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Exploring the opinion on waste management practices of the clay pottery industries, Sri Lanka

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Abstract

The perceptions of the industry people in the Panduwasnuwara area regarding the implementation of waste management practices in the clay pottery industry and the possible outcomes of integrating the waste management practices are the result of this study. Results were based on 06 depth interviews conducted among industry professionals and findings were organized into a framework of the pottery industry. Using a qualitative approach, data from pottery industry owners who recently adopted waste management practices were collected through face-to-face interviews. The study emphasized the different types of waste including transportation waste, processing wastes and negligence in the clay pottery industry. Furthermore, the research results mainly indicated that waste management practices including reduce, recycle and reusable are already utilized to some extent in the household Panduwasnuwara area. However, the findings also reflected the fact that these current practices have not yet reached their full potential. Finally, the study indicated that the key findings can be utilized not only in the Panduwasnuwara area but also in any other pottery-making areas in Sri Lanka.

Keywords: Clay Pottery Industry; Panduwasnuwara Area; Sri Lanka; Waste; Waste Management Practices; 3Rs Concept

1. Introduction

Approximately 60% of Sri Lanka's daily solid waste, about 7,000 metric tons, is generated in the Western Province. An individual produces 0.1 to 0.4 kg of waste per day, but only half is collected (Waste Management Authority & Central Environmental Authority). Local authorities, including municipal, urban, and local councils, manage waste collection and disposal under the Municipal Councils Ordinance (1947), Urban Councils Ordinance (1939), and Pradeshiya Sabha Act (1987). The Public Nuisance Ordinance and National Environmental Act No. 47 of 1981 provide regulatory guidelines for waste management.

Effective waste management requires individual responsibility, including waste reduction, segregation, and recycling. Local councils must ensure proper collection and disposal, while government agencies and businesses should focus on composting, biogas production, and technology-driven recycling (EFL Admin, 2018). Expanding recycling facilities and integrating scientific expertise in waste-to-energy and incineration strategies can enhance efficiency. Sustainable consumption habits and public awareness are essential for long-term waste The Industrial Revolution urbanized rural areas, increasing environmental threats from industrial waste, including chemicals, ashes, and effluents. Industries, rather than local authorities, are responsible for managing their waste (Vedantu, 2024). In today's evolving business environment, adaptation is crucial for survival. Implementing Waste Management Practices (WMP) can help organizations address environmental challenges and future uncertainties (UT Tyler, 2015).

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Sri Lanka's industrial sector contributes 30% to GDP and employs 25% of the labor force, with ceramics prioritized for investment (Ceramics in Sri Lanka: Opening Doors, 2015). Pottery, including earthenware, stoneware, and porcelain, has long been a cultural and economic staple, providing livelihoods in regions like Kurunegala, Matara, and Negombo. Notably, many clay pottery industries are based in Kurunegala and Panduwasnuwara (SriLankaBusiness, 2020; Sunday Observer, 2017).

Sri Lanka's ceramic pottery exports declined from Rs. 561,376 in March 2018 to Rs. 247,769 in April 2018, reflecting fluctuations in export performance. This trend indicates challenges in the industry (Central Bank of Sri Lanka, 2018).

Waste Management (WM) involves collecting, transporting, disposing of, and recycling waste, essential for reducing costs and environmental impact in industries like clay pottery. A strong WM system enhances cost savings, resource conservation, and regulatory compliance, contributing to business success (Great Western Recycling, 2020). Waste Management Practices (WMP) focus on optimizing resource efficiency through waste minimization, reuse, recycling, and recovery (Howden, 2019).

Firms address social and environmental challenges through innovative solutions like Waste Management Practices (WMP). However, Hossain and Roy (2020) highlight that the SME clay pottery industry struggles due to a lack of WMP. Effective WMP includes waste reduction, reuse, recycling, collection, and disposal, enhancing overall industry performance.

Limited research exists on Waste Management Practices (WMP) in Sri Lanka's clay pottery industries, particularly in Panduwasnuwara. This study aims to fill that gap by critically evaluating WMP in the region and identifying necessary improvements for industry sustainability.

