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Management Model of Processing Crude Oil Waste Liquid in Dumai, Indonesia

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Abstract: ***Crude Oil processing produces a production and a waste. Crude oil waste liquid has been carried out in industrial areas. This is done to save the environment and human health. Crude Oil processing has been the same with the quality standards, however, to minimize Crude Oil waste liquid, it is required the management of liquid waste oil by using a model of waste management of liquid petroleum, to minimize waste so that it generated as small as possible or close to zero, is also called Clean Production in Industry.***

Keywords: Model, Management, Waste, Crude Oil, Oil Content

1. Introduction

Crude Oil processing produces a production and waste. The waste is environmental problem, the main resource of environmental contamination is family wastes while industrial waste is considered giving contribution about 25%-50% averages (21). There are still much wasted liquid which is throwed into the river or main water by unperfectful process. Management model of waste processing is a effective waste managemant strategy.

Industrial waste influences environment and human health if it is not processed by professional management. It could be liquid or solid gases. The waste should be admnistered effectively. Effectivity here means the throughout of the goals can be achieved conciding with planning and task given performs and organizes based on schedult, correctly.

Management function is based elements in which always exists and attributes to the management process that become a sample of manager to apply the activity to achieve the goals. (1)Three functions of management proposed by Fayol are Planning, Organizing and Directing. Planning is think about what will do by source given. Planning is done to determine the goal of company globally and it is the best way to have the goals (2).

The target is the highest one in management beacuse it can give goal and direct so that management can give meaningful thing. The target has been set and informed well so that it can be used as standard of succeses or fails of a process (17).

Actually, in planning it sets what to do, how to do, who will do before performing a work (15). It always become the main foundation in performing a process to achieve the goal set. Manager sets the goal in order to well in doing a work (18). Monitoring is element of functional managemet of observation and allocate a deviations taken place, then, improved them based on the goals and expectations (12).

Management, accrding to scientists, such as Feyol, Terry Taylor and Oie Lang Lee vary, nevertheless, in fact it has the same understanding. The differences are caused by background knowledges of each of them, so, the goal of management become different. Oei Lang Lee Management is knowledge and art planning, organizing directing, coordinating and monitoring human resource by using means to get the goal has been set before (14, 19).

Organizing is performed to a big process into smaller one. Organizing is to make manager easier in monitoring and determining a person who are needed to finish the tasks given. Organizing can be done by determining what tasks should be done, who should do the tasks, how the tasks are grouped, who is responsible to the tasks and in what level the dicision has been taken(9).

Effectivity derives from effective which means effects (influences), causes, imppressons, has results (6). Effectiveness is a condition refers to the level of succesfulness or failure of process to get the goals that has been set effectively before (8).

To see the effectivity, is needed model approach. The approach is the analysis of organizing used the characteristic system as the basic analysis. Therefore, system management can be applied by giving attention to base variuos characteristic systems that influence succesfulness of a system (11).

The approach system to accomplish a problem is always : (1) The research of throughout important factors which influence solution to get the goal, (2) There are some models to get accross discipline, so that the complicated problems can be overcome comprehensively.

Management model of wasted liquid crude oil processing uses means assistance dinamic system in making a model namely Powersim Version 2.5d. The modelling means as clustering of making model which figures a research system (4).

Dinamic system is a group of interactive and dependent elements to have changes in this data and in the future time. On the other words, the changes is not dangerous if it thinks positively (24). System is every fenomena either structure or function which has at least two interactive components. Other definition of system is throughout interactive between element of thing in limited certain environment worked to get goal (11). So, system is a group of elements which interact between each other to get the goal (25).

1). The relationship of system is figured in cousal loop diagram. It reveals the interaction between components in interactive system and influence worked system.

2. Material and Method

2.1. Research Time Place

This research has carried out at oil mill in Dumai City, Riau Province, Indonesia, on June-July 2013. Dumai belongs to a city of oil content saving in Indonesia. Dumai produces 18% of petroleum in Indonesia. Dumai is located at coordinate $101^0$29'00" longitude east (BT) and $1^0$40'00" – $1^0$41'20 parralel north (LU). Dumai City.

