



Community's Perception on Small Business Production's Waste in Karang Anyar, Tarakan City

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ABSTRACT

Tofu and tempeh production is classified as a small-scale industry, which typically lacks standardized wastewater treatment facilities. This situation also occurs in the Karang Anyar village community, where poorly managed waste produced by these industries could have negative impacts on the local community. This situation motivated researchers to investigate how these production businesses manage their waste and how the community perceives the impact of the waste they generate. The research uses purposive sampling to select the locations and respondents, which include business owners and members of the surrounding community. The first objective of data analysis involves a descriptive analysis to gain an understanding of the facts and conditions surrounding waste management in tofu and tempeh production businesses. The second objective focuses on determining the community's perceptions of aesthetics, odor, and the environment. Respondents include business owners who have been operating for more than 5 years, as well as community members living within 500 meters of the production businesses and near drainage channels. The results of the study reveal that none of the 7 tofu and tempeh production businesses surveyed had standardized wastewater treatment facilities, leading to waste being directly discharged into the surrounding drainage channels. The community's perception of this business practice is categorized as "Neutral."

Keywords:

Keywords: Waste,
Waste
Management,
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INTRODUCTION

The tofu and tempeh industry is one of the household industries that fall under the category of small-scale industries. Typically, small-scale industries like tofu and tempeh production only have simple equipment and processing systems

and rarely have standardized Wastewater Treatment Plants (WWTPs)(1). From an environmental perspective, the proliferation of household industries poses significant health risks due to the disregard for factory layout and waste disposal systems. As a result, the surrounding

environment is polluted, both on a small and large scale(2).

The presence of tofu and tempeh waste, which has an impact, certainly gives rise to a distinct view from the community, also known as public perception. Perception is one of the important psychological aspects for humans to respond to things in their surroundings. According to Sugihartono(3), perception is a process of translating incoming stimuli into human sensory organs. Each person tends to perceive the same object in different ways. These differences influenced by knowledge, experience, and perspective, which then attempt to interpret them.

Ditches or drains are the most commonly used areas by tofu producers to dispose of their production waste. Disposing of tofu production waste into ditches or drains without proper treatment has detrimental effects on health and the environment. Tofu production waste that does not meet the water quality standards will degrade the water's quality in the ditches or drains. Discharging tofu production waste into ditches or drains will also impact the aesthetics of these water channels as it causes the water to change color to white. Tofu production waste can also generate unpleasant odors, leading to eutrophication or the excessive presence of nutrients that can disrupt residents' comfort around tofu and tempeh production facilities(4).

In Kelurahan Karang Anyar, there are several tofu and tempeh production businesses. In that area, 10 households engaged in tofu and tempeh production. These production houses are located in close proximity to residential areas. The

presence of these tofu and tempeh production businesses concern that social issues may arise with the local residents due to the waste processing process of tofu and tempeh.

This research focuses on Kelurahan Karang Anyar, Kota Tarakan. It aims to provide new and specific insights into the community's perception of tofu and tempeh production waste of the area. The study specifically focuses on the waste generated by the tofu and tempeh industry, making it the primary focus. This research contributes new knowledge and understanding about the specific waste produced by the tofu and tempeh industry, that sets it apart from previous studies that predominantly examined waste from other industries.

This research also analyzes the community's perception of tofu and tempeh production waste. Previous studies have primarily focused on technical or environmental aspects(5), and this research takes a more holistic perspective by considering the factors of perception and attitudes of the community towards the waste. Furthermore, this study has the potential to uncover possible solutions that to proposed based on the community's perception of tofu and tempeh production waste. If previous research has not extensively addressed this aspect, then this research can contribute new insights to waste management and raising awareness among the community.

With a specific focus on the targeted neighborhood, tofu and tempeh production waste, analysis of community perception, and potential solutions, this research is expected to provide new

insights and make a significant contribution to waste management and increasing public awareness regarding environmental issues in Kelurahan Karang Anyar, Kota Tarakan.

METHOD

The research location is in Karang Anyar Subdistrict, West Tarakan District, Tarakan City, where several tofu and tempeh production businesses are located. The selection of the location was done using purposive sampling technique (intentionally). This decision was made considering the presence of several tofu and tempeh production businesses in that area. The implementation of the research took place from June to August 2022.

The sampling technique used in this research is Purposive Sampling with respondents consisting of (1) Tofu and tempeh production business owners and (2) Community members residing near the tofu and tempeh production businesses. The sampling technique employed is purposive sampling with the following criteria: for business owners, they must have been engaged in production for at least 5 years and be located in Karang Anyar Subdistrict, and for community members, they must reside within a radius of less than 500 meters from the production businesses and be situated near drainage channels. The total number of community respondents is 100 individuals.

