CHAPTER-III

HISTORY, PRODUCTION AND PRODUCTS OF BELL AND BRASS METAL INDUSTRIES

3.1. HISTORY OF BELL AND BRASS METAL INDUSTRIES

Man’s interest in industry is as old as the human society itself. It started from manufacturing of small weapons like arrows to kill wild animals for food in the primitive stages of human life. In the process of development, man now produces most sophisticated tools and equipments to manufacture a large variety of goods and services for his consumption and use. The seed of modern industrialization was sown in 19th century A.D. in England and other parts of Western Europe have now blossomed into its full-fledged form. The fruits of industrialization have drastically changed the life and livelihood along with the nature of resource use globally.

India is not exception to the general trend of global industrialization process. Today India is counted among the first fifteen industrialized countries of the world (Prasad, 1988). However, she is still cannot be considered as an industrialize country for its vastness of population, low per capita share of such development initiative and slow pace of industrialization process. As per the Government of India’s Industrial Policy 1956, creation of District Industry Centres to provide services and support for the development of small and village industries can be regarded as a positive step in the backdrop of industrial development scenario of the country. After the Independence, government of Assam also tries to develop the industrial sector by implementing its successive industrial policies announced from time to time. However, it fails to bring significant change to the sector. The core of moderate to
large industrial sector initiated by Britishers through forest, tea and oil sector continues to represent the industrial scenario of the state. The traditional labour intensive cottage sector is not yet attained desired momentum due to lack of organized initiative from government sphere.

The metal manufacture in India has a glorious past. Archaeological evidences so far prove that the metallic culture in India is as old as the Indus Valley Civilization (2300 B.C - 1750 B.C.). Earliest non-ferrous metal used by men is copper, whose discovery and use brought about a revolutionary change in the society (Sabhapandit, 1986). Copper is often alloyed with other metals, particularly tin to form bronze and bell metal and with zinc to form brass metal (Goswami, 2009).

Assam is no exception to this general trend of metal manufacturing in the country. In Assam, the people knew mining and smelting operation of metals during early historic period (Sabhapandit, 1986). Existence of copper mines and mining of gold in ancient Kamrup is also proved by the archaeological evidences. The metal culture that prevails in Assam evidenced from the copper plate charter of Vanavalavarmandeva of the 9th century A.D., bronze image of Lord Vishnu of the 11th century A.D., bronze image of Dashabhuja Mahishamardini Durga of the late Medieval Period (1206-1761 A.D.) (Goswami, 2009).

The art of making articles from bell and brass metals are some of the important craft forms in Assam. Both the metals are used to produce variety of articles for utilitarian and aesthetic purposes. Nevertheless, the information regarding the genesis of these industries in the state is not clearly known. However, inferences can be made based on historical events and some local legends regarding the origin of bell metal industry in the state. The process of
its development can be interpreted through three different phases, viz. i) Pre-Colonial Period (up to 1826 A. D.); ii) Colonial Period (1826-1947 A.D.) and iii) Post-Colonial Period (1947 A. D. onwards).

During the Mauryan Period (321 B. C. to 185 B. C.), there was a great increase in the volume of trade and commerce all over the country. The Buddhist traders had established their supremacy over the culture of trade and commerce. The Buddhist traders were spread all over the continent of Asia. It was happening with the support of the then powerful king Ashoka, who occupy the royal throne in 268 B. C. After embracing Buddhism, he sent a group of missionaries to South-East Asian countries (Deka, 1994). On their way to Burma, the missionaries had to pass through Assam. As the products of bell metal are deeply rooted to Buddhism, the *kanhar* must have accompanied the missionaries so that they could produce the required bell metal products for religious purposes. For spreading Buddhism in Assam, some of the missionaries along with a few *kanhrs* probably settled in different parts of the state. The people of Assam learnt the art of bell metal smithy from these *kanhrs*. However, Buddhism failed to make much impact on Assamese society, but the art of bell metal smithy took deep roots in certain centres having congenial environment for its development (Deka, 1994).

According to another legend, the ancestors of present day bell metal artisans migrated to Assam in the Gupta age (320 A. D.-647 A. D.) probably from Nepal. This was possible, because the geographical boundary of the ancient Assam (known as Pragjyotish) stretched westward up to Nepal as described in the *Kalika Purana* and *Yogini Tantra* (Savapandit, 1986). However, the description from *Harsha Charita* of Bana, the mention of bell metal products dates back to the 7th century A.D., when Kumar Bhaskar Barman (594-650 A. D.),
the then king of Kamrup, presented a *Kangshapatra* (a bell metal item) along with many other articles, through his trusted envoy Hangshbega to Harsh bardhana, the then king of Kanouj (Deka, 1995). Some people believed that the *Kanshapatra* was made by a well-known *kanhar* from Sarthebari locality. However, history does not support this idea, as the family tree of Sarthebari gives flickering idea that people started to live in Sarthebari during 14th century A. D. (Deka, 1995). During the Ahom and Koch regime, the bell metal products had enjoyed a great respect. At the time of Ahom Rule (1228-1826 A. D.), the royal court, castles and the drawing rooms of the distinguished persons were decorated with various kinds of beautiful utensils made of bell metal. During the Ahom rule, along with Kamrupa, bell metal industry was flourished at some other centers of eastern Assam, viz. Titabar, Raha and Dhekiajuli. The bell metal centers of eastern Assam were existed until the first part of 20th century A.D. (Tamuli, 2009). Similar centers, viz. Gauripur, Bilasipara and Sapatgram-Asharikandi-Kartimari were attained prosperity in western Assam. Apart from these, some production units of bell metal industry were shifted from Sarthebari area to different places of Assam. Such temporary shifting of production units are locally termed as *Parbah*. Reportedly, they were settled at Kalbari, Maligaon, Fatasil Ambari, Kumapara, North Guwahati of Guwahati city. Similarly, some other production units were shifted to Jorhat, Sivasagar, Maran, Nazira, Dibrugarh, Chepan, Khowang, Sapekhaity, Golaghat, Nagaon, Lakhimpur and Narayanpur to established there temporary *garhsal* and return home before the commencement of Sarthebari *Sobha Mahotshab* (Patowari, 2009). However, at present, this practice is almost abandoned. Only two such production units have traced during the field investigation, seasonally used to migrate from village Gomura of Sarthebari area to Ganeshpara of Guwahati city.
The Ahom kings engaged the *kanhars* to produce *Bartop* (a great gun) and *Barhiloii* (cannon-balls) that can be realize from the records preserve in the State Museum of Assam at Guwahati (Tamuli, 2009). Even today, the *Singphos* of Jagaloo in the district of Tinsukia used to produce the war weapon called *hengdung* and export it to Myanmar (Saikia, 2009). During the time of *Swargadeo* (king) Rudra Singha (1696-1714 A.D.), the products of Assamese bell metal smithy did catch the eye of the people both inside and outside the country (Kalita, 2008). The Ahom kings paid respect to the *kanhars* and patronize their creative pursuit. For example, Jieudhan, a renowned artisan from Sarthebari made a pair of *Bhortaal* and fixed them in a wooden tiger in such way that roared like a real tiger while it was being touched. He presented it to *Swargadeo* Siva Singha (1714-1744 A. D.). King Siva Singha was pleased with the artisanship of Jieudhan Kanhar, donated 100 *puras* of *Nisfkeraj* land and conferred upon him a prestigious title *Choudhury* (Deka, 1995). Having royal patronage of the Ahom rulers, the *kanhars* used to make beautiful *Jhari, Gurguri, Temabota, Pikdan, Boghjhora* etc. that brings glory to the royal palace. The Ahom rulers and aristocrats found pleasure by eating food in *maihang kahi* and *maihang bati* made of bell metal (Bhuyan, 1986). At the same time, Ahom rulers restricted the extensive use of bell metal products by the general people of the state. The royal family and the upper class of the royal court and castles had the right to use those products (Choudhury, 1998). The non-use of money economy in Ahom period however hinders the development of bell metal industry up to 17th century A.D. However, the expertise of artisans developed over time, the industry failed to explore new market and evolved as an enclave form of development (Tamuli, 2009). According to economist Amalendu Guha, the increasing influence of money economy in North India was prominent over business development of Kamrupa, during the 18th century.
A.D. The resultant increase of economic activities led to some degree of specialization, particularly in Kamrup, where artisan began to attain their functional importance on the north Indian model. Sualkuchi, Ramdia and Sarthebari in Kamrup developed as centers for silk weaving, oil crashing and bell metal casting respectively (Tamuli, 2009).

Subsequently, the Koch kings used to provide royal patronage to the bell metal artisans of Assam. King Biswa Singha (1515-1540 A.D.), who ruled the western part of Assam in first half of 16th century A.D. gave the charge of kanhar and kumar to his son Brishaketu (Sastri and Saliha, 2002). Narnarayan (1530-86) became the king of Koch dynasty after his father Biswa Singh’s death. He gave shelter to the bell metal artisans of Assam (Deka, 1995). With the emergence of Vaisnavaism in his time, numerous satras were established in Assam. The bell metal products having a fine quality started paved their way in the Vaisnava religious activities. As, there was business relation of Koch kings with the people of Bhutan, along with many other products, bell metal items also exported from Kamrup to the kingdom. The influence of north Indian money economy and development of business was prominent in Koch Kingdom.

