THE RICE POSTHARVEST UTILIZATION SCHEME BETWEEN TRADITIONAL AND POST GREEN REVOLUTION ERA IN JAVANESE COMMUNITY

Rice Postharvest Utilization Culture in Indonesia (3)

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Abstract: The Javanese are an Indonesian ethnic group with a long history of rice cultivation culture. However, there is no concrete research detailing the Javanese tradition of using postharvest rice plant materials in daily life. Moreover, after the Green Revolution, the outputs of postharvest rice plants were only classified into two categories: rice as the main commodity product and the rest as waste materials which are burned or absorbed for industrial or livestock needs. These facts are in contrast with the Javanese traditional culture, which optimizes all parts from the postharvest rice plant in daily life activities for both utility and ritual items. This utilization culture was supported by both the physical characteristics of the local rice plant variety and the traditional scheme of postharvest activities. Such activities included cutting the harvested rice plants, distributing, storing, processing into rice and processing unused parts. With these five activities, Javanese were utilizing the postharvest rice plant materials beras (rice), mrambut (rice husk), bekatul (rice bran), wuli (rice ears), merang (panicle stem) and damen (rice straw). In the postharvest scheme there were 7 values practiced by the Javanese community. These were spiritual, economical, ecological, social, utility, mythological and education values.

Keywords: Postharvest rice plant, Utilization, Culture, Javanese

1. Introduction

From its primeval name, the meaning of the word Java is very close to ‘rice plant.’ Yawadwipa or Yawa is the abbreviated form of the word Jawawut, which is a type of small grain cereal that was first discovered by the earliest inhabitants of the island of Java. The rest of the word, dwipa, means ‘island’ [1]. Many local people still associate the definition of Jawawut with the rice plant, which has been a vital staple throughout Javanese history. The Javanese, an ethnicity that mostly resides in the centre and east of the island of Java (Figure 1), is an agricultural society. Its close relationship with rice cultivation cultures formed its unique community structures. For example, in the 18th century, the wealth of a province in Java depended on the soil’s fertility, irrigation systems and the water buffalo populations. Likewise, the income of a Java kingdom was not calculated based on how much money it had, but how much rice could be collected there [1].

The Klaten Regency (Figure 1), as the sample location for this research, is one of the rice granaries of Central Java. The production of rice in Klaten is supported by geographic and cultural conditions. Geographically, Klaten regency is surrounded by 134 springs and a volcano [2]. Culturally, Klaten is located between Yogyakarta and Surakarta, two Sultan palaces. These geographic conditions and its proximity to cultural centres position the Javanese in Klaten Regency as both productive in cultivating the rice plant and dutiful in practicing the values of the Javanese culture. In terms of cultivating different rice varieties, the Delanggu district in Klaten is renowned for having the most famous local rice variety in Indonesia, called Rojolele.

In spite of its close relationship with rice cultivation culture, there is no concrete research detailing the culture of postharvest rice plant activities in Java and the utilization of plants for the community’s daily needs. This is especially true
for the Klaten area. Visual examples of postharvest culture are evident in several ancient temple reliefs from Central Java (Figure 1). The reliefs depict Javanese people cutting harvest rice plants with *ani-ani* or traditional *wuli* (rice ear) cutting tools [3]. Borobudur temple reliefs depict the traditional distribution method of using a stick (built in 770 AD); and a relief from a Vishnu temple (built in 850 AD) illustrates the Javanese using *lumpang* and *alu* as tools to pound and separate *beras* (rice) from straw to process harvest rice [4].

These postharvest methods were practiced up until the government initiated the Green Revolution in 1967 [5]. The Green Revolution sparked immediate changes in crop production by replacing traditional methods with modern methods. To establish this programme, the government instituted an agricultural focus on production by introducing the use of artificial fertilizers, new rice varieties and agricultural processing machines. Through the Green Revolution, Indonesia achieved rice self-sufficiency by 1984, less than two decades later. In Central Java, rice production increased from 3.830.294 tons in 1968 to 3.994.537 tons in 1970, and production has continued to increase from there [5].

