# Kandy Period Bronze Buddha Images of Sri Lanka: Visual and Technological Styles

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## Introduction

A rich collection of Buddha images belonging to the Kandyan period ($17^{th}$ – $18^{th}$ Century AD) possessing characteristic visual features and made of different media have been found from the different parts of the country. Among them a significant number of images are made using the metal. This paper intends to study the metallurgy of the Kandyan period Buddha images which in turn gives some light to the metal technology of that period. In addition this paper tries to study metallurgy of the studied icons in relation to their visual features (visual styles). Twenty metal Buddha images which have been attributed to the Kandyan period and now deposited at the National Museum, Colombo were taken for this study (see appendix 1). These images have been classified as belonging to the Kandyan period mostly by art historical means such as iconography and iconometry which have undoubtedly been proved as very successful for this task.

A historical metal icon possesses two main styles as emphasized by Chandra Reedy (Reedy 1997: 15).

1. Visual style
2. Technological Style

The art historical method of classification uses the visual style of an icon as the main source of information in classifying an image. But in this study, it is shown that if we could combine the information gathered from visual styles of the icons by art historical means with the information obtained from their technological styles, it would be more accurate and could go for even further classifications which would not be possible based on the art historical means only.

## Visual and Technological styles

Iconography and iconometry represent a major part of the visual style of an image. Thus, while the visual style of an image relates to its social-cultural, socio-political context, the technological style carries the traits of the intentional technical choices made by the craftsman, technological traditions, resource availability, resource accessibility which could be perhaps, generally described as the socio-political and socio-economic sphere of an image. It has been found that sometimes the addition of a very little amount (several milligrams) of a precious metal such as

gold when making Hindu bronze icons in South India contributing relatively higher amount of gold in their composition (0.01% - 0.045%) not mean for any technical reason but for the ritual purpose this is practiced in some places even at the present. (Sirinivasan 1999) [1] As shown later in this study the absence of the use of lead when making Buddha images during the Kandyan period might not have been merely for a technological reason. Various Intentional technical choices that could be identified from the technological style of a metal icon (e.g. Main composition, changes in resource utilizations) would perhaps due to a reason which has its roots in the socio cultural, socio political or economic sphere of the society which it belongs to. As in the case of visual style one cannot see the technological style of an image only by looking at them. It often needs the help of appropriate laboratory based scientific analyses such as compositional and trace element, metallagraphy, stable lead isotope etc.

## Methodology

In this study the trace elements and the main composition were used to study the technological style of an icon. Atomic absorption method was used to obtain the necessary data as described by Hudges et al. for the use of spectroscopic analysis of the historic metals (Hughes et el. 1976). The analyses were carried out at the Analytical Chemistry laboratory of the Institute of Fundamental Study, Kandy.

Composition of an historical metal icon can be devided into two major categories:

1. Intentionally added elements
2. Non intentionally included elements (trace elements)

While the intentionally added elements give knowledge on the metallurgy, information on resource utilizations as well as technological choices behind the production, the trace elements might have traits on the metal sources from which at least the major metals may have originated since the metal sources inherit characteristic trace element patterns. Thus in turn perhaps reflecting traits some how at the end product. Indeed, an exhausting effort would have been needed in identifying these trace element trends.

The trace element results of the Sri Lankan historical metal icons (Thantilage 2008) have shown the potentials of the trace element methods in identifying the copper sources used, by making groupings in scatter plots of different trace element parameters.

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[1] Author had noticed slightly elevated relative levels of gold (0.01% - 0.02%) in the composition of Sri Lankan bronze Buddha images belonging to the periods earlier than the Kandyan period. Where Kandyan period images contained relatively less amount of gold (0.002% - .01%) in their composition (Thantilage 2008: 142). It could have been perhaps reflecting a deviation in some socio-cultural reason behind, if any, or any other reason responsible for the gold content of the icons belonging to the pre Kandyan period.

**Composition of the Kandyan period metal Buddha images**

It was possible to identify four major compositional categories (metal alloys) in the Kandy period images analysed as follows.

1. Bronze (copper-tin)
2. Copper-tin-zinc alloy (amount of copper> tin> zinc)
3. Copper-zinc-tin alloy (amount of copper> zinc> tin)
4. Brass (copper-zinc)

The percentages of images in each alloy type in the studied sample of the Kandy period images are given in the chart below (figure 1).