With the WMP, clay pottery industries can remove the failure aspects. By Managing waste effectively and by using effective WMP, firms will attain benefits directly. Therefore, the problem statement addresses the "How do clay pottery industries in the Panduwasnuwara area display different Waste Management Practices?"

1.1. Problem statement

Sri Lanka's pottery industry is highly localized, blending functionality with ceramic art and contributing to the cultural and economic landscape. However, research on Waste Management Practices (WMP) in the clay pottery sector, particularly in Panduwasnuwara, remains limited. Insights from local potters on WMP are underexplored. Additionally, the industry faces challenges, as reflected in a decline in ceramic pottery exports from Rs. 561,376 in March 2018 to Rs. 247,769 in April 2018 (Central Bank of Sri Lanka, 2018).

Implementing effective waste management practices can help mitigate some of these challenges. By managing waste efficiently, clay pottery industries can address key failure points and improve overall productivity. Therefore, this study seeks to address the question: "How do clay pottery industries in the Panduwasnuwara area implement and display different Waste Management Practices?"

1.2. Research Questions

Accordingly, the specific research questions have been formulated based on the research problem.

- How do employees perceive about wastage of the clay pottery industry?
- How do clay pottery industries display waste management practices?

1.3. Research Objectives

Hence, the main objective of this study is to grab opinions from potters and explore different WMPs of clay pottery industries in the Panduwasnuwara area. The other research objectives which are to be accomplished at the end of the research project are as follows.

- To explore employee perception about wastage of the clay pottery industry.
- To explore the waste management practices in the clay pottery industry.

2. Literature review

2.1. Waste

Human activity has always generated waste (Brunner & Rechberger, 2014; Chandler et al., 1997), with recent years seeing a rise in waste production and diversity (Vergara & Tchobanoglous, 2012). The Industrial Revolution accelerated urbanization, increasing waste, including metals and glass (Wilson, 2007; Williams, 2005). Waste is defined as materials deemed useless by producers, often reflecting inefficient manufacturing (White et al., 1995; Basu, 2009; Dijkema et al., 2000; Cheremisinoff, 2003). In ceramic production, waste occurs at every stage, with 9 tonnes of waste generated per tonne of extracted clay. The depletion of key raw materials like sand and clay is expected within a few years.

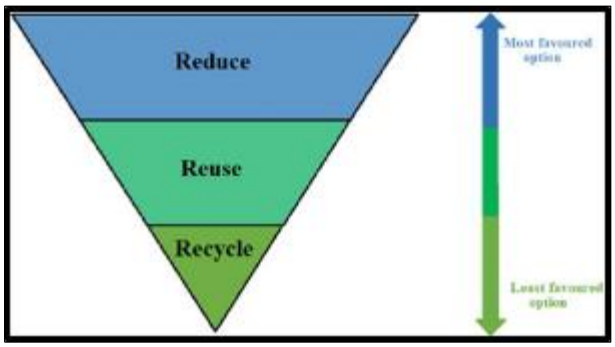
2.2. Waste management practices

Waste generation has been a long-standing issue, exacerbated by increasing population and purchasing power, leading to higher trash production (Giusti, 2009; Vergara & Tchobanoglous, 2012). This burden on the environment necessitates effective waste management, which is crucial for ecosystem protection (Marchettini et al., 2007; Ghiani et al., 2014). Waste management involves collecting, transporting, processing, and disposing of waste, focusing on environmental and public safety (Demirbas, 2011; Tchobanoglous et al., 1993). Techniques such as reuse, recycling, composting, and incineration are preferred, though methods like incineration can still produce pollutants (Troschinetz & Mihelcic, 2009; Dijkema et al., 2000). Despite advancements, much waste still ends up in landfills, with some methods merely reducing volume before disposal (Strange, 2002).

2.3. 3r's concept of waste management

The 3Rs concept - reduce, reuse, and recycle - is a key waste management strategy that prioritizes reducing waste volume, reusing materials, and recycling to minimize environmental impact (Green Coast, 2019; Rogue Disposal & Recycling, 2018). It emphasizes waste reduction at the source and promoting the reuse and recycling of materials that cannot be avoided (ResearchGate, 2017).

