

Behavioral Factors of Liquid Waste Disposal of Tofu Industry at Gondanglegi Village of Nganjuk Regency

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Abstract— The increasing population phenomenon in Indonesia bring consequences to the living environmental damages. Population growth imbalance with the environmental capability causes the environmental degradation including the environmental pollution because of human production and consumption. In the economic science the presence of industry is able to bring benefit, but in the environmental science it has potential to bring damage for the waste produced from the operational cycle can harm the living environment. The indications of environmental degradation because of waste exist in the area of the study.

Therefore this study aimed at analyzing the behavioral factors of liquid waste disposal mistakenly of tofu industry at Gondanglegi village of Nganjuk regency by using Confirmatory Factor Analysis (CFA). The results showed that the biggest influencing factor toward the industrial behavior is enabling factors, followed by reinforcing factors and the last is predisposing factors.

Keywords— Waste disposal behavior, predisposing factor, enabling factor, reinforcing factor.

I. INTRODUCTION

One of human activities which has potential to degrade environment, including the emerge of environmental pollution is industry. In the view point of economic science, industrial presence can be said as bring benefit, such as contribution to PDB, workers absorption and goods and services export value (Arsyad L, 2004). However in the environmental viewpoint is the otherwise, has potential to bring losses. It is caused by the waste produced in the operational activities which is able to endanger the living environment function (Alfiah T, 2012 and Ali M, 2011).

The increasing population, happens not only at the national level, but also at the local level, such as in Nganjuk Regency as one of autonomous area in east java. Data showed that population in 2010 is 1.017.030 persons (BPS of Nganjuk Regency, 2011), and the number increased to 1.045.375 persons in 2016 (BPS of Nganjuk Regency, 2017). Realizing the tendency of increasing population, it is not surprising if the people's economic (ekonomi kerakyatan) such as based on the trading and agricultural based industry and the environmental preservation get special attention in the local development policy, either in long term development policy (RPJPD) or in medium term development policy (RPJMD). Current survey show that tofu industries at Gondanglegi village of Nganjuk Regency negative contribution to the environment because of the mistaken liquid waste disposal behavior.

Recall to the environmental impact potential from the industrial liquid waste, then it should be done research about the behavioral factors of tofu industry in disposing the liquid waste at Gondanglegi village of Nganjuk Regency, with

expectation can be produced recommendation how the appropriate way to decrease the mistaken liquid waste disposal behavior so the home industry can be maintained without sacrifices the living environmental quality.

Industrial presence can be said bringing benefit for the local area, such as: workers absorption, local revenue (Arsyad L, 2004). But the industrial presence also has potential to bring loss for the local area. It is caused because of in the operational cycle beside producing finished product/ half finished with economic value, industry also produces waste that able to damage the living environment (Alfiah T, 2012 and Ali M, 2011). For more detail in figure 1.

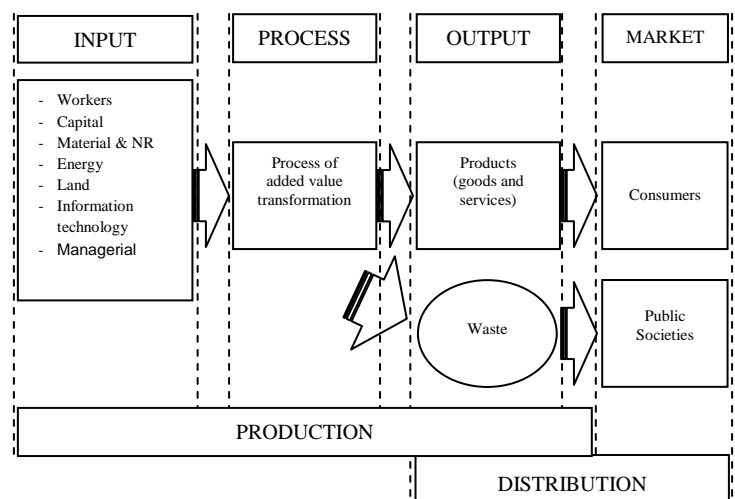


Fig. 1. Operational activities scheme of tofu industry. Source: Alfiah T (2012) and Ali M (2011)

Human behavior is the actions or activities of the human being, has wide scope such as: talking, walking, reading, writing, laughing, crying, and etc either can be observed directly or cannot be observed directly by the external parties (Notoatmodjo S, 2012). Outside of human being, other creatures also have their own behavior. The things which differentiate with other creatures are that when human being will do something always be influenced by ratio and emotion. Even one human with other sometime different depend on their socio cultural environment (Notoatmodjo S, 2014).