Despite the Green Revolution programme’s success in increasing the production of rice, several changes in Javanese farming societies gradually shifted the traditional mindset from optimizing all parts of postharvest rice plants in daily life activities into modern methods that focused on increasing *beras* production. Based on utilization statistics from 1984, around 38% of non-*beras* parts from the postharvest process was absorbed in the industrial and livestock sectors. The remaining 62% was burned as the simplest way to eliminate waste [6]. These facts are in contrast with findings related to the traditional Javanese culture and how it utilized the postharvest rice plant; Javanese had a specific scheme for each stage of processing, from cutting and harvesting rice plants to processing the unused rice plants. This traditional scheme aimed to optimize all parts of the rice plant for both utility and ritual items. Based on the first paper about utility usage, the Javanese utilized postharvest rice plant parts for their houses, rice farming purposes and several needs outside these areas. In second paper indicated, areas of utilization for ritual needs included rice fields, residential areas and rice fields, human phases (births, marriages, death), traditional performances, the royal family, and preparations for sacred days. As the third part, this paper reveals the Javanese scheme of postharvest rice plant culture became the supporting element in utilizing the postharvest rice plant in their daily life; this part also reveals the transformation in Javanese culture of utilizing postharvest rice plant that occurred after the Green Revolution programmes.

2. Methodology

To describe this utilization scheme, the text analyses both traditional and modern methods according to the phases of the cultivation process and postharvest acts. This research seeks to outline from technical and mythological perspectives the reasons behind the traditional methods that optimized the postharvest rice plant. To obtain data, the authors conducted field research as their primary methodology by interviewing Javanese people, including farmers, seniors, humanists, and professors. Based on the collected data, the postharvest scheme is classified in several phases, from the rice cutting process to processing the unused parts. From each phase there are rice postharvest materials absorbed for utilization which from this activities the authors were analyzed both from rice plant parts as well as utilization quantity aspects. The researchers also analyse the shift from the traditional post harvest scheme to the modern, post-Green Revolution scheme and how this shift impacted utilization culture within communities.
3. Dewi Sri in Rice Postharvest Culture

Dewi Sri, the Javanese mythological goddess, was born from the assimilation between Javanese animism and Hinduism traditions of deity worship [7]. Dewi Sri is believed to be the highest and most important goddess in the Javanese farming community. In agricultural areas, Javanese believe that Dewi Sri is the goddess not only of rice, but also of fertility, and she is the protector of their rice fields. In rice cultivation schemes, the closeness between the Javanese and Dewi Sri is evidenced in rice field ploughing practices, planting young rice, harvesting until the ritual of storing harvested rice in their house. In the traditional and popular performing art form wayang kulit—Javanese shadow puppetry—the figure of Dewi Sri is a major character (Figure 2). One story is entitled Sri mulih, which literally means “Sri comes home” in bersih desa (a ritual after the completion of harvesting rice). Her presence in wayang kulit performance represents the close relationship between Dewi Sri with Javanese folk entertainment.

In terms of rice utilization and the Javanese motivation to use postharvest materials for utility purposes, the Javanese believe that rice crops are deposited by Dewi Sri to provide strength (foods), hygiene (tools for cleaning houses and the body using panicle stem), protection (thatched roofs made from rice straw), and many other daily needs. In terms of ritual utilization, Javanese borrow the characteristics of Dewi Sri while using rice plant parts in their religious offerings. They also create artefacts with rice plant and wood to present the figure of Dewi Sri inside their homes.

4. Development of Rice Varieties in Java

In Java, there are essentially two varieties of rice: the first is Javanica, or the local variety; the second is Indica, or the superior variety. Javanica rice plants are usually harvested twice a year, but during the colonial era and technological revolution, farmers were pressured to produce a new variety of rice that could be harvested more frequently. This development began during the Dutch occupation in 1905 by establishing an agriculture department, the Rice Research Institute (Proefstation voor rijst en tweede gewassen), in Bogor, West Java. This unit was designed to develop rice plants through the use of germplasm diversity [8]. During the period of Japanese occupation (1942-1945), the government wanted to increase Javanese rice production, so they recommended that farmers plant pari cere or Indica rather than Javanica. To do this, the Japanese government introduced the Indica rice plant Hourai, which originated in Japan and was later blended with Taiwan local rice [9]. During the Green Revolution, after IR5 and IR8 (Indica) was released in 1967, superior varieties of rice gradually increased. The government strongly recommended that farmers use the superior variety of rice, which has a relatively short planting process and is resistant to planthopper; therefore, local rice production greatly decreased.