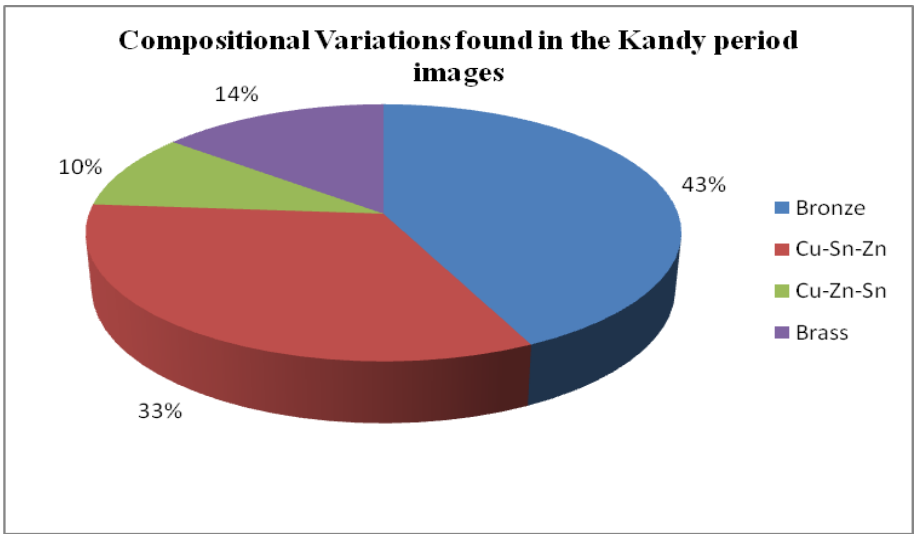


Figure 1:

The chart clearly indicates that the majority of the images are bronze with no zinc in their composition. The second largest number of images are also made of low zinc containing copper-tin-zinc alloy (average zinc 3.19%). Only the 24% of the studied icons which comprise brass and copper-zinc-tin alloy have a high zinc component in its composition implying that perhaps zinc may not have been readily available during the Kandyan period. Further, it will be shown later in this article that these high zinc containing images may have been from the latter part of the Kandyan period.

The use of high amounts of tin (15% - 19%) when making bronze and other copper alloys is seen during the Kandyan period. It is also very special to note that the use of lead when making bronze and brass icons was almost nil during the Kandyan period, unlike in the earlier periods such as Anuradhapura and Polonnaruva where lead was used throughout when making bronze. I have shown else where the origin of little amounts of lead present (< 3%) only in few Kanyan

period brass images might have been come with the metallic zinc used in producing brass since all the few lead containing images have a high content of zinc in their composition.. The use of lead when making bronze and brass is highly reasonable since the use of lead increases the workability and also the quality of the cast. So the absence of lead in copper alloys during this period, unlike the earlier periods, could either be due to the non-availability or a technological tradition followed. Silpa texts such as Chitrakaramasastra, which is definitely known to the Kandy period, does not permit the use of lead when making Buddha images. But as there are not sufficient number of other lead artifacts reported during the Kandyan period and further, as far as we know, lead is not available locally and have obtained through the foreign trade (Thantilage 2008), a further study is essential before concluding reasons for the almost abandonment of the use of lead during the Kandyan period.

## Visual Style and the Composition

When looking at the Kandyan images of the Buddha there is clearly a variation in the depiction of the folds in the robe (Mudiyanse 1967).

1. Grooved folds (e.g. K19, K27) (very fine grooved in brass)
2. Cast folds with projected round shape (e.g. K15, K17, K25)

It is important to note that in the Kandyan period images studied, grooved folds cannot be seen in any metal Buddha image made either of bronze or Cu-Sn-Zn alloy and only seen in the brass and the Cu-Zn-Sn alloy statues (High zinc containing images). All three brass Buddha images (K18, K19, K27) and the two high zinc containing Cu-Zn-Sn alloy images (K3, K32) (see appendix 2 for the photographs) look the same and have grooved folds in the robes. This is extremely important since in art history these grooved fold images have been dated to the latter part of the Kandyan period.