In the following Figure 1, the "3Rs" options are briefly explained,



ResearchGate, 2017

Figure 1 3Rs Options

2.3.1 Reduction

The waste hierarchy prioritizes minimizing waste generation through source reduction techniques as the most effective approach. This principle, known as "avoidance of waste," emphasizes preventing waste at its source. Improving manufacturing practices and reducing packaging align with this strategy, aiming to produce more goods with less packaging and encouraging consumers to choose products with minimal packaging (ResearchGate, 2017).

2.3.2 Reuse

Reusing items after their primary use is the next best option in solid waste management (SWM). It involves using items for similar or entirely different purposes, achieved through repair, selling, or donating to charities and community organizations. Reuse is preferred over recycling because it requires less processing. Additionally, sensitive reuse strategies can offer substantial social and cultural benefits alongside environmental advantages. Examples include reusing beverage bottles or shopping plastic bags from retailers (ResearchGate, 2017.).

2.3.3 Recycling

In industrialized nations, recycling is a common waste management technique involving the collection, sorting, and processing of economically valuable waste materials. Recyclable components such as paper, metal, plastic, and glass are sorted and processed for reuse (ResearchGate, 2017).

Many developed nations are adopting solid waste management (SWM) methods based on the "trash hierarchy," emphasizing reuse and recyclability. This approach is shifting policies away from landfills towards medium-priority waste treatment techniques (ResearchGate, 2010). In contrast, developing countries face similar challenges as industrialized nations, including urbanization, inequality, and inadequate waste management systems. Barriers to implementing 3R (reduce, reuse, recycle) policies in emerging countries include cultural, economic, and institutional factors, as well as a lack of knowledge and funding. Effective implementation should prioritize simple waste reduction practices over complex solutions (ResearchGate, 2010; 2017). In Europe, recycling rates have improved, with countries like Austria and the Netherlands reaching up to 60% (ResearchGate, 2017).

Developed Asian nations, including Japan, South Korea, Taiwan, and Singapore, are striving to eliminate landfills through robust solid waste management (SWM) systems supported by legal frameworks and government funding. These countries have achieved high public involvement in waste management, integrating it into daily routines. South Korea leads East Asia with a recycling rate exceeding 90%, while Singapore follows with a recycling rate above 70% (ResearchGate, 2017).

3 Research methods

The researcher used a qualitative methodology with an inductive approach and interpretivism as the research philosophy to understand the perspectives of the pottery business. The phenomenological method was employed to capture respondents' experiences and interpret them thematically. Data was collected using the Mono technique over a specific period with a cross-sectional time horizon.

3.1 Sample and Sampling technique

The study focused on the pottery industry in Sri Lanka's Panduwasnuwara area, using purposive sampling to select six potters who represented key individuals contributing to Waste Management Practices (WMP). The sample size of six was chosen based on phenomenological research guidelines, with Creswell (2013) suggesting that a sample size of three to ten is typical for such studies. The respondents were selected to ensure a diverse range of perspectives, ensuring the sample represented relevant factors to the research. Interviews were conducted using a guide, with responses chosen based on specific criteria.

3.2 Data and Data collection methods

The study will use a semi-structured, face-to-face interview method to collect primary data, which is considered effective for obtaining detailed insights, especially on topics like perceptions of Waste Management Practices (WMP) (DeJonckheere & Vaughn, 2019). Interviews will be guided by a predetermined set of questions with flexibility for further probing. Interviews will be conducted in English and then translated into Sinhalese, with audio recording used (with consent) for analysis. Secondary data will be gathered from a variety of sources, including books, websites, industry studies, and pottery-related publications. The use of simple Sinhala will help avoid language barriers and foster trust.

3.3 Data Analysis

The researcher will employ the "Thematic Analysis" method for data analysis. The University of Auckland (2020) asserts that this technique has established itself as a useful tool for analyzing qualitative data. It is an approach that focuses on identifying "patterns of meaning" or "Themes" written within the gathered data set, to expound on the previous statement.

