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Calibration of *Gantang* (*Sa'*) Based on Metric System for Agricultural *Zakat* in Malaysia

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Giving *zakat* is the third of the five pillars of Islam and it is obligatory. The issues arose when the *gantang* for *zakat* payment in Malaysia is converted to kilogramme, a metric unit for weight as usually used for foods and there was no available standard for *gantang* used for *zakat* payment in Malaysia. However, this unit is inaccurate since *gantang* (*sa'*) is not a measure of weight (*mizan*) but it is a measure of volume (*mikyal*). Thus, the objective of this research is to study the volume of the *sa'* and to calibrate it in the correct metric unit for standardisation purpose. A qualitative method was used by calibrating the *gantang* replica at Volume Laboratory, National Metrology Institute of Malaysia and the interviews with State Islamic Council, State *Zakat* Centre and State *Mufti* Department. From the calibration, the capacity of the *gantang* (*sa*') was obtained, and subsequently, the respective capacities for *cupak* and agricultural *nisab* were calculated. The finding of the research found that the volume of *gantang* was important in the determination of *nisab*, a minimum amount of crop for a certain cropping season. Hopefully this research would be a guideline for all states in Malaysia to be more systematic and efficient for the *zakat* agriculture determination.

Key words: *Gantang* (*Sa'*)*; cupak (Mudd*)*;* agriculture *zakat nisab;* metric unit; crop determination; guideline

Gantang is a dry volume measure akin to the gallon and it has a smaller version which is known as *cupak* (*mudd*). These measures were widely used by farmers or planters to measure rice, paddy, fruits and foods; but that became a history because nowadays items are measured by weight (in kilogramme). The use of *Gantang* and *cupak* ceases to exist as a result of the introduction of the metric unit system through the *Weights and Measures Act 1972*. This act aimed to establish units of measurement based on the International System of Units (SI) and to regulate weights and measures standards and instruments for weighing and measuring. The enforcement was started in 1982, allowing the change of weights and measuring instrument from traditional to metric unit in ten years time. *Gantang* and *cupak* were prohibited for trading, and those traders who still have on their possession for non-SI measures shall be fined not exceeding RM4000 or be imprisoned not exceeding three years, or both (*Weights and Measures Act 1972*).

In 2007, National Metrology Institute of Malaysia (NMIM), formerly known as National Metrology Laboratory was appointed as National Measurement Standards Laboratory under the *National Measurement System Act 2007* which among responsibility is to ensure the use of the appropriate metric unit in all measurement activities in Malaysia. Besides, NMIM is national reference for standards and traceable to international standards. However at present, there is no available physical standard reference for *sa'* nor *wasq* particularly for *zakat* payment in Malaysia.

The traditional measures (*wasq, sa', gantang,* gallon) were widely used by farmers or planters to measure and trade their agricultural produce; but that was history as nowadays items including foods are measured and traded by weight. Consequently, in Malaysia, the old standard of measure such as *gantang* (*sa'*) ceased to exist especially after the introduction of

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metric measurement system through the *Weights and Measures Act 1972*.

Ibn Umar said, "The Prophet SAW made incumbent on every male or female, free man or slave, the payment of one *sa'* (*gantang)* of dates or barley as *Zakat-ul-fitr* " (Bukhari, Hadith no. 587). The foods may be interpreted as the foods that a family usually eat like wheat, dates, barley, dried sour milk, raisins, or rice. Significantly, the unit of foods for the *zakat fitrah* payment is *gantang.* Thus, the *gantang* must be studied, preserved and calibrated in the accurate metric unit for standardisation purpose.

PROBLEM STATEMENT

Most states in Malaysia have different values of *gantang* and different weight measures of paddy *nisab*. The calibration of *gantang* has to be established because of different values of *gantang* and different weight measures of paddy *nisab* have been used in both in theory and in practice. According to Basmeh (1985), the *nisab* for paddy is 363 *sa'* Malaysia, the same measure as decided by the National *Fatwa* Committee (MFK) and now is adopted by seven states, namely, Johor, Melaka, Negeri Sembilan, Selangor, Federal Territories (Kuala Lumpur, Putrajaya and Labuan), Penang, and Sabah. Other measures were chosen by other states: 375 *sa*' by Kelantan and Terengganu; and 400 *sa*' by Pahang, Perak, and Sarawak The states of Kedah and Perlis use larger measures like *kunca* and *nalih* (Table 1). Firdaus *et al*. (2014) reason that this diversity in agricultural *nisab* is clearly due to the use of local traditional weight and the different assessment of a *sa'* weight. He also mentioned that the differences were attributed to the type, weight, density and the quality grade of paddy. Hidayah *et al*. (2014) suggested the difference is due to the use of different types of balance to weigh paddy throughout Malaysia.

