

ISSN : 1978-774X

PROCEEDING

9th ISIEM

The 9th International Seminar on
Industrial Engineering and Management

Grand Inna Muara Hotel Convention & Exhibition Padang,
West Sumatera, Indonesia, September 20 – 22, 2016

Organized by :

Industrial Engineering Department of

- Trisakti University• Al Azhar Indonesia University•
- Esa Unggul University•Telkom University•
- Tarumanagara University •Pasundan University •
- Atma Jaya Catholic University of Indonesia •
- Bung Hatta University •

Supported by :



Sponsored by :

trusted • IT • company
telkomsigma

by Telkom Indonesia



USING FUZZY INFERENCE SYSTEM ON PRODUCTION PLANNING CASE STUDY : PANDANUS HANDICRAFT INDUSTRY

Nofi Erni, Iphov Kumala S., Roesfiansjah R., Riya Widayanti

Industrial Engineering Department

Esa Unggul University

Jakarta, Indonesia

nofi.erni@esaunggul.ac.id

ABSTRACT

Handicraft pandanus industry is one of type of micro industry that used leaves of pandanus to create many woven handicraft. These industries are emerging in some rural areas of Indonesia. Pandanus woven in sheet form used as a mat and through the creative process are processed into functional product such as bags, hats, sandals and others were exported to several countries. In order produce the product, are needed the production planning which is arranged by knowledge and experience of craftsmens. These knowledge are present as linguistic data. Fuzzy Inference System (FIS) are particularly suited for modeling between linguistic variables which make reference to expert knowledge. This study is proposed to develop and validate FIS to production planning with case study at pandanus handicraft industry. The input of FIS are quality, the complexity of the design and the availability of working time. Some rule have developed to decide production level. The number of level production are arranged based on range production capacity. Research conduct based on survey and knowledge acquisitions from stakeholder (expert, produsen, retailer) of supply chain pandanus handicraft industry at West Sumatera and North Sumatera, Indonesia. This paper illustrates, how the expert management system approach was applied to manage production planning on handicraft pandanus industry. According to the result, FIS could arrange the production planning on pandanus handicraft industry.

Keywords : fuzzy inference system, pandanus handicraft, production planning.

1. INTRODUCTION

Handicraft industry which uses woven pandanus leaves as raw material is one of handicraft business that are dispersed widely as microenterprise in Indonesia. Pandanus woven in sheet form are used as a mat and through the creative and innovative process have been processed into functional items such as bags, hats, sandals and others. Many handicraft from pandanus woven have been exported to many countries.

Rapid changes in tastes and variations of customer trends requires an approach on production management, especially with regard to raw materials. In order to assist the planning and production control in pandanus handicraft industry, the research developed software with expert management system approach. The model used in this application refers to a method of managing production in modern

industry, especially to solve a lot of problem in estimating the need for raw materials to make woven pandanus handicraft. Production planning at handicraft industry is a complex concept that refers to make proper decisions under uncertainty and lack information about the the product quality and the availability of working hours.

Research on utilization of information technology in the handicraft industry has been done by Bowonder et al (2005) to improve the competitiveness of handicraft carpet industry in India. Related to knowledge management Arias et al. (2010) using fuzzy expert system approach in order manage information and knowledge to achieve the company's goals. The model based on fuzzy rules to simulate the behavior of the firms, is presented under the assumption of determined input parameters

previously detected and an algorithm is developed to achieve the minimal structure of the model.

This research aims to develop an expert system to make decision about production planning on handicraft industry. The pandanus handicraft industry has a representative to find the actual about production planning and its problem. This research aims to develop FIS to make decision about production planning on handicraft industry. The pandanus handicraft industry has selected as case study to application fuzzy Inference System approach to design production planning with linguistic variable. Most of handycraft industri have not made production planning because lack of data and unsufficient capability on operasional management .

Fuzzy Inference System are particularly suited for modeling the relationship between variables in complex environment because they introduce a process of decision making which is more human-like (Azeem 2012). These system are based on fuzzy logic modeling approach, and allow reaching solution based on linguistic variables which makes reference to expert knowledge. They are useful in the cases were human knowledge is available and there is not enough information as quantitative value. FIS need parameters as inputs and outputs. The fuzzy numbers are quantified using fuzzy logic method using membership function. The generic structure of a typical FIS illustrated in Figure 1.