The Javanese plant two main local varieties of rice plants: Rojolele and Mentik (local white rice). Javanese also occasionally planted other local varieties, such as Cempo Ireng (local black rice) and RI (red and white rice). Cempo Ireng was classified as forbidden rice; it could be consumed only by the Javanese royal family [10]. RI is an old local variety recently discovered in a temple in the Klaten area, believed to have been used ritualistically because white and red symbolize fertility. All of these local varieties are rice plants which have adapted to specific agro-ecosystems and produced structure and dimension characteristics that support the utilization of non-beras materials. In terms of the superior variety of rice plant, researchers developed new varieties based on soil, climate, temperature and taste, without considering non-beras utilization of, for example, Damen (rice straw) and merang (panicle stem).

5. Rice Cultivation Calendar System

Pranata Mangsa is the traditional Javanese calendar for planting rice, used since the Kingdom of Medang in the 9th century Hindu era [11]. Based on this calendar, Javanese harvesting time was highly dependent on rain, so the Javanese often planted wetland rice once a year followed by pari gogo, dryland rice, and palawija, or other crops. Water storages, dams and aqueducts were built during the Dutch occupation (1800-1942), creating farming infrastructures that did not depend on rain, allowing Javanese farmers to harvest two or three times a year. Klaten District’s close proximity to springs
and rivers brought water to rice fields, so harvest time was divided into two periods: panen gadu, dry season harvest; and panen rendengan, rainy season harvest. Based on these conditions, the Javanese living in the Klaten area had two postharvest activities each year when the rice postharvest materials could be obtained for daily needs.

6. Javanese Cultivation Scheme

In traditional rice plant cultivation, hereditary Javanese farmers practiced a method that essentially consisted of a preparation phase, planting phase, treatment phase, and pre-harvesting phase (Figure 3). In the preparation phase, the rice field rested after harvest time, and the process of cultivation began with rice nurseries. This process continued with the slametan ritual, a ploughing activity using lukus or cangkuls (hoes), preparing irrigation channels and irrigating rice fields. Later, digaru was performed, which involved levelling the soil using fork-shaped tools called garus and soroks. The last step was nyajeni, a ritual that requested the protection of Dewi Sri during cultivation. The planting phase followed, which was executed only by women who moved young rice plants from pinians (seedbeds) to rice fields. The treatment phase involved repelling pests and diwatuns, or pulling grass. The pre-harvest phase included performing wiwitan, or rituals of gratitude, to Dewi Sri. Farmers selected the best wulis and tied it into bundles, then the leaf located in wuli was dikepangs, or braided, so that its shape resembled a woman’s hair as a reflection of the goddess Dewi Sri. After finishing this ritual, harvesting began [12].

After the Green Revolution, the goals of which were efficiency, quantity, and production, rice cultivation simplified traditional patterns by replacing traditional tools with agricultural machinery tools; the lukus, for example, was replaced with the tractor, and three days of work became one, saving manpower and expenses. The new cultivation methods required farmers to think about cultivation more practically, by, for example, omitting rituals during the preparation and pre-harvest stages (Figure 3). Harvest ritualism expressed reverence for Dewi Sri and allowed only women to participate in the planting stage; the community no longer follows this rule, but among older generations of farmers, these rituals and rules are still performed amid modernization. The new cultivation model increases annual production outputs, and after harvest time, the process prepares for next season without rest. This pattern differs from traditional farming, which considers soil a living being that needs rest.

7. Traditional Postharvest Scheme

In terms of postharvest rice plant activities, the post-Green Revolution movement scheme differed from the traditional Javanese postharvest scheme. Traditionally, the postharvest scheme involved using all parts of the postharvest rice plant for daily life. This model was divided into five supporting steps: harvest cutting, distribution, storage, processing into beras, and processing the unused parts.

7.1. Harvest Cutting Method

During harvest time, Javanese farmers cut the local varieties of rice plant twice (Figure 4). The first cut occurred...
during ngani-ani, or the process of cutting wuli from the bottom part of the first leaf using ani-ani tools. The first step of the ngani-ani process was called nggrontongi, or choosing the best harvests for the next planting of seeds. A group of women then harvested the rice using ani-ani (about 200-500 female workers covered each hectare of rice field). After the ngani-ani process came ngepok, or clearing the base of the stem. This method took into account the plant’s use in many daily needs; it therefore produced damen with tall dimensions [12].