Differences on the Weight Equivalent of *sa'* among Jurists of Madinah and Baghdad

Al-Qardawi (1994) mentioned:

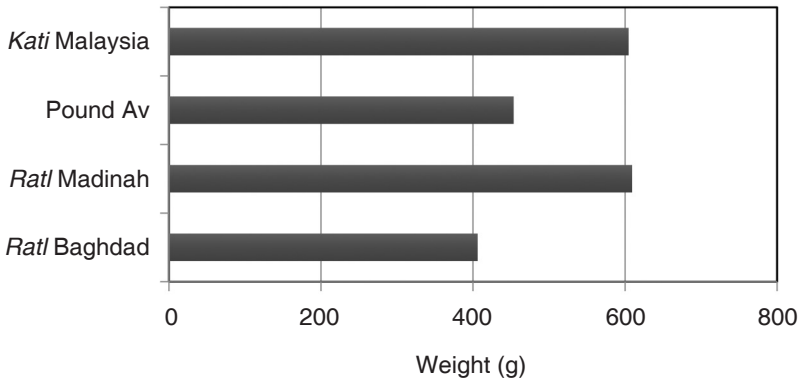
> "*A story from Al-Husain bin al-Walid (disciple of Imam Abu Hanifah) about Abu Yusuf who changed his mind of the weight equivalent of sa' from 8 ratl (Baghdadi) to 5 1/3 ratl (Madinah) during his pilgrimage. Abu Yusuf asked the people of Madinah the proof that a sa' is equivalent to 5 1/3 ratl and about 50 elderly sons of Ansar and Muhajirin brought a measure of one sa' and each narrated from his father and his ancestors that this was the sa' used at the time of the Prophet (pbuh). Abu Yusuf studied all the measures and found them all equal; and that the equivalent weight of the sa's content is a little less than 5 1/3 ratl. Al-Husain bin al-Walid went to pilgrimage the next year and asked Imam Malik about the weight equivalent of the sa'. Imam Malik said that the sa' they have at the time is the same sa' of the time of the Prophet (pbuh) and that the sa' is a measure of capacity and it cannot convert into weight*".

Al-Qardawi (1994) also proposed three ways to reconcile the two weight equivalent estimations of *sa'*:

> *Firstly, as proposed by some Hanafites that the ratl of Madinah is two-thirds of the ratl of Baghdad. This further means that the sa' as capacity measure is agreed upon. Secondly, Ibn Taimiyah suggested that the sa' in Hijaz is used only to measure grains and foodstuff while the sa' in Iraq was used only for liquid (water). According to this reconciliation, both ratl Baghdadi and Madinah are the same.*
>
> *Yet, al-Qardawi (1994) favoured the suggestion of 'Ali Mubarak that claimed there is not much different between the volume of sa' nor the ratl as a measure of weight. 'Ali claimed that a sa' full of grains weighs 5⅓ ratl while a sa' full of water is a little bit less than 8 ratl. This agreed with Ibn Taimiyah that the Iraqis considered the weight of water as measured medium while the Hijazis considered the weight of grain.*

According to Hinz (1955/2003), the basis for all Islamic weights is the dirham and the *mithqal* which are then categorised either as numismatic (currency / *an-nuqud*) weights or commodity (*al-kayl*) weights. Hinz (1955/2003) concluded that silver dirham (*an-nuqud*) weighed 2.97 g while dirham *al-kayl* weighed 3.125 g. He further suggested that the *ratl* of Baghdad was amounted to 130 dirham *al-kayl* (406.25 g) while the *ratl* of Madinah amounted to 195 dirham *al-kayl* (609.375 g), which equal to 1½ *ratl* Baghdadi. This eventually agreed with the first reconciliation as suggested by some *Hanafites* that the volume of *sa'* is same in both Madinah and Baghdad. We could simply calculate that a *sa'* in Madinah is equivalents to 5⅓ x 609.375 g = 3.25 kg and a *sa'* in Baghdad is equivalents to 8 x 406.25 g = 3.25 kg. Thus 5⅓ *ratl* Madinah = 8 *ratl* Baghdad = 3.25 kg (equivalent weight).

Table 1. The comparison of *ratl* Baghdad and *ratl* Madinah



Source: Dayang *et al.* (2015)

Gantang is very important for agricultural *zakat* payment in Malaysia. For a certain growing season, the crop gathered has to reach a minimum quantity or volume before it becomes an obligation to pay *zakat*. The minimum quantity or volume is called *nisab* and the *nisab* for agricultural *zakat* is generally 5 *Wasq* where 1 *Wasq* is equivalent to 60 *gantang*. Therefore, the *nisab* 5 *Wasq* equal to 300 *gantang* (al-Qardawi, 1994). A study conducted by Asmak *et al*. (2010) in Table 1 above shows the *nisab* rate for paddy in Malaysia that ranges from 358, 363, and 375 to 400 *gantang*. Furthermore, even if the *nisab* rate is the same, that is 363 *gantang* in the case *of* Kedah and Perak, but its conversion to kilogramme does differ significantly, that is 1300 kg and 1393 kg, respectively, and thus, the importance of standardisation.

The Discussion (*Muzakarah*) of MFK of the National Council for Islamic Religious Affairs Malaysia held on 28–29 Jan 1981 decided that *nisab* for paddy is 363 *gantang* (e-Fatwa 2012).

MATERIAL AND METHODS

Data Collection Method

This research adopts a qualitative method by using both the primary and secondary data resources. For the qualitative method, the interview has been carried out with State Islamic Council, State *Zakat* Centre and State *Mufti* Department. The secondary data for this research was analysed through literature research. There are many books and articles written on agricultural *zakat*. However, calibration of *gantang* (*sa'*) based on metric system still needed extensive research. The researchers have put the qualitative data in the data collection method. This study involves a primary method, namely,

Table 2. Agricultural *zakat* rates and *Nisab* in Malaysia

State	*Zakah* rate (%)	Analysis of paddy *nisab* of 5 *wusuq* (Unit tonne/kg)						Malaysian poverty line compared with paddy *zakah nisab*
		Gantang	*Kunca*	*Naleh*	Kilogramme (kg)	Tonnes	Ringgit Malaysia (RM)	
Johor	10	358			930	0.93	697.5	RM 720
Kedah	10	363			1300.4	1.3004	975.3	
Terengganu	5, 10	375			937.5	0.9375	703.12	
Selangor	5	363			1306	1.306	979.5	
Melaka	5, 10	400 [30]			1452	1.452	1089	
Kelantan	10	358			930.8	0.9308	698.1	
Pahang	5, 7.5, 10	~400			1452	1.452	1089	
Negeri Sembilan	5	363			1306	1.306	979.5	
Perak	5, 10	363			1393	1.393	1044.75	
Perlis	5	–	2	7	986.7	0.9867	740.025	

Source: Asmak *et al.* (2010)

the theoretical research method (literature search) and the empirical method (field study).