2. THEORETICAL BACKGROUND

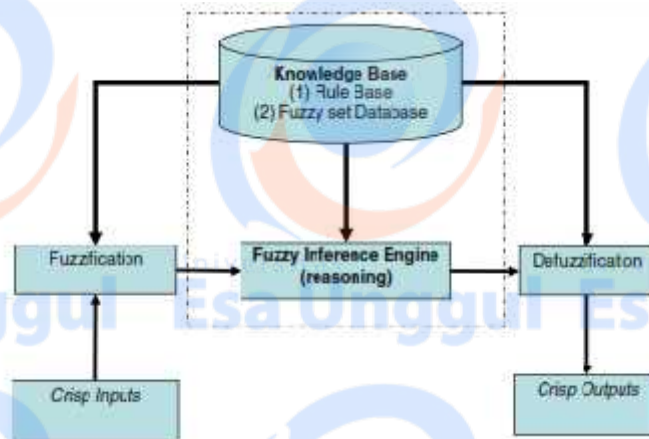


Figure 1. The inference process of Fuzzy Inference System

The Sugeno and Mamdani fuzzy models are the most known types of FIS, which have been implemented in software such as Matlab. The main components of FIS are the knowledge base and the inference engine. The knowledge base component must defines the membership functions of the fuzzy set, and rule base of linguistic. The rules in FIS are fuzzy “IF-THEN” that define the relationship between system input and output , and the general form : if “antecedent proposition” then “consequent proposition”.

A fuzzy rules based system is developed by human operators with the aid of practical experience to handle complex situations, with only a set imprecise linguistic if then rules and an imprecise system state. This system incorporate fuzzy inference and rule based expert system resembling what human do daily. Inputs and outputs are two basic elements in the system using handling approaches. The input constitutes some ambiguous verbal semantic or unclear concept for sepecific event. Following the fuzzy inference mechanism, the output can

be fuzzy set or precise set certain features. Therefore, defuzzification is necessary to convert the output result into crisp number. Fuzzy inference infers the results from the existing rule-based system (Juang et al., 2007)

3. RESEARCH METHOD

This research having done at handicraft industry especially handicraft use leaves of pandanus plant. In order to collect data, information about handicraft industry, the research have done at DI Yogyakarta, West Sumatera and North Sumatera province at Indonesia. Data and information are collect from producer leaves, craftman of woven, handicraft producer where as doing business as trading of handicraft.

The lack of accuracy information about production condition in pandanus handicraft industry are used fuzzy approach. This research are conducting with Fuzzy Rule-Based Inference System (FIS) for proper production planning at handicraft. Despite the complexity of such decision making, FIS use linguistic value to define the input and output. FIS involves three important concepts : membership function, inference rules and fuzzy set operation. Membership functions represent the fuzzy sets of input and output variables, fuzzy set operations are main operations among fuzzy sets (Zadeh, 1965) and inference rules are linguistic fuzzy rules in the form of “ IF-THEN”. In this study input fuzzy Since there are uncertainty about production of handicraft product.

4. RESULT AND DISCUSSION

4.1. Production System of Pandanus Handicraft

The expertise to make woven pandanus are usually hereditary of rural people in Indonesia village. The process is not too complicated but require several days to obtain raw materials in the form of strands woven pandan leaves. Pandanus leaves that have been separated from the stem cut into small pieces, boiled, drained with cold water and allowed to stand. After that, the dried and pressed so that the leaves flaccid to easily woven. The next stage is colored with a dye smeared food and vegetable oil in the drying process so that the color does not fade. The leaves have been further processed woven to be webbing. Woven fiber size adjusted to the product to be produced.

Most of the results in the form of woven mats used for surrounding communities region and some have been distribute and selling to various regions of Indonesia. Many motif webbing was produced has a good appearance in design style, construction and color. The more complicated /intricate workmanship and more number of materials, accessories are used will impact to the higher price. Many product of pandanus handicraft have been exported to another country such as Europe, Malaysia, Singapore Some of handicraft product from pandanus are commonly used as map, tissue boxes, sandals an bag are present in Figure 2.



Figure 2. The sample of pandanus handicraft product

The business activities of woven pandanus handicraft industry, based on observations and interviews with experts and respondents, establish an order of the supply chain from upstream to downstream. Based on the

viewpoint of the process sequence of the decision-making process and the implementation of the flow of products, information and funds, supply chain network woven crafts industry shown in the Figure 3.

