Landscape Transformation: Exploring Operations in The Traditional Practice of Brickmaking

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Abstract. This paper investigates the landscape transformation driven by the traditional brick making practice, arguing that brickmaking is a dialectical interaction between the landscape and the particular operations conducted by craftsmen across landscapes. Yet the discussion of the traditional practice of brickmaking itself has not been significantly valued as an important operation that drives the process of landscape transformation. The study investigates two brickmaking workshops in Central Java, Ambarawa and Brebes, that utilise the in-situ material for the brickmaking practice. Through visual documentation and interviews during field observations, it is revealed that various operations involved in the traditional brickmaking practice are utilised by the natural opportunities within the context, not only for sourcing raw material but also other activities in brickmaking. The findings also suggest that such operations demonstrate the understanding of landscape as a resource and place of transformation, reflected through its spatial and temporal arrangements. This paper arguably expands the discussion of brickmaking not only as an ecological architecture material production but as the basis of understanding dynamic occupation of a context.

Keywords: landscape, transformation, operation, traditional brick making, ecology

1. Introduction

In the growing discussion of landscape-change research, there are attempts to explore the changes as an innate characteristic of a landscape resulted by man and nature [1,2]. The changes of the landscape are often captured as cases to study the causes, processes and consequences of land-use changes [1,3,4], framing it as an issue for the environment [5]. Such discussions potentially provide a comprehensive understanding of how the landscape transforms, recognises the driving forces as well as its impacts [2]. However, they tend to position the landscape transformation as a product of modernity [6,7], emphasizing on the physical composition and configuration over a large area [3,5], rather than the underlying process [1]. The discussion of the traditional practice of brickmaking itself has not been significantly valued as an important operation that drives the process of landscape transformation. Therefore, this paper proposes to see such a process from a smaller scale [3], employing a micro perspective to gain a systematic understanding of such changes.

This paper investigates the process of transformation on landscapes triggered by the traditional practice of brickmaking located in Indonesia. Such traditional practice is particularly dependent on the quality of soil with a tight connection with the landscape [9,10]. Thus, brickmaking has been seen as a dialectical relationship between the landscape resources and the creation of particular kinds of brick [9,
10], an operation that binds the material production and the site. As the transformation of landscape driven by such local practices is still rarely discussed [3,6,11], this paper points out that brickmaking is an exemplary practice that allows learning on particular operations that drive landscape transformation.

This paper offers a different perspective of a landscape transformation generated by the traditional practices that drive operations within such a context. First, a literature review will draw the understanding of operations in a traditional practice of making that utilises landscape as a place of resources for the sourcing activity. Second, it provides a brief discussion on traditional brick making practice as the operating forces that create such landscape transformation. Next, a method of study will be presented, followed by case studies conducted within the traditional brick making practice. The paper then discusses the various operations occurring within the observed traditional brick making sites, highlighting them as an important part of sustainable architectural practice.

2. Operations on a landscape and traditional practice

There has been a wide discourse on ways of the traditional community residing in a remote area utilising landscape for their needs [6,10–12]. Utilising landscape traditionally suggests a great dependency on nature for their livelihood yet always operates on a small scale, implying a profound manner to have the least change of nature [13]. The production largely utilises opportunities provided by the local context, i.e. employing available technology, local material and local knowledge passed through generations [9]. Nonetheless, the utilisation of the landscape operates within a logic of actions, which is developed in a particular way based on the available circumstances [14]. The landscape—an area of earth surface constituted by interrelated elements such as air, water, soil, plants, living beings, becomes the place that provides the raw materials as well as space for operations; situating the landscape and its elements as the resources for the traditional making practice [13]. In doing so, the craftsmen negotiate between raw materials provided by the landscape and everyday tools or low technology to produce particular results [16]. They alter the surrounding landscape consequently as a necessity to adjust the landscape, which often in an indeterminate and loose manner. Some employ the cycle of nature as an opportunity, informing the operation to take place at the most appropriate time. Such operation commonly imitates the traditional structure and spatial arrangement of agrarian pattern, as an attempt to integrate within its existing landform or nature [12,13]. It suggests the potential to further understand the landscape as a transformable entity, a place that affords to transform and be transformed, among others due to its regenerative capacity [5,13].