4 Results and discussions

4.1 Sample profile

Six members of the Panduwasnuwaara region's clay pottery industry make up the study sample. The clay pottery makers were chosen by the researcher because they exhibit a variety of traits in their field. Responses were chosen

based on a variety of criteria, including the nature of the firm, its size, the items it produces, the methods it employs, its ownership, and the expertise of its potters.

Table 1 Profile of the pottery business people in this study

Respondent's name	Product line	Location	Start year
Owner 1	Producing the wood stoves	Amabagahawewa	From his mature age
Owner 2	Produce Grain Vase	Ambagahawewa	From their childhood
Owner 3	Large-scale production of gas clay pots	Medagama	From 2019
Owner 4	Producing Water Pot	Ambagahawewa	From their childhood
Owner 5	Small-scale production of Lamp	Thoragalla	From 2010
Owner 6	Producing decorative macramé	Panduwasnuwra	From their childhood

The researcher interviewed individuals in the pottery sector who had a variety of traits, which are described in Table 1. Most of the information was acquired by conducting a series of semi-structured interviews with local potters in the Panduwasnuwara area.

4.2 Data analysis and interpretation

4.2.1 Waste

The study found that waste is generated at nearly every stage of the clay pottery production process, including raw material handling, storage, and warehousing. All pottery owners interviewed acknowledged the presence of waste during both production and distribution. They also noted the use of various techniques to reduce raw waste in their operations.

TRANSPORTATION WASTE

Entire pottery people agreed that they were creating waste in the transportation of raw clay. Owner 01 who is a producer of wood stoves responded in this manner. "There is a lot of waste in transportation". Owner 6 who is making gas clay pots said *"There are some raw clay wastes falling to the road when the raw clay is transported".*

- Inbound logistic waste

Pottery business people have perceived that there is some waste in inbound logistics. And they have perceived there is more waste in inbound logistics rather than before. Because of the large-scale production and logistic processing logistic waste has increased in the pottery business. Owner 01 confirmed, "Same as others we have some waste when it transports and cunning the clay". Under this inbound logistic waste, there are two kinds of waste those are as raw clay falls from tractors when traveling and is delivered with unnecessary parts.

Table 2 Inbound logistic waste

a.	Raw clay falls from tractors when traveling	"We have some raw clay wastes in transportation same as other villagers who are making clay pots. Some raw clay wastes fall onto the road when the raw clay is transported by the tractors. The roads which are used to transport clay are not good. There are some pits in that road than when the tractors came by those roads it will lead to falling the raw clay from the tractor." - Owner 06
b.	Deliver with unnecessary parts	"We have to remove half of the clay parts as waste. The reason for that removal is tractors deliver raw clay with a lot of rocks and leaves. Baco can't clean everything like a hoe. Therefore Baco loads the clay with unnecessary parts." - Owner 04
c.	Cunning waste	"And also when cunning the clay, we use the Bako machine. Those machines make a lot of waste when cunning the clay. When cunning the clay Bakos it is consuming a lot of waste of clay on the land. Bacos cannot control small kinds of clay parts." – Owner 01

- Outbound logistic waste

Pottery producers in the study recognized waste in their distribution process, particularly due to transportation. The low-cost transportation methods they use often result in damage to products. For example, one owner producing wood stoves noted that improper loading and transportation lead to damages, with some stoves needing to be disposed of as waste. The pottery producers identified waste generation during product loading and travel, where clay products often collide and become damaged.

Table 3 Outbound logistic waste

a.	During the loading	"As I told you before these chutty pots are very heavy. Then we can't transport these chutty pots keeping one on another one. But we can't do so. Because we have to bear the loss if we transport without keeping one on another one. Then we used to load the lorry by keeping one on another pot. Then some of chutty pots are damaged and we have to remove those as waste." – Owner 06
b.	A large number of items in one load	"We can't store these gas clay pots one on another one, but when we transport these, we use lorry. In a lorry we can't load without keeping one on another one, then it will lead to making a lot of damaged clay pots and we have to remove those as wastes." - Owner 03
c.	Collapse each other when traveling	"However we load the vases there is some waste which we can't avoid. When Lorries travel to the destinations, these vases will collision each other and it will lead to damage the vases." – Owner 02

