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The Importance of Translation Mathematics Old Script

[1]Shahrul Nizam Ishak, [2]Noor Hayati Marzuki, [3]Jamaludin Md. Ali
School of Mathematical Sciences,
Universiti Sains Malaysia,
Pulau Pinang, Malaysia
E-mail: [1]shahrul.usm@gmail.com, [2]hayati@cs.usm.my,
[3]jamaluma@cs.usm.my

ABSTRACT

In this paper, a concise discussion of the text study will be carried out by focusing on the significant of Malay mathematics old script translation. We also discuss the importance of the translation work that need to emphasize. Stages of the translation period based on history knowledge also been highlighted. An example of the translation from *Rauḍat al-Ḥussāb fī 'Ilm al-Ḥisāb* that was written by Malay 'Ulama[1] in 1307H/1893M is also shown here. The book was printed in Egypt and has been used in teaching and learning among the student at the Holy Mosque (*Masjid al-Harām*). Therefore, from this work hope that the introduction of the book presented here is sufficient to stimulate interest in readers and researchers to embark and investigate the beauty and the power of script translation in providing more knowledge especially in the mathematics education area.

Keywords: Mathematics Translation, Old Script, *Rauḍat al-Ḥussāb.*

INTRODUCTION

The amount of translation into Arabic from Greek, Syrian, Persian and Sanskrit was at its peak during the ninth and tenth century. 'Ulama of Islam, Christianity, Judaism and even Zoroastrianism were employed in the translation and writing new scientific masterpieces. In the course of time the works of Euclid, Ptolemy, Aristotle, Apollonius, Archimedes, Heron, Diophantus and the Hindus were accessible in Arabic. Foremost among the translator was the Nestorian Hunayn ibn Ishaq (809-873M) who had 90 pupils' translators under his supervision including his son, Ishaq, his nephew, Hubaysh, the mathematicians Thabit ibn Qurra and Quata ibn Luqa [7].

Khalid ibn Yazid, the Umaiyyah caliphate (661-749M) had learnt chemistry from a priest. He also commanded that the translation from Greek chemistry treatises into Arabic should be made [14]. During the times of

[1] A person who is knowledgeable of Islamic law and scientific fact

Caliph al-Mutawakkil (847-861M) the Sabian mathematician, Thabit ibn Qurra acquired great fame. He and his disciples translated the principal Greek works on geometry and astronomy including the classical treatises of Apollonius and Archimedes [14].

Nevertheless, Malay 'Ulama such as Sheikh Ahmad al-Fathani, Sheikh Ahmad 'Abdul Latiff al-Khatib al-Minangkabawi, Sheikh Tahir Jalaluddin and Haji Umar Nuruddin Sungai Keladi, Kelantan are among the great mathematicians. For instance, Sheikh Ahmad al-Khatib in his famous book *Rauḍat al-Ḥussāb fī 'Ilm al-Ḥisāb* [1] (The Garden of Mathematician in Calculation Knowledge) and *'Alam al-Ḥussāb fī 'Ilm al-Ḥisāb* [16] have briefly explained about the numbers and geometry concept and its practical application in daily life [3]. Therefore, the disquisition by Sheikh Ahmad in *Rauḍat al-Ḥussāb* represents the characteristic of mathematics discussion in Medieval Islam.

Thus, the studies in this paper summarize aspect concerning the importance of translating mathematics book. Section 2 describes the historical overview of Islamic sciences and technologies. Various stages of translation period are elaborated in section 3. Section 4 provides a brief description of the important translation work to be carried out. Section 5 give an example of translated part on triangles concept from *Rauḍat al-Ḥussāb*. The conclusion of this work will be remarked in section 6.

HISTORICAL OVERVIEW OF ISLAMIC KNOWLEDGE DEVELOPMENT

The Greek civilization has been dormant for many years until it appears back in the middle century and during the Renaissance time. Majorities of the Western scholar looks like they did not realized that the knowledge during the 6H/12M that written by Islamic 'ulama such that al-Khawarizmi, al-Farabi, al-Ghazali, al-Faraghani, Ibn Sina and Ibn Rusyd has been translated into Latin language. The great and popular Aristotle and Euclid treatises are actually translated from Arabic language [5]. Thus, it is true that a Muslim 'ulama is the one who discover and contribute the knowledge heritage to the West civilization in the middle century or the Renaissance period and also modern period.