Throughout the pre-colonial period, the bell metal industry was flourished in Assam. Nevertheless, in the colonial period, the bell metal industry had to pass through its terrible days. The industry had to face a brunt of imperial economic polices, atrocities of Kayans (Marowari Mahajans) and traders of Bengal. Apart from it, the great economic depression between two World Wars, the bell metal industry declined almost all other parts of Assam, except the Sarthebari region. Sarthebari is a sleepy town in the district of Barpeta, where bell metal industrial products enlightening the cultural glory of the state. Jaat Kahi (dish with a
three-legged brass ring) produced by the artisan Puspa Kanhar from Sarthebari is still bears the mastery of his talent, which is preserved in the British Museum. While seeing the product at an Exhibition in 1870, Queen Victoria of England, ordered the government official to offer the title of Jai gir to Puspa Kanhar. However, he was deprived to receive the title and gave him only fifty rupees as making-charge for the six-month period, which he spent for making the kahi (Patowari, 1995). In between 1883-84 and 1892-93, the British people carried out a survey, considering Sarthebari as an ‘Industrial Village’ and prepared a map. Nevertheless, there was no follow up action taken, perhaps due to the affect of historic raijmel relating to increasing taxation issue. During the later part of the 19th century A. D. late Puspa Ram Tamuli Kanhar (in short, Puspa Kanhar) raised the banner of revolt against the British regime in the historic ‘Raijmel’ organized at Panagaonrtup of Sarthebari area in 1894. The people from different classes and working background like Gohain of Satras, Brahmin, Kanhar and farmer participated in raijmel. During his imprisonment, the jail authority allowed Puspa Kanhar to make utensils of bell metal inside the jail. He produced a special variety of kahi and bati inside the jail, which are now locally known as jail kahi and jail bati. He also made a bunch of betel nut, a Bhortaal weighing 7.5 kg and a mirror of bell metal. He was released from jail prior to finish his tenure for his talent as realised by the British rulers (Patowari, 1995).

British took over the political control of Assam in 1826, as per the Yandaboo Treaty with Burmese ruler. Slowly the transport and communication system of the state had changed. With the increasing opportunity of trade and commerce, a class of intermediaries, mainly the Keyans (Marowari Mahajans) and Bengali traders came to Assam and they
slowly enter into the production and marketing process of bell and brass metal industries of the state. The intermediaries, like the Kayans followed some crucial practices to enjoy maximum profit on their investment. For example, when the mahajans provide raw materials to the artisans in advance for making bell metal products, the artisans sometimes used more metal than the actual weights offered for the purpose. This extra amount of metal used by the artisans is termed as Baltikanh. However, the mahajans pay the wages to the artisans based on per seer (.933109 kg) of the materials supplied by them. The artisans had to sell their labour free of cost for that extra materials used in the process of production. They never get the value of Baltikanh from the mahajans. During the processes of production, a part of raw material exhausted while burning and cleaning the products. This lost portion of raw material is termed as Mulmarakanh. The mahajans cut off a part of wages of the artisans as against the amount of mulmarakanh. The artisans there by lost a sizable amount of wages in this process. Even, when the artisans came back to mahajans with their finished products, they had to pay one rupee against per mound (40 kg.) of bell metal products. This practice was termed as Gadichatka and the clever mahajans called it as Mithaikhowa (Deka, 2006). Besides, at the time of wage calculation for the season, the kanhars had to make few products free of wage for the mahajans (Choudhury, 1982). To do away with the exploitation and all round development of bell metal industry, "The Assam Samabai Kanhar Sangha Limited" was established in 5th November, 1933 under the able guidance of late Kohi Ram Das and his followers. The head office of the society is located at Sarthebari. The society was renamed as "The Assam Co-operative Bell Metal Utensil Manufacturing Society Limited" (ACBMUMSL) and was registered under Co-operative Regulation Act, 1912 in 11 June
Establishment of the society can be regarded as a milestone in the history of bell metal industry of Assam (Patowari, 2009).

After independence, it was thought that the hopes and aspirations of the artisans of the bell metal industry would blossom. However, the Government of India took no fruitful measures for the development of this cottage form of industry. It was in 1957-58 that a rolling mill of 50 HP with a processing capacity of two tones raw material per day was provided to the ACBMUMSL by the industrial department of the Central Government. However, the machine could not be functioning properly as there was no trained expert to handle it (Talukdar, 1990). The problems of raw materials, charcoal and sales tax remained the same. During the later part of 1970s, government of Assam took some positive steps for the development of bell metal industry, like submission of a project plan to the Department of Industries. Nevertheless, no follow up action had taken up in subsequent years. The Department of Industries, Government of Assam was instrumental in setting up a Common Facilities Service Centre (CFSC) at Hirabori Reserve, Sarthebari in 1978 for the development of bell metal industry, but the centre has not yet functional. After much careful discussion, the government of Assam decided to exempt sales tax to ACBMUMSL, which stands even today (Govt. of Assam, 1988). In 1926, Late Ganga Ram Kanhar of Sarthebari region was able to receive prize in the Annual Conference, National Congress of India. The expert bell metal artisan late Hareswar Deka and Bhagaban Deka have able to receive silpi awards from the president of India in 1965 and 1984 respectively (Patowari, 1995).

Like the bell metal industry, there is no clear documentary evidence regarding the genesis and functioning of brass metal industry in Assam. However, the history of brass
metal industry in the state is generally associated with the settlement of Muslim Marias in the state. They settled in Assam after a war between General Turbak and Ahom soldiers in 1532 A. D., fought at Kaliabar (Das, 1999). The Ahom king Suhungmung settled the war prisoner in different parts of the state and employed them as caretaker of the royal elephants and cultivators. However, having inefficient in these duties, they took to work in brass metal craft (Das, 1999). At the beginning of the 18th century A. D., the Marias settled in Hajo. There were about 15 to 20 families of Maria forming a cluster at Hajo in the later part of 19th century A. D. (Das, 1999). Apart from this Maria people, some people from Hindu religion from Hajo are also engaged in the production of brass items.

The brass metal craft of Sarthebari revenue circle is locally known as “Sarai Silpa.” Reportedly, it was started at about 1850 A. D. Initially, it was limited to only two villages, viz. Baniakuchi and Haldhibari. In course of time, the industry is extends to as many as seventeen adjacent villages. Late Bhadiram Kalita and Dhananjoy Kanhar were the prominent artisans of this area (Deka, 1995). The workers engaged in this craft are not belonging to any special caste or sub-castes. People from any caste may engage as brass smiths. Generally, the artisans are belonging to Hindu religion. The artisans are not belonging to a special caste, rather a professional class. Thus, the profession is not for a closed community and open to any one who prefers to adopt it.

At the time of the partition of India in 1947, some peoples were resettled in different parts of both the countries. Some peoples of then East Pakistan (now Bangladesh) having the knowledge of brass metal smithy came to India and settled in different parts of Assam. Mention may be made about the artisans of Barpeta Road and Silchar, which were belong to
this group of peoples. They settled and engaged as brass metalworkers. Field survey in this regard reveals that this group of people are mainly belonging to Hindu Bengali origin.

3.2. RAW MATERIALS AND ENERGY SOURCES

All earth elements can group into two broad categories as- metals and non-metals. Metals are opaque, lustrous and a good conductor of heat and electricity. Iron, gold, silver, copper, tin and zinc are common metals. Non-metals are elements that cannot conduct heat and electricity very well. Only 18 elements are generally considered non-metals, while there are over 80 metals. Metals become shiny when cut, scratched or polished. They can be hammered into thin sheets without breaking. Metals are ductile i.e. they can be melted and drawn into thin wires. All metals except mercury are solid at room temperature (22°C) and have high melting points. Gold and copper were one of the earliest metals to be discovered by mankind. Seven metals are known as metals of antiquity, upon which ancient civilizations were based. These metals are gold (6000 B. C.), copper (4200 B.C.), silver (4000 B.C.), lead (3500 B.C.), tin (1750 B.C.), iron (1500 B.C.) and mercury (750 B.C.). The Mesopotamians, Egyptians, Greeks and Romans knew about these metals (BPI World Wide, 2010).

Sometimes, metals are mixed at a particular ratio to form new metals called alloy. Both bell and brass metals are alloys. Bell metal is a form of bronze. It is an alloy of copper and tin. Copper is a noble metal (pure metal) and tin is a poor metal (useful after added to other substances). These two basic metals mixed at a proportion of 78:22 i.e. 78 per cent copper and 22 per cent tin to produce bell metal. At Sarthebari, late Bhaba Nath Bhuyan introduced the art of making fresh raw materials by mixing the virgin materials to that ratio (Deka, 1976). It is the earliest known alloy and is harder than any other common alloys, except steel. For making raw
materials, copper is to put in a *Mohi* (a crucible made of clay). It is placed on *Aafar* with scrap metals to be melted or heated and heats by charcoal fire on the *Aafar* (the mouth of the bellow extends to the fireplace, the furnace where crucible can place). The copper turns red after heating for some time. It is interesting that copper never melts alone. After the copper turned to red, it needs to mix at the required proportion of tin. Then the mixture is again heating up to melt. The smelted liquid is then pouring in an *Aak* (a clay mould), where the liquid cools down and takes a solid form like a cake of bell metal (Goswami, 2009). The ingots produced by this processes is ready for use to production of articles. The virgin metals required for bell metal are not available in the producing regions. Therefore, the *kanhars* mostly use old, decrepit bell metal (*bhanga kanh*). However, the cost of raw material is high, if produces from virgin metals by the artisans themselves. Again, the production of new raw materials involves additional time in this process. To produce diversified articles of varying shape and size, *kanhar* may take help of specially made Deep Drawing machine at a reasonable cost. Some artisans are now using the help of Re-rolling Mill to convert lump into sheets (Deka, 2009). The mill is running under the private partnership basis at Sarthebari.

