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Operational Sequence Analysis of the NongpokSekmai Pottery of Manipur, India

Keisham Ingocha Singh[1], Mayanglambam ManiBabu[2]
[1]*Research Scholar, Department of Anthropology, Manipur University, Canchipur*
[2]*Professor, Department of Anthropology, Manipur University, Canchipur*
Corresponding Author: Keisham Ingocha Singh

Abstract: Under the theoretical ambit of chaine operatoire, the present paper attempts to explore the technological perspective of the Nongpok Sekmai pottery in the valley of Manipur (India), and could revealed seven significant stages of operational sequences starting with ceramic resources procurement process to post-firing treatment through shaping, decoration, drying and firing. The study could also unveil an amalgamation of traditional technological system, geo-morphological context of the area and inherent knowledge domain of the people in giving unique character of the earthen vessels that the people produced.

Key words: Chaine Operatoire, Traditional technology, operational sequence analysis, Nongpok Sekmai pottery, Manipur valley, India.

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I. INTRODUCTION

The present paper attempts to explore the social factors influencing Nongpok Sekmai pottery production systems, accessed through the perspective of *'chaînes opératoire'* or 'production sequences'[1,2,3,4].Originally defined by Andre Leroi-Gourhan[5,6,7,8], the term *chaine operatoire* defines the sequential nature of bodily actions as one goes about daily repetitive technological activities[4,9,10,11,12].Lemonnier's proposition of the term "operational sequence" has synonymy to *chaine operatoire*, which was borrowed from social science especially ethnology[13] and this approach has since been applied to a broad spectrum of material culture through the work of ethnographers and historians of science as well as archaeologists[14].Leroi-Gourhan's concept was duly influenced by Mauss's vision of technology as a "total social fact" focusing more on an understanding how bodily movements are reflected and conditioned by social tradition[4,15]. Mauss explanation in this regard is that even the apparently natural body actions were learned through primary socialization of the individual. Thus, material transformation of natural resources into cultural products through sequential physical actions, were choices—technological choices—made among alternatives that in their very enactment, and whether intended or not, expressed ethnic, gender, age, and personal identities[15].

Operational sequence analysis in pottery is an approach for planning the sequential steps of pottery production. This analysis provides a journey of examining the entire organization of the pottery making process from raw material to final product[16] and pinpointing the role played by technical knowledge, tools, machinery and materials[17]. 'Operational sequence' designates the overall process that leads from a given state of matter to its transformed state[18]. The process of 'operational sequence' is a logical method of analysis[19] and looks for the progress of the technological steps and human actions. As stated by Brysbaert, 'the operational sequence (*chaîne opératoire*) does not just represent a technical series of steps since this takes place essentially via human actions, and thus implies social processes and procedures as well as technical ones[4,20]. Operational sequence analysis also tells us to understand how all the parts of the production process are inter-connected[21] and interrelated since human technology involves techno-cultural settings. It becomes an analytical tool for the production of pottery and operational sequence analysis is therefore, an analytical tool which enables us to understand how technical knowledge affects the way natural elements are transformed to make artifacts[17].

*Chaîne opératoire*or operational sequences is used for the present study to describe complete pottery manufacturing sequences of Nongpok Sekmai earthen vessels and to examine both the technical and social factors influencing the decision-making strategies artisans employ during production. Hence, there needs to make identification and correlation of technological behaviour with cultural framework.

Nongpok Sekmai is one of the seven pot-making populations in Manipur, situated in the same named village located in the Thoubal District of Manipur (India). And there have some fewer works on other

populations within the perspectives of *chaine operatoire* such as among the Andros[22,23,24,25,26,27,28,29,30,31],Nungbi Tangkhul[32] and Paomei Nagas[33].

The present study on the operational sequence analysis of pottery making in Nongpok Sekmai delineates the stages of pot making starting from resource procurement (clay and temper), the preparation of the clay, to the forming of a vessel, subsequent firing and treatment after firing.

