References


Chapter - 6

Production Process of Orissan Brass & Bell Metal Craft

This and the following three chapters are based on the result of sample survey of the brass & bell metal craft (a main constituent of metal craft; and metal craft as revealed from the macro data contributes the largest output in value terms to the total value of production) conducted during 1997-98. The aim is to produce a set of micro-economic data set of the craft unit based observations to permit further econometric modelling of production relationships. Studies on small handicraft units based on the census data are limited value in answering some of the more interesting questions regarding the role of handicrafts units and their relative economic efficiency. The level of aggregation of census results make comparisons of relative factor intensities and levels of productivity little more wildly and some times provided untenable results. Besides, the census data provide little or no information on such important characteristics as the background of the entrepreneur, the nature of its products etc. The following chapters present the results of the sample surveys and analyse such issues as the relative factor intensity, productivity and economic efficiency of the brass & bell metal crafts. This chapter summarises the production process for further investigation into the issues outlined above.

6.1 The History: The knowledge and skill of using metals for craft production was known to the people from pre-historic times. Use of metals was possibly an important factor for the growth of human civilisation. The utilisation of Copper, Brass and Bell metal in elementary or alloyed forms dates back to the good old age of the past. According to Forbe's chronological chart of early metallurgy, the first native copper was known as early as 5000 B.C., and the Egyptian pre-dynastic period (3500-3000 B.C.) witnessed the hammering, melting and casting of copper ores. The alloying of copper with lead, antimony and tin began as early as the first metal age (3000 - 3200 B.C). The Greek sculpture of the Fifth Century B.C. used bronze, an alloy of copper.
and tin, with magnificent skill and workmanship to produce statues. (Hillyer and Huey, 1966, 31-33).

6.1.1 The primitive techniques of lost wax process, simple or open casting, chiseling, hammering and lapping have been known to the Indian metal craftsmen since about 3 millenium B.C. The metal craftsmen and their art connected with both solid and hollow casting techniques are referred to in the ancient literature of India; Rig Veda, Yajur Veda, Upanishad (4000-5000 B.C.), the Arthasastra of Kautilya (300 B.C. - 100 A.D.), Mahabharat (500 B.C - 200 A.D.), the Manu Sanhita (300 B.C -1 000 A.D.), Yajnavalkya Sanhita (100 - 300 A.D.), the Agni Purana, Matsyha Purana, Silpa Sastra (400 A.D.) and Manushya Purana (C.F. Reeves, 1967; 1-3, and Chattopadhyaya, 1976; 135).

6.1.2 The craftsmen were not only producing craft items of their choice but also producing daily use articles meant for storage and kitchen. The reason for a large-scale use of such metals was that they were not easily oxidised. The discovery of a small bronze statue of a dancing girl at the ancient site of Mohenjodaro (2000-1500 B.C) is an example of the versatile, genius and superb workmanship of skillful metal craftsmen of Mohenjodaro and Harappa. The artistic creation on the statues apparently brings home the point that the development of metal age had started much earlier than the twin city civilisation. During the golden ages of Gupta regime, the crafts and the arts of the country received their active patronage and promotion and, therefore, grew systematically with artistic splendour. The famous Chinese traveller Hiuen Tsang who travelled through India during the seventh century A.D. has made a mention of the 80 feet high copper statue of Lord Buddha in Nalanda. The 7.5 ft. high copper statue of Buddha in Sultanganj, now preserved in British Museum and Art Gallery, stands to testify the antiquity of growth and use of non-ferrous metals in India. After the fall of the Gupta dynasty, Harsha Vardhan of Kanauj followed by Ashoka and Kanishka of Kusari dynasty reigned over north India. All of them patronised the art and craft of the country. King Harsha, being a poet and dramatist, encouraged among other things; the art metal statuary and casting.