7.2. Distribution Methods

Damen and wuli were obtained and distributed from the postharvest cutting process mentioned above. After the ngepok process, damen was stacked in the rice field using circular and conical shape patterns. For residential needs, damen was distributed by diangkut (which used pulled wagons) for large quantities and disunggi (placed on the head), dipikul (on shoulder), or digendong (picked up) for small quantities (Figure 5). One bundle of damen had a diameter between 60 and 75 centimetres. Javanese social beliefs were displayed when farmers distributed damen to those in need with no expectation of any repayment [12].

7.3. Storing Methods

In homes after the distribution process, damen was placed inside damen storage areas called njlangkringan, usually located on the right side of a house (Figure 7) and designed with a floor higher than ground level to protect damen from rain, water, and humidity. The wuli part of the plant, was stored in lumbung pari, or granaries (Figure 7). These were usually found in limasan houses, which were owned by middle-class families. For lower class families, the storing place was located inside senthong tengen (Figure 6 & Figure 7), a room located on the right side of a house and used for stacking wuli and storing farming tools in kampung houses [13].

by creating untingan (tying by placing the collected wuli into a circle the size of thumb and index finger), which were placed in gubuk panen (harvest huts). Ties from bundles of harvested rice were then fixed, merged into prentilan (three to four untingan merged into one bundle with the size of a circle made by both hands’ forefingers and thumbs), dried under the sunlight in two days by reversing prentilan position every midday on each day (Figure 5), and prepared by stacking the dried prentilan for distribution. Merged bundles (prentilan) were usually distributed by dipikul, which used pikulan (a shouldered stick) for small quantities and diangkut for large quantities (Figure 5). Because of their close relationship with Dewi Sri, wuli distribution was conducted by women from several villages by means of picking up (digendong) using tenggok (Figure 5), containers made from bamboo [12].
braided wuli were picked up using jarik (traditional fabrics belonging to the rice field owner), preferably by women. During the trip from rice fields to the house, the person carrying the braided wuli, or “Dewi Sri,” had to concentrate fully and abstain from speaking until the ritual was complete [13]. Therefore, in several areas, this ritual was performed before dawn to avoid crowds. In some villages, wiwitan was performed in the evening and continued during harvest time the next day. Children usually participated in this ritual by watching in galengan, or paddy dike, and eating together.

Inside the house, “Dewi Sri” was placed inside the senthong tengah (the sacred or praying room) (Figure 6 & Figure 7). The Javanese believed that this room was a layover place for Dewi Sri, who would bring blessings and fertility into their lives. For those who had granaries outside their houses, they hung the “Dewi Sri” over the door inside the granary (Figure 7). They then tied two bundles of wuli in front of senthong tengah (granary door), called Sri-Sadhono, a representation of Dewi Sri and Raden Sadhono (pair of Dewi Sri) which symbolized permission before harvesting their “child.” In upper class joglo houses, Javanese place wooden dolls carved as a Javanese couple (Loro-Blonyo) (Figure 6) in front of senthong tengah (usually called petanen) as their Sri-Sadhono representation. On the following day or harvesting day, the ritual continued inside the senthong tengen for kampung houses or granary for limasan houses (Figure 7) by stacking three kinds of leaves into a bundle, each with a specific value related to prosperity and protection (Figure 6). Klouwih (breadnut) leaves signified the desire for gods to continue providing ample amounts of rice until the next harvest. Pulutan (urena lobata) leaves represented abundance of sustenance, and keduk ireng (palm leaf midrib fibre) is used to scare away evil. After this ritual, the wuli were “allowed” to be stacked with the conical shape pattern. The Javanese believed that the conical shape directed to the sky symbolized a communication with gods who resided there [13]. This concept was taken from gunungan, a shadow puppet character with a mountain shape (Figure 6) pointing to the skies. In terms of design, this traditional stacking pattern allowed grains to avoid moisture by placing the wuli’s stalk inside the stacking cone and grains on the outer side.

