More than Just a Material Perfection: Preserved Human-Environment Relationship in Traditional Brick-Making Scenarios

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Abstract. This paper argues the importance of traditional, local bricks-making production as a convergence of craftsman, material, and environments. The relationship between those three aspects brings meanings to the brick, emphasise on the process of making beyond its property as a physical material. This paper focuses on the forming phase of the brick-making scenario, whereby the craftsmen have more control in altering the bricks clay. In particular, we conduct this study in three brick-making workshops in Indonesia, precisely in Songgom, Welahan, and Tanjung Pinang. It is found that the stories of identity, the tools used the production, and context-involved production is preserved within the end product. These findings contribute to the current architecture material discussion to look at the imperfection of traditional-made bricks as something that should be celebrated to preserve the local culture.

1. Introduction
Clay bricks are one of the oldest and most used technologies in architecture [1] that is still used and developed until now. However, in the recent discussion, the development of them is more focuses on their material properties like the mixing of new additive, its recyclability, or strength [2–7]. The popularity of this building material also pushes the material industry that promotes precision, faster and bigger production, and uniformity; granting a perfect product for building. While it promises more amount of products, the modern industry hurts local traditional practices that produce brick in a smaller-scale and embedded with the cultural values of the region [8]. This paper addresses the alternative values in these indigenous practices that need to be preserved.

As a material, traditional-produced bricks contain the imperfections of hand and the variations in the ingredients that are the enemies of industrialised perfection [9,10]. Nevertheless, the pursuit of perfection in modern brick production dulled our senses to the real value of the material reality [11]. It implies the importance of traditional brick-making practice regarding its materiality; the value beyond its physical properties concerning the culture. The diverse way of practising brick-making and the passed knowledge through generation are few of the added value of this practice. It appreciates the existence of the maker and culture as part of the whole bricks' trail from earth into a build construction. In this aspect, traditional practice exceeding the modern industry.

This paper starts with showing the connection between actors, material, and their environments in the traditional brick-making scene, and how they interact within the forming phase in particular. Then, the context and methods of how this study conducted are explained. The discussion moves to the many insights on how stories are injected in the brick-making process. Finally, this paper will be ended with the potentials and things to consider in the traditional, small-scale brick workshop.
2. Craftsman, Material, and Environments in the Local Brick-Making Scenario

From a broader perspective, the discourse on brick-making practice indeed needs to be shifted from its material properties only to its materiality. The materiality should be explored from the actors and methods they use in making the bricks, and it is embedded within local culture [8]. Brick is a cultural product, which has an involvement of people who works on making the brick with their hand and tools. In a local brick-making practice, it can be read as crafts, things produced by the skilful hand of craftsmen. The practice involves the environments as well because bricks originally produced by modifying soil from the earth. Datta, with his relational ontology, suggests that land is not fixed, as it can influence the actions of people and has the same standing with people who lives on it [12]. It means that the environment also growing with and around the people [13], become an inseparable context of the makers in producing their bricks. Therefore, the importance of the craftsman, raw materials, and environments in brick production is not within themselves. The lengthy process of brick-making that involve craftsmen, handling the raw materials from their immediate surroundings, indicate the complicated relationship between materials, technology, people, and places [11]. The local brick-making practice is then a confluence of craftsman, material, and environments that poured into a process.

The confluence produces a variety of bricks according to the local practices that can not be achieved in a regulated, modern industry. They become scenarios, possibilities of many sequences of action [14]. Generally, the sequence in the brick-making process involves extracting the raw soil from the earth, forming the clay, drying the raw bricks, and finally firing the bricks to achieve the finished products [15]. “In the higher stages of skill, there is a constant interplay between tacit knowledge and self-conscious awareness… Craft quality emerges from this higher stage, in judgments made on tacit habits and suppositions” [9]. The craftsmanship of the people reflected in their methods and techniques for handling the brick. Specific methods and techniques that are passed down through generations in different part of those phases are present in local material production in Indonesia [8]. Within the four phases of brick-making, the forming phase informs the craftsmanship the most because it is where the contact between the craftsmen and material occurred.