Majority of terminologies and words that used in the Europe language are originated from Arabic. In addition, a lot of treatises have been translated into Latin from Arabic during the middle century. These proof that contribution of the Islamic civilizations help in the West development.

The basis of teaching and learning in Islamic civilization is during the Prophet's period. All of the knowledge and skills are based on the al-Quran including the way of life that hold by the *Kalimah Tauhid* (There is no God except Allah and Muhammad is the Messenger of Allah). Based on this *kalimah* its demand human to study the universe including human, animal, plants and planet to note the power of Allah [2].

There is no other Islamic civilization can be compared to the era during the reign Caliph Harun al-Rashid and also the era during his son Abdullah al-Ma'mun. Caliph al-Ma'mun was a great patron of learning and also very appreciate science skill especially mathematics and astronomy. However, Abbasid Caliphate is also very noted because successfully developed Islamic civilization until become civilization most outstanding and prosperous. During the spread knowledge from Islamic civilization to European civilization, Frederick II from Roman Empire (1215M) had set up a University Naples in 1224M for purpose in expanding Islamic science to Europe. At this university translation activity actively made from Arabic into Latin and Hebrew. Frederick also has propelled Michael Scott migrate to Toledo in the year 1217M to do commentary translation on Ibn Rusyd writing [6]. Therefore, the germination and Islamic civilization breed play an important role and finally raise the spirit and also development of knowledge in Renaissance Period further lift the European civilization to the pinnacle of success as civilization that most main on this day.

THE GOLDEN PERIOD OF TRANSLATION

The most impressive and extensive translation movement appeared in history is in the 8^{th} to 11^{th} century during the Islamic civilization. **N**umerous translated works have been published through the Western scholars such as David King, Fuat Sezgin, R. Rahsed, J. P. Hogendijk and others. Besides, the European scholar also began an extensive program of translation of Arabic mathematics manuscripts into English, French and German. For example, Heinrich Suter in Switzerland, Franz Wopepche in France produced a large number of translations and has been collected and published by the Institute für Geschiehte der abisch-islamischen Wissenchaften, German.

The Muslim 'ulama generally were concerned to understand, codify and assimilate the learning of knowledge to the conceptual of Islam. Hence, the translation period can be divided into three categories.

First Stage

The first stage is during the period of al-Walid ibn Abdul Malik (86-96H/705-715M). He was the third caliph of Umayyad's caliphate. He was the first who brought up idea to translate Greek books to Arabic parallel with the move to make Arabic as the official language. Among the books that have been translated such that medicines, astronomy and chemistry.

Second Stage

The second stage is during the period of Abu Ja'far al-Mansur (136-158H/754-775M). He was the second caliph of Abbasid's caliphate and also the great grandchild of al-'Abbas. Among the translated field during that time for instance medicine, mathematics, geometry and astronomy. A new development in this period is with the order from the caliph; the logical knowledge has been interpreted into Arabic. The need is important to Muslims so that they can organize argument and arrange comparable evidence with Jews and Christians certainly wise argue [4].

Third Stage

The third stage begins during the period of Abdullah al-Ma'mun (198-218H/813-833M) until fourth century. He was the seventh caliph of Abbasid's caliphate and also the son of Harun al-Rashid. He founded a research institution called *Bayt al-Hikma* (House of Wisdom). Supported by the state treasury, this institution attracted a galaxy of scientist, scholars and 'ulama especially competent translators.

Hence, the golden period of translation happen during the tenth century. This is the peak period where science and technology spread out all over the world. Currently, there were born many Muslim 'ulama that assist in the knowledge development. Table 1 shows examples of Muslim 'ulama and their expertise during the medieval Islam [11].