Like the bell metal, brass is an alloy of copper and zinc; mixed at a ratio of 70:30 i.e. 70 per cent copper and 30 per cent zinc (Deka, 2009). The process of making raw materials for brass industry is almost same as the bell metal. Coke-fired pot furnaces are used for melting brass metal (DSIR, 1951). However, leaded brass sheets of 60:40 containing 1.25 per cent lead are also manufactured for the use in tube well strainers. Zinc is included in the class of transitional metals. They are hard, shiny, strong and easy to shape. Therefore, at the presence of zinc, brass metal can easily be bended to give shape to the articles. Brass is
yellow in colour, somewhat similar to gold and harder than copper. It is ductile and can hammer into thin sheets. From prehistoric period, men knew brass as calamine brass and used to make low quality coins in ancient Greece, Rome and China. Now it is mainly used for production of household appliances, decorative items, plumbing, electrical applications, and rifle and pistol ammunitions.

In the pre-colonial economy, many aspects of both the bell and brass metal industries were under the control of artisans. The client provides necessary raw materials to the artisans and brings back the finished product after paying making-charges. After British annexation, the scenario had changed. The artisans were fully controlled by the mahajan through a class of intermediaries called aratdar. These intermediaries are in favour of mahajan and supply of scrap to the production units. The kanhars (artisans) used to take the scrap metal and produces articles as per the demand of mahajan. After the First World War, the economic position of the state had worsened and the supply chain disrupted. After the establishment of ACBMUMSL in 1933, the supply scenario of raw materials to the production units had revamped to some extent. However, the sangha had to depend upon the mahajans for scrap materials, as they could not bought directly from its source for the scarcity of fund. At present, the businesspersons use to import raw materials through two channels. Raw materials imported from Bangladesh through Barpeta Road via Koch Bihar and then it supplied to production units of Sarthebari (Pathak, 2009). Another channel of scrap metals of bell metal industry is controlling by the mahajans of Fancy Bazaar, at Guwahati. The businesspersons have bought the scraps from Pakistan via Delhi and are selling the same to the artisans or to the local traders or supplied to the production units through aratdar.
engaged in the industry. They are also supplying the sheets and circles to the production units of brass metal industry (Kalita, 2010). The local traders (businesspersons who are supplying raw materials to production units and have own sale centre) and aratdar (a broker) are supplying the scraps to the production units in return of the finished products and wages. Formerly, up to 1938-39, metals were imported to India from German, U.K. and Japan. Now brass sheets are produced in India. The other minor metals and items used in bell metal industry are copper, sulphate, borax powder, lac, flint paper, jute fibres, rice bran, mustard oil, clay etc. (Tamuli, 2009). The brass metal industry also needs borax powder and sulphuric acid as minor items in the process of production.

The study regarding the demand and supply of raw materials for bell metal industry reveals that there is around 30 per cent shortage of raw materials against the requirement. Supply of raw materials varies from 60.48 to 73.26 per cent against requirement during 2003-04 to 2007-08 and the average supply figure for the period stands at 69.63 per cent (Table 3.1).

**Table 3.1: Demand and supply of raw materials in bell metal industry**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Place</th>
<th>Total artisans</th>
<th>Surveyed artisans</th>
<th>Annual raw materials demand</th>
<th>Raw materials supplied (in kg)</th>
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<td>189</td>
<td>94620</td>
<td>55929</td>
</tr>
<tr>
<td>2</td>
<td>Ganeshpara</td>
<td>11</td>
<td>11</td>
<td>8500</td>
<td>6188</td>
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<td>Western Assam</td>
<td>69</td>
<td>10</td>
<td>4900</td>
<td>3209</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1329</td>
<td>210</td>
<td>108020</td>
<td>65326</td>
</tr>
<tr>
<td>P. C. of raw material used against total need</td>
<td>60.48</td>
<td>73.26</td>
<td>71.12</td>
<td>72.64</td>
<td>70.64</td>
</tr>
</tbody>
</table>

**Source:** Field Survey, 2008-09

Note: Average raw materials supply against each artisans = 75224.442÷210=358.212 kg.
Average demand of raw materials for each surveyed artisans = 108020÷210=514.381 kg
Annual demand of raw materials in Assam = 514.381×1329=683612.349 kg
During the period, lowest supply of raw materials was recorded in the year 2003-04 as the artisans of bell metal industry stopped their garhsal for almost three months to fulfil their demand of raising wage. During 2004-05, the supply of raw materials had increased to 73.26 per cent against requirement, as the price hike of raw material was under control to some extent. However, per capita supply of raw materials against each artisan during the period was 358.212 kg., against the per capita need of 514.381 kg, which hampers the production process.

Supply of raw materials to brass metal industry in the form of sheets and circles have managed by different components like mahajan, local trader, aratdar and hawker. However, the study exposes that the supply of raw materials was limited from 58.99 to 66.97 per cent against the requirement during the period of 2003-04 to 2007-08 and the average supply stands at 63.35 per cent against demand (table-3.2).

**Table 3.2: Demand and supply of raw materials in brass metal industry**

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<td>67528</td>
<td>66512</td>
<td>66512.49</td>
</tr>
</tbody>
</table>

P. C. of raw material used against total requirement: 66.97

**Source:** Field Survey 2008-09, Cl- producing cluster

Note: Average annual supply of raw materials to each artisans: 66512.49÷168=395.908 kg.
Average annual demand of raw materials to each artisans: 105000.00÷168= 625.00 kg.
Average annual raw materials demand of brass metal in Assam: 625.00×955=596875.00 kg.
Apart from short supply, production units of bell metal need to rely mostly on local traders and *mahajans* for the supply of raw materials (table-3.3). Share of contribution of local traders is as high as 24.39 per cent to total raw materials supply. Not a single unit of bell metal sector is survived solely on the supply of raw materials from cooperative society (ACBMUMSL). However, the role played by the co-operative society cannot be ignore, as the society has contributed to 36.59 per cent bell metal producing units jointly with *mahajans* and local traders. However, almost half of the raw materials supplied to the production units have directly controlled by *mahajan* and local traders.

**Table 3.3: Sources of raw materials for bell metal industry**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the place</th>
<th>No. of units Surveyed</th>
<th>Source of raw materials</th>
<th>C</th>
<th>M</th>
<th>LT</th>
<th>M,LT</th>
<th>M,C</th>
<th>L,TC</th>
<th>M,LT,C</th>
<th>LT.H</th>
<th>M.H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sarthebari Cl</td>
<td>36</td>
<td></td>
<td>00</td>
<td>03</td>
<td>10</td>
<td>08</td>
<td>02</td>
<td>12</td>
<td>01</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>Ganeshpara</td>
<td>02</td>
<td>--</td>
<td>01</td>
<td>--</td>
<td>--</td>
<td>01</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>Western Assam</td>
<td>03</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>01</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>41</td>
<td></td>
<td>00</td>
<td>04</td>
<td>10</td>
<td>09</td>
<td>02</td>
<td>12</td>
<td>01</td>
<td>01</td>
<td>01</td>
</tr>
<tr>
<td>p.c. to its total</td>
<td></td>
<td></td>
<td></td>
<td>00</td>
<td>9.76</td>
<td>24.39</td>
<td>21.95</td>
<td>4.88</td>
<td>29.27</td>
<td>2.44</td>
<td>2.44</td>
<td>2.44</td>
</tr>
</tbody>
</table>

Source: Field survey 2008-09

Note: Cl- producing cluster, C- The Co-operative Bell Metal Utensils Manufacturing Society Ltd., M-Mahajan, LT-Local Trader, H-Hawkers, and B-Buyers

Supply of raw materials to the production units of brass metal also revealed the overall domination of local traders and *mahajans* (table 3.4). However, *hawkers* and buyers also contribute with a very little share of raw materials supply. The study reveals that the supply of raw materials has directly controlled by *mahajans* and local traders, in more than two third of the brass metal production units. Apart from this, they also controlled the production process of the units jointly with other suppliers like hawkers, buyers, etc.
Therefore, *mahajans* and local traders play an important role in the production process of bell and brass metal industry.