Literature Search

Through this theoretical approach, the literature study was conducted to gather some initial information about the study background that was to find out the differences on the weight equivalent of *sa'* among jurists of Madinah and Baghdad. This study involved a documentation method by means of referring documents on agricultural *zakat* and using the historical approach which places more emphasis on the practice of the Companions.

Interview Method

The interview method was used by experts in the field of *zakat* especially those who were directly involved in the administration and management of *zakat*. It comprised respondents in the State Islamic Council, State *Zakat* Centre and State *Mufti* Department. The objective was to obtain information on the *fatwa* of agricultural *zakat* decided at the level of State *Fatwa* Committee and its implementation method of the management of agricultural *zakat* in the State's *Baitulmal*. The semi-structured interview was carried out by using the phone call interview. Interview questions were structured by referring to the need of the study that involved the study of *gantang* in agricultural *zakat*. The structure of the questions was done by categorising every question to the issues raised as to ensure the data analysis via interview gathered easily.

Data Analysis Method

The second stage of the empirical method was the processing and analysis of data. To analyse the data obtained, the methodology used was in the form of inductive analysis, deductive and comparative.

Inductive Analysis

The method used was content analysis and concentrated on the views of previous scholars and the contemporary ones over the issue. A possible explanation for this might be the differences on the weight equivalent of *sa'* among jurists of Madinah and Baghdad. The researcher also used the different arguments analysis on the views of the *fuqaha*` regarding the standardisation of *gantang* (*sa*').

Deductive Analysis

The interview questions were structured from literature data and the interview was analysed in a deductive manner.

Descriptive Analysis

This research used a set of tables, diagrams and graphs to analyse data obtained from the interviews and calibration process.

Comparative Analysis

Comparative analysis of data from the interview and documentation of all States in Malaysia has been conducted. In this view, a comparative method was adopted by finding a difference and similarity between all the states regarding the paddy *nisab* in Malaysia as to produce systematic, integrated and consistent resolutions. Calculation of *cupak* volume and *nisab* also has been carried out.

Sampling Technique

The efforts to standardise *gantang* started with the weighing of rice using *gantang* by Malaysia Department of Islamic Development (*Jabatan Kemajuan Islam Malaysia* known as JAKIM) back in 2003. JAKIM (2003) conducted a study to determine the *zakat fitrah* amount in the standard metric unit, namely, kilogramme. Based on the study, MFK (1981) decided that one *gantang* Baghdad of rice is equivalent to 2.6 kg for Peninsular Malaysia and 2.7 kg for the states of Sabah and Sarawak.

According to MFK (1981), the types of *gantang* used in the procedure in the determination of the weight of one unit measure of *gantang* were the two replicas of *gantang* Baghdad: one was a wood replica from Negeri Sembilan*;* and another; a brass replica from Islamic Religious Council of Kelantan (MAIK). The *gantangs* were filled with rice and then weighed using a digital balance to get the rice weight. The types of rice that were used in the procedure were the most popular varieties consumed in Malaysia, as per the record of National Paddy and Rice Bhd. The balance used was a digital metric balance from Ministry of Domestic Trade, Consumerism and Cooperation (MDTCC, formerly MTDCA-Ministry of Domestic Trade and Consumer Affairs 2003).

The *gantang* replica borrowed from MAIK, was replicated from a *Qadhi* (Islamic judge), *Al-Marhum* Tuan Guru Abdullah Tahir Bunut Payung) back in 1985 which was copied when he was studying in Makkah. *Gantang* Baghdad is a *gantang* that is used specifically for *zakat, fidyah* and *kaffarah* payments in Malaysia. It is called *gantang* Baghdad because it followed the Baghdadi measurement system. In the Middle East back then, the measurement systems that were commonly used were the *Hijazi* and the Baghdadi (Iraqi) systems. *Gantang* Baghdad is a smaller in size compared to *gantang* Malaysia. *Gantang* Malaysia was standardised to equal the imperial gallon size (4.54609 litres) during the introduction of metric units through the *Weights and Measures Act 1972*.

RESULTS

The brass *gantang* replica as used by JAKIM is borrowed from MAIK and calibrated in Volume Laboratory, National Metrology Institute of Malaysia using volumetric (see Figures 1, 2, 3) and gravimetric (see Figures 4, 5, 6, 7, 8 and 9) methods (*ISO 4787:2010*). Both methods used water as a calibration medium since water has a uniform property and universal. Water is widely used as measured medium by researchers and meteorologists around the globe in order to determine the capacity of containers or standards. In both methods, a slicker plate as shown in the following figures was used to measure the water. The calculation of volume is in accordance to *ISO/TR 20461:2000/Cor.1:2008(E)*. The laboratory is accredited with *ISO 17025*.