This paper focuses on the forming phase of the process, whereby the craftsmen have more control in altering the bricks clay. “Forming is carried out mechanically by forcing the clay through a die or just by knocking the clay by hand into a mould” [15]. The two types of forming may incorporate machines but still utilise the human hand as the main motor of the phase. Forming phase mainly involves mixing the ingredients and moulding the clay [16] but might include an additional step like cleaning the edge of the bricks. While mixing the ingredients, various type of additive can improve the quality of bricks; like reduce the fattiness, better moisture regulation properties, reduce of shrinkage, or higher porosity [15]. However, the primary intention of it is to reduce waste from other local industries [16]. It illustrates how the action of the craftsmen to the material is affected by their environment, and the material turns as a manifestation of this consideration. After mixing the ingredients, the craftsmen have raw clays that can be altered in the moulding or any additional step, as the clays are still soft and can be formed before entering the drying and burning phase. On the other hand, the modification at this stage is also a gesture toward an imperfect brick as it may transform slightly in shape.

Thus, the specific ways of forming that been held by local brick-making practice bring uniqueness to the finished bricks even though the ingredients are the same. It leaves the identity of the maker on the bricks, be it a personal mark or other traces of their presence [9]. The mark that placed on the brick indicates the view of material not only as a structure but also as an architectural surface [17]. As a practical dimension of culture, the act of making transforms matter and articulates meaning [18]. The bricks then are imbued by the meaning produced by both the craftsman and his environment, giving it such identity. “As a cultural practice, traditional brick-making process is embedded with indigenous knowledge which contributed to the ecological value of architectural practice within its particular context” [16]. This paper interested in exploring these local practices, look at how the context influences the practice and what kind of identities are left by the craftsmen and environments in the bricks.
3. Methods
This paper collects data from three bricks-making workshops; the first one is located in Welahan, Jepara, while the second one is in Songgom, Brebes. Both of them are in Central Java, whereas the third data are sourced from Lembah Rantau Village, Tanjung Pinang, Riau Islands. These three workshops are mainly chosen as they have distinct characteristics of the environment. The workshop in Welahan is located in a big area next to a paddy field. The terrain is relatively flat and open, hence the exposure to the sunlight. In Songgom, the area is situated at the riverside, which can be distinguished as a two-level, narrow flat plane. Moreover, the site in Lembah Rantai Village is a scarped land, where most of the brick-making scenario happened in the lower end of the slope.

The data are gathered mainly through field observation and interview with the brick makers. Additionally, data of Lembah Rantai Village gathered by a secondary source, who went there and interviewed the actors, including the owner of the workshop. To capture the reality of the workshop, we create photographs and visual notes to document the brick-making process from earth into the finished bricks. We look closely at the craftsmen’s choice of action in the forming phase, start from mixing the ingredients to any last process before drying phase. It is intended to investigate the different steps in the forming phase between three workshops and highlight the intertwine between craftsman, material, and their environment in the forming phase.

4. The Multiple Scenarios in Forming Phase

| Extracting | Forming | Drying | Burning |
|------------|---------|--------|---------|
| Welahan    | mixing ingredients | moulding | scraping the surfaces | marking with two diagonal lines |
| Songgom    | mixing ingredients | moulding | move to the drying area | turn the mould upside down |
| Lembah Rantai | mixing ingredients | moulding | cutting the brick sausage | move to the drying area |