## Visual Style and the Trace elements

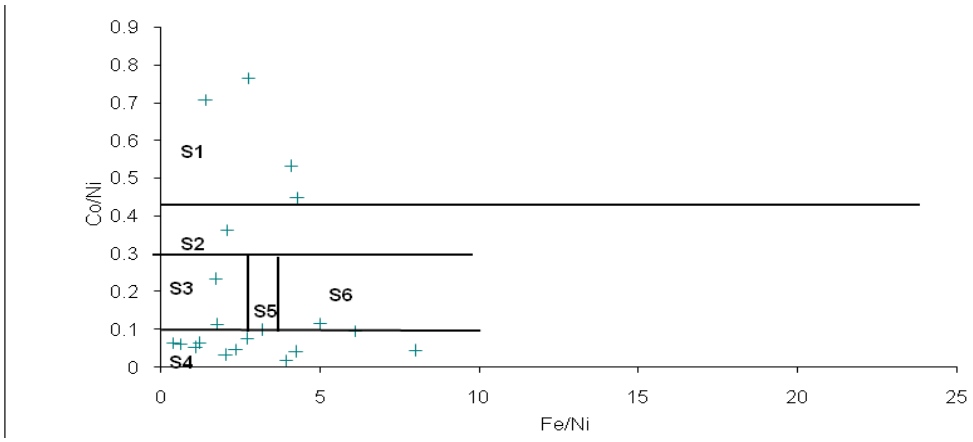


Figure 2: *Trace element scatter plot Fe/Ni Vs Co/Ni of the Sri Lankan Kandy period Buddha images*

By examining the trace element patterns of over one hundred bronze icons representing Anuradhapura to Kandyan periods it was found that the trace element scatter plot of Fe/Ni Vs Co/Ni (figure 2) is extremely successful in differentiating image groups sharing the same metallurgical history in Sri Lankan context. Almost 75% of the Kandyan period images studied here (only art historically dated as Kandyan) have been grouped with the trace element group S2 (see Figure 2) indicating some similarity in their metallurgical history. It has also been shown that the same scatter plot could be used to identify the images made using copper from the local Seruwila metal deposit. The images in trace element group S1 has been attributed as having been made from the copper obtained from the Seruwila deposit (Thantilage 2008).

Remarkably, images K15, K25, K28 (see appendix 2 for the Photographs) look somewhat different from the rest of the Kandyan images. Even though they belong to the second robe fold category mentioned above, a difference can be seen in their robes which are smooth, wide (thick) cast folds when compared to others in the category. The images appear to be older than the other Kandyan images. (pers. comm. Lakdusinghe 2006). The present archaeological field study by the author on Seruwila copper deposit had revealed the copper production in the Seruwila may have been ceased during the Polonnaruwa period because the exhaustion of copper ore there. Hence the presence of Seruwila copper during Kandyan time may be attributed to either reuse of older metal or images may not belonging to the Kandyan period but may have been belonging to an earlier period. The difference in the visual style of these images point probably latter would be the case.

Images K15, K25, K28 are made of Cu-Sn-Zn alloy. Several Anuradhapura period images are also made out of the same alloy but with the difference that the Kandy images have over 16% tin in their composition.

It can be seen from this study that none of the brass images have been subjected to gilding. Also from this study, it has been identified that the brass and the high zinc containing Cu-Zn-Sn alloy had been used in image production only in the later part of the Kandyan period. It could be assumed that the thick rounded folds in the robes may be older than the grooved folds. As mentioned earlier no image made out of bronze or Cu-Sn-Zn alloy has grooved folds in the robes. They all have cast smooth, projected folds in their robes.

Images K15, K25, K28 and K17, which are stylistically different to others in the Kandyan group, also had differences in their technological styles, as mentioned above, indicating that these images could be separated from the rest of the Kandy period images. So it would be significant for art historians to study these images thoroughly. Unfortunately no detail of provenance or context is available with the National Museum registers.