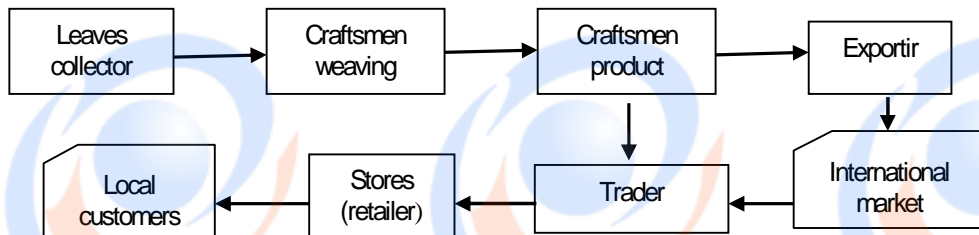


Figure 3. The structure of supply chain onf pandanus handicraft industry

4.2. Developing of Fuzzy Inference System of production planning

Knowledge management are useful as a fundamental role in the process to collect the correct information transfer and dissemination within the organization. Knowledge is intellectual capital, it is critically important for organization. There are so many researchers who interest in how to acquisition knowledge in various research type. In order to construct knowledge stored in the minds of experts, known methods of the Expert system. This method is capable of structuring knowledge and deposited into the machine to be used as a substitute for an expert in making decisions.

Knowledge of woven pandanus handicraft businesses related to the production control has not been compiled into a systematic knowledge and easy to navigate. Various models of the craft that is not yet classified into specific categories. Demand for raw materials in the form of ready woven pandan leaves has not been calculated so as to ensure availability. The process for acquiring knowledge begins with the process of socialization is done through observation and brainstorming.

Defining the criteria inputs and outputs

There are three fuzzy inputs used in preparing the FIS is the quality, the complexity of the design and the availability of working hours.

a. Quality inputs are grouped into two categories such as high and low. The definition of them are :

1. High if the handicraft woven pandanus is strong , tightly webbing and smooth.
2. Low if the handicraft woven pandanus have webbing as brittle. sparse and coarse.

b. Design complexity factor is determined by the complexity of workmanship webbing. Wicker motif is determined by variations in the color used. Criteria relating to the use of color are grouped into three, namely:

1. Difficult if using a motif woven pandan leaves with the colors of more than two types
2. Medium if the motif woven using two colors
3. Lower if the motif woven using only one color.

c. Working time is related to the availability of working hours of craftmens to produce handicrafts. Based on the availability of time to make handicraft, the working time are grouped into:

1. Higher if work hours available more than 40 hours / week
2. Medium if work hours available within 20 to 40 hours / week
3. Low if work hours available within 10 to 20 hours / week

The next step after defined inputs is collect some information of production level as output variables. Because lack of number of production level in this study have defined production planning with sub criteria, low, medium and high.

Rule Based Expert System

Expert systems are defined as consulting systems that simulate the reasoning behavior of human expert. The most important components of expert systems are the knowledge base and the inference engine. The main part of the FIS model is the rules. The behavior of a fuzzy system is characterized by a set linguistic rules which constitutes a rule base. The fuzzy “if-

then” rules are defined on the basis of experts knowledge in each area. In Mamdani approach the premises and the consequences of the if-then are linguistic variables associated with fuzzy concept. Every rules has a weight as the number between 0 and 1 which assign the importance of each rule. A fuzzy rule can be written “ if x_1 is a , and x_2 is b, where x_1 and x_2 are variables, y is solution variable, and a, b, and c are fuzzy linguistic terms.

The linguistic rules are extracted based on FIS approach. Table 1. present the fuzzy interpretation of some parameters based on fuzzy linguistic. The extracted rules are entered in to the rule editor of software developed using MATLAB.

Table 1. Fuzzy Rules of Alternative for Production Planning Handycraft

Rules	Fuzzy Inputs			Fuzzy Outputs
	Quality	Design complexity	Work hours	Production planning
1	Low	Difficult	Average	Moderate
2	Low	Difficult	Low	Low
3	Low	Difficult	High	Low
4	Low	Moderat	Average	High
5	Low	Moderat	Low	Moderate
6	Low	Moderat	High	Low
7	Low	Easy	Average	High
8	Low	Easy	Low	High
9	High	Easy	High	High
10	High	Difficult	Average	High
11	High	Difficult	Low	Moderate
12	High	Difficult	High	Low
13	High	Moderat	Average	High
14	High	Moderat	Low	High
15	High	Moderat	High	Moderate
16	High	Easy	Average	High
17	High	Easy	Low	Moderate
18	High	Easy	High	Low

Fuzzification - Defuzzification

Fuzzification is the process of converting precise or imprecise data into fuzzy data by

assigning membership function. In this study the linguistic criteria adopted from Table 1 as fuzzy variables. The subcriteria as inputs of the

proposed fuzzy inference approach. In this research are used triangular membership function is exploited due to its prevalent. The criteria linguistic are assigned as three categorise. The experts are involved in the formulation of criteria and their input factors are craftsmen who make webbing, craftsmen who produce handicrafts from the webbing, wholesalers and store that sent the craft

products to end customers. Fuzzy set input and output model are entered to Matlab software. present at Figure 4.

Defuzzification is a process to transform a fuzzy output to a crisp output. The centre of area method (COA) are used in this study, while defuzzification to get crisp number of output.