2.2. Sampling Data

Primary data is taken by using quesionnaire an interview. Data collection through quesionnaire was given to the employee of oil industry were 40 samples taken randomly.

Analysis unit which focus on this research is the employees under management of waste crude oil liquid industry while the aspects of analysis fromis research are plan that consists of Source A 1. Humanbeings; consists of eduaction, health, communication, and monitoring. 2. Fund, 3. Technology, 4. Method, 5. Procedure, 6. Crude Oil consumption. The production of waste crude oil liquid. And B. Organizing consists of 1. Responsibility, 2. Authority, 3. Reporting, 4. Directing. The result of testing valid variable of processing managemant of crude oil liquid.

Secondary data was takem from management of processing waste which consists of parameter, production, waste, oil consumption and water quantities used for processing on 10-06-2013 (22).

2.3. Research Material

Samples which has been taken were grouped and then analyzed by using measured method. After measuring samples, the effectiveness of waste liquid separator TPI was determined and Separator Biotreatment by using likert scale and spider method. The level of effectiveness processing is the level of decreasing or increasing of parameter consentration checked after water waste through performing of process display on percentage (%) by using general formulation counting processing demand (9). Namely:

$$E = \frac{(S_o - S)}{S_o} \times 100\ \% \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (1)$$

E = Effectiveness of processing waste liquid (%)
So = Consentration of Influent (mg/L)
S = Consentration of Effluent (mg/L)

Generally Netting Spider Method was used to identify potential found in research object; covered powerness and the weaknesses of aspects from research object, in this case, the method used to indentify some issues (3).

Netting Spider method intends to see diagram showed in net spider so that it can get information about the powerness and the weaknesses of research object, so it suggestes an opinion or recommendation related to the research.

Method of measuring sample can be seen in Table 1

Table 1: Sample Analysis of Petroleum Waste Liquid 2013

No	Parameter	Kinds of data	Measuring method
1.	Sulfida	Primer	1.APHA-4500 S^{-2} F-2005
2.	Amonia	Primer	2.APHA-4500 B/C-2005
3.	Phenol	Primer	3.APHA-5530 B/D-2005
4.	OC	Primer	4.POC-100-80
5.	COD	Primer	5.APHA-5220 B-2005

Reseacher 2013

2.4. Data Analysis

The comparision of effectivity separator by using netting spider method, the comparison of the effectiveness parameter liquid waste sparartor Title Plant Interceptor (TPI) and separator Biotreatment can be seen in the table 2 as the following:
Formulation Standard of Effectivity and Attitude
Effectivity:

Attitude Effectivity:

$$\frac{\text{Inlet} - \text{Outlet}}{\text{Inlet}} \times 100\ \% \quad \ldots\ldots\ldots\ldots\ (2)$$

Table 2: The result of waste water separator II-TPI and Separator II-Biotreatment Process, 2011-2013

No	*Analysis*	*Effectiveness 2011(%)*	*Effectiveness 2012 (%)*	*Effectiveness 2013(%)*
1	Sulfida	88.24	90.48	100
2	Amonia	86.92	75.00	91.16
3	Phenol	87.50	95.00	92.85
4	Oil Cont	77.78	75.00	90.00
5	COD	56.77	68.87	53.70

Research, 2013

3. Result and Discussion

The processing of crude oil waste liquid had criteria sufficient or effective enough. The processing saparator waste TPI and Separator Biotreatment in 2011-2013, the result was the same and it increases the effectivity because of improvement of waste processing unit to separate process waste water, drainase waste water and rain according to Permen 2010 (13).

To achieve the most effective one; would find the solution so that it was produced minimum waste or zero waste, nofelty from the research is how to apply the process of

waste minimally. Therefore, it was needed the datas of liquid waste management of petroleum.

Management of crude oil waste liquid processing consists of plann, do, check and action. Research unit were orgnization group of people, incident, or other object of research. The measurement of plann, do, check and action and the recapitulation can be seen in the table 4 as the following. To increase more effectively management model were used, so that the waste closed to zero.