**Table 3.4: Sources of raw materials to brass metal industry**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the place</th>
<th>No. of units Surveyed</th>
<th>Source of raw materials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>Sarthebari Cl</td>
<td>20</td>
<td>01</td>
</tr>
<tr>
<td>2</td>
<td>Hajo</td>
<td>22</td>
<td>08</td>
</tr>
<tr>
<td>3</td>
<td>Silchar</td>
<td>04</td>
<td>--</td>
</tr>
<tr>
<td>4</td>
<td>Guwahati</td>
<td>02</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>Mugkuhi</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>6</td>
<td>Barpeta Road</td>
<td>02</td>
<td>--</td>
</tr>
<tr>
<td>7</td>
<td>Western Assam</td>
<td>03</td>
<td>01</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>55</td>
<td>12</td>
</tr>
<tr>
<td>p.c. to total</td>
<td></td>
<td>--</td>
<td>21.82</td>
</tr>
</tbody>
</table>

Source: Field survey 2008-09

Note: Cl- producing cluster, C- The Co-operative Bell Metal Utensils Manufacturing Society Ltd., M-Mahajan, LT-Local Trader, H-Hawkers, and B-Buyers

Charcoal and coke are used as fuel in bell and brass metal industry. Wood charcoal has been produced and is used in India since time immemorial. Charcoal is superior to wood as fuel, because it can be easily lighted, burns without emitting smoke, and provides intense and steady heat. The quality of charcoal depends on the species of wood used. Good charcoal is black and glistening with a bluish tinge, free from taste and smell and burn without producing smoke or flame. Black charcoal of good quality having a fixed carbon content of about 77 per cent can obtained by retorting wood at $350^\circ C$, but in actual practice, the temperature is used $500-600^\circ C$ (DSIR, 1951). Wood charcoal is extensively used for ore melting, as fuel for black smiths, metal works and for numerous cottage industries as source of energy. Charcoal is produced in the state of Madhya Pradesh, Maharashtra, Andhra Pradesh, Orissa, Uttar Pradesh, Punjab, West Bengal, Bihar, Assam, Meghalaya, etc (DISP, 1951). Due to fast decreasing forest cover in Assam, production of charcoal is also
decreased. Therefore, suppliers import them from other states like Meghalaya (Garo Hills) and West Bengal. The production units of bell and brass metal industries also collect a very little amount of inferior quality of charcoal from local production coming out of household use as firewoods. In Assam, charcoal is locally known as angar (cinder).

Coke fired pot furnaces are used for melting brass. These are by-products of burnt coal used in brick industry, wine forge etc. in Assam. Generally, coke is collect by a class of businesspersons and supplied it to the production units of brass metal industry, which are priced per bag. Over the years, the size of the bags of charcoal and coke are reduced at a faster rate against its increasing price. The profit of the artisans is largely depended upon the price of energy, as they have to bear the cost of energy from their end.

The supply of energy to both the industry is not regular and sufficient (table 3.5 and 3.6). Some times the production stops due to non-availability of energy. The traders of Boko, Mirza, Palashbari and Bijoy Nagar of south Kamrup use to supply charcoal to the local traders and co-operative society of Sarthebari bell metal cluster. The two units of

**Table 3.5: Demand and supply of energy to the bell metal industry**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Name of the place</th>
<th>No. of total artisans</th>
<th>No. of surveyed artisans</th>
<th>Energy (charcoal) used in bell metal industry (in bag)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sarthebari Cl</td>
<td>1249</td>
<td>189</td>
<td>15356</td>
</tr>
<tr>
<td>2</td>
<td>Ganeshpara</td>
<td>11</td>
<td>11</td>
<td>1474</td>
</tr>
<tr>
<td>3</td>
<td>Western Assam</td>
<td>69</td>
<td>10</td>
<td>760</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1329</td>
<td>210</td>
<td>17590</td>
</tr>
</tbody>
</table>

Annual uses of raw materials | 65326 | 79132 | 76819 | 78469.5 | 76320.71 | 75224.44 |

Source: Field Survey 2008-09

Note: Average annual supply of charcoal for each kg of products 20933÷75224.442= 0.278 bag.

Total annual demand of charcoal to surveyed units 0.278x108020= 30030 bags

Total annual demand of all units of the state 0.278x683612.349=190044 bags
Ganeshpara at Guwahati use to receive charcoal from the traders of south Kamrup. Western Assam bell metal cluster receives charcoal from Parbatjhora area of Kokrajhar district. The study of the energy source of bell metal industry reveals that with the increase of raw material supply the demand of energy also increased. Average energy demand for one-kilogram bell metal product stands at 0.276 bags (1 bag charcoal is approximately 15 kg). Therefore, the total need of energy is estimated to be 29814 bags, if raw materials are supplied to the production units as per the demand.

**Table 3.6: Demand and supply of energy to brass metal industry**

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Name of the place</th>
<th>No. of total artisans</th>
<th>No. of survey artisans</th>
<th>Charcoal and coke used in brass metal industry (in tin.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Type of energy</td>
</tr>
<tr>
<td>1</td>
<td>Sarthebari</td>
<td>449</td>
<td>84</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CC</td>
</tr>
<tr>
<td>2</td>
<td>Hajo</td>
<td>367</td>
<td>52</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CC</td>
</tr>
<tr>
<td>3</td>
<td>Silchar</td>
<td>25</td>
<td>07</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Guwahati</td>
<td>03</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mugkuchi</td>
<td>25</td>
<td>09</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Barpeta Road</td>
<td>22</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Western Assam</td>
<td>36</td>
<td>07</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Upper Assam</td>
<td>28</td>
<td>00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>955</td>
<td>168</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CC</td>
</tr>
</tbody>
</table>

Source: Field Survey 2008-09  (C-Coke, CC-Charcoal)

Note: Average demand of coke for each kg brass metal products 9616.8 ÷ 66512.49 = .145 tin,
Total demand of coke for surveyed units .145 x 105000 = 15225 tin,
Total demand of coke for all units of the state .145 x 596875 = 86547 tin,
Average demand of charcoal for each kg brass metal products 843.4 ÷ 66512.4 = .013 tin,
Total demand of charcoal for surveyed units .013 x 105000 = 1365 tin,
Annual expected demand of charcoal for all units of the state .013 x 596875 = 7759 tin
Field investigation also reveals that each kg of brass metal products involves 0.143 and 0.013 tin (1 tin coke is equivalent to approximately 10 kg, and 1 tin charcoal is approximately 5 kg) of coke and charcoal respectively. The average annual uses of coke and charcoal are estimated to be 9616.8 and 843.4 tin respectively (table 3.6). Again, the estimated demand of coke and charcoal stands at 86547 and 1365 tin respectively, if total raw materials demand of all production units are fulfilled.

Study on the sources of energy, also reveals the overall dominance of local traders and *mahajans* in the supply chain (table 3.7 and 3.8). In case of bell metal industry, local traders have supplied as many as 39.02 per cent of required charcoal. The head office of the ACBMUMSL and *mahajans* has supplied energy next to local traders. On the other hand, local traders supplied as many as 85.46 and 72.73 per cent of coke and charcoal to production units of brass metal units. Apart from it, a very little amount of charcoal has been collecting from household firewood.

**Table 3.7: Source of charcoal to bell metal industry**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the place</th>
<th>No. of units surveyed</th>
<th>Sources of energy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>1</td>
<td>Sarthebari Cl</td>
<td>36</td>
<td>04</td>
</tr>
<tr>
<td>2</td>
<td>Ganeshpara</td>
<td>02</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>Western Assam</td>
<td>03</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>41</td>
<td>04</td>
</tr>
<tr>
<td>P. C. to total</td>
<td></td>
<td>09.76</td>
<td>39.02</td>
</tr>
</tbody>
</table>

Source: Field Survey 2008-09

Note: Cl- Production clusters, M-Mahajan, LT-Local Trader, MLT-Mahajan and Local Trader, C-The Assam Co-operative Bell Metal Utensils Manufacturing Society Limited (ACBMUMSL), MC-Mahajan and ACBMUMSL, LTC-Local Traders and ACBMUMSL LTMC-Local Traders, Mahajan and ACBMUMSL
The production units of bell and brass metal industries have also faced some problems in the procurement of raw materials. The responses of the artisans in this regard have studied to explore the dimension of the problem (table-3.9). The study reveals that irregular and insufficient supply of raw materials, shortage of working capital to buy raw materials, low quality of raw materials and control of traders are the problems faced by the bell metal production units. Irregular and insufficient supply of raw materials seems to be the main problem, as revealed by the artisans of all the production units. The artisans of bell metal industry also have scarcity of working capital. However, the response to this problem is 60.98 per cent, which is less than expected. The study reveals that the artisans have an inherent tendency to take loan from local moneylender, mahajan, trader, co-operative societies, relative, etc. at a mutually agreed higher rate of interest as working capital. Again, the control of traders in the supply chain of raw materials is a serious problem for the industry.