The human being behavior emerging not stand alone, but caused by stimulus, which become the forming factors of human behavior. Precede Model is directional model used to diagnose and evaluate the human behavior in the health education. Precede Model stated by Lawrence Green (1980). The model explained several forming factors of human behavior. According to the model, human behaviors are

influenced by 3 (three) main factors. First factors, predisposing factor, factors which facilitate the someone behavior. Generally, predisposing factors can be said as personal consideration which influence the behavior occurrence. Those included in the predisposing factors such as: knowledge, attitude, belief, and values owned by someone, and how the characteristic such as: age, sex, education level, occupation influence the behavior occurrence. Second factor, enabling factors, factors which facilitate or enable the behavior occurrence: presence of facilities and infrastructures as the support for the behavior. Third, reinforcing factors, factors which encourage or strengthen the occurrence of behavior. The factors also called as the enclosing factors, factors which come after the behavior occurrence, has role to give incentive or punishment for the behavior for the continuity or stoppage of the certain behavior. Example: policy (rule), apparatus (control) and prominent figures / religious figures (Notoatmodjo S, 2014).

For detail, Precede model (*predisposing – enabling – reinforcing*) can be seen at figure 2.

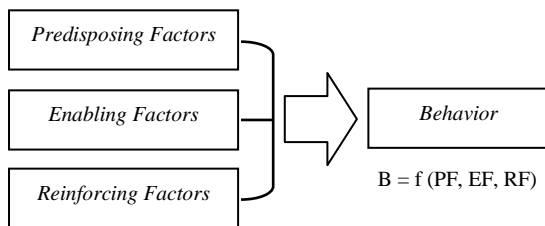


Fig. 2. Precede model.

Source Notoatmojo S (2014)

Related to the research, the understanding about human behavior is important. It is caused by the environmental condition cannot be separated from the human behavior. Also the vice versa, the human behavior able to cause impact to the environment, present and cannot be separated from the living environment. Between human and living environment always occurs reciprocal dynamic relationship, that is: (i) human beings influence the living environment, and (ii) human beings are influenced by the living environment. The change in the living environment will cause change in the human behavior to adapt with the new condition. The change in the human behavior will cause the change in the living environment (Sastrawijaya A T, 2009).

Along with the reciprocal relationship theory between human beings and the environment above, if there is change potential in the living environment caused by the human being behavior, then we can investigate further about the causing factors for the human behaviors. The mistaken liquid waste disposal by industry can be investigated further through human being behavior. The industrial position here only as entity, but the doers are human beings. And if refer to the opinion stated by Sastrawijaya A T (2009), tofu industry liquid waste mistakenly disposal has potential to decrease the living environment quality. Even if the liquid waste mistakenly disposal more than the environmental capacity and carrying capacity then, has potential to produce environmental pollution and damage.

II. STUDY METHOD

The research is prescriptive research by using quantitative descriptive by using *Confirmatory Factor Analysis* (CFA) method, analysis technique selected is interdependent technique based on variance by using *partial least squares* (PLS).

Tofu industry population in the location of 150, while the sample used and calculated by *proportional stratified area* (*cluster*) random sampling of 60 units.

The construct used in the analysis: first, construct included into predisposing factors consist of: knowledge (X₁), attitude (X₂), education (X₃), income (X₄); Second, constructs that included into enabling factors consist of: liquid waste processing facilities (X₅), information media (X₆); Third, constructs that included into reinforcing factors consist of: environmental cadre (X₇), external aid (X₈), institution (X₉), extension (X₁₀) and regulation (X₁₁).