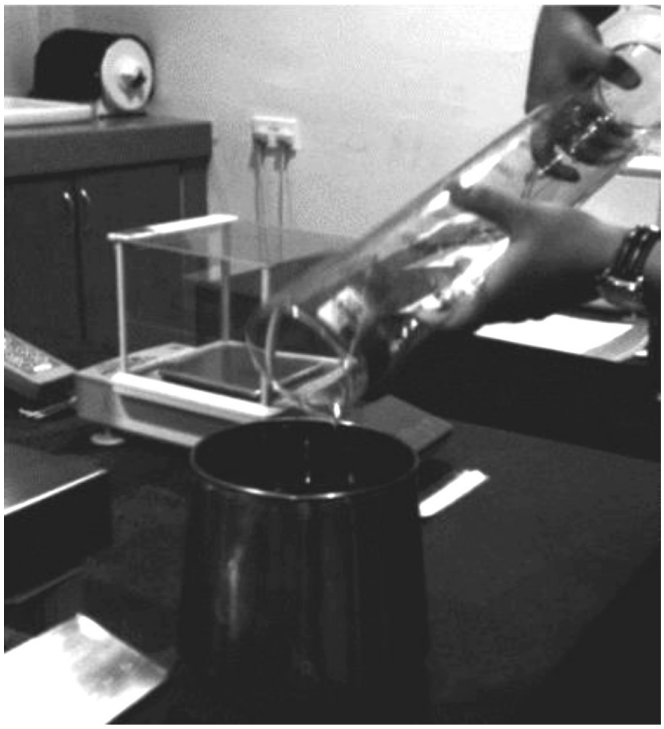
DISCUSSION

The results from *gantang* Baghdad calibration ranged from 3.10 to 3.11 litres with an average of 3.11 litres. This result was closed according to al-Hamawi (1994), as suggested in his book *Matn al-Ghayah wa at-Taqrieb fil Fiqh asy-Syafi'i* (originally written by Abi Syuja' al-Ishfahani, 593H). Al-Hamawi (1994) explained that if the *gantang* had a cubic box shape, the edge length should be 14.6 cm each and if calculated the volume was 3.11 litres per *gantang*.

There were other Islamic scholars who were aware of conversion of *gantang* into litre. Al-Qardawi (1994) clarified in *Fiqh al Zakah* as cited in Ali Basha Mubarak from Egypt who studied the Baghdadi *ratl* (a standard weight). He concluded that one *ratl* of wheat equals to 408 grammes and he estimated (based on weight) that one *gantang* of water is 2.75 litres. Al-Khin *et al*. (1982), in *al Fiqh al Manhaji*, estimate one *gantang* equals to 3 litres.

Source: Dayang *et al*. 2015

Figure 1. The meniscus setting for volumetric calibration



Source: Dayang *et al*. 2015

Figure 2. The volumetric calibration of *gantang* Baghdad from Islamic Religious Council of Kelantan (MAIK)

Source: Dayang *et al*. 2015

Figure 3. The use of slicker plate to level water in the volumetric calibration

Source: Dayang *et al*. 2015

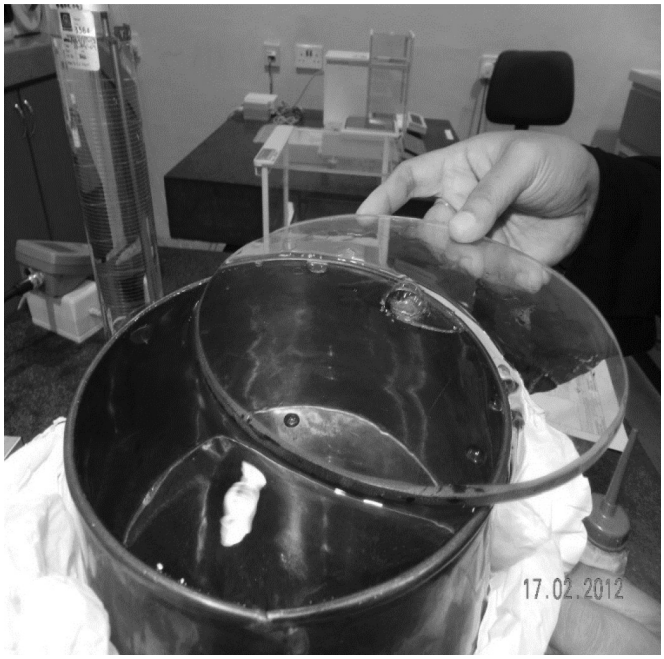
Figure 4. The notes written at the bottom of the *gantang* Baghdad from MAIK