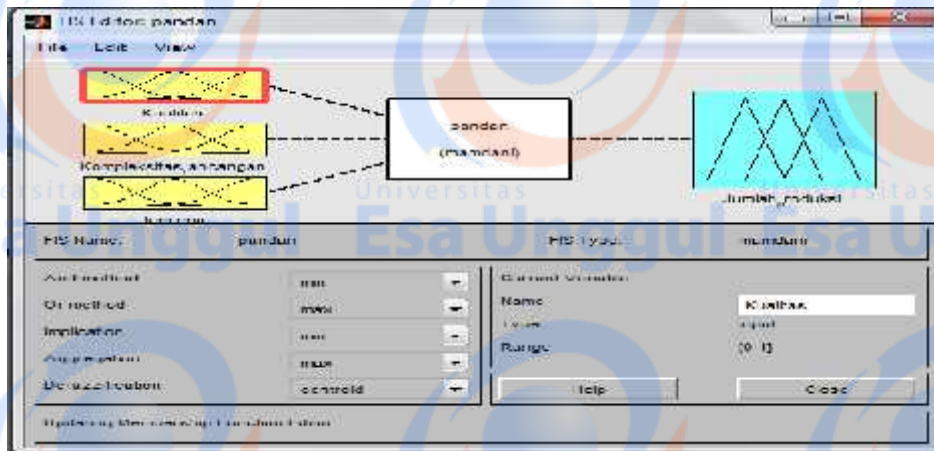


Figure 4. The FIS editor of Fuzzy input and Fuzzy Output

5. CONCLUSION

In this paper, a fuzzy inference system is proposed to solve the the problem for production planning of handicraft pandanus industry. The nature of the problem is complex due to the lack of accurate information as well as the need for knowledge of experts. A fuzzy rule-based system with linguistic variables an some of set "if-then" rules are applied to solve the production planning. The production planning consider about quality, complexity design, availibility working hours as input FIS. The experts are involved in the formulation of criteria and their input factors are craftsmen who make webbing, craftsmen who produce handicrafts from the webbing, wholesalers and store that sent the craft products to end customers. Based on using FIS based on the expert opinions, the developing rules FIS can be helpful to develop a production planning.

6. REFERENCES

- (a) Agrawal, Sharma, Kumar. 2010. IT Based KM Framework for improving Research and Methodology Process in Technical Education *Journal of Engineering, Science and Management Education/Vol 2, 2010/17-22*
- (b) Arias A.D., Castro J.L., Navarro M., Sanchez J.M, Zurita J.M., 2010. A fuzzy expert system for business management. *Journal of Expert Systems with Applications.*, Vol. 37 Issue 12, p7570-7580
- (c) Azeem, M.F. (2012). Fuzzy Inference System: Theory and Application. In Tech Publications.
- (d) Howkins, John. 2001. The Creative Economy. Penguin, London
- (e) Juang, Y.S., Lin, S.S., Kao, H.P. (2007). Design and implemetation of a fuzzy inference system for supporting customer

requirement. Expert Systems with Applications.

- (f) Yoshiyuki Oshita. 2009. An analysis of Creative Industries Policy: Creativity and Design in the Context of Policies. Quarterly Journal of Public Policy & Management. Vol.3

AUTHOR BIOGRAPHIES

Nofi Erni is currently a fulltime senior lecturer in Industrial Engineering Department at Esa Unggul University, Jakarta, Indonesia. She earned B.Eng. and Ph.D in Agroindustrial Engineering from Faculty of

Agricultural Technology, Bogor Agricultural University. She research interest are expert management system, supply chain management, creative industry.

ACKNOWLEDGMENT

The authors would like to thank for Directorate of Higher Education - Ministry of Research Technology and Higher Education Indonesia for funding the research through research grant at Research Decentralisation Scheme and many thanks to Institute for Research and Community Development, Esa Unggul University, Jakarta, Indonesia.



RELIABILITY ANALYSIS AND MAINTENANCE MANAGEMENT EVALUATION OF FLASH BUTT WELDING MACHINE WITH RCM II

Arief Suwandi¹, Ulia Rahma²

Industrial Engineering Department of Esa Unggul University, Jakarta
arief.suwandi@esaunggul.ac.id, uliarahma94@gmail.com

ABSTRACT

PT INKOASKU is a leading company dedicated to steel wheel rim manufacture for passenger car and pick up which has more than 50 production machine as the company's physical assets. One of those production machines is Flash Butt Welding that serves to weld both sides of the material with 3 critical steps called Preheat-Flashing-Upsetting. FBW is maintained by performing the scheduled maintenance activities which are expected to eliminate potential failures that may occur. In order to improve maintenance performances, the Reliability Centered Maintenance is selected as the method to determine the appropriate maintenance actions for each component of the machine. The analysis has 3 sub-methods which are Functional Block Diagram to analyze machining flow process; FMEA (Failure Mode & Effect Analysis), and LTA to analyze functional failure consequences. The analysis has categorized the best preventive maintenance actions such as 12 components are categorized as Scheduled On-Condition Task, 3 components are categorized as Failure Finding Task, etc. Analyzing the reliability by calculating the value of MTTF and MTTR for each component is done to complete this study. The final result provides 23 proposed actions along with the maintenance schedule as an improvement of maintenance performances.