II. STUDY AREA

Nongpok Sekmai (24.8059928 latitude and 93.9479816 longitudes)is a Chakpa[34] (the people claimed themselves as a constituent of Meitei population) inhabited village situated in the east of Imphal valley at a distance of about 35 kilometers in the Thoubal District of Manipur (India). The village lies in between two parallel residual hill ranges running north-south direction, one the Kwarok hill in the western and the other Sanajing hill in the eastern. The village has a settlement area of about one square kilometer surrounded by the paddy fields to its western and northern sides. The eastern and southern borders are marked by inter-village roads - respectively one that connects with the Ningel village and the metalled Yairipok-Shikhong road. The village is segmented into three different hamlets (*leikai*), such as, Makha (southern), Mayai (middle), and Awang (northern).

III. THE CONTEXT OF POTTERY PRODUCTION – THE OPERATIONAL SEQUENCE

In pottery making, the Nongpok Sekmai craftsperson carried out seven general stages of production sequence (or *chaîne opératoire*)comprising - (1) raw material procurement, (2) clay processing or preparation, (3) fashioning or shaping, (4) decorative forming, (5) drying, (6) firing and (7) post-firing treatments.

Raw material procurement:

The clay: The craftsperson reported that in the early days the clay resource procurement site, the *Kamphang* had an area of about 1,250 acres. But today, only two small areas measuring about 300 x 150 sq. ft. and 250 x 100 sq. ft. are reserved for quarrying the clay. A large portion of the area has been switched into paddy field which is now became the community property of the village. These two reserved areas are also locally named differently. The first one which is nearer with the village is called *'Mapal'* (near one) and another which is further from the village is *'Manung'* (further one). However, one, Smt. Keisham Mombi Devi, an adept craft-person, narrated another version of *Manung* and *Mapal*. According to her, in the *Manung*, clay is abundantly found deep inside the pit whereas in the *Mapal* favourable clay is found in the very outer or above layer of less dept. That is why they call the first one *Manung* (deep inside) and *Mapal* (outer surface layer).The quality of the clay is also different from these two sites. Clay from *Manung* is black in colour while that of *Mapal* is reddish and gray in colour. Craftsperson prefers to quarry clay from *Mapal* as it brings about fine wares. An inter village road called Nongpok Sekmai – Kwarok Maring village road runs through this area leaving *Mapal* on the northern side and *Manung* on the southern side.

The people believed that the clay deposited area is under the custodianship of a custodial Goddess called the *Kamphang Lairembi Ima* who cares for the welfare of the village. There is no associated ritual for quarrying clay to the Goddess. But, when they happen to see, while working at the site, some natural phenomena like - movements of lotus leaves and the waves rolled on the water surface in tune with the blowing of wind - it is a general believe of the presence of the goddess at the quarry site. In such circumstances, they perform a ritual act (*hei-ra thadokpa*) by way of offering items of flowers, fruits and sweets.

The potters collect clay with the help of an iron-bladed bamboo implement *(leibakthang).* They dug pits and the immediate surface layer of three to six inches thickness is left out which is being considered as impure in the sense that the primary and secondary roots of herbs and shrubs are rooted in the layer. Sometimes, clay may be found with small pebbles and granules of which they reject it out rightly. While choosing the right clay, they apply their age old knowledge. If the clay is stickiness, purity and soft, they assume that the stuff is the right one for potting. Such suitable types of clays are normally found from highly weathered surface areas. Then, the selected clay is extracted bit by bit from its matrix with the *leibakthang*. They dump the dig out clay into a container called *leibakpolang* (bamboo basket especially made for carrying clay) in the early days. Today, they use sacs made of poly wires of 50 to 75 kg net. The potter digs the clay with handful breaks one after another and then puts the break clays to the containers of either *leibakpolang, khudeng* (a tub measuring about 34 cm. in diameter at the base and 46 cm in diameter at the mouth and used for washing, bathing, cleaning and carrying purposes) or sacs as convenience with the potter. While doing this, if the potter notices any visible impurities like roots, quartz-grain, she immediately stops the digging and removes the impurities. The head load of clay weighing about 20 kg and a sack of about 50 to 60 kg. They used to fetch two head loads of clay each in the morning and afternoon. Today, the tradition is replaced by bicycle, auto- rickshaw or sometimes tractors (big vehicles) by hiring labours for digging, loading and unloading. As each load of freshly excavated clay is brought to the house, it is dumped onto a shady flat ground surface.