TABLE 1: The Summary of Medieval Islamic 'Ulama

Period	*Scholar Name*	*Field Expert*
780-850	Muhammad al-Khawarizmi	Arithmetic, algebra, practical geometry
Ninth century	'Abd al-Hamid Ibn Turk	Quadratic equations
830-890	Thābit Ibn Qura	Euclidean justification of algebra
850-930	Abu Kamil Ibn Aslam	Algebra using irrationals
Mid-tenth century	Abu Sahl al-Kuhi	Centers of gravity
Mid-tenth century	Abul l'Hassan al-Uqlidisi	Earlist Arabic arithmetic
Mid-tenth century	'Abd al-Aziz al-Qabisi	Sums of integral power, trigonometric methods
940-997	Muhammas Abu'l Wafa	Theorem of spherical trigonometry
Early eleventh century	Abu Bakr al-Karaji	Algebra an early use of induction
Early eleventh century	Abu Nasr Mansur	Theorem of spherical trigonometry
Early eleventh century	Ibn Baghdadi	Irrationals
965-1039	Abu 'Ali Ibn al-Haytham	Integral power, paraboloid, parallel postulate
973-1055	Muhammad al-Biruni	Trigonometry and its applications
1048-1131	'Umar al-Khayyami	Cubic equations, parallel postulate
1125-1180	Ibn Yahya al-Samaw'al	Decimal fractions, polynomials

However, the motion of translation in the Abbasid caliphate period is more towards philosophy, science and medicine field. Not even one of the Ancient Greek treatises regarding the arts, comedy or Greek history was translated into Arabic [8]. According to [9], the main factor that influence the Islamic 'ulama in not to translate the Greek treatises because they have selective attitude where they find some of the Greek elements are contradict to the faith of Islam.

THE IMPORTANCE FACTORS OF TRANSLATION

Why translation works are important during the Islamic civilization? There are many reasons and factors that make translations important as the first step in science and technology development. Some of the factors are as follows:

Language Factor

Islam and Arabic language cannot be isolated from the Muslim country. Arabic are the language of al-Quran and also the language of daily communication among them. Thus, Arabic has been an official knowledge language for the Baghdad and Cordova residents. In addition, Arabic has become their important language in understanding the science and technology especially during the reign of Umayyad Caliphate. The ability of the Arabic is very amazing and has opened many chances to the Muslim in enhancing scientific vocabulary.

Academic Factor

Translation is needed among the student and the researcher in various fields in order to copes the recent technology knowledge and also to give better understanding. Interpretation works will be difficult and incomplete if there is no infrastructure building to work in. Hence, government has built up a good institution condition area such as academy, schools, library and observatory centre for the student and researcher.

For example, during the reign of Fatimiyyah (297-567H/909-1171M) a library was constructed namely *Dar al-Hikmah* where the scholars met each other in discussing their opinion and knowledge. The *Bayt al-Hikma* (House of Wisdom) also plays an important role in academic knowledge translation area in Abbasid caliphate. In addition, in this library people can find both original and translators of scientific works in Greek, Sanskrit and Persian. Shortly thereafter, a rich stream of ancient sciences began to pour into the Muslim land as a result of systematic and intense translator activities.

Commander Factor

According to the Western researcher of the Islamic history ad philosophy expert such as D. L. O'leary [12] and R. Walzer [13] stated that they agreed that commander encouragement as example the Caliph al-Mansur and Caliph al-Ma'mun are very important in the translation development and movement during that time. The role of caliph in sending numerous missions to foreign lands to obtain copies of important books is also one of vital aspect why translation is important. In addition, the caliph paid the translators according to the weight of their translated book in gold.