Table 3.8: Sources of energy to brass metal industry

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the place</th>
<th>No. of units surveyed</th>
<th>Sources of energy</th>
<th>Coke</th>
<th>Charcoal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LT</td>
<td>H</td>
</tr>
<tr>
<td>1</td>
<td>Sarthebari Cl.</td>
<td>20</td>
<td></td>
<td>19</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>Hajo</td>
<td>22</td>
<td></td>
<td>22</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>Silchar</td>
<td>04</td>
<td></td>
<td>01</td>
<td>03</td>
</tr>
<tr>
<td>4</td>
<td>Guwahati</td>
<td>02</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>Mugkuchi</td>
<td>02</td>
<td></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>6</td>
<td>Barpeta Road</td>
<td>02</td>
<td></td>
<td>02</td>
<td>--</td>
</tr>
<tr>
<td>7</td>
<td>Western Assam</td>
<td>03</td>
<td></td>
<td>03</td>
<td>--</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>55</td>
<td></td>
<td>47</td>
<td>03</td>
</tr>
<tr>
<td>P. C. to total</td>
<td></td>
<td>85.46</td>
<td></td>
<td>05.45</td>
<td>01.82</td>
</tr>
</tbody>
</table>

Source: Field Survey 2008-09  
Note: CL-Production Clusters, LT-Local Traders, H-Hawkers, LC-Local Collection, O-Other Sources
Table 3.9: Problems of bell metal production units in the procurement of raw materials

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the place</th>
<th>Irregular and insufficient supply</th>
<th>Shortage of working capital</th>
<th>Irregular price</th>
<th>Low quality</th>
<th>Time consuming</th>
<th>Poor transportation system</th>
<th>Supply control by traders</th>
<th>No. of units surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sarthebari Cl</td>
<td>36</td>
<td>23</td>
<td>11</td>
<td>25</td>
<td>11</td>
<td>07</td>
<td>23</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>Ganeshpara</td>
<td>02</td>
<td>01</td>
<td>01</td>
<td>02</td>
<td>00</td>
<td>02</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>3</td>
<td>Western Assam</td>
<td>03</td>
<td>01</td>
<td>01</td>
<td>02</td>
<td>00</td>
<td>01</td>
<td>02</td>
<td>03</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>41</td>
<td>25</td>
<td>13</td>
<td>28</td>
<td>13</td>
<td>08</td>
<td>27</td>
<td>41</td>
</tr>
<tr>
<td>P. C. to its total</td>
<td>100.00</td>
<td>60.98</td>
<td>31.71</td>
<td>68.29</td>
<td>31.71</td>
<td>19.51</td>
<td>65.85</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey 2008-09

Apart from these, others parameters fixed for the study has not viewed as vital problems, so far the responses of the production units are concerned. Among them, the irregular price of raw materials is one of the main problems faced by the industry. Nevertheless, as the units receiving raw materials supply against the making charge, only 31.71 per cent of production units are concerned about the price of raw materials. Apart from it, the time-consuming collection process of raw materials is also acts as a hurdle to the industry.

The views express by the workers of brass metal production units indicates that irregular and insufficient supply of raw material is the main problem associated with production (table 3.10). The problem of working capital of the brass metalworkers is somewhat less than that of bell metal industry as the workers use to receive part of the making-charge in advance from the traders. Frequent change of raw material price is also a
major problem faced by the artisans. However, only 56.36 per cent respondent have expresses it as a problem. It is because 40 per cent of the production units procure raw materials from their own capital. Others, units that receive raw materials against making-charge, have little concern about the matter. Low quality of raw material is also a problem of the industry. Apart from it, time consuming raw materials collection process is also a problem, especially for the artisans of Hajo and Mugkuchi, as they used to spend many working hours in the collection process. The production units under study have expressed the available transportation system as affordable to them. However, they viewed the decreasing working days is the result of control of traders on raw material supply. Out of total units under investigation, 58.18 per cent have opined that traders’ control over raw material downsized the production as well as their income.

**Table 3.10: Problems of brass metal production units in the procurement of raw materials**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the place</th>
<th>Irregular and Insufficient supply</th>
<th>Shortage of working capital</th>
<th>Frequent price change</th>
<th>Low quality</th>
<th>Time consuming</th>
<th>Poor transportation system</th>
<th>Supply control by traders</th>
<th>No. of units surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sarthebari Cl</td>
<td>20</td>
<td>10</td>
<td>18</td>
<td>12</td>
<td>04</td>
<td>01</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Hajo</td>
<td>21</td>
<td>13</td>
<td>07</td>
<td>14</td>
<td>13</td>
<td>02</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>Silchar</td>
<td>04</td>
<td>02</td>
<td>01</td>
<td>01</td>
<td>--</td>
<td>--</td>
<td>02</td>
<td>04</td>
</tr>
<tr>
<td>4</td>
<td>Guwahati</td>
<td>02</td>
<td>--</td>
<td>02</td>
<td>01</td>
<td>02</td>
<td>--</td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>5</td>
<td>Mugkuchi</td>
<td>02</td>
<td>--</td>
<td>01</td>
<td>--</td>
<td>02</td>
<td>--</td>
<td>--</td>
<td>02</td>
</tr>
<tr>
<td>6</td>
<td>Barpeta Road</td>
<td>02</td>
<td>01</td>
<td>01</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>02</td>
<td>02</td>
</tr>
<tr>
<td>7</td>
<td>Western Assam</td>
<td>03</td>
<td>01</td>
<td>01</td>
<td>--</td>
<td>02</td>
<td>--</td>
<td>01</td>
<td>03</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>54</td>
<td>27</td>
<td>31</td>
<td>28</td>
<td>23</td>
<td>03</td>
<td>32</td>
<td>55</td>
</tr>
<tr>
<td>P. C. to its total</td>
<td></td>
<td>98.18</td>
<td>49.09</td>
<td>56.36</td>
<td>50.91</td>
<td>41.82</td>
<td>05.45</td>
<td>58.18</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field Survey 2008-09
3.3. IMPLEMENTS USED IN THE PROCESS OF PRODUCTION

The bell and brass metal artisans produce variety of articles using age-old implements at the same manner as their ancestors did. Involvement of modern scientific implements are almost absent in the process of production. Some of the implements used by the artisans in both the industries are common. Apart from these common implements, the artisans of bell metal industry use some additional implements. The values of all the implements vary as per their sizes. Number of implements involved in the production process is determined as per the number of kanhars involved. The tools and implements used in the process of production are as follows:

_Aafar_- The mouth of the bellow extends to the fireplace, the furnace where crucible can place

_Aafar Sunga_- A bamboo pipe use to provide air to the fireplace

_Aak_- An earthen mould with a circular hole in its middle part. The implement is used to pour out the melted bell metal

_Aakar_- A circular shaped dice made of clay and use to pour out the melted bell metal for cooling down to take solid form

_Aake_- A medium size (one side pointed) anvil made of iron. The pointed end is placed on a wooden log at the time of work.

_Aalebari_- A bamboo sticks use for stirring the melted bell metal

_Barisila_- The posts to support the _lathe_ (a strip of wood in _kund_ that used in bell and brass metal industries)

_Bhati_- The bellow made of goat’s skin and use to provide air to the fireplace through the _aafar sunga_ to _aafar_. Today the artisans of bell metal smithy uses air blower machine instead of _bhati_ made of goatskin.
Bogi- A small size chisel use to engrave designs on certain utensils made of brass metal

Chatli- A bamboo shoot shaped implement made of iron and use by kanhars to smoothening and polishing of bell metal items like bota, kahi etc.

Chena- A chisels like implement use to cutting the edge of metal products to make smooth and decorated with flowers, creeper, leaf etc. These are different types like phool chena, julkhanda chena, gunashira chena, kharika chena, khol chena etc.

Chak Bhor- A gimlet made of steel and use for making circular pattern in the utensils

Dheka- A kind of anvil with both side pointed ends. It uses by the kanhars to give rounded shape of the utensils like lota, kalah etc.

Gharmara- It is an iron spike attached with a bamboo bow. The spike of iron calls Ghar. These instruments have used for designing the products of bell metal.

Haturi- A hammer made of iron fixed with a bamboo or wooden handle of one or one and half feet long. One side of the hammer is round and the rest is flat. However, hammer of different shapes and sizes use as per the requirement of the garhsals. Barhaturi, Kamoruwa, Pahmara, Mathni, etc. are different types of haturi use by the kanhars.

Kati- A pair of scissors uses to cut the thin sheets of bell and brass metal by the Kaitnar to give them proper shape after hammering.

Khanta- An iron instrument use for polishing the bell metal products

Kund- A turner’s lathe made of wood and used for polishing and designing the utensils. Lac is used to adhere closely the utensils to the kund and polished by whirling the kund

Lowal- A very sharp instrument made of iron and steel use to clean the products

Mohi- A crucible made of clay. It is placed on aafar with scrap metals to be melted or heated.
Nagara- A coil made of straw

Naora- A water container made of wood and use to submerge the products for cooling.

Niyeri- An anvil made of iron and circular in shape. Kanhars used to keep the hot bell metal cakes (lumps) on it for hammering. At best, there are three anvils of different sizes use by the kanhars in a garhsals. The big size niyeri used by the kanhars to give rough shape of the articles. They use the small size niyeri to smooth the surface of articles.

Pak Bhor- A gimlet made of steel and use for boring holes in the utensils.

Pan- It is a mixture of copper, zinc and borax use for joining the utensils where necessary.

Pani Dhol- A water container made of wood and use to submerge the products for cooling.

Pata- It is a piece of smooth stone use to sharpen the implements.

Reti- A file, a rasp made of steel having sharp edges with a handle of bamboo. This instrument is used to rub and make the utensils smooth. It is locally called as ‘O’ File and these are three different types- round file, flat file and three or four-sided file.