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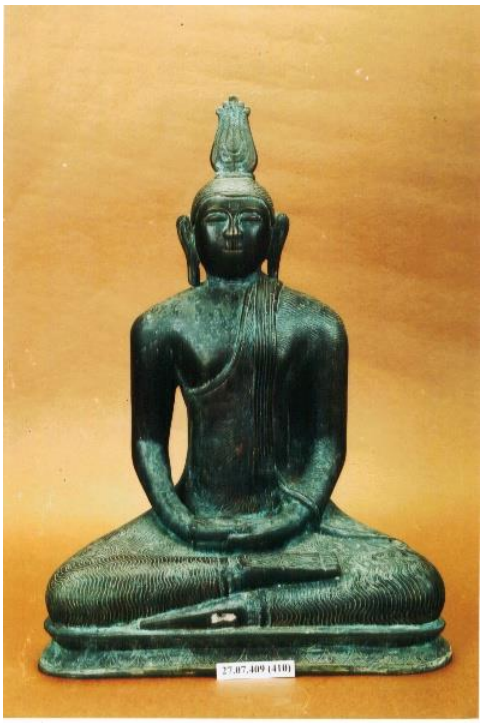
Appendix 1

List of Studied Kandy period images and their composition

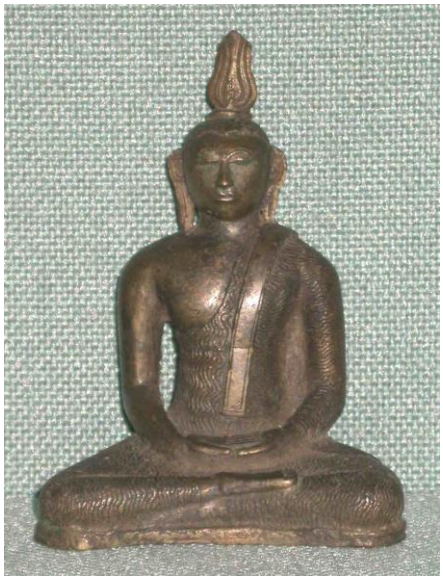
| **Image No.** | **Museum Reg. Number** | **Image** | **Alloy type** |
|---|---|---|---|
| K3 | 27.07.409 (410) | Buddha Image (sedent) | Copper-zinc-tin |
| K11 | GB.27.7.9 (279) | Buddha Image (sedent) | Copper-tin-zinc |
| K15 | 50.85.233 | Buddha Image (sedent) | Copper-tin-zinc |
| K16 | 41.150.177 | Buddha Image (sedent) | Copper-tin-zinc |
| K17 | GB.35.80 | Buddha Image (sedent) | High tin bronze |
| K18 | 38.850.85 | Buddha Image (sedent) | Brass |
| K19 | 28.74.418 | Buddha Image (sedent) | Brass |
| K22 | GB.30.80.93 | Buddha Image (sedent) | High tin bronze |
| K25 | 39.132.124 | Buddha Image (sedent) | Copper-tin-zinc |
| K26 | 38.623.66 | Buddha Image (sedent) | High tin bronze |
| K27 | 38.619.66 | Buddha image standing | Brass |
| K28 | GB.24.79 | Buddha image standing | Copper-tin-zinc |
| K29 | GB.21.79 | Buddha image standing | Copper-tin-zinc |
| K30 | X.52.169 | Buddha image standing | Copper-tin-zinc |
| K31 | GB.18.79 | Buddha Image (sedent) | High tin bronze |
| K32 | 38.848.84 (597) | Buddha image (Recumbent) | Copper-zinc-tin |
| K42 | GB.13.74 | Buddha Image (sedent) with Makara Torana | High tin bronze |
| K45 | 38.1140.107 | Buddha image standing | High tin bronze |
| K46 | 33.87.3 | Buddha image standing | High tin bronze |
| K47 | 39.216.132 | Buddha image standing | Bronze |