Keywords : RCM, FBD, FMEA, Reliability

1. INTRODUCTION

Reliability is the ability or probability of a system (machine, component, or product) will perform its specified function under the specified condition throughout its specified life expectancy (Stephens, 2004). In other words, reliability is the ability of a machine that have been exceeded its expected life period, should be able to perform its function at its expected level of capacity. One of the supporting factors of reliability is the ability of the company to perform maintenance and repair machinery at good level and also the ability to fulfill these kinds of spare parts needed. As long as the production machines are in their optimal conditions, production is expected to be on time without any obstacles such as the production line stopped because of engine failure.

PT Inkoasku is a leading company dedicated to steel wheel rim manufacture for passenger car and pick up or minibus which has many types, sizes, and two different colors with different coating process. The company's production capacity is 2.6 million units per year with 32 variations of disc type

and 29 variations of rim type. The main material of steel wheel rims are aluminum steel special in plate shaped which allows to do recognition in the form of cutting, stamping, coiling, flaring, forming, and force-fitting. This continuous machining process makes company needs to conduct an improvement activities that focus on optimal maintenance machining techniques and structured to improve the performance of production machines.

In this study, improvement activities will be pursued to the mapping problem of machining into the machine functions, the machine failures, the consequences of failures, until the appropriate remedial actions along with the calculation of time while the failures occur and record it into a worksheet with RCM II approach. RCM or Reliability Centered Maintenance is used to identify applicable and effective Preventive Maintenance task (Eisinger and Rakowsky, 2001). It used a structured, logical process in optimizing the maintenance requirements of physical resource in order to realize its inherent reliability. In other words, RCM is a process to determine the maintenance

requirement of any equipment in its operating context by identifying the functions of the equipment, the causes of failures and the effects of the failures. This RCM method will be applied for Flash Butt Welding (FBW) machine.

FBW machine is one of the production machines on the rim line production which serves to combine both sides of the plate circumference with welding process. FBW machine is selected as the research object with the consideration of the failure effects and downtime levels are quite high. The average failure rates throughout 2015 is >10 times per month with the average downtime is +40 minutes. The longest downtime throughout 2015 occurred in May, which is 1518 minutes or 25.3 hours. This incident occurred due to the unpredictable failure which caused the company suffered big losses due to the limited stock because of the decrease production number and delays. Based on this incident, RCM II is necessary needed in order to be able to analyze the preventive action and machining reparation according to the failure modes and minimize the failure consequences.

2. RESEARCH METHOD

2.1. Data Collecting

In this study, data collected by three methods, which are 1) Observation Method; 2) Interview Method; and 3) Documentation Method. Observation method is done by direct observation of the real situation in the company regarding the maintenance system. Interview method is done by direct interview with employees about the company's policy of handling failures and maintenance management. Documentation method is done by collecting data such as operator's notes, maintenance department's archives, FBW machine's manual book, and any other documents related. Figure 1 shows research method used in this case study.