Clay is allowed to collect throughout the year, excepting five days in a year. These five days commences from the first day of *Sajibu* (the first month of the Meitei Lunar Calendar). They even throw away the collected clays which could not make pots before the New Year, describing it as *aribananba* (previous year). Both male and female can quarry clay from *Kamphang* as and when necessary. Though quarrying is allowed throughout the year, they usually collect clays just after harvest till the onset of the yearly monsoon. The calculation of the lump sum weight of a head load is done in such a manner that three head-loads are to produce two *pots* (a unit of measurement applied by local potters to indicate a bagful of pot) of the finished stuff. The collected clay is then, stored in a shady place near the work shed. Individual potters used to collect clay from the site alone in the olden days. But, the potters preferred to go in group so as to share labour while digging, loading and giving companion.

*The Nungjreng (tempering material):*The tempering material that is medium coarse sand locally called *nungjreng* is quarried from the Ingourok River which is running in the eastern and northern border of the village and integrated at the *Thumkhong* Lake. They quarry the tempering material with the help of *yotpak* (hoe) and *khudeng* from the stream bed of Ingourok River.

The tempering materials are carried forward from the upper course during the rainy seasons and stored on the bank and bed of the stream. Nongpok Sekmai, being situated on the downstream of the upper course of the Ingourok River is geographically and geologically facilitates to carry out the cultural functions of human civilization called pottery.

Clay processing or preparation*:*

The collected *nungjreng* is also stored at a corner of the shed near the house. After this, they are ready to mix and pound the clay with the *nungjreng*. The ratio of clay and tempering material (*nungjreng)* is 1:1. At first, the potter spreads the *nungjreng* over the ground or polly sheet in a circular shape and sieves the coarser materials such as roots, twigs, and bigger stones with the help of *chegairong* (a flat basket made up with bamboo stripes used in sieving sand of the coarse materials). Over the circularly spread *nungjreng*, clay lumps which are already stored in a shady corner of the house are taken out with the help of a hoe by breaking up the required lumps, and also removed those impurities that are apparent to the eye. Just after the spread of clay over the *nungjreng* before pounding, the potter sprinkles water whatever felt required over the mixture. The potter pounds with a solid long wooden pestle called *leibakshuk*. The preparing clay is upturned and pounded for four to five times in order to get thorough mixture of the clay and *nungjreng* which is locally called *leibaksuba* with the *leibakshuk*. In each every upturned, the unwanted materials are still sieved and also put *nungjreng* according to the malleable condition of the clay. The potter differentiates two types of *nungjreng* based on their size as coarse (*apouba-nungjreng*) and fine (*akuppa-nungjreng*). They prefer the *apouba-nungjreng* as it is easy in pounding as well as it takes less time and energy.

The potter rubs a small portion of the mixture with her thumb and index finger to examine whether the mixture is ready for potting or not. If the potter finds the *nungjreng* granules evenly in the mixture with her two fingers, the stuff is perfect for use. This is called the *leibakmunba*. Another method of examining the *leibakmunba* is also done. If the mixture is not slippery when rubbed simply with fingers, it is generally assumed that the clay is mixed thoroughly with the *nungjreng*. After this the paste which is called *leibak leitum,* is stored in a shady place by covering with either clothes or polly-sheets and then takes out portion by portion whatever required for the desired size of the pot to be made. If the paste is not properly pounded, the paste is slippery when rubbed with fingers. This is called *leibakmundaba*. If pots are made with *leibakmundaba* paste, there would be cracked, broke or *pokhaiba* while firing.

Fashioning or shaping:

Initial shaping starts with the shoulder, neck and rim parts of a pot. For this, a lump of paste which will be required to make the desired shape and size of the pot that is taken, it kneaded with both hands by placing it on a flat wooden plank (measuring about 1.6′ x 1′).Impurities that still remain with the paste are removed as these are felt by the potter's fingers, and by doing this, the malleability of the clay is further increased. Air bubbles, which can cause severe damage to a pot during firing, are eliminated from the clay during this phase. Now, the paste is flattened by applying palm pressure against the plank. Then, the two ends of the flattened paste are joined making into a hollow conical shape (tube). One of the open ends of the tube is closed by squeezing the clay paste with the potter's fingers. The finger pressures push the leather downward by making the body wall thinner and at last closes the opening of the conical tube. Thus, the closing of the one end of conical body that is the base of the pot is made. At this stage, the base portion is left unfinished. Then, towards the other open end, more pressures are exerted with the fingers in order to make elongated portion of shoulder, neck and rim parts are to be made. While doing this, the other hand of the potter gives supports of the body from inside. After this, the potter puts the preformed pot upturn on an inverted old pot which is used as a stand or platform (locally called *lepshum*). In case of the smaller pots, support of a *lepshum* is not required.