6.1.3 During the ninth century A.D. the metal crafts had flourished in Deccan Plateau under the rulers of the Chola dynasty. The Chola dynasty fell to Islamic rulers in the
thirteenth century A.D. and the fate of the craft was a matter of local heritage and culture. During the same period, the metal craft industry had already developed to the heights of excellence in the Vijay Nagar kingdom, especially during the reign of Krushna Deva Roy. The Muslim rulers captured the capital city of Vijay Nagar in 1565 A.D. The absence of any patronage of these crafts from the Muslim rulers was not only detrimental to the craft, but also to the artistic creativity of the artisans.

6.2 Development of Metal Crafts in Orissa: In Orissa, the metal crafts particularly based on non-ferrous metals like, Brass and Bell-metal, Copper, Bronze, etc. developed not only through royal patronage but also due to the social and ritualistic needs of the people. The non-ferrous metals as well as their alloys have wide applicability in situations where iron and its alloys are unsuitable for substitution. Non-ferrous metals are comparatively lighter and are resistant to corrosion and to an extensive range of chemical reactions. Besides, these metals have therapeutic properties, which make it an active ingredient in the medicines prescribed for human treatment. The kings and rulers of Ganga dynasty during the eleventh century A.D. patronised and encouraged the non-ferrous metal crafts for decoration in their palaces, temples, and in social rituals and rites.

6.3 A Description of the Manufacturing Process

6.3.1 About the Process: The manufacturing process being discussed here has been in practise for several centuries in the past. We have limited our study to the state of Orissa, in which the process has been both a source of livelihood and inspiration to a large groups of workers commonly referred to as artisan. These workers use one of the following metals / alloys as their primary raw material.

(i) **Bell-metal (KANSA):** It is an alloy of copper and tin. The ideal mix is 28 kgs. of tin in 200 kgs. of copper. But tin being about three and half times as costly as copper, the artisans sometimes reduces the tin content to about 27.5 kgs. This proportion has to be fairly precise as a higher or lower proportion of tin tends to make the final product more brittle.

(ii) **Brass (PITALA):** This is an alloy of copper and zinc mixed in the proportion of 100 kgs. of copper and 70 kgs. of zinc.
(iii) **Tau**: It is an alloy of copper and zinc in the proportion of 1:1

(iv) **Copper**: This metal is also used in a small variety of items traditionally in our society. The metal by itself soft and readily gets oxidised resulting in a change of the colour of the item

There are other metal artisans, who use Aluminum, German-Silver (an alloy of nickel, copper and zinc in the proportion 100: 200: 100) or some other alloys like *Neri* and *Phula Kansa* for which the basic metals are the same. But these artisans are restricted to only few pockets in Orissa and we have not taken them in consideration in our present study. These artisans are spread in the following geographical areas.

### 6.4 Geographical spread of brass and bell Metal craft in Orissa

(The villages have been picked up with a craft concentration of at least five households)

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<tr>
<th>SI No</th>
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<td>1.</td>
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<td>Tubey Tangiri Pallahara, Jhimiripali, Balipasi</td>
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<td>Simulia Remuna</td>
<td>Chakradharpur Sahaji Patna</td>
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<td>3.</td>
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<td>Bijepur Attabira Baragarh Sadar</td>
<td>Pahandi Adhairpalli, Gandhitikira, Kultatikira Kattapalli</td>
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<td>Puintala</td>
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<td>Gudveli Padar</td>
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<td>Tangi Choudwar Tigiria</td>
<td>Saranga, Bhatimunda, Ganaraba, Gokulpur, Rashiknagar Bindhanima</td>
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<td>7.</td>
<td>Dhenkanal</td>
<td>Gondia Dhenkanal Sadar Bhubana Odapada Kamakshyanagar</td>
<td>Karamula Oukhama, Bhagirathipur Badahatta, Gopalpurpatana, Bhuban, Pushtikpatana, Sahugharpatna, Bhitarvidya Indipur, Khadag Prasad, Luni Puttasahi</td>
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<tr>
<th></th>
<th>Deogarh</th>
<th>Ganjam</th>
<th>Jajpur</th>
<th>Keonjhar</th>
<th>Khurda</th>
<th>Mayurbhanj</th>
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<td>Pita Targara</td>
<td>Balisarei</td>
<td>Ghuntapasi</td>
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<td>Balichuan, Hirapur, Pratapsasan, Rathijema</td>
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<td>Muktapur, Haladia</td>
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<td>Thakurmunda</td>
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<td>Nawarangpur Sadar</td>
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<td>Itamati, Adakata, Kantilo</td>
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<td>Dhankauta, Jamankira, Rengali</td>
<td>Chouhanpur, Mundhenpalli, Lachhim Jamankira, Chouladepot, Ganeshnagar, Budhiapalli, Bansupalli</td>
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6.5 Production Classification: The items produced by these artisans can be broadly classified into the following categories.