Sarah- A kind of tongs vice made of iron. It uses to hold tightly the heated bell metal cake over niyeri to beat by hammer to make thin and increase the breath. Gol-sarah, Pat-sarah, Bejimukhiya-sarah, Kamari-sarah, and Pon-sarah are the common types of sarah used in bell metal production units.

3.4. PRODUCTION PROCESS

The metalworkers of Assam usually follow two methods in manufacturing products. The more popular is the hammering method, popularly called heating and beating method. This method entailed beating out the lump or plates into desired shapes with the help of
hammer after heating in furnace. The second method entailed casting into specific moulds (Goswami, 2009). Bell metal products are generally manufactured following the method of hammering. Casting method is used to produce *lota, glass* etc. from *dhalua kanh* (a mixture of bell and brass metal, inferior in quality) with the help of specific mould (Gupta, 1908).

The bell metal artisans generally produce articles by melting down old and decrepit items. The process of *pita* or hammering is almost exclusively used in manufacturing of utensils. The artisans beat out the lump of bell metal up to a required shape with the help of their hammer and furnace. After that, the component parts are soldered together by means of an alloy of copper, zinc and borax (*pan*). The rough vessel is then turned in a *lathe* to chisel and polish. In the process, the bottom of the vessel is first heated and fixed on a cylindrical piece of wood with resign and the bar of wood is made to revolve backwards and forwards with a piece of rope. One *bhaiga* worked at the rope and the *Ojha Kanhar* applied the chisel. This step is followed by the process of polishing the product with the help of *lathe* and a pad, over which smeared with an oily polish. Both the processes of chiselling and polishing appeared to be very old fashion and time consuming (Gupta, 1908).

There is hardly any change in the traditional manufacturing process of bell metal products. The general steps involved in the process of bell metal products are as follows:

1. The pieces of bell metal scrap are putted in an earthen pot called *mohi* for melting.

2. Then in the *aafar*, charcoal is put and the fire is lighted, where the *mohi* is placed for heating for melting the scrap metal.
3. With the help of an aalebari, the scrap metal in the mohi is stirred and tested to know the state of melting.

4. The scrap metal turns to liquid and is poured in the aakar, where it gets cool to take a solid form, locally called aautakanha.

5. Normally, the bell metal cake or lump is heated in the aafar. On being heated, the red lump is put out of the aafar.

6. The hot bell metal piece is then placed on niyeri, where the Ojha-Kanhar holds the cake with the help of sarah to move the lump in required direction and the bhaigas sit around the niyeri. They keep on hammering it a rhythmic manner for expanding the lump to desired shape and size. Presently, some of the units of Sarthebari bell metal cluster have used flat sheet from rolling mill prepared from bell metal lump. It reduces the physical labour of the kanhars. They make such sheets from the lump by paying Rs. 8 for per kilogram metal.

7. Once the shape of the product is given, it is again placed in the aafar to make hot and red.

8. The hot and red product is put in the water of Pani Dhol to make it cold and hard.

9. There remain certain defects in the shape of product and a process of hammering with small hammer brings its proper shape.

10. On being hammered, certain cracks developed in the outer edge of the product and the Kaitnar with the help of a kati cuts the cracked edge.

11. Kaitnar also cleans the black layer of the product with a khanta. The product is again heated in fire.

12. Product is then polished by two artisans in the wooden unit called kund. Lac is necessary to fix the product in the polishing unit.
13. The last stage is devoted for polishing, designing and finishing. These tasks are performed with the help of Bhor, Chena, Lowal and Reti.

14. By following all these steps stated above, articles of different shape and size, are produced and ready for sale or use.

The process of production of brass metalwork is somewhat different from that of bell metal industry. Thin brass sheets, circles and scrap brass are the main raw materials used in the process. Brass sheets or circles are made either from recycled scraps or from virgin materials. Rolling mill at Guwahati produces these sheets and circles. The artisans procure these materials directly from mill owner or the local traders by cash or in a condition to return the finished products against making-charges. Production units located far away from Guwahati depend mostly on the local traders, hawkers and customers for supply of raw materials. The method of manufacturing brass metal products requires the similar steps like that of bell metal products. However, for polishing of the products, apart from Reti, sand is also used. In the last stage of polishing, designing and finishing tools like Bhor, Bogi and Chatli are used.

3.5. RANGE OF PRODUCTS

The products manufactured in bell and brass metal units are used for different purposes both inside and outside the state. According to the quality, products of bell metal can divide into four different classes, viz. (i) Bazaruwa- low quality products, (ii) Aachli-good quality products, (iii) Charach- better quality products and (iv) Aachli-Charach- best quality products. In general, the products of bazaruwa and aachli classes are available in the market and easy to sell for its low sell prices. Charach and aachli-charach products pay
respect by the peoples of all classes. However, the prices of the products of these classes are more and generally, beyond the reach of average buyers.

*Kahi* (dish) is a popular product of bell metal industry in Assamese society. According to design, decoration and shape there are several types of *kahi*, viz. *Chada Kahi, Chach Kahi, Julkhanda Kahi, Kardoisiriya Kahi, Ban Kahi or Bela Ban* (dish with a foot - with three sub types- *Chach Ban Kahi, Julkhanda Ban Kahi and Jail Ban Kahi*), *Jaat Kahi* (dish made with three leg of brass ring and over which cups are placed to served rice and curry), *Maihang Kahi* (dish with a foot and was used by the *Ahoms* of ranks), *Pandhowa Kahi* (dish with high and board rim- with three subtypes), *Dofla Kahi* (used by *Nichi* people of Arunachal Pradesh) etc. Apart from *Kahi*, *Bati* (bowl) is also an important utilitarian bell metal item. There are around fourteen types of *bati* viz. *Chadha Bati, Chach Bati, Bahir Koniya Bati, Julkhanda Bati, Bet Konia Bati, Khur Konia Bati, Tel Bati, Sijupotia Bati, Hattujuiya Bati, Raheli Bati, Garo Khura Bati, Satriya Bati, Dofla Batii, Ban Bati* (with nine sub types), *Maihang Bati* etc. Water containers like *Lota* (small pot- with six sub types), *Ghoti, Dagdagi Kalah* (with four sub types), *Gageri, Tekali and Chariya* (a round shaped washbasin with two sub types) are of very commonly used household items. As offering betel nuts to guests is an important gesture in Assamese traditional culture, the *Bota* a bell metal item associated with such practice attained various shapes and forms. There are around nineteen types of *Bota* (A kind of tray for offering betel nut or offering things to god and goddess or show honour to respectable persons) and *Saphura* (box) are in use. Other significant bell metal products used extensively as household items are - *Gasa* (a stand to hold a lamp), *Temi* (lime pot), *Gurguri* (kind of smoking apparent, locally called as *hooka*),
Dab (folding handle of a knife), Jhari (water pot made with a spout at its middle part), Bhogjhara (water vessel with a spout), Karach or Heta (ladle use to serve meal), Piyala (cup use to take tea), Pikdan (spittoon), Kharika Sunga (tube to hold tooth pick), Beri (A ring made for tightening or strengthening the wooden handle for tool), etc. Some other items of religious association are Aashan (altar use to keep deity), Bigraha (statue of deities), Saki (small vessel to get light flame by burning oil), Thal (dish for offering), Doba (big drum), Ghanta (bell), Barkanh (gong used in temples and satras) and Sarai (tray with stand and cover). Apart from these utilitarian and socio-religious bell metal items, instruments like Taal (cymbal used in socio-religious functions), Kanh (bell used in office, educational institutions), photo frame, frame of looking glass, tiffin box, badges, and decorative items like animal and bird figures are also some other interesting products of the industry.

Most of the products of brass metal industry are resemble to products of bell metal sector. However, some products like Tou (cooking utensil), Kharahi (container with dense but small holes on its body to pass water), Karia (container used to draw milk), Badna (water pot with a pipe, use by the Muslims), Gilas (glass made of brass metal), Tray (flat receptacle used to carry cup, glass, etc.), Chamoch (Spoon) and Jug (a container) are used as household utensils.

Dunari (sarai like container without a high stand use in marriage ceremony), Dhupdani (vessel used for burning incense), Japa (box type container use to keep dresses of a girl when she attains her first period), Dhunadani (vessel used for burning a kind of resin) and Koli (flower bud or a bud like knob fixed at the top of temple) are some of the products used in socio-religious life of Assamese society.
Apart from these utilitarian and socio-religious brass metal products, some ornaments like bangle (a bracelet or anklet), chain (an ornament arranged a series of links in a line), earrings (an ornament for the ear, kanbala) and pendants (an ornament longed on neck, latkan) are used by the Assamese female. Apart from it, decorative items like banana tree, bunch of nuts, pen stand. The artisans also produce flower vase (phuldani), Japi (hat to felicitate or show honour to a respectable person).

3.6. TRADITIONAL MANAGEMENT SYSTEM OF PRODUCTION UNITS

Any production system presupposes the existence of a structural framework. The traditional cottage industrial production system of Assam too, exhibits organized institutional components of its own. Articles are produced through a series of distinct work order. The bell and brass metal industries of Assam have its own organisational framework, which is also functioning in the similar manner. Normally a member of 4 to 6 kanhars constitutes together to form a bell metal production unit. Every kanhar involved in this process are experienced, having necessary expertise and fortitude. However, a brass metal unit generally offer employment to lesser number of supporting artisans than a bell metal unit does. Even only single man managed brass units have seen during the field study, at Hajo.