Till this stage the final touch of the shoulder part is not given. Only the wall is made thinner. From the shoulder region the neck portion is made extended providing with a constricted portion caused by pressing with thumb and fingers of the potter. Again, from the neck portion, the outturned rim of the pot is formed by pressing the upper edge outward. It is rubbed with a wet piece of cloth (*phinalphadi*) for giving a final shape. The incomplete pot is sometimes shade dried to give it leather hard lineament.

Next step that follows is to make the upper portion of the body part (the base of the shoulder) into thin and smoothens by pressing between the wetted thumb and index finger in a rotatory motion. A small pot containing water is placed at the convenient place of the potter for wetting fingers. Then, the upper body is beaten with a plain *phuyeichei* (paddle) being supported by the fingers of the other hand from inside the body. Then, the wall of the body of pot is thinning by rubbing pressure with the right hand fingers, while the left hand palm supports from outside, during this the potter moves round with backward steps. A *cheikhet* (bamboo scraper) which is having a convex surface is used for giving smoothen the inner wall. The potter holds the bamboo scraper with one hand and rubs the inner wall longitudinally being supported by the fingers of the other hand from outside the body. If it is a small pot, the potter does not use the bamboo scraper. At this stage, the shape of the pot is clearly visible. After this the pot is kept for some time in the open space for further operation.

Functional Class of NongpokSekmai Pottery:

Sl. No.	**Category**	**Pottery Types**	**Specific Utility**
1.	Cooking Vessel	Amachabi	For cooking either rice or curry for one person,
		Phurak	For cooking either rice or curry for more than one person
		Phujao	For cooking rice
		Ngangkok	For cooking rice (steam method)
2.	Liquid/Water Storage Vessel	Sangomchaphu	For storing water
		Phurak	
		Phujao	
		Ngangkha	
		Kharung	
		Tumloi	For preparing rice beer
3.	Usages as eating paraphernalia.	Kambi	use as rice plate
		Kegam	use as bowl
		Kamlong	use as rice plate
4.	Dry Storage Vessel	Chengphu	For storing rice
5.	Drinking Vessel	Pawachabi	For drinking water
6.	Vessels for Ceremonial purposes	Pawachabi,Bhuja,	For using in Saradha ceremony (Death ritual)
		Ee-haichaphu	For using during the Lai Haraoba ceremonies (Ritual of Sylvan Gods)
		Naophamchaphu	For putting umbilical cord for burying
		Amachabi,	Inauguration of house, *Sarenchanba* (a ritual act of crisis rite), *PotshemJaduTouba* (black magic/ witchcraft),
		Kumari,	Used during Initiation rites
		Kambi,	Used as receptacle for offering ritual items
		Diya,	Offering Lamp (*Lai thaomei*)

Decorative forming:

When the desired shape is obtained, the outer surface is again beaten with a wooden paddle that has four different design patterns, such as *ananbi* (plain), *ngamaroo* or *yangkhei potki mayek* (herringbone), *keiyen mayek* (basketry or chevron) and *kharung mayek* (criss-cross or rhomboid). A *phuyeinung* (stone somewhat spherical in shape) is used as anvil to counteract the force of the beater. By holding the anvil, the potters' left hand inserts inside the pot from the mouth opening and then starts beating with the right hand by holding the desired *phuyeichei*. A rhythm of movements of both hands in a swift manner is done throughout the wall of the pot starting from bellow the shoulder region. The rhythms of left and right hand movements are done in such a way that the force of right hand's beat is to be absorbed with the spherical stone that holds with the left hand and in between, the force applied and the stone, the leader becomes impermeable wall by removing air bubbles,

pores and holes. There are various purposes of doing this operation at this stage. It gives the final shape of the pot, the desired decoration and made impermeable (solid) wall structure of the pot.

Drying:

The prepared pots, then, are dried for some hours in the sunshine first to avoid crakes which is followed in the shade to get leather hard stuff. By age-old knowledge, the potter knows that if the pots are dried up in the sunshine, there may have cracks and small fissure that marked at the end product, therefore, the potter shifts the pot drying pattern alternately first at sunshine and then in the shade. By doing this the potters take care of the drying pots while shifting from one place to another to avoid breaking. The potter knows that once any breaks at any portion of the pot, the life of it is shattered and marked it as reject both by customers and producers.