III. RESULT AND DISCUSSION

Profile of Tofu Industry

Profile of tofu industry is general picture about tofu home industry at Gondang Legi village of Nganjuk Regency obtained based on survey results.

A. Respondents characteristics based on Based on Sex, Age, Education level and Business duration

Generally the respondents characteristic based on sex can be seen at figure 3.

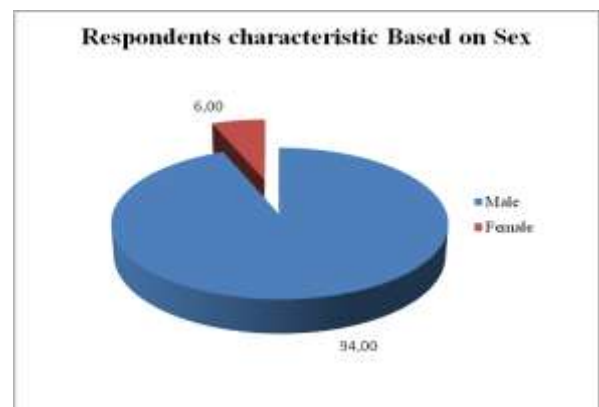


Fig. 3. Respondents characteristic based on sex.

Source: Analysis Result

Male tofu Industry owners more than females.

Fore respondents characteristic based on age can be seen at Figure 4.

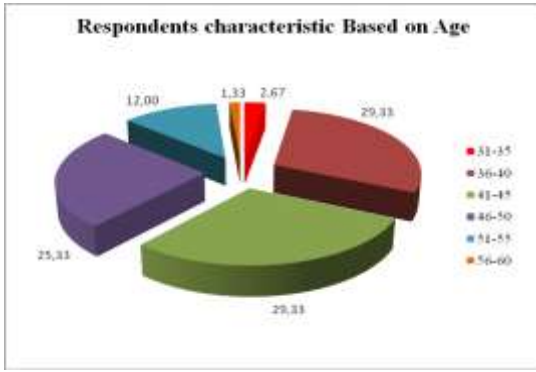


Fig. 4. Respondents characteristic based on age.

Source: Analysis result

Data showed the owner in the age range 36 - 40 years.

While respondents characteristic based on education level can be seen at figure 5.

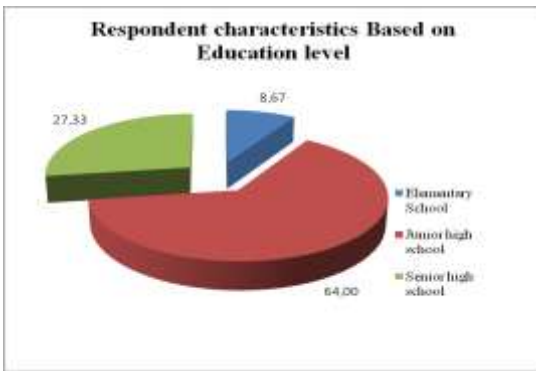


Fig. 5. Respondent characteristics based on education level.

Source: Analysis result

Data showed the industrial majority owners graduated from junior high school.

While for business duration can be seen at figure 6.

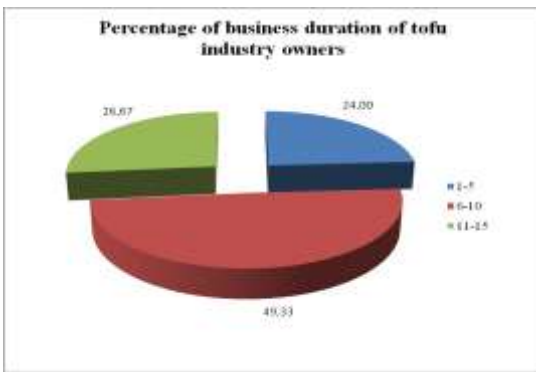


Fig. 6. Percentage of business duration of tofu industry owners.