There is no special occupational castes or sub-castes of workers engaged in the production of bell and brass industries in the Brahmaputra valley. According to Gait (1896), they were mostly persons of the kalita, keot and koch castes and the word kashar (not kanhar) tacked on their proper caste name as an indication of the occupation they follow. However, instead of kashars the people of Assam call them kanhars. Nevertheless, kanhars is not a professional class. This is not a closed community. It is open to any one who prefers
to adopt it as a means of occupation. The brass metalworkers of Hajo Cluster prefer to reveal themselves as *pital karikar*.

There is a unique organisational structure associated with bell metal craft. The production units are predominantly involved in partnership basis and the rest are organized as wage basis or both wage and partnership basis or share of making-charge basis. The predominance of partnership basis in bell metal industry is the result of the age-old practice prevails among the artisans working under the system locally known as *Ojha-Pali* or *Kanhar-Bhaiga*. In this system, normally a group of four to six artisans combine and pull their resources to work under a common production programme. The smithy owner is known as *kanhar* or *ojha*. He is normally the oldest and most experienced worker in the group. The rest of the workers are the *palis* or *bhaigas*. The tools and equipments are generally owned by the *kanhar*. The *kanhar* is also responsible for the maintenance of expenditure incurred by the unit for fuel, minor materials and day-to-day garhsal management. This expenditure has deducted from profit at the time of half-yearly audit. Some of the smithy owner procure raw materials from own capital and sell the products to *mahajans* or local traders or *aratdars* against cash. This type of smithy owner offers monthly salary or wage to his co-partners. The nature of profit of a unit depends upon the ability of the master artisan (*kanhar*) and mutual decision taken by the supporting artisans for the working programme under the leadership of the *kanhar*. In the partnership system, none of the workers generally gets direct wages. After the deduction of *garhsal* (workshop) management expenditure, the workers in mutually agreed ratio share the income of the unit. The *bhaigas* normally receive equal shares; the *kanhar* gets one, and half times the share of a *bhaiga*. 
The management system of brass metal industry is different from that of bell metal sector in some respects. In case of majority of production units of Sarthebari cluster, the smithy owner from their capital procures raw materials and *bhaigas* earn as daily wage or monthly salary system. In Hajo, the majority of units receives raw materials from Guwahati based *mahajan* or local traders and return the finished products after receiving the making-charges. The making charge received by production units was Rs. 60 to 65 against each kg of finished product in 2007-08. The smithy owners offer daily wage or monthly salary to their co-partner according to their pre-fixed mutual agreement. The other minor brass metal producing areas exercise systems of operation.

No formal education is a prerequisite to enter into the bell and brass metal industries as worker. A good physique and will power to work hard are the parameters for accommodating a new comer. The supporting partner needs no capital to engage them as a *bhaiga* under an *ojha kanhar*. The members of a single family also run some production units. Two such production units are surveyed in Sarthebari bell metal cluster. However, it does not mean that production units are restricted only to family line. Rather it opens to all willing workers. The workers of bell and brass metal industries acquire the traditional industrial skills by observing and acquainting with the production since their childhood. Therefore, the skill is passing over from generation to generation (Baishaya, 1986). The workers of these industries may be grouped into three categories, viz. skilled, semiskilled and unskilled, depending on ability of their artisanship. However, in reality, there is no standard categorisation of workers in their respective production units. Nevertheless, from the
traditional organizational system the *kanhar*, *bhaiga* and the *garhsika* (apprentices) may be grouped as skilled, semiskilled and unskilled workers respectively.

The bell and brass metal works used to perform in a co-operative basis. The artisan’s group combine together to form a production unit to work at their farmhouse called *garhsal*. The *garhsal* is owned and governed by the *ojha* or *kanhar* or master artisan, and assisted by *palis* or *bhaigas* or co-partners. Every *bhaigas* are assigned to a specific work by the *kanhar*. However, it does not mean that a *bhaiga* knows only a particular task of the whole operation. Nevertheless, *kanhar* search the artistic skills of his co-partner and division of labour have done accordingly. The item of products of a particular unit depends upon the skill and efficiency of the *kanhar*. According to skill and performance of works, the *bhaigas* are divided into three different types as *Gurelia*, *Maithnar* and *Kaitnar* who helped the *kanhar* in different stages of production. Apart from them, another type of workers called *adhbhaiga* or *garhsika* (learners) are also engaged in the industry. The technique and knowledge of the *kanhar* of a particular unit is well reflected through the products. The articles made by a particular unit are a combine creative effort of *ojha kanhar* and manual labour of the *palis*. The profit of a particular *garhsal* is solely depends on the professional attitude of the *kanhar* and will power and manual labour of the *bhaigas*. It is prime responsibility of the *kanhar* to solve any problems and overcome any obstacles confronted by the *garhsal* in the production process.

When the products are produced for local market, the *kanhar* used to manage the required amount of copper and tin. When the requirement is more and no longer locally available, then they need to hunt for other sources. The responsibility of charcoal and other
minor materials also lies on the *kanhar*. In the pre-colonial period, the sole control of collection of raw materials, production and marketing of products was in the hand of *kanhars*. They had direct relationship with the customers. The production units had used to made products as per the demand of the customers.

In the production process, the *kanhar* engaged his supporting partners according to their working skills. Normally, he is the skilled and most experience person of the group and generally an expert in making a particular item. Therefore, every production unit has a speciality in a particular product and the unit is known for its specialized products. However, they can produce more than one item in the production process. Apart from *kanhar*, *gureila* is the helm keeper for the *garhsal*. In the hammering process, others follow him. During hammering process, generally he sits opposite to *kanhar* near the *aafar*. He also performed the duty of shaping the products with the help of *reti* (file). In a *garhsal*, there is only one *gureila*. *Maithnar* is another important worker in the production process. He is involved in smoothening and giving them proper shape to the products through his *mathani* hammer. He also gives final touch of polishing and ornamentation through a simple wooden tool called as *kund* (turner’s lathe). There are more than one *maithnar* in a garhsal. *Kaitnar* is another traditional post in the production process. A *kaitnar* has to perform the duty of polishing the products through an iron chisel called *khanta*. He is also performing the duty of melting the scrap materials. There may be more than one *kaitnar* in a *garhsal*. *Garhsika* is another worker through which the technique of production passes through generations. They are also referred as *adbhaigas*. In fact, they are learners and perform all sorts of duties like hammering, preparing the *aafar*, pulling of *kund*, cleaning the *garhsal*, carrying the raw
materials and finished products from and to traders. They get partial share or daily wage from the *kanhar*.

In the past, *parbah* was a common feature of bell metal sector of Sarthebari cluster. It was prevailing until the middle of the second half of the 20th century. *Parbah* is an act of temporary shift of production unit from its homeland to a distance place. In this system, many of the production units with their tools and equipments periodically shift to different places of eastern and middle part of Assam from Sarthebari. They established their temporary *garhsals* and produced articles as per the local demand. *Hawkers* sell their products and collect the old, decrepit utensils around a manageable distance from the location of temporary *garhsal*. The tradition is almost extinct now. During the field study, only two such units are found functioning at Ganeshpara of Guwahati, temporarily shifted from Gomura village of Sarthebari Cluster.

During the field investigation, it is found that most of the master artisans engaged in bell and brass metal industries are financially weak. They are not in a position to invest even the cost of *garhsal* management. Therefore, they are compelled to take the financial support from the local moneylenders, *mahajans*, traders or co-operative societies (excludes ACBMUMSL) at a mutually agreed higher rate of interest. Thus, the *kanhar* became more dependent upon *mahajans* or traders. The suppliers of raw materials, energy and working capital are mostly rest on the intermediaries. In this way, the major share of the income of the unit goes to the trader community. *Kanhars* also faces the problems to manage their production units that arising from shortage and price hike of raw materials and fuel.
3.7. PLACE OF PRODUCTS IN ASSAMESE CULTURE

The bell and brass metal products occupy a special place in Assamese society. These products are considered as household assets and extensively used in marriage and religious rituals. Apart from it musical instruments and decorative items are also prepared from bell and brass metal.

Bell and brass metal products form a major part of the household utensils of an Assamese family. The kahi, bati, bota, lota, chariya, ghati, kharahi, tou, sarai, heta etc. made of bell and brass metals are integral part of rural life of Assamese society. It is believed that having food in bell and brass metals utensils help the people to maintain sound health because of the presence of copper in bell and brass metal products (Talukdar, 2009). During the pre-colonial period, the rulers and aristocrats of Assamese society found pleasure in having food in maihang kahi and bati, ban kahi and bati, and hatikhuiya bati made of bell metal. Every section of the Assamese society use to have their food in bell and brass utensils as per purchasing capacity. However, at present, with the availability of good-looking low priced utensils made of stainless steel, plastic, aluminium etc. have largely replaced the household use of bell and brass metal products. Off the movable properties, the bell and brass utensils and containers are highly prized possessions since these are associated with social status.