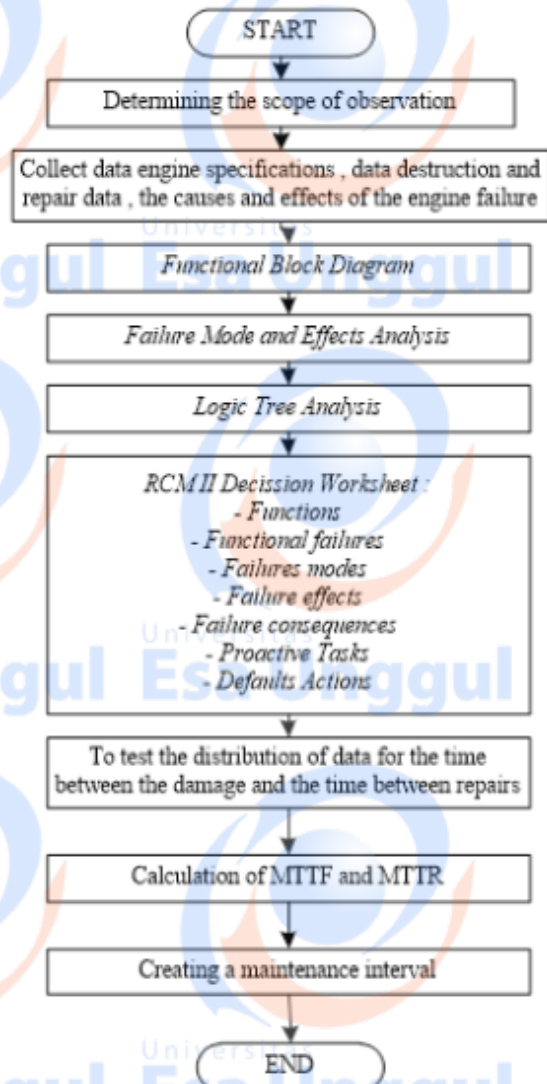


Figure 1. Research Method

2.2. Data Processing

Data processing is performed to obtain FBD, FMEA, LTA, RCM Decision Worksheet, the distribution type, value of MTTF and MTTR, as well as maintenance interval.

1) Functional Block Diagram (FBD)

FBD drawing is done based on the operating system Flash Butt Welding machine with automatic system which includes the circuit of operating system inside the machine up to the output of the process (Putra,2011).

2) FMEA Worksheet

After understanding the process flow of the machine through the FBD, followed by making FMEA Worksheet that identifies functions, functional failures, failure modes, and failure effects. Then, calculate the value

of the RPN (Risk Priority Number) based on three main aspects, which are *Severity*, *Occurrence*, and *Detection* (Villacourt, 1992).

3) *Logic Tree Analysis (LTA)*

LTA performed to determine the category of the failure consequences caused by a failure modes. This analysis will provide the form of four consequence categories named A,B,C,D which are obtained based on three basic questions of LTA, such as Evident, Safety and Outage. The result of the LTA will become one of variable input for RCM Decision Worksheet along with the result of FMEA as well.

4) *RCM Decision Worksheet*

After the FMEA Worksheet and LTA analysis is completed, all of the results are summarized in a worksheet named RCM Decision Worksheet. This worksheet will help the company to visualize the failure consequences based on the personal standpoint, organization point, and environmental standpoint. Additionally, RCM Decision Worksheet also provides another separate sheet in the form of maintenance actions categories based on Preventive Task and Default Task analysis.

5) *Distribution Test*

The test is conducted on machining historical data which has been collected in order to see the trend of the distribution of data patterns. Distribution of breakdown machine consist of four distribution, namely Normal; Lognormal; Exponential; and Weibull (Walpole, 1982). The test can be done manually or with a software program named Minitab-16.

6) *Calculation of MTTF and MTTR*

The calculation of MTTF (Mean Time To Failure) is conducted based on the interval between each failures in FBW machine, while MTTR (Mean Time To Repair) calculation is conducted based on the length of the time required to repair each failures. Both of these calculations done manually by a formula adjusted to the distribution of the data.

7) *Maintenance Interval*

This calculation afterwards can be done as an application of RCM method by making a schedule for maintenance operation throughout the coming years along with the preventive task's description which suited the company very well.

3. RESULT AND DISCUSSION

3.1. *Functional Block Diagram (FBD)*

The flow of FBW machining process with automatic system can be seen in **Figure 2** below.

3.2. *Failure Mode and Effect Analysis (FMEA)*

FMEA is a method used to identify the failure modes that might cause any malfunction and to ascertain the effect of the failure associated with the failure modes itself (Moubray, 1991). To identify the cause of the highest failure at every failure that occurs in the subsystem "Flashing & Upsetting Devices" in FBW machine, therefore the calculation of the RPN by multiplying the assessment of Severity, Occurrence and Detection of each cause of failure. RPN calculation formula is as follows.

$$RPN = S \times O \times D$$

FMEA calculation showed five highest result of RPN lies in the *Limit Switch*, *Contact Relay*, *Solenoid Valve*, *Flexible Hose*, and *Air Regulator*. The examples of the FMEA results are shown in **Table 1**.

3.3. *Logic Tree Analysis (LTA)*

LTA classifies the consequences of failure into four categories, namely a) A Category, if the failure modes have consequences for the safety of the personnel and the environment (*Safety & Environment Category*); b) B Category, if the failure modes have consequences for the operations of the production both in terms of quality and quantity of products which can cause significant economic losses (*Operational Category*); c) C Category, if the failure modes does not affect the level of

safety and operational activities and only cause economic loss which is relatively small for repairs (*Non-Operational Category*); and d) D Category, if the failure modes belong to the hidden failures, which is then broken down into several categories such as D/A, D/B, and D/C (Moubray, 1991). Moubray (1991) also explain these four categories are the answer of the three LTA's basic questions, which are a) *Evident* (Does

the operator under normal circumstances know there has been a failure or abnormality on the machine?); b) *Safety* Does the failure modes threaten the safety level?); dan c) *Outage* (Does the failure modes make a whole or some part of the machine stops?). The results of LTA worksheet then used as a basis to create an RCM worksheet.