In this research, the methods used for primary data collection include observation, interviews, and questionnaires. These methods are supplemented with secondary data obtained

through literature review and documentation. The documentation used in this study includes photographs related to the field conditions that can support the research.

Data analysis in this research employs descriptive analysis and weighting techniques. Descriptive analysis is used to assess the attitude scale obtained from Likert scale questionnaire data, which consists of five levels of attitude responses: Very Concerned (VC), Concerned (C), Neutral (N), Unconcerned (U), and Very Unconcerned (VU) (Yustika, 2021). The analysis is then followed by weighting (scoring) and categorization.

The data analysis for the first objective involves descriptive analysis aimed at identifying the facts and on-site conditions related to the waste management of tofu and tempeh businesses. The data analysis for the second objective is conducted to understand the community's perception regarding aesthetics, odor, and the environment. To determine the community's perception of aesthetics and odor, the qualitative data obtained from the questionnaire will be converted into scores using Equation 1.(6)

$$P = \frac{x}{x^1} \times 100\% \quad (\text{Equation 1})$$

P = Percentage

X = The value of a respondent's answer to a single item.

x^2 = The ideal value

Table 1. The level of community perception regarding odor, aesthetics, and the environment

Criteria	Frequency	Value
Very Concerned (VC)		5
Concerned (C)		4
Neutral (N)		3
Unconcerned (U)		2
Very Unconcerned (VU)		1
Total	100	

Sources : Saskia (7)

Determining the range of the highest and lowest scores by multiplying the lowest and highest weighted values with the number of respondents;

$$N = 1 \times 100 = 100$$

$$M = 5 \times 100 = 500$$

Determining the scale range using the equation:

$$SR = \frac{(m-n)}{b} \quad (\text{Equation 2})$$

SR = scale range

M = highest score item

N = highest score item

B = Number of classes

Table 2. Score Interpretation

Scale Range	Criteria
100-179	Very Concerned (VC)
180-259	Concerned (C)
260-339	Neutral (N)
340-419	Unconcerned (U)
420-500	Very Unconcerned (VU)

Sources: Shaskia & Yunita(8)

RESULT AND DISCUSSION

1.1. Perception of Odor.

Tables 3 and 4 display the community's perception of odor emanating from production houses and waste discharged into drainage channels. The highest level of offensiveness reported by the community towards production house odor is classified as Very Concerned, with 27% of respondents, while 14% found it Very Unconcerned. The community believes the aroma has an impact, particularly when passing by the production houses, although some individuals claim it has no effect due to the distance from their homes. Concerning the offensive odor from drainage channels, 41% perceive it as Very Concerned, with 9% finding it Very Unconcerned. Based on these tables, the majority of the community considers the emitted odor to have negative effects.

During the rainy season, the community perceives no disturbance from liquid waste discharged into the drainage channels, as it lacks unpleasant odors or aromas. However, in the dry season, the odor from the waste produced by tofu and tempeh production, which is released into the drainage channels, becomes highly pungent, causing significant disruption for local residents. This occurs because the waste, typically carried away by flowing water, becomes obstructed due to low water volume. Consequently, the wastewater settles in the drainage channels, gradually generating unpleasant odors. The community's perception of the waste odor from tofu and tempeh production, as depicted in Tables 3 and 4, provides insights into their perception levels concerning odors originating from production houses and drainage channels.

1.2. Community Perception Regarding

Environment

Table 3. Level of community perception regarding odor 1.

Question	Criteria	Frekuensi	Scale	Total	Percentage
What is your response to the odor/aroma coming from the tofu/tempeh production facility?	Very Concerned (VC)	14	5	70	27%
	Concerned (C)	16	4	64	25%
	Neutral (N)	21	3	63	24%
	Unconcerned (U)	12	2	24	9%
	Very Unconcerned (VU)	37	1	37	14%
Total		100	15	258	100 %

Source: Primary data, (processed)

Table 4. Level of community perception regarding odor 2.

Question	Criteria	Frekuensi	Scale	Total	Percentage
What is your response to the odor/aroma emitted from the waste discharged from tofu/tempeh production into the drainage channels?	Very Concerned (VC)	24	5	120	41%
	Concerned (C)	14	4	56	19%
	Neutral (N)	24	3	72	24%
	Unconcerned (U)	10	2	20	7%
	Very Unconcerned (VU)	28	1	28	9%
Total		100	15	296	100 %

Source: Primary data, (processed)

Perception of aesthetics was assessed through Tables 5 and 6, which revealed the community's perception of the impact of waste on the turbidity of drainage water and the cleanliness of drainage channels. Table 5 indicated that the highest percentage, 33%, fell under the category of Concerned for the turbidity caused by waste, while 7% considered it Very Unconcerned, with 3% in the lowest category of Unconcerned. In Table 6, the highest percentage of 33% was reported under the category of Concerned. For the impact of waste on dirty drainage channels, while the lowest category of Very Unconcerned accounted for 8%. According to the community's statements, untreated liquid waste discharged into the drainage channels results in turbid, dirty, and contaminated water, thus negatively affecting the aesthetics of the surrounding environment. Tables 5 and 6 present the community's perception levels regarding aesthetics related to the production houses and waste discharged into the drainage channels.