7.4. Processing into Beras

Outside their houses, every five or six days, Javanese women helped each other process wuli into beras by putting prentilan (the larger bundler) of wuli into lesung (a boat-shaped tool) and beating it using alu (wooden stick) (Figure 8). Later, mrambut (rice husk) was inserted into gunny sacks, and merang remained in the prentilan bundle condition and were placed in pawon (traditional kitchens) (Figure 7) as a cooking stock and material for bathing and creating brooms and other daily tools. Gabah (unhulled rice) would be processed into beras.

Figure 7. Javanese traditional house layouts
Figure 8. Traditional processing into beras methods
For beras processing, after the lesung process, the gabah
was diseloh (ground) by lumpang (a pot-shaped tool made from wood or stone) until the bran fell apart (Figure 8). This continued with ditapeni, or filtering beras from menir (smaller beras), tugelan (broken beras) and gravel with a circular throwing movement using nyiru (Figure 8), a cylindrical shaped tool made from bamboo. Later, the process continued with ngiteri, or an encircling movement, using nyiru to separate beras and gabah. The remaining gabah were processed using the lesung process and then repeated. Berras was inserted into gentong beras (rice pots made from clay) and placed in pawon (Javanese traditional kitchens) (Figure 7).

The remaining materials from the beras processing, such as bekatul (rice bran), dedak (broken husk), tugelan and menir (broken beras), were inserted into gunny sacks and placed inside kitchens, lesung or emper (front yards) (Figure 7) [13].

7.5. Processing Unused Postharvest Rice Plant Parts

After harvest time, damen was stacked in the rice field area and later taken by the surrounding community. The remaining damen, which was physically broken and very short, was called awul-awul. This damen would later be burned in rice field areas or used as emposan, which is damen that has been mixed with sulphur to be burned for repelling rats. In residential areas, the remaining postharvest rice plant parts were later used for animal feed or burning at bedian (a space for burning damen that was located beside the byre) (Figure 7). The dust from burned straw at bedian was used for repelling mosquitoes from the byre and house perimeters [13].

8. Postharvest Scheme After Green Revolution

The Green Revolution postharvest scheme was developed to optimize quantity of rice; it therefore involved processing postharvest rice plant materials into beras effectively and efficiently, eliminating the non-beras waste materials instantly to start a new planting process. After farmers began planting new varieties in 1970, the use of ani-ani tools during harvest drastically decreased. The short dimension of new varieties made farmers prefer harvesting rice with sickles (Figure 9, no.1). Based on W. Collier’s research, harvesting one hectare of a rice field with ani-ani requires 200-500 female workers, while the sickle requires only 10-20 workers. Additionally, this new process does not consider the use of non-beras materials. Along with new rice varieties which produced short rice plant dimension, the new harvesting method also create dimension of damen which already short becomes shorter and difficult to utilize as in traditional postharvest scheme.

After the above-mentioned chopping, the harvested rice plants were inserted directly into plastic sacks (Figure 9, no.2) and distributed using pickup cars or trucks (Figure 9, no.3) to selepan factories, where they were processed into beras using huller machines (Figure 9, no.4). For small quantities of chopped rice plants, the mobile selepan, or huller machine, served farmers by bringing the tools into the rice fields (Figure 9, no.5). This process changed the traditional pounding process, which was once performed among Javanese women, into a new process of using huller machines, which centralized in rice industries and required only three workers per factory. This centralization also changed the distribution scheme of harvested rice from rice fields to houses into selepan factories. This condition also creates house no longer serves as storing place for non-beras materials such as damen, merang, wuli, mrambut and bekatul.

After the rice processing phase, postharvest rice plant parts

![Figure 9. Post Green Revolution rice postharvest scheme](image-url)
such as beras, damen, merang and mrambut were obtained in factory areas or rice fields (the remaining damen after harvesting process). The beras parts from the hulling process were later distributed as a main commodity product. The other parts, such as merang, mrambut and damen, were burned in rice field or commercialized by farmers as an opportunity to gain income from industries (Figure 9, no.6). This absorption non-beras materials for industrial needs starting in around 1960 where small medium enterprises and large industries drastically established. In this era, several industries were simultaneously established to provide new materials that were categorized as industrial products and replaced the use of natural resources within communities. For instance: cardboard replaced damen as material for wayang damen; plastic mats replaced lemek damen (mat from damen); and clay tiles replaced thatched roofs.