(i) Household utensils: These include large pots used to store water or for cooking purposes, metal plates, saucers, cups, etc. used for dining purposes, large and small spoons, perforated ladles etc. These household utensils that had withstood the test of time as reliable and dependable utensils are gradually being replaced by light, less expensive and more presentable household kitchenware.

(ii) Sacred wares: These items are used in temples as a symbol of our tradition. The priests for rituals use them in temples for the deities or the worship of the deities and on ceremonial occasions. Trumpets (Kahali), musical instruments like Gini and Kubji, Kalasa on the top of the temple are some of the examples.

(iii) Icons: These artisans manufacture images of some traditional Hindu deities.

(iv) Luxury goods and artware: These artisans also make artware to decorate drawing rooms like flexible brass fish or snakes, portraits and luxury goods of artistic value. Some of these are made to order and sold in the export market.

This form of art, classified as handicraft by the government has its own unique place in our social and cultural life. Many families run this handicraft through generations, enriching the art to meet the market demand from time to time and also earning their livelihood by making a profession of this art. The government has given due recognition to this form of craft and tried to give it support in the form of financial assistance through co-operative societies, marketing through organised institutions and similar help. Artisans are also given state level and national level awards for excellence in this art to promote competition and produce craft items of high artistic value.

The manufacturing unit has three workplaces; one to melt the scrap metal and cast them into standard size ingots, the second to use these ingots and make an
item, and the third to finish this item for producing a finished product. The detailed description of these three working units is given below.

6.6 Scrap Metal Melting Unit

The basic material which is used for this industry, may be

(i) Old and used items of these metals, which are discarded by a consumer. Normally there is a community of persons, who sell the finished items directly to the consumers. These persons commonly called as “Thattaries” carry a basket full of variety of items with them and move from place to place on foot or bicycle and provide the items to the consumer at their doorstep. They also collect discarded metal items, mostly through barter in which the consumer gets a concession in the price by giving some old discarded items. These discarded items are brought back to the manufacturing unit for processing.

(ii) Metals purchased from the market, which may be pieces of unalloyed single metals. Normally the local markets make a very limited supply of such metal pieces. More often the artisans have to depend upon the markets of larger cities to procure such supply. It is common for workman to buy such materials from Kolkata market, which is cheaper and has an assured supply of material in larger quantities.

(iii) Metals are also irregularly procured from places that purchase stolen electric wires (mostly copper) at a cheap rate and sell them to the workmen at much lower rates.

The basic raw material is melted in large size fire clay crucibles, which are available in a variety of sizes. Some of these crucibles are available in local markets. Better varieties of crucibles, which are more durable, are always often procured from Kolkata market. The furnace in which the scrap is melted in crucible is an earthenware device in which hard coal or charcoal is used as the fuel and a blower is used for fanning the furnace. The melting process often needs help of two or three persons simultaneously, one of them operates the blower and the other one or two stir molten material. The impurities floating at the top scooped out. The molten material is then
procured into standard size stoneware cups (achhu) to produce standard size ingots of the metal.