Source: Dayang *et al*. 2015

Figure 5. The use of slicker plate to level water in the gravimetric calibration

Source: Dayang *et al*. 2015

Figure 6. The use of slicker plate to level water in the gravimetric calibration

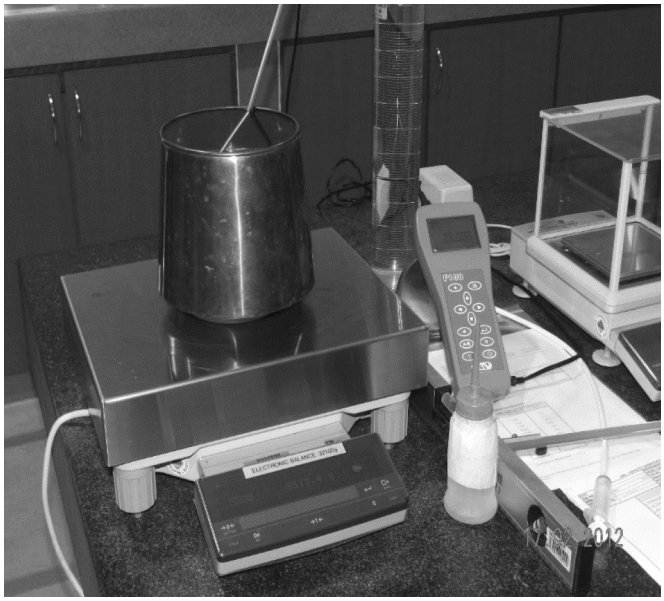


Source: Dayang *et al*. 2015

Figure 7. The use of slicker plate to level water in the gravimetric calibration

Source: Dayang *et al*. 2015

Figure 8. Water is used for the gravimetric calibration of *gantang* Baghdad



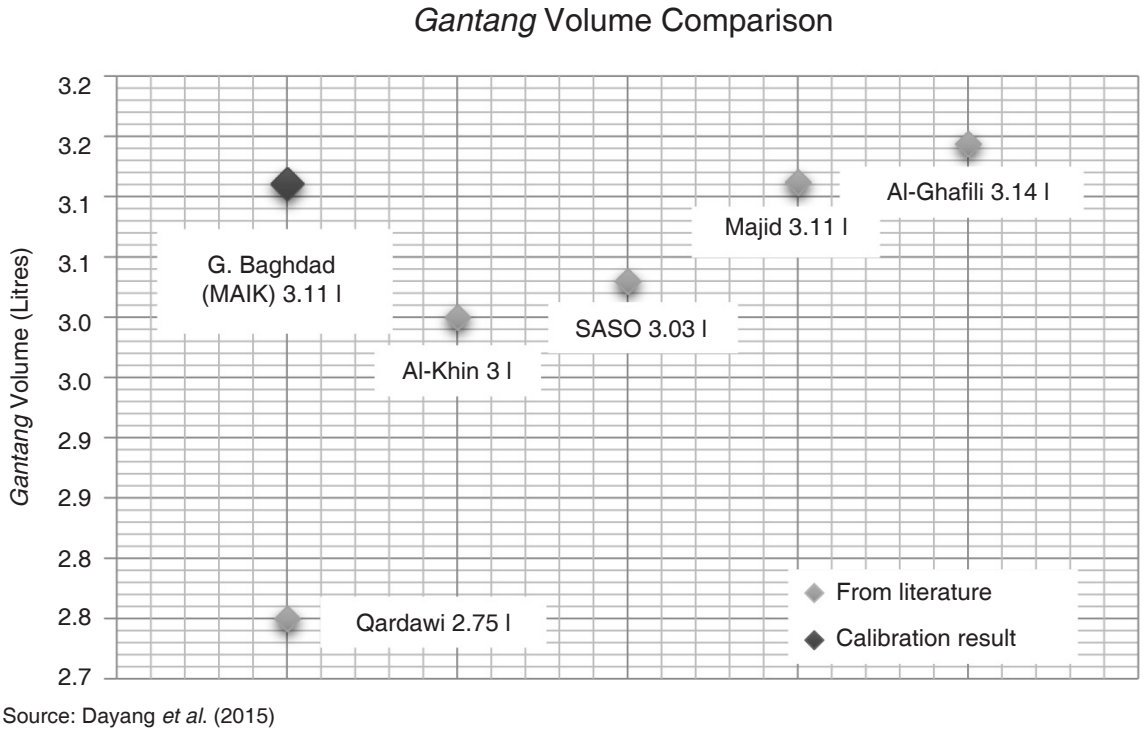
Source: Dayang *et al*. 2015

Figure 9. The gravimetric calibration of gantang Baghdad from MAIK

Saudi Arabian Standards Organisation (SASO) officially published the Prophet's *gantang* as 3.03 litres (Khalid *et al*. 2001). They claimed that the *gantang* was traceable (has chains) to the *gantang* that was used by Prophet Muhammad SAW to pay *zakat fitrah, sadaqah* and *kaffarah*. Nevertheless, Al-Ghafili (n.d.) in his paper '*Sa'*: between Old and New Standard', mentioned one particular *cupak* that was traceable to the Companion, Zaid ibn Tsabit's *cupak* that he used to pay *zakat fitrah* for Prophet Muhammad SAW. This *cupak* was calibrated, also at SASO using water as a measured medium and it had a capacity of 786 millilitres and a *gantang* would be 3.144 litres. The result and the literature are summarised in Figure 10.

The Accurate Metric Unit

Before 2003, the rate for *zakat fitrah* was determined by each state religious council and back then the situation was far more complicated. Back in year 2000, the *gantang* was defined as 2.27 kg by Selangor, Terengganu and Perak. Kelantan clarified it was 2.56 kg while Kedah set it as 3.063 kg. The difference in the capacity of *gantang* happened due to its' various sizes and the different types of rice (different density and size) used in the weighing process. In fact, the discrepancy also happened around the Islamic region. Saudi Arabia



Source: Dayang *et al.* (2015)

Figure 10. The comparison of calibration result to the literatures

estimated one *gantang* of rice as 2.4 kg, Iraq and Kuwait 2.5 kg, Indonesia 2.176 kg, Brunei 2.268 kg and Singapore 2.3 kg. The difference in value led to one conclusion, where there was a slight mistake in the conversion of the *gantang* into the modern metric unit.