Figure 1. Differences in Forming Phase in the Three Brick-Making Workshops

Figure 1 illustrates the brick-making scenario of the three workshops, whereby the distinction of forming process already eminent after mixing the ingredients. The difference is increasingly visible when it enters the moulding and the steps beyond as a result of a different relationship between each location’s tradition, context, and materials that show the peculiarity of each brick. The following paragraphs will elaborate the values offered by these traditional practices: how they preserve the identity of the practice, how the tools are creating the material imperfection, and how the craftsmen adapt to their context.
Local identity of the brick is created through the manipulation of raw brick’s surface by the craftsman with the influence of the environment in the forming phase. The interplay of the makers and their environments with the brick shows craftsmanship as it best. Figure 2 highlights two diagonal lines carved on the clay bricks in Welahan, Jepara. That mark just made before the bricks entering the drying phase as a signature of the craftsman. In one of the interviews, the craftsman said that he purposely put those lines with his index and middle fingers to make a trademark of Welahan’s bricks, paying respect to his land. He felt it is needed because Jepara was famous for its brick workshops so that a specific character is necessary to make bricks produced by this workshop recognisable. From this instance, the bricks’ identity emerges from the geographical location of the land through the hand of the craftsman. It also indicates the maker’s intention to see brick as an architectural surface, visible to the end-user in any appropriate way.

Material modification in the various step of forming is done by the craftsmen’s hand or tool in order to gain the perfect material imperfection. With specific techniques, they demonstrate the making of imperfect materials. In figure 3, the craftswoman in Songgom uses a wooden dough base to mould the clay into a raw brick. When the clay fills the mould, she evened the surface and moved to the drying area. There, the wooden base is turned upside down, generate two buttery-smooth upper surfaces of raw bricks without the need to scrape the bricks’ surface that is present in Welahan. Whereas, the bottom part of the brick will have a slightly concave surface because of the hand movement.
Figure 4. Cutting Bricks Sausage with Metal Cutter in Lembah Rantai, Tanjung Pinang
(Photograph by Hariko Wahid)

As mentioned in the paragraph above, the utilisation of tools also intended to cut down forming steps. It shows in figure 4, wherein Lembah Rantai workshop a metal mould would form a long 20 cm-wide brick sausage, then cut into a smaller module. This machine reduces the time needed to soften the surface of the brick, and at the same time produce more bricks in one mould. With a mechanical egg-cutter-like die, the bricks are sliced into smaller, brick-sized pieces and moved to the cart to be dried for 48 hours. This machine produced smoother brick surface, but the imperfection arises in waste produced by such mechanism. Here, as the module cutting only use an approximation of the craftsman and have to be longer than the metal-die, there will be a waste in every cut.

Figure 5. Brick-Making Workshop in Songgom, Welahan, and Lembah Rantai Concerning Their Contexts

The intertwine between craftsman, materials, and their environments also informed how the craftsmen ultimately respect the working land as part or restriction of the making process. Because
they are taking the soil from the earth, they adapt to the surrounding in return. Figure 5 shows the many ways to adapt to the context. The flat but narrow ground in Songgom forces the craftsmen to work with a little cart so they can move the soil from one point to another efficiently. Distributing the ingredients directly from the cart, they lay the dough on a drum before mould the brick at the height of the craftsman’ waist. While in Welahan, the vast flat ground makes it possible to form the brick by moulding it on the drying area directly. The open space also makes the brick maker make a portable shield to protect him from the intense ray of the sun yet still support his mobility. Lastly, the workshop in Lembah Rantai with its steep terrain use a funnel to deliver the ingredients from the higher ground to reduce the time from extracting to forming phase. The maker in figure 5 is waiting for the clay mixture from above to be developed. These practices demonstrate the strategy used by the three workshops to cope with their environments.

5. Conclusion
The study explores how local brick-making practices with their specific cultural values transform the four phases of brick-making into multiple possibilities of action in the form of scenario. A single change in the craftsmanship could produce a different kind of bricks even if they have similar ingredients or context. Hence, the discussion suggests that the existence of local identity of the craftsman and their environments are manifested in the brick, preserve the stories of how it made, what kind of tools are used, and what adjustments are made regarding the condition of the land to produce the perfect material imperfection. Stories of cultural values that reflected in brick-making scenarios should be celebrated. Without nullifying the modern industry, small-scale traditional workshops around Indonesia needs to be maintained as they have meaning beyond just a material perfection. Further research on the ecological and sustainability aspects, however, are needed.

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