The drying place is done mostly at the courtyard, *yenakha* (the southern part of the dwelling house where sunlight gets abundantly till sunset) and any place convenience for the purpose in and around the work shed. Potting, being a craft throughout the year, the potters take care of drying pots during rainy season by avoiding rains while drying the pots. For this the potter takes extra care and vigils the weather of the day minutely to avoid the unwanted incidence of wetness.

Firing:

After the pots are well dried up, they are ready to fire which is fixed the firing day according to the convenience of the potter. Firing of pots is basically done in the open. For this, a circular firing bed is prepared of which paddy husks is first spread with a thickness of about two inches. Just above the spread paddy husks, straws are again distributed evenly for about four to six inches thickness and then over it is spread a layer of paddy husk. This circular husk-straw firing basement is called *yampha*. *Phuhing* (unbaked pots) do not place directly on *yampha,* instead old pots or pot fragments are closely packed in order to prevent smokes coming out from the *yampha*. If smokes come out between the old pots, it affects the newly baked pots with black colour which is/are normally discarded. Then, unbaked pots are put upright one over another in a heap above the old pots and fragments, which is called *phuhing chanba*. To support the heap of the unbaked pots, old pots are kept sidewise around the *yampha* with the mouth outward. Straws are again put outside and above the circular old pots which is called *sawang namba*. Then, the heap along with the *sawang* is covered again with a thick layer of straw that is again covered by a thin layer of ash on the top. After this, fire sets all around. Firing completes within three to four hours.

Post-firing treatments:

When the pots are still red hot, *kuhi* (*Pasaniapachyphyla*) liquid is applied over the outer surface with the help of a brush formed by a bunch of inflorescence *Arundo donax* Linn. species (locally called *yengthou-mapal*) in a rotatory motion, producing a horizontal line near the shoulder portion. In doing this, several vertical lines of unequal length are also seen. The painted horizontal line is sometimes seen interrupted and never joined leaving a break. The pots with such complete painted ring are meant to use in the funeral only, while incomplete ring pots for domestic purposes.

For preparing the *kuhi* liquid, the dried bark of *kuhi* tree is ground and soaked in water for five/six days, and thereby obtained a thick reddish dark coloured solution. Sometimes, such preparation is done by boiling the bark to reduce the duration of diffusing time of the solution. In this case, the solution is ready to use after three days.

IV. CONCLUDING REMARK

Manufacturing of pottery is based on a specific system of material resources, tools, manufacturing process, skills, verbal and non-verbal knowledge and specific ways of coordinating work[35]. As stated by Roux, the *chaîne opératoire or* operational sequences of pottery production involves two levels of descriptions as i) the successive transformations of the raw material into a finished product (main actions) and ii) describing the technological behaviors or activities in each steps or actions of the main actions[36]. The present study reveals that the *main action* of Nongpok Sekmaipottery production is performed into seven operational steps, such as, raw material collection (clay and sand), preparation of clay, shaping, decoration, drying, firing and post-firing treatments.

It is seen that the geomorphologic conditions (material resources) that surround the village gave an impetus to the development of the craft of pot making among the people. As they belonged to the Chakpa group of population, who have been assigned of pottery making occupation (by the then King of the State), and as they found the present area satisfactory in having suitable potting material, they might have settled in the area.The other surrounding Meitei villages like, Ukhongshang, Shikhong, HijamKhunou, Ningel, Kakmayai and

Lourembam do not engaged in this occupation, though they are located in the vicinity of the Kamphang area. These villages are located within a radius of about two to three kilometers from the clay site.

Various traditional implements are used to carry out the operational sequences of producing earthen vessels. The end products, classed on functional attributes of the earthen vessels, include - cooking vessel, liquid/water storage vessel, usages as eating paraphernalia, dry storage vessels, drinking vessel, vessels for ceremonial purposes and miscellaneous items. It is seen from the study that there is linkage of every potting operation steps where different domains in terms of time management and inherent technological knowledge of craftsperson, geo-setting of the surrounding, cultural and psychological factors etc. combine together towards giving an end product.

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