This misunderstanding happened because the foods like rice, wheat and dates were measured by using *gantang* before being weighed with a balance (kilogramme) like nowadays. G*antang* is a dry capacity or volume measure (*mizan*) and obviously not capacity measure (*mikyal*). Hence, it should not be converted to kilogramme (kg). The unit for volume in SI unit is a cubic metre (m^3) but since this unit was too large, another unit might be accepted for *gantang*, which is litre (l). 1 cubic metre (m^3) equal to 1000 litres. A cubic metre (m^3) was more suitable for *nisab (Wasq)* while for *cupak* it should be in millilitre (ml) as it is a quarter of *gantang*. Except for the size factor, the *gantang* conversion to cubic metre, litre and millilitre would be consistent and standardised while kilogramme would be different according to the types of food. For example, a *gantang* of rice might be heavier compared to a *gantang* of barley but this was acceptable as long as the *gantang* capacity in litre was constant. *Gantang* itself was a measurement unit and must remain, but it could be calibrated in litre.

Nisab of Agriculture: The Scenario in Malaysia

Al-Qardawi (1980) explained that majority of Muslim scholars since the eras of Companions and Followers believed that crops must be at least five *wasq* to be *zakatable*. He explained that the estimation of *nisab* should be done on the dry product after it takes its final form before sale (after cleaning, filtering and skinning). He also cited in al-Ghazali in his book *al Wajiz*, written that the five *wasq* must be considered in the dried form of raisin, and in grain after cleaning and removal of its bran, except for crops that are sold freshly (like *rotab* dates) or with their bran. Ibn Qudamah (n.d.) in his book *al-Mughni* cited Abu Khattab said that *nisab* for grains with husk or hull is double which is ten *wasq* or equal to six hundred *gantang*.

The staple food in Malaysia is rice, which originates from paddy. Paddy is the unhulled grains and after the de-husking process, paddy is known as rice. Freshly harvested paddy might contain impurities and foreign matters including soil, stones, weed seeds, fragments of rice stalk, dust, and dead insects. Thus the *nisab* is 600 *gantang* for paddy and 300 *gantang* for rice (after being cleaned from impurities, after drying and de-husking process).

The *nisab* for paddy thus 363 x 4.54609 = 1650.2 litres. This is similar with the value al-Qardawi (1980) cited, 2.75 litres if taking into account that the *nisab* for paddy (unhulled) is 600 *gantangs*. Hence, 2.75 x 600 = 1650 litres. Pahang, Perak and Sarawak, have paddy *nisab* of 400 *gantang* Malaysia, which equal to 400 x 4.54609 = 1818 litres. This could be related to the official volume of *gantang* as published by SASO, and the *nisab* for paddy could be calculated as, 3.03 x 600 = 1818 litres.

Table 3 shows that the paddy *zakat* in Malaysia is paid in currency value totalling around RM9–10 million annually. With this high collection, inaccuracy in conversion to the modern metric unit will have a high impact. As can be seen, all states in Malaysia have different values of paddy *nisab* (Zaim 2013). The data were collected through telephone interview with zakat centre officers from every state. Most of the states usually have two growing seasons. The State of Kedah, known as Malaysian rice bowl, collected around RM4–5 million annually. Moreover, Kedah (or even Perlis) has other capacity measures, namely; *kunca*, *nalih* and *kepul*. However, Kelantan and Terengganu have another set of measures: *nisab* of 375 *gantang* Malaysia which equals 375 x 4.54609 = 1704.8 litres. However, the authors have not found any related references on this value.

The Impact towards *Zakat* Payment in Malaysia

From the *gantang* calibration results, the capacity of *cupak* and *wasq* (*nisab*) could be calculated, as below (Table 4).

Malaysia adopted the opinion of Imam Abu Hanifah to pay *zakat* in value instead of using food and other equivalent items. For instance, the amount of *zakat fitrah* is determined using the weight of a *gantang* of rice (2.6 / 2.7 kg) then paid in currency value (*Ringgit* Malaysia) based on current rice price. While *gantang* was used for the payment of *zakat fitrah, cupak* was used for the payment of *fidyah* and *kaffarah* (fines/compound). These units (*gantang* and *cupak*) were relatively small compared to *wasq*. The estimation using weight (in kilogramme) for *gantang* to simplify the payment of zakat *fitrah* in currency value, even though still inaccurate, but still it could be used. It could be estimated that the equivalent weight was only valid for the types of rice in Malaysia. Nevertheless, if one pays more than that, the small extra amount could be considered as *sadaqah* (good deed).

On the other hand, the use of weight (kilogramme or tonne) as a standard metric unit was not suitable for *wasq*. *Wasq* is a larger capacity measure used for the determination of agricultural *nisab*, and 1 *wasq*