A landscape transformation expresses the occurring operations [2,13]. Over time, significant transformation occurs due to dynamic operations within the landscape as a recurring process. In consequence, the process generates particular arrangements of space and material over time [1]. However, the transformation is observable through the changes of the function and spatial organisation, the landform, the composition of landscape elements on the earth’s surface, including the presence of additional structure and infrastructure [3,5,13]. To reveal further the transformation process, it is thus important to explore various operations on the landscape, drawing attention to the important aspects that drive the transformation itself.

3. Brickmaking practice and the utilisation of landscape

Traditional brick making practice relies on natural resources available in the landscape as its raw supply of materials. It utilises soil and earth-based material as main ingredients, with a mixture which requires a good composition of clay, silt and sand [17,18]. Absences of certain components or characteristics do not necessarily impede the course of brickmaking, instead, the craftsmen tend to perceive it as an opportunity to produce a different variety of bricks [18]. Alternating between the different ingredients for the brick making demonstrates a particular operation which comes into play, involving a specific knowledge to modify the practice. The operation during the extraction of raw material undoubtedly demonstrates a process of landscape transformation into different kinds of arrangements.

Each landscape exhibits its characteristics [19]. Since soil is a crucial resource for the brickmaking, sourcing its availability within a landscape particularly drives the landscape
transformation process. Some brickmaking workshops reside by the riverbank, operating there in seasonal sedimentation that creates a constant supply of raw material, fitting the landscape for the operation [20]. Another example can be seen as a shift from an agricultural landscape into seasonal or permanent brickmaking workshops, driven by the good quality of soil from agriculture activities [21, 22]. The exploration demonstrates how the landscape becomes resources as well as the place for brickmaking practice, suggesting that the sourcing activity drives immensely the landscape transformation.

Many studies demonstrate that earth-based material production changes the landscape in various forms and scales that can be traced through times [20,22–24]. There is no exact formula in brick making practice, but the typical operations in the traditional brickmaking often include sourcing and preparing the raw materials, moulding the mixture, drying, and firing the bricks as sequential activities [17,18]. In a smaller-scale production, the whole activities of brick making tend to reside at the same place; while a more divided process may happen in a larger production through separating one activity from the other, thus generating a different spatial arrangement of a production site. Such an arrangement operating on such a landscape particularly drives the process of the landscape transformation. Yet, it is still scarcely discussed [10], suggesting a tendency to generalise such practice and its impact on the landscape. This paper aims to explore the operations on the landscape in the traditional brickmaking process, how they trigger landscape transformation and generate particular patterns over time. Therefore, it can be argued that such dynamic occupations of landscape in traditional making practice demonstrate a dialectical relationship between the craftsmen, resources and landscape.

4. Method
This paper employs a qualitative study to explore various operations that drives landscape transformation in a traditional brick making practice. The study explores the interdependency of both operations, by employing a case study that emerges within its natural setting [25]. Cases offered in this study will be analysed and interpreted to reveal a particular pattern of various operations in a traditional context that transforms the landscape.

This study collects data from field observations taken at two brickmaking workshops in Central Java, Ambarawa and Brebes, Central Java. Ambarawa and Brebes are areas well-known for their small-scale brick production that supplies the demands from surrounding areas of Java. The observation is conducted through visual documentation and interviews to attain a more comprehensive understanding of their particular ways of operating during the brickmaking. Both workshops are selected to represent different landscape characteristics—the hilly and relatively flat topography—and the different production rhythms across contexts. Some similarities between the two areas can be seen in the way the whole activities of brickmaking are conducted on-site and practised traditionally, including local knowledge that passes on for generations, the use of low technology and everyday working tools, such as a hoe, mattock, and large bucket. Both workshops occupy landscapes located in the countryside—along with forest and paddy fields.
5. Exploring the operations on landscapes and its transformation
Brickmaking is not solely about the raw material and the variety of products but also about a process that further recreates the landscape. As discussed earlier, the sourcing activity of brick making becomes one part of the practice that demonstrates connections amongst the craftsmen, resources and the landscape. However, various operations also operate on the site of brickmaking, which eventually drives the landscape transformation. To reveal the possible underlying process of landscape transformation, the discussion on findings will be elaborated based on two important aspects from exploring the operations on the landscape—landscape as a resource and as a place that transforms. A particular arrangement of the landscape becomes the indication of the operations and how they transform the landscape.