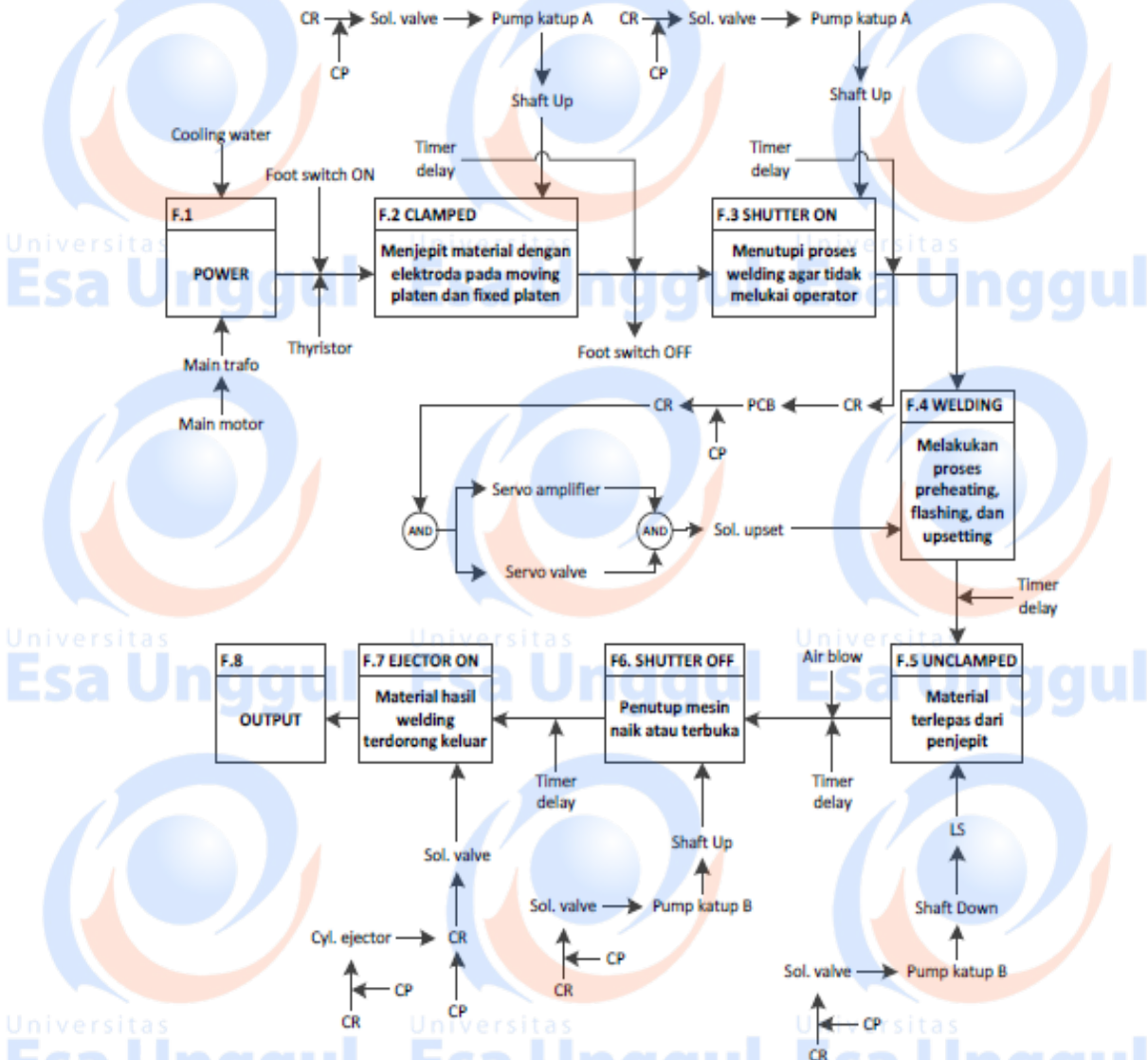


Figure 2. Functional Block Diagram FBW

3.4. Reliability Centered Maintenance (RCM)

RCM worksheet arranged based on the results of FMEA and LTA. Then the determination of Preventive Task and Default Task on worksheet adjusted based on the categories of task in RCM Decision

Diagram. At subsystem “Flashing & Upsetting Devices” in FBW Machine, the functional failure is not able to perform preheating, flashing and upsetting with its first failure mode is a limit switch may breakdown due to an error setting. This failure mode is hidden so that preventive action or preventive task can't be done

because included in the category of hidden. The results of the analysis can be made as an RCM worksheet which results the proposed task along with the initial maintenance interval and the PIC or person-in-charge of the maintenance activities. The proposed corrective action for failure mode

limit switch doesn't work due to incorrect setting is "No Maintenance Scheduled" because this failure mode is concealed of hidden failure. Because of this failure is hidden, the PIC is the maintenance division. RCM worksheet can be seen in **Table 2** below.