Table 3 : Parameter Managementof WasteProcessing.

No.	Variabel	Result
1	Plan/Rencana	3.67
2	Pelaksanaan /DO	3.75
3	Chek/Pengawasan	3.73
4	Action/Tindakan	4.06
Amount		15.21
Good Criteria		3.81

Table 4: Score Skala Likert of positive statement [1]

Answer	Score answer of positive question	Rank score of question
Sangat Baik/ Best	5	4.21-5.00
Baik/ good	4	3.41-4.20
Cukup Baik/ fair	3	2.61-4.40
Kurang Baik/ less good	2	1.81-2.60
Sangat Tidak Baik/ worst	1	1.00 -1.80

3.2. Discussion

Validity Model was carried out to know the feasibility of model built. Is it representative from the real research and can infer the dicision which ensured the mode by using two fases structural model testing and output testing. All of dependent varables were formulated numerictly (Formulation of Model Validity AME = (XS-XE/XE x 100 %) if the value was ≤ 30 meaning that the result was valid), by using powersim version

2.5d has diagram management of petroleum waste liquid processing. The formulation was:

$$AME = \frac{(XS - XE)}{XE} X\ 100\% \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where X_S is means of simulation resultand X_E is means emperical data

$$AVE = \frac{(V_S - V_E)}{V_E} X\ 100\% \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$V_S$is means of simulation resultand $V_E$is means of empirical data ofvalidity Model, where $V_S$is means of simulation resultand $V_E$is means of model empirical data.

It can be valid ifvalue AME or AVE ≤ 10% forlaboratory research (almostallvariablescan be controlled) and ≤ 30% forout laboratory research (almostallvariablescan't be controlled) [11]. Further, in the valid modelwas carried outsensitiveness testingtoleverange point.

Validity structural testing had a purpose to know how is compatibility of structural model built coming near to the real structure. This testing related to limited syaytem, variable of system maker and assumption used in it. It could be done by testing of structural comptibility and structural consistency. Validity model above was valid because the result 7,36 % if the value

AME ≤ 30 % means valid. Formulation of validity model AME = (XS-XE/XE) x 100 %.

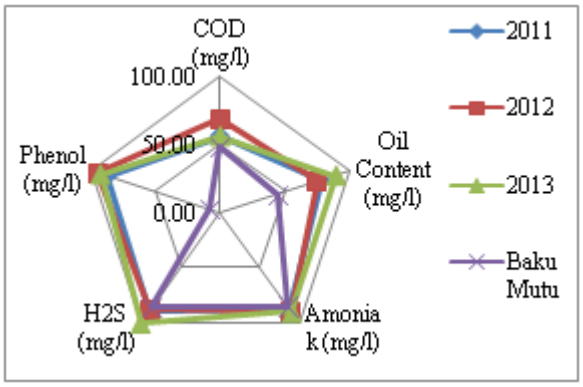

Figure 1: Effectivity analysis of processingoil contentby using net spider

Generally, the purposes of monitoring is to create effeciency and effectivity in a process and try to realize it (16). Or good control is a control for practicing profession and career optimally, namely by determining target and create organization climate to encourage their development and make them responding vigorously task sharing management.

Validity testing of structural model
The research finding supported the theory of controlling management system which can be realible well, had the following elements: commitment, responsibility, authority (20).

The discussion of processing model of waste oil content.

Scenary A changed Plann, that is to increase means of separator TPI from 8 to 10 so that the waste reducing from using separator TPI 8 the final result waas Zero Waste and under standard quality.

Model management of processing oil content by using means TPI 10 pieces setting series will produce the waste minimal Sulfida from 2,6 mg/L become 0 mg/L, Amonia from 5,7 mg?L become 3,2 mg/L, Phenol from 0,2 mg/L become 0 mg/L, oil content from 2 mg/L become 1,98 mg/L COD from 119 mg/L become 94,25 mg/L. This model is minimize the waste. The analysi result on picture 2.