Table 5. Level of community perception regarding aesthetics 1.

Question	Criteria	Frekuensi	Scale	Total	Percentage
What is your response to the waste from tofu/tempeh production that causes the river/ditch water to become white and turbid?	Very Concerned (VC)	20	5	100	32%
	Concerned (C)	26	4	104	33%
	Neutral (N)	27	3	81	26%
	Unconcerned (U)	5	2	10	3%
	Very Unconcerned (VU)	22	1	22	7%
Total		100	15	317	100 %

Source: Primary data, (processed)

Table 6. Level of community perception regarding aesthetics 2.

Question	Criteria	Frekuensi	Scale	Total	Percentage
What is your response to the waste from tofu/tempeh production that makes the environment dirty?	Very Concerned (VC)	20	5	100	33%
	Concerned (C)	24	4	96	32%
	Neutral (N)	16	3	48	16%
	Unconcerned (U)	15	2	30	10%
	Very Unconcerned (VU)	25	1	25	8%
Total		100	15	299	100 %

Source: Primary data, (processed)

1.3. Community Perception Regarding

Environment

Table 7 presents the community's perception of waste causing contamination in drainage channels, where the majority of respondents, 37%, find it Very Concerned, while 6% find it Very Unconcerned. In Table 8, the community's perception of waste causing health issues is shown, with the highest percentage falling under the category of Very Unconcerned at 36%, while 31% find it Very Concerned. Table 9 reveals the community's perception of waste production damaging the ecosystem in drainage channels, with the highest percentage, 33%, reported as Very Concerned, while the lowest category of Very Unconcerned accounts for 8%. Lastly, Table 10 highlights the community's perception of liquid waste discharged into drainage channels, with the highest percentage, 41%, falling under the Very Concerned category, while the lowest category of Very Unconcerned accounts for 5%.

The community members expressing concerns perceive the waste discharged into the drainage channels as contributing to

environmental pollution, particularly noticeable during the dry season. They note that apart from emitting unpleasant odors, the waste also negatively impacts the overall beauty and aesthetics of the surrounding area. Some residents have reported health issues related to the waste, including itching when participating in community cleaning activities to clear the drainage channels.

They have observed that not wearing boots during these activities can lead to skin irritations. Additionally, residents living in close proximity to, but not directly next to, the drainage channels have voiced worries about the production process, particularly the emitted smoke, which causes respiratory difficulties. According to their testimonies, when the weather is overcast or cloudy, the smoke from tofu and tempeh production becomes trapped by the clouds, hindering its dissipation and further exacerbating the issue.

The community also complains about the wood fuel used in the production process being placed on the roadside, which not only makes the environment dirty but also results in nails falling off the wood, causing punctures in the tires of passing vehicles. The community's perception of the environment is their response to the environmental conditions caused by waste from tofu and tempeh production. This perception, as presented in Table 7, demonstrates the community's perception of waste from tofu and tempeh production in terms of the environment as follows:

Table 7. Level of community perception regarding environment 1.

Question	Criteria	Frekuensi	Scale	Total	Percentage
That is your response to the waste that causes the river/ditch to become polluted?	Very Concerned (VC)	23	5	115	37%
	Concerned (C)	24	4	96	31%
	Neutral (N)	16	3	48	15%
	Unconcerned (U)	18	2	36	11%
	Very Unconcerned (VU)	19	1	19	6%
Total		100	15	314	100 %

Source: Primary data, (processed)

Table 8. Level of community perception regarding environment 2.

Question	Criteria	Frekuensi	Scale	Total	Percentage
What is your response to the waste that causes health issues?	Very Concerned (VC)	12	5	60	31%
	Concerned (C)	13	4	52	27%
	Neutral (N)	0	3	0	0%
	Unconcerned (U)	5	2	10	5%
	Very Unconcerned (VU)	70	1	70	36%
Total		100	15	314	100 %

Source: Primary data, (processed)

Table 9. Level of community perception regarding environment 3.

Question	Criteria	Frekuensi	Scale	Total	Percentage
What is your response to the waste from tofu/tempeh that damages the ecosystem of drainage channels/ditches/rivers?	Very Concerned (VC)	19	5	95	33%
	Concerned (C)	15	4	60	21%
	Neutral (N)	20	3	60	21%
	Unconcerned (U)	23	2	46	16%
	Very Unconcerned (VU)	23	1	23	8%
Total		100	15	284	100 %

Source: Primary data, (processed)

Table 10. Level of community perception regarding environment 4.