Source: Analysis result

Data showed industry majority owners have run the business for 6-10 years. But, there are also that more than 10 years or less than 5 years.

B. Production process at the tofu industry

Tofu production process is process of tofu making, from submerging of soybean as input, ended with the molding and cutting the raw tofu and ready to be marketed. Based on

primary survey results, tofu production stages can be seen at figure 7.

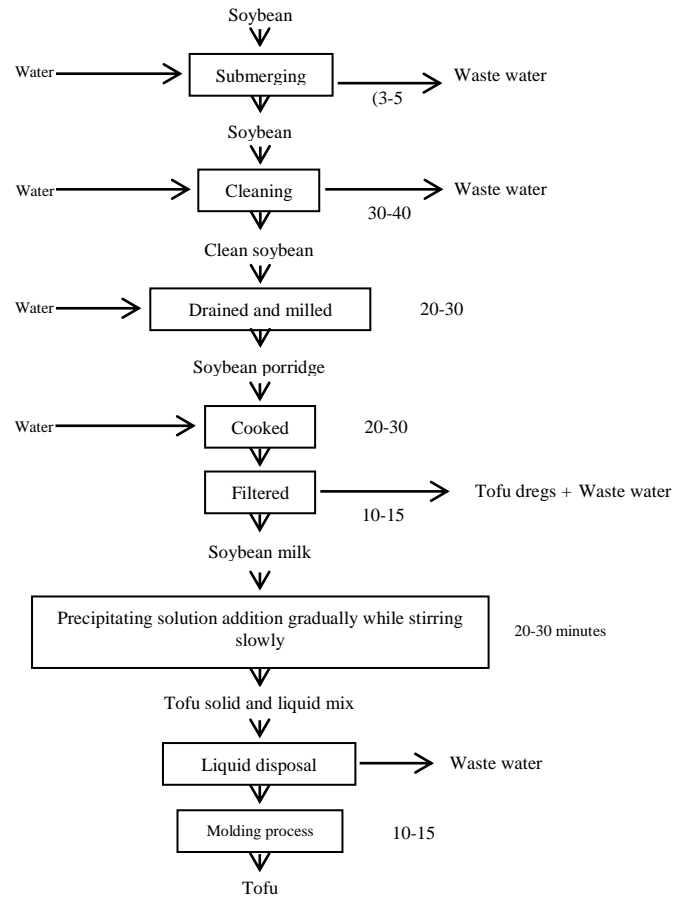


Fig. 7. Flow process of tofu production.

Source: Analysis Result

C. Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is one of method in factor analysis to confirm a model based on theory. In the research, confirmatory factor analysis (CFA) process done twice, that is CFA First Order and CFA Second Order.

CFA 1st Order

CFA 1st Order aimed at knowing the validity of construct in measuring dimension. Testing results determined by loading factor and Average Variance Extracted (AVE) value. A construct can be said as valid in measuring dimension if the loading factor more than 0.6 and Average Variance Extracted (AVE) value more than 0.5.

Convergent Validity 1st Order toward all construct

Testing results of convergent validity 1st order toward all construct at predisposing factors can be seen at table 1.

TABLE 1. Testing results of Convergent Validity 1st Order of all dimension constructs of Predisposing Factors

Dimension	Construct	Loading Factor	Explanation
Predisposing Factors	Knowledge (X ₁)	0.980	Valid
	Attitude (X ₂)	0.978	Valid
	Education (X ₃)	0.122	Invalid
	Income (X ₄)	0.144	Invalid

Source: Analysis Result

Testing results of *convergent validity 1st order* toward all dimension constructs of *enabling factors* can be seen at table 2.

TABLE 2. Testing results of *Convergent Validity 1st Order* All Dimension constructs of *Enabling Factors*

Dimension	Variable	Loading Factor	Explanation
Enabling Factors	Facilities (X ₅)	0.908	Valid
	Information media (X ₆)	0.925	Valid

Source: Analysis result

Testing results of *convergent validity 1st order* toward all dimension constructs of *reinforcing factors* can be seen at table 3.