K3

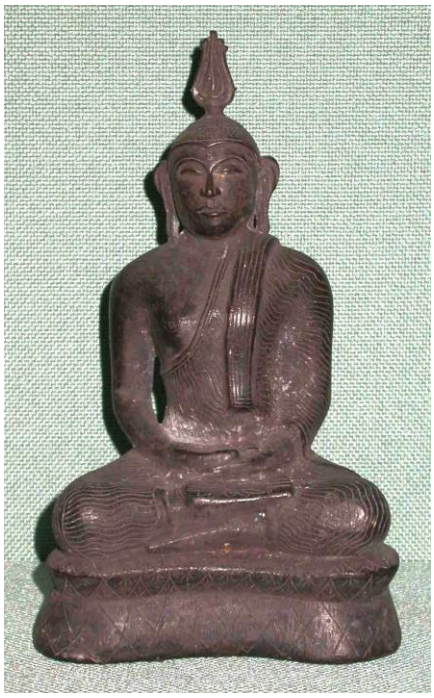
K11

K5

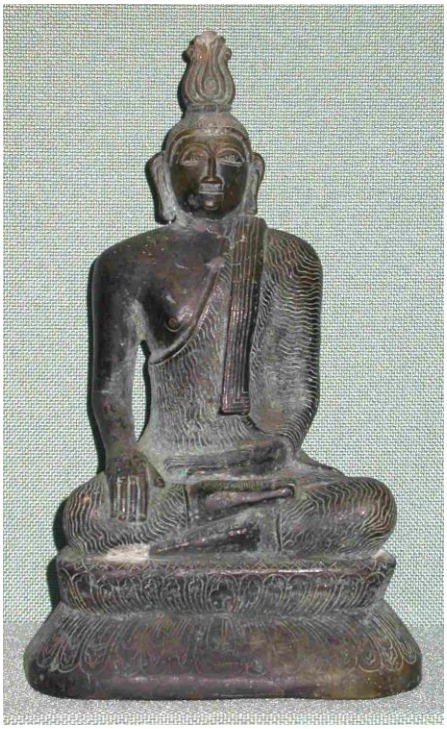


K16

K 17



K18



K 19


K 22

K 25

K 26

K 27

K 28

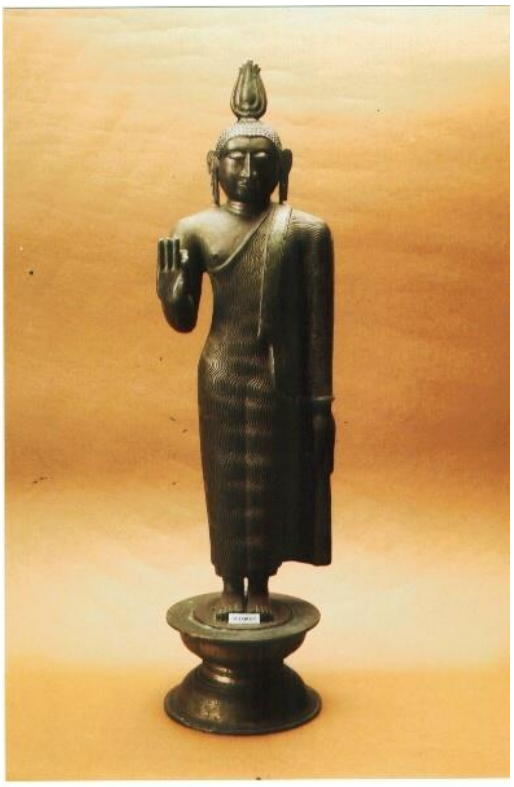
K 29

K 30

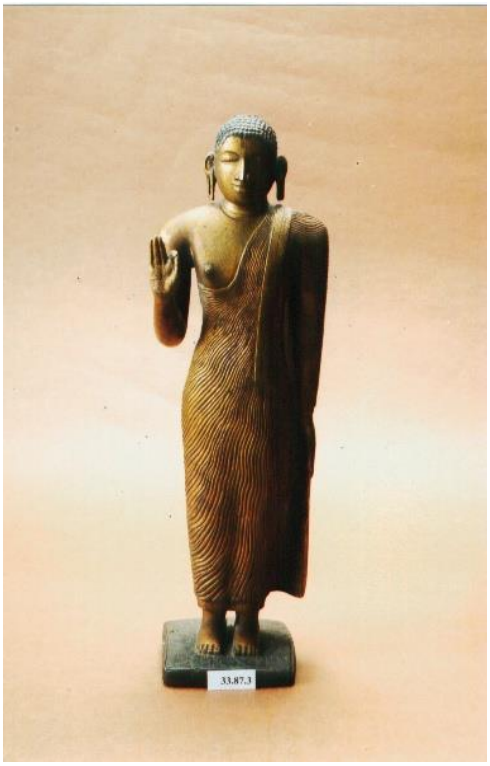
K 31

K 32

K 42



K 45




K 46


K 47