5.1. Landscape as a material resource
Based on the field observation, the sourcing of raw material in both workshops can be differentiated into three modes: (1) extracting or mining the raw material such as soil and water directly from the landscape, (2) gathering additional materials available within the landscape, albeit its form as waste or by-product of other production activities, and (3) outsourcing the materials beyond the landscape, i.e. through buying. Aside from the soil and the water, raw material included in the sourcing activity also consists of sawdust, firewood, bran, a certain type of soil or sand, and even goat dung, that are produced locally or the neighbouring landscape nearby.

Fig 2. Manoeuvring between trees, transforming landscape by employing local knowledge, tools and technique in Ambarawa

Fig 3. Rearranging soil and vegetation in shifts, transforming the landscape in the cycle of agriculture and brickmaking in Brebes

In Ambarawa, the craftsmen occupy an area in the middle of a forest, on the hilly side of the region. The sourcing of soil starts by clearing up a small area of the patch and digging between the trees. The craftsmen kept the trees until reaching a certain depth, scraping the perimeter of the digging sites to maintain their safety during the sourcing (Fig 2). Based on the visual and tactile experience, the craftsmen dig deeper and move farther between the trees in an attempt to collect more fertile soil as much as they can. A maze-like labyrinth is created as the extraction extends through the years, the existing trees are sooner or later cut for firewood; in the end, a hilly surface transforms into a large and vast open area, connected to the neighbouring brick making workshop. After the soil extraction is no longer possible, they move to a different area in the forest, leaving the workshop site used for other functions, i.e. raising livestock. Such operations transform the landscape over time and, by some means, mimic the swidden pattern performed by some traditional agriculture communities [6,12,13].

Meanwhile, in Brebes, the craftsmen utilise their paddy fields as the brickmaking workshop sites. The brickmaking starts in the dry season, directly after harvesting period, and ends before the rainy
season starts for another planting cycle. After clearing up the field, usually, only two out of twelve parcels of the field are used for brickmaking. The craftsmen make use of the available soil and source the soil by ploughing and digging the soil, but only the top layer as the fertile soil layer (Fig 3). This practice does not rely on indicators such as certain colour and texture of the soil, as much as in Ambarawa, but only relying on certain depth. The ploughing may extend to other parcels to attain more soil depending on the demand, using all the parcels, but then at the end of the season, the landscape transforms once more into an agricultural landscape with different vegetation. The seasonal shifting indicates the utilisation of opportunity integrated within the existing agricultural operation.

The operations on the landscape, especially during the sourcing activities, indicates that such transformations are driven by the utilisation of opportunity provided by nature and can be seen clearly in both workshops. However, they operate in their particular ways depending on the available resources on the landscape, as argued [14,15]. The abundance of good quality soil provides an opportunity to craftsmen to extract and eventually transform the landscape into another arrangement constituted by different elements. Such an arrangement requires sometimes the specific operation such as digging between trees, creating maze-like dugouts below the earth surface, instead of ploughing the field till certain depths, and vice versa. The employment of everyday tools such as hoes, mattocks, and buckets, also signifies the transformation process driven by particular operations during the sourcing activity. These operations call for micro-invention [15,16] based on local knowledge, tools and techniques, which are developed as traditions, passed down for generations, including the rearrangement of sourcing area and time.

5.2. Landscape as a place that transforms
The transformed landscape due to prior sourcing activity affords a new possibility for the craftsmen and drives further operations that transform the landscape. For example, a shifting of functions—from sourcing to other activities—suggests the landscape as a place that transforms. The open space created is also occupied intensively for other activities that subsequently operates in the brickmaking practice, such as moulding, drying, and firing [17] (Fig 4). A continuous transformation process is observable both in Ambarawa and Brebes, yet projected in a different rhythm. The site of the brickmaking workshop expands gradually, causing the craftsmen to adjust the land surface for ramps and pathways to connect the sourcing activity with other production activity and for more shelters to store the raw brick or new kiln. Constructing shelter and pathways as permanent landscape elements, the placement of moulding, drying and firing area in between those permanent elements suggesting that the landscape can always be rearranged and once more transformed. Meanwhile, such a permanent arrangement is not apparent in Brebes. Originating as a paddy field keeps the craftsmen maintaining the size, depth and the main function of the landscape. A minimum alteration of the landform is demonstrated only by the additional temporary shelter or mixing pond, as well as stacks of bricks, that can be removed anytime, transforming the landscape back as an agricultural function. Such shifting of functions becomes possible as the operations reoccur overtimes, thus allowing the landscape as a place that always transforms.