PROCESSING WASTES

According to Ngoc and Schnitzer (2009), industrial waste is generated during the processing of raw materials to create new goods in mills, mines, or factories. In the pottery industry, waste is identified at various stages of production. For instance, one potter (Owner 06) explained that waste occurs before placing handmade clay pots (chutty pots) into the oven. Due to the high water content in the handmade pots, they need to be fired quickly. However, because their oven is small, not all pots can be fired at once, leading to the disposal of some pots as waste. Pottery producers have identified different types of waste at each step of the pottery-making process, including preparing the clay mixture, shaping the pots, and the final oven firing process.

- Wrong clay mixture

Interviews revealed that the clay mixture is crucial in the production of clay pots in the Panduwasnuwara area. Different clay products require specific clay mixtures, with some needing more sand or clay. One potter (Owner 1) explained that waste occurs when the clay mixture is incorrect, particularly for wood stoves. A high sand ratio can cause the wood stoves to blast in the oven, leading to waste. Another potter, who makes water pots, noted that similar issues arise with water pots and grain vases when the raw clay mixture is not properly balanced, particularly when a higher sand ratio is required.

Table 4 Wrong clay mixture

a.	A high ratio of sand	"Chutty pots are fully handmade. We need some extra amount of sand rather than clay for our raw clay mixture to make handmade clay pots. But when it comes to the oven. The oven needs an exact ratio of raw clay to burn clay pots well. Then there is some compliance with these two processes." – Owner 06
b.	Removing unnecessary parts	"The grain vase should be beautiful and also those should be without a hole in the vase. Therefore I have to take quality raw clay. So when I prepare raw material for the vase I have to separate some small rocks, leaves from raw clay then I have to remove a lot of clay as wastes." - Owner 02

- Overtime between processes

The pottery production process involves several steps, and delays between these steps can result in waste. Potters must also manage weather conditions, which can affect the process. For example, Owner 01 explained that during hot

weather, half-made wood stoves must be discarded because the drying process interferes with the assembly stage. The lack of adequate storage space for products also contributes to increased waste, as unfinished items can dry out before the next step can be completed.

Table 5 Overtiming between processes

a.	Long storing time	"These water pots can't be stored for a lot of time. These water pots are used for bear water, therefore, these pots should be strong enough. If we store these water pots for a long time without burning them in the oven it will lead to reducing the strength of the water pots. Therefore we have to burn them immediately. But we don't have enough oven space for that. Then we have to remove some of the water pots as waste." – Owner 04
b.	Time wasting when unloading	"These chutty pots are very heavy because these are made by hand not machines. We can't make these chutty pots lightly weighted by hand. Machines are making perfect clay pots but we can't make them by hand like that. Then there is some extra heavy in these chutty pots. We have to be very careful and dedicate a lot of time to unloading these clay pots because of the heavy. Then our time is wasted." - Owner 06

- Overheat in oven

In the pottery industry, the oven process is a critical stage where waste can occur, particularly if overheating happens. Owner 03, who produces gas clay pots, explained that excessive heat can cause the pots to explode. Additionally, the use of kerosene oil to remove the pots from the machine can leave residue on the pots, which, when subjected to heat, can also lead to waste as the pots may burst. Proper temperature control is essential to minimize this issue.

NEGLIGENCE

All pottery owners acknowledged that careless actions during the manufacturing process lead to waste. Owner 01 emphasized that neglecting proper handling, such as unloading wood stoves without care, can result in damage. If any part of the wood stove is damaged, it cannot be sold and must be disposed of as waste.

- Machine consumption waste

Pottery owners acknowledged that waste is generated when using machines, such as for making gas clay pots. Owner 01 explained that during the machine process, it's difficult to measure the exact amount of clay needed, leading to excess clay being discarded as waste. This waste is a result of negligence in the process.

- When unloaded from the oven

Pottery owners acknowledged small waste when unloading final products from the oven, particularly lamps. Owner 05 explained that negligence, such as unloading multiple lamps at once without careful handling, leads to damage and waste. The use of baskets during unloading also contributes to the damage, resulting in further waste.

