

PRELIMINARY STUDY OF ETHNOMATHEMATIC ELEMENTS IN ACEH

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Abstract.

As an area which has close relation with Islamic culture, Aceh has included mathematics in some religious activities of its community. The paper highlights a preliminary study of two topics of ethnomathematics related to Acehnese culture, namely *faraid*, the law of inheritance and geometry of its wooden house ornaments.

Keywords: ethnomathematics, ornaments, Aceh

1 Introduction

An educational institution at university level had been established in Aceh since the beginning of 16th century, when a king of Aceh Darussalam Kingdom, Sultan Ali Mughayatsyah (1511-1530) founded Jami Al-Bayt al-Rahman (Baiturrahman University) soon after handling the kingdom.

During the 16th and 17th century Islam had been widely spread in the Nusantara archipelago and many educational institutions were built in the new Islamic center areas. References and textbooks were more needed for learning process, and this grew the writing of religious texts and literature. These activities are particularly performed in Aceh which had long become the gathering center for clerics, writers, and scholars.

Among the scientific texts inherited by the ancient scholar was *Dar al Faraid* by Syekh Nuruddin ar-Raniri who lived in 17th century, in the era of Sultan Iskandar Muda, Sultan Iskandar Thani, and Sultanah Sri Ratu Safiatuddin. *Dar al Faraid* wrote about *tauhid* (unity) and religious philosophy (Hadi, 2005).

In a manuscript entitled *Kitab Tazkirat al-Tabaqat Qanun Syara' Kerajaan Aceh* by Syekh Syamsulbahri, the obligations of Aceh people were mentioned as the kingdom tree or kingdom base commanded by Sultan Ali Mughayatsyah, consists of 21 sections. Section 4 said that the obligation of Aceh people was to teach and learn how to be a goldsmith, a blacksmith and a flower graver. In section 14, is the obligation to teach engraving wood and stone with texts and flowers and print the stones with sand, clay, brick and coral, calcified, all crushed and sieved (Alfian, 2005).

Instead of presenting results, this paper aims to stimulate the study of the two ethnomathematic elements in Aceh. First is *faraid* (law of inheritance) to preserve the knowledge had been achieved by scholars in the old time. Second is the study of geometrical structure in crafts that built as ornaments in mosques, wooden houses, and graves scattered in many places in Aceh. Furthermore the study also aims to develop new methods to implement the law for future use, and geometry for education, such as by utilizing computerized method.

2 Ethnomathematics in Aceh

2.1 About Ethnomathematics

Ethnomathematics is quite a later subject compared to ethnobiology, ethnochemistry, or ethnoastronomy. Ethnomathematics was pioneered by Ubiratan D'Ambrosio in 1985. Ethnomathematics can be seen as math in environment or math in community. On another level, ethnomathematics is a particular way used by a community in mathematical activities such as grouping, sorting, calculating and measuring. Mathematic education can take advantages from the culture as sources to increase and build motivation and confidence of students (Sumardiyono, 2004).

2.2 History of Scientific Activities in Aceh

Many scientific texts were written which showed the level of academic atmosphere in old time. *Hikayat Raja-raja Pasai* is the oldest Islamic and also Malay text in Nusantara. *Jawi* writing (Arabic text in Malay language) used was a main specification of the Malay manuscripts along five centuries after the writing had been introduced.

Many literature and suffix texts were written by Hamzah Fansuri (lived in 16th century) who was a famous scientist, a poet, and a sufism expert then. *Taj al-Salatin* (17th century) by Bukhari Al Jauhari wrote about ethics, politics, and government.

Syamsuddin As-Sumatrani (17th century) was a favorite cleric of Sultan Iskandar Muda, later was honored as the prime minister. He was very productive, great scholar, philosopher, and writer who wrote at least 16 books. *Hikayat Aceh* is an important reference that explained about the life of Sultan Iskandar Muda, written by an unknown author.

Nuruddin ar-Raniri, another great cleric and writer, inherited us more than 40 title books of various branches of knowledge. Among his most famous works are *Bustanussalatin*, *Shiratalmustaqim*, *Tibyan fi Ma'rifat al-Adyan*. Teungku Syiah Kuala or Syekh Abdurrauf wrote not less than 36 titles about law, sufism, *tafsir* Al-Quran and Hadith (translation and explanation) and also poetry (Hadi, 2005).

2.3 Faraid

The inheritance law is the most complete rule in the Quran. Main references of the law are verses in Surah An-Nisaa (4:11, 12, and 176). The more common verses are found in Surah Al-Anfal (8:75), Al-Ahzab (33:6) and An-Nisaa (4:7).

The importance to study *faraid* was stated in the Hadith: "Study the *faraid* knowledge and teach others. Verily I am an ordinary man who surely will die, and this knowledge of *faraid* will be lifted. Nearly two persons who disagree in dividing inherited wealth could not find anyone to reconcile them" (from Imam Ahmad, Turmidzi and al-Hakim).

The inherited persons were classified in 8 groups, namely:

1. Group of *ash-habul furudl*, family members who have been determined in Quran, hadith, or *ijma*. They are the first group the inheritance given.
2. Group of *ashabah nasabiyah*, persons deserve the left over.
3. *Rad*, distribute the left over to *ash-habul furudl*.
4. Group of *dzawil arham*, all of family members who are not included in group 1 and 2.
5. *Rad* for husband or wife, if the dead person doesn't have any family member.
6. Group of *ashabah sababi*, the master who has freed his slave.
7. Person who gets more than a third.
8. *Baitul Mal*, if there is none to be included in any of the above.

The above groups has been set in a table of inheritance (As-Shabuni, 1995).

A more sophisticated table from the old Aceh culture was also found, written in *Jawi* script. This table has not been studied due to the limitation in reading and understanding *Jawi*. This study is directed to investigate the table and to recall the knowledge inside.

The beauty of mathematics in the Quran which can be seen in the inheritance distribution is in its arithmetical calculation. Here the Least Common Multiplication is optimally used such that all portions can be stated as integers.

2.4 Geometrical Ornaments

Caring for environment does not only mean to deal with living creature, but also to preserve culture. The culture inherited from previous generations contain wisdom which is still worth to be applied and studied these days. Traditional building is one kind of the culture products which is relevant to be studied by mathematics point of view, particularly the ones in Islamic countries that usually full of ornaments built by geometric designs. However geometry is not the only branch of math involve in those designs, but also algebra plays an important role. Although numerical

methods have not existed in the old era, for this time study it may be helpful in producing the repeated forms of ornaments.

Symmetry is the subject for mathematics education that can be adopted from those traditional buildings. The patterns often appear are calligraphy, arabesque, polygon, square, star and rose with 5, 6, 8, 10, 12, and 16 petals (Abbas, 2005).

Acehnese traditional houses are stilt and made of wood. The ornaments are influenced by Islamic designs although it has it's own characteristics. Most of these ornaments follow the plants, flowers, and leaves patterns, which show the appreciation to environment. The symmetry pattern involved will become an interesting subject to be explored (Arif, 2008).



Figure 1. Symmetry in design and ornaments of Acehnese traditional house
 (source: Dayah Tanoh Abee, Aceh Besar)

3 Summary

The paper introduced two possible elements of ethnomathematics in Aceh, *faraid* and geometrical ornaments. History has proven a better knowledge of inheritance law had been achieved in old time. This achievement should be recalled back in order to avoid the decrease level of understanding the law. The other element, the study about symmetry of traditional patterns may gain student interests in geometry.

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