Table 3. Paddy *zakat* collection and paddy *nisab* in Malaysia

No.	States	Paddy *zakat* collection	Paddy *Nisab*	
1	Kedah	RM3,607,935.80 (Jan–Oct 12)	2 *kunca* 2 *nalih* 6 *gantang* 1 *cupak* 2 *kepul*	1300.49 kg
2	Selangor	RM2,214,547.00 (Jan–Dec 11)	363 *gantang* Malaysia	1306 kg
3	Perak	RM1,186,152.75 (Jan–Oct 12)	400 *gantang* Malaysia	1306 kg
4	Perlis	RM736,081.00 (Jan–Jun 12)	RM742	
5	Kelantan	RM457,289.70 (Jan–Oct 12)	375 *gantang* Malaysia	875 kg
6	Penang	RM303,739.33 (Jan–Oct 12)	363 *gantang* Malaysia	1300 kg
7	Terengganu	RM301,391.31(Jan–Oct 12)	375 *gantang* Malaysia	937.5 kg
8	Pahang	RM112,000.00 (Jan–Dec 11)	400 *gantang* Malaysia	1920 kg
9	Johor	RM74,166.13 (Jan–Dec 10)	363 *gantang* Malaysia	816.75 kg
10	Melaka	RM31,874.50 (Jan-Jun 12)	363 *gantang* Malaysia	1300 kg
11	N.Sembilan	RM25,560.70 (Jan–Jun 12)	363 *gantang* Malaysia	1306 kg
12	Sabah	RM21,351.20 (Jan–Sep 12)	363 *gantang* Malaysia	980.1 kg
13	Sarawak	–	400 *gantang* Malaysia	–
14	Federal Territories	–	(No agricultural activity)	
	Total value for paddy *zakat* collection= RM 9, 072, 089.42			

Source: Phone interviews (2012)
*Details in the references.

Table 4. The calculation of *cupak* capacity and *nisab*

Methods / Literatures	*Gantang* volume (Litres)	*Cupak* volume (Millilitres) = ¼ *Gantang*	*NISAB* (Dehusked grains) = 5 *Wasq* = 300 *Gantang*		*NISAB* (Unhulled grains) = 10 *Wasq* = 600 *Gantang*	
			(Litres)	(m^3)	(Litres)	(m^3)
Gantang Baghdad (MAIK)	3.11	777.5	933	0.933	1866	1.866
Majid (Abi Syuja')	3.11	778	933	0.933	1866	1.866
Yusuf al-Qardawi	2.75	688	825	0.825	1650	1.65
Mustafa al-Khin	3	750	900	0.9	1800	1.8
SASO (Official)	3.03	758	909	0.909	1818	1.818
Al-Ghafili	3.144	786	943	0.943	1886	1.886

Source: Dayang *et al*., 2015

equals to 60 *gantang*. As can be seen from Table 4, the *nisab* for rice or other de-husked crops is 5 *wasq* or 300 *gantang* and this ranges from 0.825 m^3 to 0.943 m^3 with the difference of 118 Litres. While for unhulled grains such as paddy, the *nisab* is 600 *gantang*, ranges from 1.65 m^3 to 1.886 m^3 with a different of 236 litres. It could be illustrated when we adopt the lowest volume, the agricultural *zakat* might become obligatory to more farmers and vice versa. From the literature, we know that the scholars like al-Khin (1982) and al-Qardawi (1980) were referring to estimation done by other researchers. Al-Khin (1982) cited estimation of Islamic encyclopaedia which generally round up the value. Whereas al- Qardawi (1980) cited the estimation of volume of water that used the weight of wheat, might lead to inaccuracy since *gantang* was not a weight measure but it is a capacity measure.

Besides that, the wheat would have spaces in between its grains (the property as measured medium is not uniform and thus not suitable). Al-Hamawi (1994) estimated the volume by giving the dimension of a cubical box in centimetre. This estimation is more accurate for calculation of volume even without a measured medium. The best way of finding the capacity of Prophet's measures was to calibrate the original measures themselves which we do not have. What we have are the replicas of the measures which were claimed to be traceable to Prophet's measures. Hence, the better way was to calibrate these measures.

Since Prophet Muhammad SAW mentioned that the standard for measures should be according to the measures of the people of Madinah, we should adopt the capacity that was traceable to the Prophet's measure specifically from Madinah (in Saudi Arabia). SASO (2001) has been looking into the issue and already published their official capacity for *gantang* (3.03 litres) though there are other values (3.144 litres) as the research and the discovery of the measures are ongoing. The difference in both values, 0.114 litre, was not really significant for the payment of *zakat fitrah, fidyah* and *kaffarah* but we must refer to one value only in order to standardise. On the contrary, the different in paddy *nisab* between both values was 68 litres (Table 4) which was large enough for *zakat* to become compulsory. Thus, it is crucial to study more on the Prophet's measure, and collaboration with other standard organisations such as SASO should be forthcoming. An inter-country comparative study (calibration of the measures claimed to be traceable to Prophet's measure), particularly among Islamic countries should be undertaken in order to standardise the conversion of the unit measure of *gantang* to the standard metric unit(s).

CONCLUSIONS

The result of calibration, in terms of capacity, of one unit of *gantang* Baghdad (MAIK, used by JAKIM in 2003) is as follows:

1 *gantang* = 3.11 litres (l).

From the result, thus, the capacity for *cupak* and the crops *nisab* by calculation, in the standard metric units was as follows:

	1 *cupak*	= ¼ *gantang* =	**778 millilitres (ml)**
and *nisab*	**5 *wasq* (rice)**	= 300 *gantang* =	**0.933 cubic metre (m^3)**
	10 wasq (paddy)	= 600 *gantang* =	**1.866 cubic metre (m^3)**

These values were valid for reference and could be used in Malaysia until a new decision is made by MFK to use standard capacity that was traceable to Prophet's measure. *Gantang*, *cupak* and *wasq* themselves were measurement units and should be retained for *zakat* payment purposes while being calibrated in litres, millilitres and cubic metres for standardisation purpose. As it has been mentioned before, a *gantang* replica as used by JAKIM was borrowed from MAIK and was calibrated at Volume Laboratory, NMIM. From the calibration, the capacity of the *gantang* (*saa*') is obtained, and subsequently the capacity for *cupak* and agricultural *nisab* were calculated.