- Storing gas clay pots one on another

The interviewer proves that some pots are not very strong and there is some waste by keeping one pot in another one. And owner 03 who is making gas clay pot prove that with said

"These gas clay pots are not very strong. Then when we unload pots we should consider that and also we can't store this one on another one because these are not strong enough to bear that weight. But we don't have enough space to store therefore we store one on another one, then we have some of the waste in upper clay pots."

- Do not consider pot size

Some potters have the opinion that they have waste because they do not consider the size of clay pots. And the owner who is making water pots has an opinion on that.

"In my opinion, we don't have any waste if we carefully unload the water pots from the oven. But these water pots are very huge. Therefore we have to have some waste. We have to bear huge dedication for unloading the water pots. By the way, there is some waste when unloading the water pots."

- Washing out clay with the rain

Before potters get into the clay pot-making process, they need to store raw clay somewhere. But they are not much considering about waste which is generated because of the rain. One interviewer stated that there is some kind of because of rain. Pottery owners, like Owner 05, reported waste occurring before the clay pot-making process, particularly due to improper storage of raw clay. Without a dedicated storage area, rain can wash away clay and sand, leading to additional waste. The washed-out clay and sand must be replaced, adding to the overall waste before production even begins.

4.2.2 Waste management practices

Cheremisinoff (2003) highlighted that different waste streams require distinct management strategies, as industrial waste may contain more hazardous substances compared to municipal waste. In the pottery industry, various waste management practices are employed to handle the waste generated during production, as identified through the interviews conducted in the study.

REDUCE WASTE MANAGEMENT PRACTICE

Among the pottery industry, people's feedback was that they try to reduce their waste in different kind of ways. Owner 03 said *"Absolutely we try to reduce our waste in some ways. We have tried different ways to reduce our waste and some of them work."*

Interviewees prove that they are reducing waste by managing two things in their process. They try to reduce their waste by managing raw clay mixture and by managing heat in the oven.

Figure 2 Managing raw clay mixture

- By managing raw clay mixture

The first step in the clay pottery-making process is to prepare a raw clay mixture. Clay pottery people declare that they will be able to reduce blasted clay pots in the oven by using the proper clay mixture. Owner 01 proved that with this statement.

"When we prepare our clay mixture, we have to consider that very much, then we will be able to reduce the blast in the oven". Owner 04 declared that,"we try to manage the ratio of sand and clay in our raw clay mixture. Then we will be able to reduce waste.

- By managing the heat of the oven

Pottery people declared that they would be able to reduce their waste by managing heat in the oven. And they are using some ways to manage heat in the oven.

Pottery makers have implemented strategies to reduce waste by managing oven heat. One method involves taking sufficient time to heat the oven, as mentioned by Owner 01. Additionally, they switched from using coconut fronds,

which produce high heat, to normal wood for heating the oven. The lower heat from the wood helps prevent the blasting of gas clay pots, thereby reducing waste.

Figure 3 Processing stage of the pottery products

RECYCLE WASTE MANAGEMENT PRACTICE

- Recycle waste before the oven process

All the clay pottery people who faced to interview proved that they do not dispose of any waste clay which has generated before the oven process. They recycle all the wasted clay parts which have been generated before the oven process. Some of the owners declare this,

"Normally, we do not dispose of the waste made before loading to the oven process, because we can recycle those." - Owner 01

Table 6 Recycle waste before the oven process

a.	Recycle by adding water	"Yes, we recycle the waste. The wastes which are making the process before the oven, we recycle. There are no leaves and rocks the waste clay in that process then, by adding water to those wasted clay." - Owner 02
b.	Recycle by grinding	"After grinding and adding water, we will be able to use those clay to make lamps again." - Owner 05

Figure 4 Recycle waste before the oven process

- Collection of raw clay to recycle

According to the interviews, interviews were provided some information regarding their recycling processes and how they collect waste for recycling. And they have agreed that they collect waste material in places. According to the observation, there are two places to collect the waste. Those are as follows.