TABLE 3. Testing results of *Convergent Validity 1st Order* all Dimension constructs of *Reinforcing Factors*

Dimension	Variable	Loading Factor	Explanation
Reinforcing Factors	Environmental cadre (X ₇)	0.883	Valid
	External aid (X ₈)	0.914	Valid
	Institution (X ₉)	0.451	Invalid
	Extension (X ₁₀)	0.887	Valid
	Regulation (X ₁₁)	-0.570	Invalid

Source: Analysis result

If it is depicted, testing results of *convergent validity 1st order* toward all constructs can be seen at path diagram at figure 8.

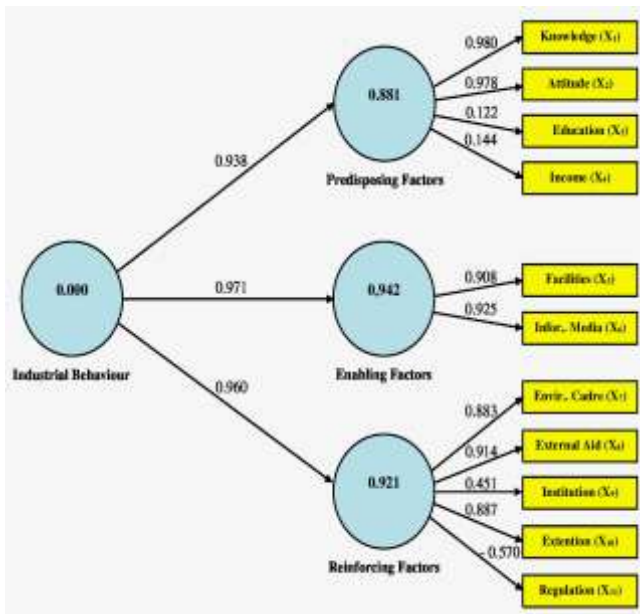


Fig. 8. Path diagram of testing results of convergent validity 1st order. Source: Analysis result

From the testing results of *convergent validity 1st order* above can be said that there are several constructs which were invalid in measuring the dimension. Because of that, it is tested again without enclose the invalid construct. Invalid constructs: education (X₃), income (X₄), institution (X₉) and regulation (X₁₁). Because of that it was done retesting of *convergent validity 1st order*.

Convergent Validity 1st Order without Invalid constructs

Retesting results of *convergent validity 1st order* at *predisposing factors* dimension can be seen at table 4.

TABLE 4. Retesting results of *Convergent Validity 1st Order* of *Predisposing Factors* Dimension

Dimension	Construct	Loading Factor	Explanation
Predisposing Factors	Knowledge (X ₁)	0.979	Valid
	Attitude (X ₂)	0.981	Valid

Source: Analysis result

Retesting results of *convergent validity 1st order* at *enabling factors* dimension can be seen at Table 5.

TABLE 5. Retesting results of *Convergent Validity 1st Order* of *Enabling Factors* Dimension

Dimension	Construct	Loading Factor	Explanation
Enabling Factors	Facilities (X ₅)	0.911	Valid
	Information media (X ₆)	0.923	Valid

Source: Analysis Result

Retesting results of *convergent validity 1st order* at *reinforcing factors* dimension can be seen at table 6.

TABLE 6. Retesting results of *Convergent Validity 1st Order* of *Reinforcing Factors* Dimension

Dimension	Construct	Loading Factor	Explanation
Reinforcing Factors	Environmental cadre (X ₇)	0.923	Valid
	External aid (X ₈)	0.928	Valid
	Extension (X ₁₀)	0.928	Valid

Source: Analysis result

If it is depicted, testing results *convergent validity 1st order* toward all variables can be seen at path diagram at figure 9.