Other example of a dedication for search of foreign books is illustrated by the troubles taken by the translator namely Hunayn ibn Ishaq, in order to find a copy of medical book written by Gallen. Hunayn said that at first his colleagues, Gabriel went to great troubles in order to find it and he said:

> *I myself searched with great zeal in quest of this book over Mesopotamia, all of Syria, in Palestine and Egypt until I came to Alexandria. I found nothing except in Damascus, about half of it (Galen's books). But what I found was neither successive chapter nor complete. However, Gabriel also found some chapters of this book which are not the same as those I found [10].*

Trade Factor

The economy sources for the Islamic countries are the international trade beside the agriculture and industrial sector. The European country is the biggest importer of ready-made goods because they tend to be a consumer rather than producer at that time. This made the people especially for the researcher have to improve their production and goods quality by using recent technology. Thus, in order to implement it, basically translation work comes first to wisely understand previous work done that based on other language treatises before new generation or expanding product can be made.

Occasionally, according to [15], he emphasize on defending the principle faith of Islam is the main factor why Muslim people interested in the non-Islamic science knowledge especially from the Greek.

MANUSCRIPTS TRANSLATION AND TEXT WRITTEN BY MALAY SCHOLARS

Basically, the magnificent period comes from the knowledge of Arabic and Arabic science because an oxford scholar name Roger Bacon has said that:

"…Roger Bacon never wearied of declaring that the knowledge of Arabic and Arabic science was for his cotemporaries the only way to true knowledge" [17].

In addition, the Western scholar that holds to the justice of history have agreed and confessed by saying that:

"Down to 15th century, whatever scientific activity existed in Europe was engaged in assimilating Arab learning without greatly adding to it"[17].

Thus, Malay 'ulama also played important role in the Alam Melayu civilization. In 2007, the Institute for Mathematical research (INSPEM) Universiti Putra Malaysia has recognized five Malay mathematicians as "*Tokoh Pemikir Matematik Malaysia*" that have been contributed in mathematics development since the 20th century until present period such as Sheikh Ahmad ibn Muhammad Zain al-Fatani, Shiekh Ahmad Abdul Latif al-Khatib al-Minangkabawi and Sheikh Tahir Jalaludin al-Azhari [18].

The main factor of the important of translation from the Malay 'ulama writing is to mould good characteristic foundation of Malay mathematical thinking. This factor may influence the way and pattern of thinking in the Malay cultural, nation and religion. However, to be more successful, the Malay has to develop their own mathematics formulation in order to solve their daily problem. This because each problem occurs in different country, different culture and different nation will have different way of solution. For example, the determination of qibla direction [19] of Alam Melayu is varying to the Middle-East country by referring to the location of the cities that depends on its latitude and longitude. Hence, Sheikh Tahir Jalaludin has taken an action to build a logarithm for *qibla* calculation in his treatises namely '*Pati Kiraan Pada Menentukan Waktu yang lima dan Hala Kiblat dengan Logaritma*' (1357H/1938M).

Besides, translation of texts and manuscripts written by Malay 'ulama are important because to contribute the mathematics thinking into the mathematics education development. Commonly, the original text was written in Arabic due to most of the Malay 'ulama are graduated from Makkah and Egypt education system. Hence, not many people in Alam Melayu can understand Arabic. So, translation into the language of majority can understand is very important. The mathematics knowledge has plenty of terminologies and each term of the terminology is different in languages. For example the word that has been translated such as:

Al-Jabr	-	bertemper
Al-Dzil	-	naung
Al-Sifr	-	nol
Al-Muthallath	-	segitiga
Al-Masahah	-	ukuran tanah

Therefore learning and teaching mathematics required local language as a medium. If the student can not understand the contents of the subject, it means that the learning and teaching process will fail. So, in Alam Melayu the preferable language is Malay language. Thus, all of the scientific subject should be carried out in the Malay language in order to give wider chance to

Malay people especially in contribute their ideas for the civilization development.

AN EXAMPLE TRANSLATION PART OF *RAUḌAT AL-ḤUSSĀB*

Sheikh Ahmad has briefly explained about the geometry concept in chapter seventh of his book namely *Rauḍat al-Ḥussāb*. Actually, the word "الحســـاب" could be read in two different pronunciations. If we read as '*al-Ḥisāb'* it means "the arithmetic" and if we read as '*al-Ḥussāb'* it means "the calculators". Hence, it make the translation from Arabic to other languages have to be very particular otherwise the meaning will be misunderstood.