9. Utilization of Postharvest Rice Plants

Traditionally there were five postharvest rice plant stages from which parts could be obtained (Table 1). The first involved cutting the harvest rice plants in the rice field; two resulting materials—wuli and damen—had 25 uses, both for utility and ritual needs (Figure 10). Wuli parts were the main outputs of a harvest, and they were used mostly for rituals such as wiwitan, Sri-Sadhono, and kembang mayang. For rituals, the best wuli were chosen and taken directly from the rice field as a form of respect for the mythical elements. Damen, another material obtained from the second step of cutting the rice harvest, was used mainly for utility items related to rice farming activities; these included thatched roofs around rice fields, irrigation tools, roping materials, pest repellent tools, seeding materials, toys, and more. When it came to rituals, damen was not utilized as a main element, but was used in supporting tools such as mats and incense burning for wiwitan rituals. The second stage was the distribution process, in which damen was obtained for three utilizations, which consisted of tying: untingan into prentilan; creating thatched roofs for gubuk panen as a place for distribution preparation; and tying damen for distribution purposes.

The third stage was the storing process, which occurred after wuli and damen were distributed to the house. In this phase, wuli and damen could be used in ten different ways. Damen was utilized for housing needs related to exterior purposes such as creating or fixing thatched roofs, and interior items such as traditional flooring materials and mats. At this stage, wuli also being prepared as seeding material for the next stage of planting. The fourth stage happened after beras processing occurred. In this process, the parts from processed wuli—merang, mrambut, bekatul and beras—were obtained for 24 utilizations. At this point, beras was the main output, and it was utilized not only as a staple food but also as an exchange tool and for several rituals. Merang were employed for various utilities, such as cooking tools, brooms, and self-care tools for such activities as pulling grey hair, arching eyebrows, and making traditional shampoo; the shampoo was made from mixing water with ash obtained from burnt merang. Kelud (brooms) and traditional shampoo were utilized for both physically cleaning the body or home and for several spiritual cleaning rituals. The other parts that could be obtained from this stage are mrambut and bekatul (rice bran); mrambut was utilized for cooking and self-cleaning tools, while bekatul was used for traditional food, animal feed and certain rituals. The fifth stage was the processing of unused parts from postharvest rice plant activities. In this stage, awul-awul, or broken damen, was utilized for two purposes: for repelling mosquitoes around the house area, for which awul-awul was burned in bedian; and for repelling rats in rice fields, for which awul-awul was turned into empesan.

| PHASES               | TRADITIONAL SCHEME                  | POST GREEN REVOLUTION SCHEME                  |
|----------------------|-------------------------------------|-----------------------------------------------|---|---|
| Cutting              | Wuli & damen                        | Wuli & damen                                  |
| Distribution         | Damen                               | Damen                                         |
| Storing              | Wuli & damen                        | Damen, merang, mrambut & bekatul              |
| Processing into beras| beras, merang, mrambut & bekatul    | Damen, merang, beras, mrambut & bekatul       |
| Processing unused parts | Awul-awul (broken damen)            |                                               |

Table 1. The materials utilization based on postharvest scheme

Figure 10. The quantity of utilization in utility and ritual needs based on postharvest scheme
remaining parts were burned in the centre of the rice field.

In terms of utility needs with the above process, there were three areas in which the Javanese mostly utilized postharvest rice plant materials: the cutting phase, storing phase, and beras processing phase. This fact supports the utilization of postharvest rice plant materials for residential and rice farming activity needs, which was established in the first part of this paper. In terms of ritual use, only those materials from the cutting and beras processing phase were utilized, because these phases created the highest quality materials. In terms of architecture, the Javanese traditional house was strongly influenced by daily activities as rice farmers. Therefore, in the Javanese traditional house, both kampung and limasan layout was designed with the beras processing area in mind, as well as a storage area for beras and non-beras materials and area for mythological elements. This condition was supporting the utilization of postharvest rice plant materials in house area both for ritual and utility terms (Figure 10).