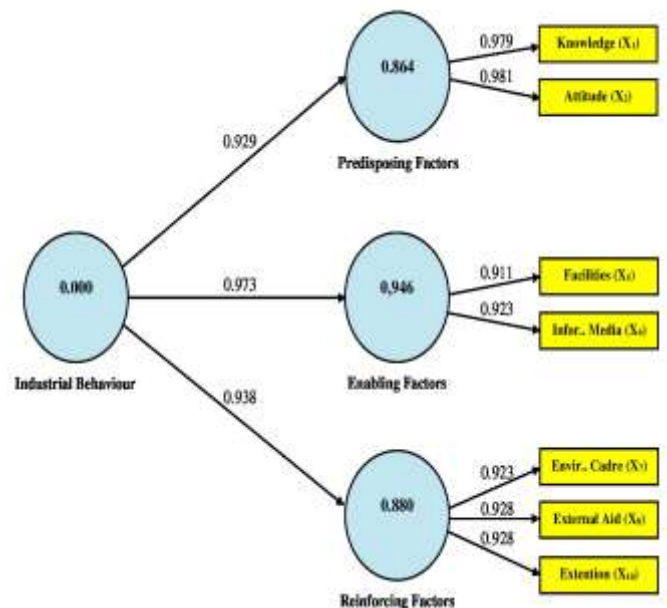


Fig. 9. Path diagram of retesting results of convergent validity 1st order. Source: Analysis result

Convergent validity 1st Order beside valued from loading factor, also valued through Average Variance Extracted (AVE). A variable can be said as fulfill the convergent validity test if has Average Variance Extracted (AVE) more than 0.5. Testing results of Convergent validity 1st order through Average Variance Extracted (AVE) can be seen at table 7.

TABLE 7. Testing results of Convergent Validity 1st Order Through Average Variance Extracted (AVE) values

Dimension	AVE values	Explanation
Predisposing Factors	0.960	Valid
Enabling Factors	0.841	Valid
Reinforce Factors	0.858	Valid

Source: Analysis Result

CFA 2nd Order

CFA 2nd Order aimed at knowing the validity of dimension in measuring variable. Testing of CFA 2nd order shown by loading factor values. A dimension can be said as valid in measuring variable of the loading factor value more than 0.6. Testing results of convergent validity 2nd order can be seen at table 8.

TABLE 8. Testing results of Convergent Validity 2nd Order

Variable	Dimension	Loading factor	Standard Error	T Statistics
Industrial behavior	Predisposing Factors	0.929	0.008	119.730
	Enabling Factors	0.973	0.002	399.422
	Reinforce Factors	0.938	0.009	106.478

Source: Analysis result

Discriminant Validity

Discriminant validity calculation aimed at reconfirming the valid construct validity in measuring dimension. The value produced from discriminant validity called as cross loadings value. A construct can be said as valid if cross loading construct a more than alike construct value at other dimension. Testing results of discriminant validity can be seen at table 9.

TABLE 9. Testing results of Discriminant Validity

Construct	Dimension Predisposing Factors	Dimension Enabling Factors	Dimension Reinforcing Factors
Knowledge (X ₁)	0.979	0.876	0.698
Attitude (X ₂)	0.981	0.922	0.784
Facilities (X ₃)	0.731	0.911	0.810
Information media (X ₄)	0.946	0.923	0.776
Environmental cadre (X ₅)	0.686	0.800	0.923
External aid (X ₆)	0.701	0.817	0.928
Extension (X ₇)	0.719	0.784	0.928

Source: Analysis result

Reliability

Reliability calculation aimed at testing reliability of each dimension. The measure used is composite reliability. A dimension can be said as reliable if the value more than 0.7. Calculation results of composite reliability can be seen at table 10.

TABLE 10. Testing results of Composite Reliability

Dimension	Composite Reliability	Explanation
Industrial behavior	0.963	Reliable
Predisposing Factors	0.980	Reliable
Enabling Factors	0.913	Reliable
Reinforce Factors	0.948	Reliable

Source: Analysis result

Results interpretation of Confirmatory Factor Analysis (CFA)

In the research, Confirmatory Factor Analysis (CFA) done in two stages, that is CFA 1st Order and CFA 2nd Order. CFA 1st Order aimed at knowing the construct type that able to represent each dimension which influence the industrial behavior, while CFA 2nd Order aimed at knowing the dimension type which influence at industrial behavior.