Firstly, he described about the area of different square shapes and parallelogram. Then, he also clearly perceptible on finding the area of triangles, area of a circle and the value of Pi (π) that have been used which is $22/7$. In the next section, method in finding surface area of a cube, cylinder, cone, sphere, camp and also fraction of sphere are elaborated. An example of geometry application are also been stated as calculation to determine the height of the hill and minaret, the depth of the well, the broadness of the river in certain conditions. Finally, arithmetic series and geometry concept and probability problem are also been remarked in the last section [3].

Therefore, here we illustrate an example of the geometry concept that has been proposed by Sheikh Ahmad al-Khatib [1]. In chapter seventh, Sheikh Ahmad has discuss about triangles measurement. He gives the definition of triangle as a surface that has three sides and its can be divided into three categories where the right angle (قـائم الزاوية) , the obtuse angle (منفرج الزاوية) and the acute angle (حــاد الزاوية). The rights angle can be divided into two parts, the obtuse can be divided into two parts and the acute angle can be divided into three parts. Examples are illustrated in Figure 1.

Then, in the second section of this chapter he describe on how to calculate the area of triangle. After that he continues his discussion on finding the volume of the triangle. Finally, he stated the significant of the works carried out. For instance, to determine the characteristic of triangle all three sides have to square it respectively and if the summation equal to the

length result it consider as the right angle and if it is more wider it consider as acute angle and if it is less wider it consider as obtuse angle [1].

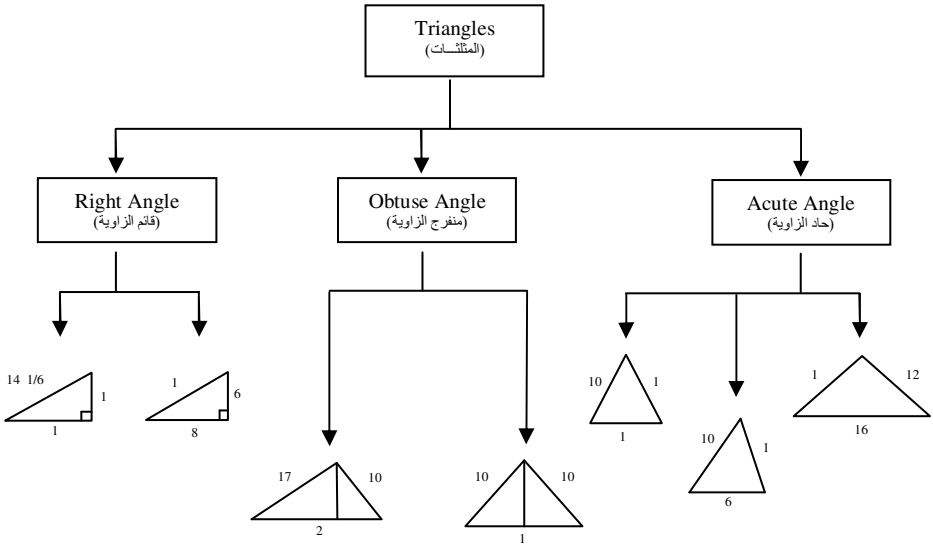

Figure 1: Example of translation about the triangles.
[Source: *Rauḍat al-Ḥussāb fī 'Ilm al-Ḥisāb*, 1307H/1893M]

CONCLUSION

This paper describes the translation works from other language to the language that current people in certain area can be understood is very important and should be done. For example from Arabic language to Malay language or vice versa. Numerous stages of translation period have been reviewed to give motivation among readers. Geometry concept that stated in *Rauḍat al-Ḥussāb* also been remarked here. However, the influence of Islam on science and mathematics, basically referred as "Islamic" rather than 'Arabic'. Thus, with this humble work, hope that people will appreciate the beauty, the utility, the 'Way' of mathematics connects to the phenomena, in nature, in arts and also in education as a development key. Therefore, the influences of the translation mathematics old scripts are very important in order to develop high quality of mathematics researcher parallel with other areas of human endeavor.

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