Question	Criteria	Frekuensi	Scale	Total	Percentage
What is your response to the liquid waste that is discharged into the drainage channels/ditches/rivers?	Very Concerned (VC)	27	5	135	41%
	Concerned (C)	26	4	104	31%
	Neutral (N)	19	3	57	17%
	Unconcerned (U)	8	2	16	5%
	Very Unconcerned (VU)	20	1	20	6%
Total		100	15	332	100 %

Source: Primary data, (processed)

1.4. The Community's Perception of Waste from Tofu and Tempeh Production.

Table 11 presents the overall community perception of odor, aesthetics, and the environment, with a total score of 2292 out of the expected total. The perception level of the community reaches 28.6%, indicating agreement among more than 25% of the population regarding the impact of waste from tofu and tempeh production when discharged into the drainage channels, affecting odor, aesthetics, and the environment. The average attitude score of 284, as shown in Table 11, categorizes the

perception as "Neutral." This suggests that waste from tofu and tempeh production has a noticeable impact on the community, although there are individuals who may not perceive its effects on the drainage channels.

Concerned community members hope that tofu and tempeh producers in Karang Anyar will take measures to treat their liquid waste before disposal into the drainage channels, minimizing the impact on nearby residents living in close proximity to the production sites. The liquid waste generated from tofu and tempeh production can be effectively utilized as natural fertilizer(9) for plants, aligning with Nurman's(10) view that it contains a significant protein content, and decomposition by soil microorganisms releases nitrogen compounds beneficial for soil absorption.

Similar to solid waste that can be sold to farmers, liquid waste can also be sold to farmers in need of organic fertilizer, ensuring that this waste can still generate profits rather than being disposed of into the drainage channels. Liquid waste can be utilized as a feedstock for biogas, serving as an alternative fuel source. This aligns with the opinion of the Ministry of Environment (2006) that, in general, the anaerobic process produces methane gas (biogas). There are two types of biogas generators or digesters(11): (1) Floating Type, Fixed Dome Digester, and Baffled Reactor for Anaerobic Treatment. Table 11 provides information on the overall community perception regarding the three criteria (odor, aesthetics, and the environment) as follows:

Table 11. The community's perception of waste from tofu and tempeh production.

Indikator	SIKAP					Score	Criteria
	VC	C	N	U	VU		
What is your response to the odor/aroma emanating from tofu/tempeh production houses?	14	16	21	12	37	258	Unconcerned
What is your response to the odor/aroma that arises from the waste of tofu/tempeh being discharged into the drainage channels?	24	14	24	10	28	296	Neutral
What is your response to the waste from tofu/tempeh that causes the river/ditch water to become white and turbid?	20	26	27	5	22	317	Neutral
What is your response to the waste from tofu/tempeh that makes the environment dirty?	20	24	16	15	25	299	Neutral
What is your response to the waste that causes the river/ditch to become polluted?	23	24	16	18	19	314	Neutral
What is your response to the waste that causes health issues?	12	13	0	5	70	192	Very Unconcerned
What is your response to the waste from tofu/tempeh that damages the ecosystem of drainage channels/ditches/streams?	19	15	20	23	23	284	Neutral
What is your response to the liquid waste being discharged into the drainage channels/ditches/streams?	27	26	19	8	20	332	Neutral
Score Total						2292	
The average						286,5	

Source: Primary data, (processed)

CONCLUSION

Based on the conducted research and its discussion, it can be concluded that there is a lack of proper wastewater treatment facilities for liquid waste from tofu and tempeh production in Karang Anyar Subdistrict. This inadequacy creates environmental issues, especially during the dry season when the impact is more prominent. The average attitude score of the community, which is categorized as "neutral," indicates that waste from tofu and tempeh production does have an impact on the community. However, it is worth noting that there are individuals who may not perceive the effects of waste being discharged into the drainage channels.

In light of the research findings, several recommendations and inputs are suggested for both tofu and tempeh production businesses in Karang Anyar Subdistrict and the government. Business owners should consider exploring alternative methods for treating liquid waste, such as employing anaerobic treatment techniques. Additionally, local government authorities need to be more responsive to community complaints and social issues related to environmental concerns, specifically within the tofu and tempeh

production industry. It is crucial for the government to enhance policies on industrial zoning, particularly waste management, to ensure the harmonious coexistence of industrial activities and the community. Furthermore, stricter regulations should be imposed on business permits granted to tofu and tempeh producers in Tarakan City, specifically within Karang Anyar Subdistrict, to enforce proper waste management practices.

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