Tabel 5 : Real Condition and Simulation

Condition	H_2S mg/L	Ammonia mg/L	Phenol mg/L	OC mg/L	COD mg/L
Real	0	5,7	0.2	2,00	119
Simulation	0	3,2	0	1.89	94.25

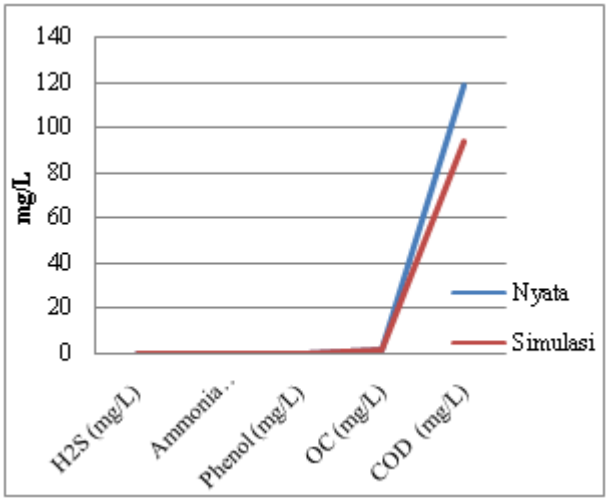

Figure 2: Real ModelandSimulation Model

Tabel 8 Real Conditionand Simulation

MeasurementLikertat present
(Plan) 1.Human resource a.Education b.Health c. Communication d.Checking
2.Funding
3.Technology (S-TPI-8 buah)
4.Method
5.Procedure a. Measurement b. Time
6.Production crude oil
7.Productioncrude oil waste
8.Organizing
a.Responsibility
b.Authority
d.Directing
(Do) 1.Applythe processing of management waste system
2.Apply Procedure
3.Do checking
4.Correction continously
5.Apply method
6.Apply information
(Check) 1.Checking
2.Campany has SOP
3.Sustability performance
4.Having report
5.CheckingAuditor
(Action) 1.Doing improvement of processing waste
2.Comparingthe result achived to the previous one.
3.Application of solution
4.Preventing problem.
5.Suitable with SOP ISO 17025

Table 9 Model Novelty

Model Novelty
(Plann)1.Human resource a. Education b.Health c. Commnication d.Checking
2.Funding
3.Technolofy (S-TPI-10 pieces)
4.Method
5.Procedure a. Measurement b. Time
6.Productioncrude oil
7.Productioncrude oil waste
8.Organizing.
a.Responsibility
b.Authority
c.Reporting
d.Directing
((Do) 1.Applythe processing management waste system
2.Apply Procedure
3.Performing monitoring
4.Correction continouty
5.Apply Method
6.Applyinformation (S-TPI10 Buah)
(Check) 1.Checking
2.Campany has SOP
3.Suetabilityof processing
4.having report
5.Checking Auditor 6.Enhancement directing.
(Action) 1.Improvementwaste processing
2.Comaparingthe resultachieved tothe previous one
3.Application of solution
4.Prevention of problem.
5. Suitable ,SOP, ISO 17025, minimizewaste.

Scenary B is to increase performing factor (do) and monitoring (check) (23) intended what is the process suetable with planning before. Do an action to minimize waste can be done.

Generally model can be used to develop scenary or optional policy and observed the affect of each of them. It should be logic and relevant so that decision maker can compare between the stuations and alternative policy.

4. Conclusion

From analysis result of netting spider showed the effectivity had increased every year. These, because of improving company management and loyality towards implementation of UU Permen KLH 2010 on lampiran III. Model TPI 10 can minimize waste so, it woul be clean production.

5. Other Recommendations

The waste industrial processing in Dumai has fulfil quality standar, and in the proces management of waste were suggested to check more intensively, and many petroleum used katalis Pt, Ni, Cr how is metal returning and further research in order to be able to decrease waste to Waste

Receotion Center Indonesia, processing management is very important to increase checking and performancing.

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