,". *Sprouts: Working Papers on Information Systems*, 10(26). <http://sprouts.aisnet.org/10-26>
- Panuju DR, Mizuno K, Trisasongko BH. The dynamics of rice production in Indonesia 1961–2009. *J Saudi Soc Agric Sci* [Internet]. 2013;12(1):27–37. Available from: <http://dx.doi.org/10.1016/j.jssas.2012.05.002>.
- Parkins, H & Smith C. *Trade, Traders and the Ancient City*. London: Routledge.
- Pigeaud, T. 1962. *Java in the 14th Century: A Study in Cultural History The Nagara Kertagama by Rakawi, Prapanca of Majapahit, 1356 A.D. (Koninklijk Instituut Voor Taal-, Lnad- En Volkenkunde Translation Series 4)*. Springer-Science Bussines Media DOI: 10.1007/978-94-011-8776-3.
- Prihatmoko, H. 2011. *Pengelolaan Transportasi Air Abad X sampai Abad XV Masehi di Jawa Timur Berdasarkan Sumber Prasasti*. Thesis. Universitas Indonesia.
- Raffles, T. S. 1817 *History of Java Volume I*. Gilbert and Rivington Printer.
- Rahmawati, M., Riyadi, M. I., & Rizaldy, R. J. (2019). Sungai bengawan solo: tinjauan sejarah maritim dan perdagangan di laut jawa. *Candrasangkala: Jurnal Pendidikan dan Sejarah*, 5(2), 24-39.
- Reid, A. 1998. *Southeast Asia in the Age of Commerce 1450-1680*. Yale University Press.
- Ricklefs, M. C. 2001. *A History of Modern Indonesia since c.1200*. Palgrave.
- Silva, F., Stevens, C. J., Weisskopf, A., Castillo, C., Qin, L., Bevan, A., & Fuller, D. Q. 2015. Modelling the Geographical Origin of Rice Cultivation in Asia Using the Rice Archaeological Database. *PLOS ONE*, 10(9), doi:10.1371/journal.pone.0137024.
- Sutikno. 1989. Geographical mapping in Indonesia. *Indonesian Journal of Geography* 19-58:1-9
- Tarling, N. 2008. *The Cambridge History of Southeast Asia Volume 1 From Early Times to c. 1800*. Cambridge University Press.
- Van Der Eng, P. Market Response to Climate Stress: Rice in Java the 1930S, *Australian Economic History Review*, Vol. 50, No. 1. doi: 10.1111/j.1467-8446.2009.00272.x