Table 7 Collection of raw clay to recycle

a.	Collect waste near the workplace	"We collect waste clay generated by machines near to those machines then it will be easy recycle those" – Owner 05
b.	Collect waste in raw clay storage	"If these wasted clay pots are very tight we have to collect those into the land which we are using the store for our transported raw clay". – Owner 06

REUSABLE WASTE MANAGEMENT PRACTICE

All the interviewees proved that they are reusing all the waste after making oven process rather than lamps. Owner 05 who produces lamps declared that wasted lamps cannot be used anymore. *"The waste generated after the oven process will be collected near to oven. Because those wasted lamps will not be able to perform anything".* And there are reusability wastes. Pottery people proved that they use waste which is generated after the oven process to prepare their oven structure.

- Dispose of places

All the pottery makers declared that they were disposing of the waste to fill the pits of land or roads. And there are reusability wastes. Pottery people proved that they use waste which is generated after the oven process to prepare their oven structure. But after some usage limit, those should be disposed of. And they agreed that there is no place to dispose of waste generated by lamp production. As follows,

Table 8 Dispose of places

a.	Dispose of waste on land and road	'If we have over sufficient waste after the oven process, we dispose of those to fill some land. There is some land which has pits. So we use waste wood stove parts to fill those pits." – Owner 01 "We use those to fill some pits in the road. Because of the strong, we can fill pits of road." – Owner 04
b.	There is no separate place to dispose	"The waste generated after the oven process will be collected near to oven. Because those wasted lamps will not be able to perform anything. Therefore we keep those near to oven." – Owner 05

- To prepare oven structure

All the interviewees rather than lamp producers declared that they are reusing waste which is generated by the oven process to prepare the oven structure. The interviewer agreed with that. *"We can use damaged water pots to make our oven. We can prepare the upper part of our oven strongly with these wasted water pots."* – Owner 04

"Yes, we reuse our wastes made in the process of the oven. We use that waste for making the upper part of our oven." – Owner 03

Figure 5 Preparation of the oven structure

- Reuse wasted clay that has unnecessary parts

There is some waste because of removing unnecessary parts from the raw clay. Some of the interviewees declared that they could reuse the wasted raw clay for producing clay pots like a wood stove. *"Therefore the rocks and leaves do not matter for raw clay which is used for making wood stoves. So the removed raw clay by grain vases will be used for making wood stove."* – Owner 02

5 Conclusion

The purpose of this study was to investigate how ceramic manufacturers in the Panduwasnuwara region manage their waste. Clay pottery industries can eliminate the failure factors with the WMP. Businesses will directly profit from good waste management and the use of WMP. The ideal organization will maximize the reuse, recycling, and recovery of all event materials while limiting pressure on main sources to make the most effective use of resources (www.howden.com, 2019). As a result, the following was the primary research goal of this study.

5.1 To explore employee perception about wastage of the clay pottery industry

The study, which focused on six pottery industry members from Panduwasnuwara, used a qualitative phenomenological approach to identify various waste types in the pottery production process. These include transportation waste (inbound and outbound logistics), processing waste (wrong clay mixture, overtime between processes, overheating in the oven), and negligence-related waste (machine consumption, unloading from the oven, improper storage, and rain-induced clay washing). All participants confirmed the presence of significant waste in their processes, particularly in transportation and production, with some waste attributed to negligence.

5.2 To explore the waste management practices in the clay pottery industry

The study focused on six pottery owners in the Panduwasnuwara area and identified their waste management practices (WMPs), including reducing, reusing, and recycling waste materials generated during the manufacturing process. The owners implement strategies to manage raw clay mixtures, control oven heat, and recycle waste before the oven process, while also reusing certain materials. The majority of pottery owners prioritize recycling waste from the early stages of production, as they do not dispose of it but recycle it instead. The study concluded that most pottery industry workers engage in waste management practices to improve profitability, with recycling being the most common WMP employed. Recycling has been widely adopted as a method for reducing costs and increasing efficiency, helping the industry generate profits. The study provides valuable insights for academics and businesspeople, enhancing their understanding of successful recycling strategies in the pottery industry in Panduwasnuwara, highlighting its role in boosting profitability and sustainability.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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