In conclusion, calibration of *gantang* (*sa*') have its impact towards the *zakat* payment in Malaysia and was important to determine the value of agricultural *zakat*. Further research needs to be carried out to determine the precise value of *gantang* (*sa'*) based on the metric system for agricultural *zakat* in Malaysia.

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REFERENCES

´Ibn Qudamah, n.d, *Al-Mughni wa al-Syarh al Kabeer, Beirut*, Dar-al Kutub al Ilmiyyah.

Abi Syuja' Ahmad bin al-Husain al-Ishfahani, 593H, Matn *al-Ghayah wa at-Taqrieb fil Fiqh asy-Syafi'I*, 2nd edn, Beirut, Dar Ibnu Hazm. Translated by Majid al-Hamawi (1994).

Al-Ghafili, AM n.d. *Gantang: between old and new Standard*, Saudi Arabia, n.p.

Al-Hamawi, M 1994, *Matn al-Ghayah wa at-Taqrieb fil Fiqh asy-Syafi'i*, 2nd edn, Beirut, Dar Ibnu Hazm (originally written by Abi Syuja' Ahmad bin al-Husain al-Ishfahani, 593H).

Al-Khin, M, al-Bugha, M & as-Syarbajy, A 1982, *al-Fiqh al-Manhaji*, Damsyik, Dar al-Qalam.

Al-Qardawi, Y 1980, *Fiqh al Zakah*, vol 1. Jeddah, Scientific Publishing Centre of King Abdul Aziz University (Translated by Dr Monzer Kahf).

Abdullah, B 1985, 'Rasulullah's s.a.w. Guides to *zakat*, *sedekah* and *khairat'*, Kuala Lumpur, Religious Affair, Prime Minister's Department.

Asmak, AR, Pazim, FO, Siti Mashitoh, M, Nor Aini, A & Azizi, CS 2010, 'Assessment method for agricultural *zakah* in Malaysia: an institutional perspective', *World Applied Sciences Journal*, vol. 11 no. 12, pp.1500–1508.

Compilation of the Decisions of National *Fatwa* Committee: 1st *fatwa* (Issues on *Muamalat*). 1981, viewed 30 May 2016, <http://e-muamalat.islam.gov.my/>.

Compilation of the Decisions of National *Fatwa* Committee: 9th *fatwa* (Issues on *Muamalat*). 2003, viewed 30 May 2016, <http://e-muamalat.islam.gov.my/>.

Dayang, NAS, Mohamed, AR & Hamdan, H 2015, 'Standardisation of agricultural nisab through metric system', in *Fiqh zakat*: addressing *fiqh zakat* issues in the contemporary world, eds A Halim *et al*., Institut Kajian Zakat Malaysia.

Firdaus, AR, Azman, AR, Hussein 'Azeemi, AT, Luqman, A, Siti, MA, Mohd Faez, AB & Ummu, SA 2014, 'The inconsistency of assessing agricultural *zakat*', *Global Journal Al-Thaqafah*, vol. 4 no. 1, pp. 1–16.

Hidayah, M, Asmak, AR & Nurzahidah, J 2014, 'Memperkasa zakat pertanian sebagai pelan pembangunan masyarakat Melayu', in *Proceeding of the International Conference of* Masjid, Zakat *and* Waqf *(IMAF 2014)*, Kuala Lumpur, Malaysia.

Hinz, W 2003, Measures and weights in the Islamic World, Kuala Lumpur: International Institute of Islamic thought and civilization (ISTAC), (Translated by M. Ismail Marcinkowski (Original work published 1955)).

International Organization for Standardization 2010, 'Laboratory glassware – volumetric instruments – methods for testing of capacity and for use', *ISO 4787:2010*.

International Organization for Standardization 2000, 'Determination of uncertainty for volume measurements made using the gravimetric method', *ISO/TR 20461:2000/ Cor.1:2008(E)*.

Interview with En Nazli Amirri Ngah, Penolong Kanan Pengarah (Wakaf dan Sumber Am), Majlis Agama Islam dan Adat Melayu Terengganu, 24 July 2015.

Interview with En Murtadha Abdullah, Ketua Pegawai Agama Majlis Agama Islam dan Adat Istiadat Melayu Kelantan, 30 July 2015.

Interview with En Mohd Fuad Abd Rahman, Account Assistant at Majlis Agama Islam Johor, 9 October 2015.

Jabatan Kemajuan Islam Malaysia (JAKIM) 2003, 'Penentuan harga zakat fitrah seluruh Malaysia: portal rasmi fatwa Malaysia', viewed 28 May 2016, <www2.e-fatwa.gov.my/.../penentuan-harga-zakat-fitrah-seluruh-malaysia>.

Khalid, YK, Sulaiman, MS & Abdul Aziz, MY 2001, *Saudi Arabian standards organization achievements in 20 years of Sovereignty of King Fahd Abdul Aziz*, Saudi Arabia, n.p.

Laws of Malaysia: Weights and Measures Act 1972 (Act 1971), edn 2002, Kuala Lumpur.

Nor Aini, A 2015, *Zakat padi di Malaysia*, Kuala Lumpur: Penerbit Universiti Malaya.

Sahih Bukhari. Chapter no: 25, Obligatory Charity Tax after Ramadaan (Zakat ul Fitr). Hadith no: 587.

Zaim, MI, Mohd Farhan, MA, Luqman, A & Muhammad Ikhlas, R 2013, 'Zakat pertanian di Malaysia: satu kajian pemerkasaan', *Labuan e-Journal of Muamalat and Society*, vol. 7, pp. 33–47.