CFA 1st Order; at the stage, from initial 11 (eleven) constructs, then decrease become 7 (seven) constructs which were stated as valid. It means, there were 4 (four) constructs fall at the CFA 1st Order stage. Four fallen constructs were:

- Education (X₃)

The fall of education construct cannot be separated from the influence of respondents perception who mostly state agree that education is important, but most respondents also disagree that education able to bring contribution toward attitude and action change. Survey results showed that the highest education level by all respondent mostly junior high school / equivalent. It means, with low education level can be said that respondents do not have comprehensive knowledge about waste so have little possibility to produce good understanding and followed with good individual awareness to change attitude and action.

- Income (X₄)

The fall of income construct cannot be separated from respondents perception who mostly stated that income was important, but mostly also disagree that income able to bring contribution to the change of attitude and action. It is caused by most existing tofu industries have fluctuate income. At the condition the respondents still focus at “how the business can survive”. The change of attitude and action in handling liquid waste not become priority.

- Institution (X₆)

The fall of institution construct cannot be separated from respondents perception who mostly stated that institution was important and bring able to bring contribution to the change of attitude, but mostly also disagree that income able to bring contribution to the action change. It was influenced by failure experience in forming institution which able to protect and fight for the tofu industrial advance at Gondang Legi village of Nganjuk Regency. The information come from interview during survey.

- Regulation (X₁₁)

The fall of construct regulation cannot be separated from respondents perception who mostly agree that regulation was not important, although mostly agree that regulation actually able to bring contribution to the change of attitude and action. It was caused by mostly respondents know that waste disposal mistakenly is prohibited action, but mostly do not know how to handle the liquid waste well. With other words, regulation

in handling liquid waste of tofu industry was not appropriate approach.

The seven constructs produced from the stage of CFA 1st Order which stated as valid, or can be said as influence the tofu industrial behavior in liquid waste disposal that is:

1. Knowledge (X₁)
2. Attitude (X₂)
3. Liquid waste processing facilities (X₅)
4. Information media (X₆)
5. Environmental cadre (X₇)
6. External aid (X₈)
7. Extension (X₁₀)

CFA 2nd Order stage, at the stage obtained that third dimension which influence the industrial behavior stated as valid. Beside that, also known that dimension with biggest influence to industrial behavior was *enabling factors*, followed by *reinforcing factors* and the last was *predisposing factors*.

Finally, from the CFA 1st Order to CFA 2nd Order, can be said that the occurrence of tofu industrial behavior of liquid waste disposal caused by no facilities, either in the form of information media what has role to distribute the danger and prohibition of liquid waste disposal mistakenly or no liquid waste processing facilities that owned by tofu industry. Even if the condition not followed with the understanding improvement to all tofu industrial owners about the importance of environmental preservation and the danger of liquid waste disposal mistakenly, either through extension or empowerment by environmental cadre. It cause no action in handling liquid waste disposal well.

IV. CONCLUSION

From the result of this study, it can be concluded that:

1. Finally, from stage of CFA 1st Order to CFA 2nd Order, can be said that the tofu industrial behavior occurrence which dispose the liquid waste mistakenly caused by no facilities, either in the form of information media that distribute the danger and prohibition of liquid waste disposal mistakenly or no liquid waste processing facilities owned by the tofu industry.
2. Beside the condition not followed by effort to improve the awareness all tofu industries about the importance of environmental preservation and the danger of tofu industrial liquid waste disposal mistakenly, either through extension or empowerment by cadre— environmental cadre.

It caused no action change in handling the liquid waste well.

V. RECOMMENDATION

Input suggestions that can be said for this study were:

1. Information media distribution evenly about the danger and prohibition of liquid waste disposal mistakenly.
2. Provision of liquid waste processing facilities for tofu industry, can be done by self help or through external aid (government and private).
3. Extension to tofu industries evenly about the danger of liquid waste disposal mistakenly and the importance of environmental preservation.
4. Empowerment of tofu industry about the liquid waste handling well so produce liquid waste with pollution content that fulfill the requirements.

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