In contrast, in terms of modern postharvest activities schemes, postharvest rice plant part materials can be obtained after farmers have harvested and processed rice into beras using huller machines. Materials from postharvest rice plant parts are utilized mostly for industrial and ritual purposes (Table 1). Beras, as the main output, is collected for rice distribution industries; merang is typically used in mushroom cultivation industries; mrambut and damen is used for burning materials in brick industries (Figure 11); and another damen is used for paper industries and cattle feed. The remaining damen, which makes up the highest percentage of materials, is burned by farmers in the rice fields. Some places still use postharvest rice plant materials for traditional Javanese rituals, including kelud, kacar-kucur, kerun, sawur, kembang mayang and mangghah molo, but the source of the materials and the production processes do not follow the traditional requirements due to changes in the postharvest culture scheme. In order to obtain wali parts for rituals, Javanese practice the same traditional procedure of directly taking it from the chopping process. In obtaining parts from the beras processing phase, however, the community currently buys bekatal, beras, damen or merang from selepan factories. In the traditional scheme, these materials were obtained directly after farmers processed beras in their homes.

10. Conclusion

Through these data findings, this research concludes that, traditionally, the Javanese postharvest rice plant scheme consisted of communal harvest cutting, distribution, storage, beras processing, and processing unused rice plants in order to use them for tools and other needs. This culture created a sustainable postharvest scheme by integrating the scheme with other elements of life such as daily needs and community utilization of resources and materials produced from the rice cultivation process. The sustainability of the postharvest scheme allowed a Javanese village to internally maintain its continuity of life by planting rice plants and then using the plants inside the community to meet the village’s own needs (Figure 12). Their belief that rice plants were a gift from Dewi Sri, the rice goddess, encouraged Javanese to utilize postharvest rice plants as much as possible. From this perspective, the Javanese showed respect to rice plants by optimally utilizing all parts of the plants and by creating rituals with mythological rules related to rice cultivation and postharvest schemes that sustained the relationship with mythical elements.

![Figure 11. Brick industry (left) and mushroom industry (right)](image)

![Figure 12. The pattern of postharvest scheme with daily needs](image)
utilization scheme, there were three relationships formed inside the community: first, the human relationships encouraged inside the community during cooperative creation of artefacts with no expectation of repayment; second, the relationship between the community and the environment developed through the people’s sensitivity to identifying and obtaining rice plant parts from the five postharvest activities as materials for their daily needs; and third, the relationship between the community and the artefacts. The forms of utilization of artefacts express the different values of the Javanese, as evidenced when these three relationships changed in the post-Green Revolution era. The process became commercial, and differences of rank emerged (positions similar to boss and worker) in obtaining rice postharvest materials and producing artefacts. The quality of non-beras material produced from new varieties, as well as high demand in production quantity, changed the traditional postharvest scheme and affected the relationship between community and environment. This efficiency- and quantity-based rice farming programme meant the community could not optimally absorb the non-beras materials and resulted in what the Japanese call the ‘mottainai’, or redundant, behaviour of burning the non-beras materials as the simplest way to prepare for new rice farming activities. The presence of industrial items also supplanted the role of traditional artefacts, which had a close relationship with the community through their local values and production processes, and transformed the community into a commercial society with universal interest in commodity items.

The traditional Javanese postharvest scheme had seven main values. The first was spirituality, as could be seen from the rituals performed in several phases of the postharvest scheme. The second was economics; beras as the postharvest main output was used as trade material for fulfilling non-beras needs and as wages for farm workers. The third was ecology, which was reflected in the Javanese practice of optimally utilizing postharvest rice plant materials and viewing rice plants as living beings that should be treated appropriately. The fourth was society, which was reflected in the Javanese culture of mutual cooperation practiced in every phase of postharvest activities. The fifth was utility, as seen in how the Javanese optimally utilized non-beras materials such as damen and merang for their daily needs. The sixth was mythology, which was evidenced in Javanese attitudes toward Dewi Sri in their postharvest activities. The seventh was education, as shown in the wiwitan ritual where children were invited to celebrate and learn about agricultural activities.

Today, because of agricultural modernization, the communities are emphasizing economics. This focus has gradually diminished the six other values practiced in traditional postharvest practices. However, based on this research’s findings (which consist of a first and second paper in addition to this third paper), the culture of utilizing the rice postharvest materials in Indonesia, in particular among the Javanese, has been discovered and defined. Through workshops and group discussions with local communities, the findings of this research could provide knowledge especially for the young generation and support design development to fulfil the community’s needs through the utilization of postharvest rice plant materials and traditional knowledge.

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