This is the main workshop where the items are manufactured. The unit consists of an earthenware hearth with an outlet through which the blower keeps fanning. A wire gauge network supports the bed of charcoal and the blower fans the bed from below. The fuel used is charcoal, which is maintained red hot in the furnace for processing of the metal.

6.6.1 some tools and appliances are used in the processing of an item. Broadly these are:

(1) **Pincers:** A pair of pincers, usually made of iron has wooden handles. This is used for firmly holding metal ingot in the furnace until it becomes red hot and soft for being shaped by hammers.

(2) **Pike:** This is a long bar of iron which is bent at one end. A person uses it to manipulate the red hot metal in the furnace by moving it so that new surfaces are exposed to maximum heat. It may also have a wooden handle to prevent overheating.

(3) **Anvil:** This is a fixed platform made of a piece of iron, which is flat at the top. The metal is dug into earth to absorb heat and the flat surface at the top is used to provide a firm support to the red hot metal. Several workmen work on this metal simultaneously with hammers, each being responsible for distinct parts.

(4) **Hammer:** This is the main mechanical device by which red-hot metal is shaped, moulded or flattened on the anvil. Hammers have varying size depending upon the pressure the ore expected to exert on the surface. They may be large, small or even tiny enough to give pressure to shape the metal. Hammers are mostly made of iron with a small handle for convenient operation.

(5) **Stone Platform:** This is a fixed platform of granite stone on which the red hot metal ingot is hammerised with large hammers to give it an initial shape.
(6) **Water Tub:** Water tubs, mostly earthenware that are large enough to hold a few of the manufactured items are embedded to the ground. They contain cold water. The manufactured unit, which is usually hot, is immersed into the tub to cool it down.

6.6.2 **Man-Power:** The workers of the main manufacturing unit do a teamwork, which needs good co-ordination. There is a chief artisan of this unit who sits in front of the fire place manipulates the red hot metal in the bed of red hot charcoal with his pincers. He may be helped by two energetic persons to hammer the metal in the stone platform. When the metal is ready for operation on the anvil, a team of persons hammers its different parts to give it the proper shape. Usually, one person is responsible for one fixed part of the unit when similar units are manufactured in a run.

6.7 **Finishing Unit:** This unit is supposed to remove any irregularities on the surface of the final product and make it smooth. Some engravings, patterns or designs may also make these items more beautiful. The common appliances used in this unit are:

1. **File:** These are long iron rods mostly with a triangular iron section and a handle. The three surfaces are rough to varying degrees. Sometimes straight-line grooves are made on these surfaces to give them the desired roughness. It is used by an operation to make a surface smooth and rounded. Blunt corners, small edges etc. can be filed to make them smooth.

2. **Lathe:** This consists of a motor, which rotates a platform at adjustable speeds. The unit to be processed is mounted on the lathe or sometimes fixed on it by a stocky material like sealing wax. The lathe is rotated. It serves as grinding machine to engrave lines on surface and make it smooth.

3. **Scraper, Drill, Graver:** Many finishing devices are available to make an item more beautiful and attractive to the customers. Many of them are used along with the earthen devices. Scrapers are used to remove excess metal, which make an item
irregular in shape. Drills are used to bore holes in the metal. There are also some graves, which are used to engrave designs or devices on metal surfaces.

6.8 Production Speciality of Sample Centres: The craft concentration areas normally specialises on a specific product or a group of products. On account of specialisation and working systems of the area, manufacturing process variations exist from place to place. Minor process variations are also observed in specific places. The system of production as discussed, could be casting or heating and beating method. The sample villages indicate some variations to the production process besides producing items specific to a location. The following are the observation to the product and process variation is the sample villages.