The shifting of functions is apparent through the re-appropriation of transformed landscape i.e. setting particular areas for moulding, drying or firing, adding structure and infrastructure for a better working sequence, and so forth. Such elements as shelters, pathways, heaps of materials, mixing ponds, and a stack of bricks, are arranged and rearranged following any significant landform changes. The changes of landscape insinuate various operations that alter the landscape and its elements further, suggesting a flexible spatial organisation over time, either temporarily or more permanently. The operation on landscape repeats in a seasonal cycle, between planting seasons and monsoon, transforming the vast green paddy field into a bare brown surface without any vegetation, but afterwards the landscape shifts again into the green composition. The operations that shift based on season indicate the possibility of creating a cyclical landscape transformation. The transformations end only if the landscape is considered unresourceful or loses its transformable capacity.
Fig 4. The operations on landscape and the transformations

Fig 5. The pattern of landscape transformation, suggesting a dialectical process between operation and the landscape
5.3. The pattern of the landscape transformation

Learning from the operations taking place in both workshops, the manoeuvres in the landscape demonstrate the idea of micro-invention [16], which becomes very particular in each workshop in terms of spatial and temporal adjustment. The operation on landscape transforms the landform in Ambarawa from the continuous surface into the interrupted surface with varying depth, with some areas deeper than the other. The recurring operation evolves in the landscape, transforming the landform gradually from isolated trenches into a vast open landscape with different compositions of landscape elements—from a green surface with mature trees into brown with small patches of green shrubs, suggesting a different density of vegetation. Apparently, such operations persist longer and demonstrate a more permanent trace in the landscape during transformation, i.e. excavated landform. Meanwhile, the operation on the landscape in Brebes during brickmaking does not transform the landform radically, it maintains as a relatively flat surface, yet varies in the composition of landscape elements.

Based on the situations, it is apparent that operations on landscape become the underlying process of the transformation (Fig 5). The landscape that is altered priorly by the sourcing process creates a new arrangement that becomes an opportunity for other activity. If such an opportunity is further utilised through different operations, insinuating another rearrangement. Such processes suggest a continuous pattern and the possibility of multiple landscape transformations over time. It also infers that the recurring landscape transformation reflects the transformative capacity of a landscape. Thus, this pattern demonstrates that multiple transformations may take place on the landscape as a dialectical process between the landscape and the operations conducted by craftsmen.

6. Transformation as dialectics between operations and landscape

The findings in this study clearly demonstrate that the operations on a landscape in traditional practice contributes significantly to the current landscape transformation. In particular, the study emphasises the importance to understand the landscape from its performance, “what it does, how it works as a cultural practice [26]. The dialectical relationship between the landscape and the operations conducted by the craftsmen can be captured in the traditional practice of brickmaking, not only during the sourcing activity, but also throughout the moulding, mixing, and firing, that can be traced over time. Through the inquiry into the operations in Ambarawa and Brebes, it can be identified that two important aspects of the landscape become crucial in the transformation process—landscape as resources and landscape as a place with transformative capacity. The operations during the sourcing activity become a way of responding to the landscape as a resource. Such operations shift the landscape and its elements into a new arrangement and consequently affects further operations on the landscape and subsequent transformation, suggesting the utilisation of the landscape’s transformative capacity over time. The study expands the current understanding of landscape transformation, showing the operations of traditional practice as the basis of understanding such a dynamic occupation within a context. Such landscape transformation may be found in similar small-scale earth-based material production, suggesting the opportunity of future studies to explore further such practice for a more comprehensive understanding of the sustainable spatial practice.

7. References

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