The well to do section of the society become patrons of such metallic objects, because of its prestige value, durability, quality and above all its material resale value even after breakage. Till recently, next to gold and silver ornaments, bell and brass metal articles have
considered valuable household wealth. For regular family use, generally simple and less decorative *kahi, bati, ghati, lota, chariya, kharahi*, etc. are the choice. However, guests are served in beautifully decorated bell and brass metal products. People used to welcome their guests with a *bota* or a *sarai* made of bell and brass metal to offer betel nut and pay regards to guests.

The utensils made of bell and brass metals are not only used in a specific purpose, but also form a part of Assamese social behaviour and cultural heritage. These products are extensively using in social functions. To invite and welcome elders *bota* and *sarai* are use. To offer something as a token of love and respect to a person, *bota* or *sarai* are used as momentous. Guests are felicitations with *sarai* or *bota*. From the ceremonies of birth to death of human beings, use of bell and brass metal items are indispensible in Assamese society. In *annaprasanna* (the act of offering first meal of rice to a child), the parents used to offer new set of *kahi, bati, ghati*, glass etc. to the child. Relatives also offer some items made of bell metal as a token of love to the child. In the *churakarana* (the ceremony of tonsure) and *upanayana* (investiture with the sacred thread) ceremonies that prevails mostly among the Brahmins, bell metal products are used. The boy who is going to have *churakarana* or *upanayana* or marriage has to keep a *daponi* (a flat shaped bell metal item) with him. In a *shrasdha* (funeral) ceremony, the family of the deceased has to offer some bell and brass metal products to the priest, who used to perform the ceremony.

The marriage ceremony in Assamese society incorporates many functions like *jaron* (vermilion ceremony), *panitola* (holy water collecting ceremony), *shradha* (a religious
function performed to recall and show honour to ancestors), *dara aru kanya dhowa* (bathing of bride and bridegroom by holy water), *dara adara* (welcoming the bridegroom), *baran* and *mandhora* (felicitation ceremony) where the bell and brass metal products are extensively used. In *jaron*, the bride has offered ornaments and dresses by her in law’s family in a *sarai* or *bota*. In *Panitola* ceremony, the female folk of the bride or bridegroom family and their kith and kin used to go to river/ pond for collecting holy water. Different types of vessels made of bell and brass metals like *kalah*, *lota* are used for collecting the holy water. During the marriage ceremony another function called *shradha* is performed to recall and show honour to their already died ancestors of both the families. In this ceremony, *saki*, *gasa*, *dhudpani*, *lota*, *bati*, etc. made of bell and brass metal is used. In *dara aru kaya dhowa* function, female members in the marriage ceremony collectively assemble at a specially arrange place, where a banana is planted to perform the bathing of bride or bridegroom by holy water. The women presents in this function used to sing different sportive songs, the *bianam* (marriage songs). The bridegroom is welcome to the bride’s house by washing his feet with water brought in a *ghati* and a *kahi* is used to bring *saki* (lamp), incense sticks, garlands to perform religious rituals related to *dara aadara* ceremony. During the *mandhora* function, the newly married couple used to felicitate the elders with presents as a mark of respects and the younger ones as a token of love. In this occasion, *bota* or *sarai* is used to give presents. Due to such an extensive use of bell and brass metal products, the *bianams* also have references to such items. For example, in a *bianam* by the women folk at the time of *panitola* function, name of bell and brass metal vessels like *ghoti*, *lota*, *bati*, *kalah* are referred. In the following marriage song, the female members invite the mother of the bridegroom to come out with necessary vessels for collecting holy water-
Chotalote ogi-dogi O hori majiate bati

Ule aaha baror mayek putra ahe rati

Aoile aana pitlor kalah bhanga phuta chau

Aru aana kanhar ghoti-lota

Bapur biyar pani tulba jau  (Kalita, 2009)

It is customary to give utensils like kahi, bati, ghati, lota, chariya, bota, kalah, sarai, with the bride. These offered utensils not only show the socio-economic position of the family of the bride, but also add elements of prestige of the family of her husband. During the marriage night a function called baran is performed, where along with some cloths these utensils are offered to bridegroom by his father in law. A bianam of baran ceremony at the time of offering these utensils (bachan) is as follows:

Bar Kalah Kore Dan,

Teo Jawer Apaman O,

O Hay Lowa Jawe Hatpati

Thowa JaweKakhar Kati

Puwa Niba Bhar Bandhi O,

Bar Kahi Kare Dan,

Teo Jawer Apaman O,

O Hay Lowa Jawe Hatpati

Thowa Jawe Thakpati

Puwa Niba Bhar Bandhi O,
Bar Chariya Kare Dan,

Teo Jawer Apaman O,

O Hay Lowa Jawe Hatpati

Thowa Jawe Thakpati

Puwa Niba Bhar Bandhi O  (Kalita, 2009)

In this *bianam*, the womenfolk express the list of utensils offered by the father-in-law at the *baran* function. It is also ironically expresses in such a way as if the bridegroom (*Jawe*) is not satisfied with the articles given by his father-in-law. As a part of the practice, the bride is used to touch some bell and brass metal utensils with her foot, before entering her-in-laws’ house for the first time. It is a prevailing social belief that touching of metal utensils by the bride, with her foot increases the pride and prestige of the bridegroom’s family (Deka, 2006).

The bell and brass metal products have a close relation with the religious rituals of the Assamese society. Bell and brass metal products have deeply associated with *vaishnavism*. Vaishnavism emerged during the later part of 15th and early part of 16th century and extensively spread in Assam. Numerous *satras* associated with *vaishnavism*, along with *mandirs* and *dewalays* (temples) are there in Assam where bell and brass metal products are using in the religious practices. In fact, no religious ritual is possible in Assam without the use of bell and brass metal items. The *aashana, ghanta, barkanh, dobakanh, bigraha, gasa, saki, taal* made of bell and brass metal are extensively used in *satras, mandirs* and *dewalays* of Assam. Sacred offering to a deity are essentially to be arrange in a *sarai* or *bota*. The priest often read out religious scriptures before an assemblage by keeping them on a *bota*. 
For doing nam-prasanga (prayer), bhortaal (cymbals) are used by the devotees. Apart from these, there are other uses of bell metal products. Ring bells are used in school, colleges and police stations to keep time.

Musical instruments made of bell and brass metals are used in cultural ceremonies. The instruments mainly consist of cymbals of different types along with the barkanh, dobakanh, bell etc. Bhortaal is used in the performance of nam-prasanga along with nagaranam, junanam (devotional songs) and palnam (devotional song). Khanjuri taal is used in the bhaona (folk drama), bargeet (Assamese classical songs composed by Srimanta Sankardeva and Madhabdeva) and satriya nritya (classical dance form of Assam). Khutitaal is used by the ojha-pali (choral dance). Cymbals are also used in bihu dance, the most popular form of folk dance in Assam. In the bihu songs too, reference of the profession of bell metal smithy are made. A bihu song, which reflects the life of kanhars, is as follows:

_Tomak Tamul Dia Botakhani_

_Senaire Haturir Bol_

_Jowabeli Bohagat Moke Garhai Disile_

_Mordhan Behaloi Gol_ (Deka, 1995).

It narrates about the products of the kanhars, which is his symbol of love and indirectly refers to the act of shifting of garhsal (parbah) to a distance place.

The beautiful bell metal products like bhogjhora or Jharilota, Dagdogi Lota and Kalah etc. were used in the past to decorate the royal palace of Assam and houses of the aristocrat families. The Ahom rulers also used Bartop and Barhiloi made of bell metal in the battled field. Against this, sophisticated items like earrings, rings are also made of bell and
brass metal. Even today, a section of the society used to collect and preserve antique items made of bell and brass metal industries and decorate their modern drawing rooms. To increase their benefit and attract the customers, the new generation artisans used to produce fancy items such as flower bud, flower vase, clock frame, banana tree, bunch of areca nut, photo frame, pen stand, badge, dining table; images of great men, animals, birds, gods and goddess.

The peoples of other neighbouring states and countries have showed a great sense of love and respect for bell and brass metal products of Assam. For example, the Daflas (Niches) of Arunachal Pradesh favoured greatly the dofla kahi, bati etc. made of bell metal. The capacity to own these articles is treated as the symbol of prestige and proud for them. Among the Buddhist of the neighbouring countries like Bhutan, Nepal and Tibet are fond of bell and brass metal products of the state. Especially, they use four different types of cymbals such as rumu, chiming, pasang and jumu in their religious activities.

References


Director of Science and Industrial Research (1951): *The Wealth of India, a Dictionary of Indian Raw Materials and Industrial Products. Part-II*, New Delhi, p. 187

Goswami, M. (2009): *The Bell Metal Industries in Assam: A Study on Sarthebari*, 1880-


Note: Kalita, R. reveals the song at the time of field survey in 2009

Kalita, R. reveals the song at the time of field survey in 2009

Deka, M. reveals the song at the time of field survey in 2009

Pathak, P. President of Adhoc Pacifist Organisation reveals the information at the time of field survey in 2009

Saikia, P. General Manager, NEDFi reveals the information at the time of field survey in 2009

Talukdar, T. (Dr.) reveals the information at the time of field study in 2009