(i) Tangiri: The main items produced at these villages are measuring units - big and small - (MANA, SERA, GOUN etc.) and processed through casting method. In the casting process, the artisans use wax, LAKH, oil as their main supporting raw material besides fuel. The Artisans use raw wood and also charcoal as fuel. Use of raw wood is more prevalent in the villages as compared to the other sample villages. The unique feature as observed in Tangiri is the exclusive employment of family labour. Usually the male members of the household perform the casting job while the females and children do the rest of finishing work of the product on part time basis. On an average, the work units work about 73 days in a year for the purpose of casting only. Further, the sale of the products directly to the consumers by the craftsmen is the notable feature of the village. The male members of the household sell the final products by carrying the products in the baskets, bags etc. And moving from place to place either on foot or on bi-cycle during the period when casting is not done.

(ii) Kultatikira: Dinning tray (THALI), dinning plates (THALIA), brass pitcher (PITALA GARA) are the main items produced in the place. Four artisans in a work unit produce 4 Kgs. of dinning tray and plates, 6 Kgs. of pitcher per day through heating and beating method. On an average, the artisans work 250 days in a year. Only male members do the production job. The hiring of labourers in the production process is
restricted to the 'KANSARI' community only. The members of the other communities are also debarred from producing the Brass and Bell-metal craft.

(iii) Bhatimunda: Bhatimunda is one of the important producing village of the metal crafts, of the State where vessels-large and small (HANDA), pitcher (GARA), ladle (CHATU, KADIKA), spoon (DANKI), metal tub-large (KUNDA), metal tub-small (PITAL TASALA) are produced from Brass of Bell-metal craft. Individual households have been assigned exclusive production rights to produce a specific product only. This right is determined by the Caste-Council of the artisans. The heating and beating process is mainly prevalent. On an average, the work units operate for about 100 days in a year. The female and child labour is absent in the production process. The KANSARI community only mans the production units. However, hired labour from other communities for performing few jobs is allowed.

(iv) Bhuban: Bhuban, the largest Village of the State produces mainly household utilitarian products such as large vessel (PITALA HANDA), small metal units (TASALA), dinning tray (THALI) and ladle (CHATU). The heating and beating method is adopted for production. Few artisan families share some work units and the output so generated from the combined effort is sold and profit is appropriated amongst them. On an average the units operate about 170 days in a year. Hired labour is used. Male members dominate the scene. Female and child labours are absent.

(v) Patrapur: A village in the district of Ganjam, Patrapur produces mainly pitcher (GARA) and tray (PITALA THALI) made of brass through heating and beating method. The work units operate about 90 days in a year. The labour shortage is a unique feature of the village. The labour shortage is due to migration of labour out of the State for better remuneration prospects and also payment of low wage rate. Therefore, though the units tried to work for more days, could not do so and work only for about 90 days in a year.

(vi) Laxminagar: A village close to the Jajpur - Keonjhar Road town specialises in producing dinning bowl-large (KANSA), dinning bowl - small (GINA). The heating and
beating process is practised and three to four persons for work unit produce 7 to 10 Kgs. of product in a day. The units operate through the male members only for a period of about 270 days in a year. The unique feature of the place is that all the work units operate on sharing basis by the artisans. After allowing a small amount for maintenance of the work units and depreciation of the tools and appliances the profit is shared by all the members.

(vii) Bainchua: Famous for bell-metal work, Bainchua is situated about 15 Kilometers from Bhubaneswar, the State Capital. The dinning bowl (BELA, GINA) is the main product from the village. The artisans work about 60 days in a year employing more than 5 artisans per the work unit. The employment of hired labour is mostly prevalent. Female and child labour is absent.

(viii) Kantilo: Kantilo is famous for its excellence in quality product besides producing large varieties of utilitarian and artistic product. Dinning tray (THALI), dinning plates (THALIA), dinning bowl small (GINA), pitcher (GARA) is some of the exclusive products produced at Kantilo. The idols are manufactured through casting while other items are produced through beating and heating method. Hired labour is employed in many units and on an average; the work units operate 140 days in a year. Female and children are employed in some of the units for finishing jobs on part time basis.