Table 1. FMEA Worksheet

RCM II INFORMATION WORKSHEET (FMEA)		SYSTEM	FLASH BUTT WELDING	Facilitator:	Date:	Sheet No.			
		SUB-SYSTEM	Flashing & Upsetting Devices - Hydraulic System	Auditor:	Date:	of			
NO.	FUNCTION	FUNCTIONAL FAILURE (Loss of function)	FAILURE MODE (Cause of failure)	SEV	OCC	DET	RPN	RANK	
1	Conducting the process of grafting material with arc welding methods .	Unable to perform preheating, flashing and upsetting well	Limit switches may malfunction due to incorrect setting.	7	6	6	252	2	
			Limit switches may malfunction	8	7	6	336	1	
			Roller wear out	6	4	5	120	9	
			Handle block broken or loosened so regardless.	7	5	5	175	6	
			Cooling water does not flow through the cooling pipe around the point electrode	7	6	5	210	3	
			Upset Solenoid not functioning properly.	7	6	6	252	2	
			The timer is not running well because socket timer slack or because of the influence lifespan	7	4	5	140	8	
			Servo amplifier is not synchronized with the servo valve.	8	6	7	336	1	
			The machine does not perform the welding process .	Selector Weld ON -OFF switch is not working	7	3	4	84	12
				Push button switches on the panel board is not functioning	7	3	4	84	12
	Welding program control on the PCB problem	7	5	5	175	6			
	Contact relay is not functioning due to coil or wire coils inside overheat , bum, melt , or disconnected	7	7	4	196	4			

Table 2. RCM Worksheet

RCM II DECISION WORKSHEET		SYSTEM	FLASH BUTT WELDING			Facilitator:	Date:	Sheet No.							
		SUB-SYSTEM	Flashing & Upsetting Devices			Auditor:	Date:	of							
FMEA		LTA			PREV. TASK			DEF. TASK			PROPOSED TASK	INITIAL INTERVAL	PIC		
F	FF	FM	H	S	E	O	H1	H2	H3	H4				H5	S4
1	A	1	Y	N	N	Y	N	N	N				There are no scheduled maintenance or repair activities	-	MTC
1	A	2	Y	Y	Y	Y	N	N	N				There are no scheduled maintenance or repair activities	-	MTC
1	A	3	Y	N	N	Y	Y						Perform scheduled lubrication system	8 jam	MTC
1	A	4	Y	Y	N	Y	N	N	Y				Replace handle block	3 tahun	MTC
1	A	5	Y	N	N	Y	Y						Checking the flow of cooling water and indicate leaks in pipelines or flexible hose	1 hari	Operator
1	A	6	Y	N	N	Y	Y						Perform lubrication system and purge solenoid scheduled	8 jam	MTC
1	A	7	Y	Y	Y	N	N	N	Y				Change timer	1 tahun	MTC
1	A	8	Y	Y	Y	Y	N	Y					Note synchronizing servo valve servo amplifier with each conducting overhaul	6 bulan	MTC
1	B	1	Y	N	N	Y	N	N	N				There are no scheduled maintenance or repair activities	-	MTC

3.5. Reliability Analysis

Reliability calculation includes distribution testing, calculation of distribution parameters and the calculation of MTTF and MTTR.

FBW's interval data between each failure and each repair which have been previously collected will be tested to determine the type of distribution based on the highest value of Index of Fit (IOF). As for *limit switch*, the

distribution type of interval breakdown is Weibull Distribution with IOF score around 0.9954 with the value of parameters are $\beta = 2.973$, $\alpha = -17.353$, $\theta = 342.703$ while the distribution type of interval repair for *limit switch* is Lognormal Distribution with IOF score around 0.979 and the value of parameters are $\mu = 3.4829$ and $\sigma = 0.168$. After getting each type of distribution, then calculate the average between failure time or Mean Time To Failure (MTTF) and the average between repair time or Mean Time To Repair (MTTR). MTTF and MTTR formula will be adjusted by each type of

distribution. The calculations which have been done on limit switch provided value of MTTF around 306.16 hours and MTTR's value around 33.01 minutes. MTTF value indicates that there is a potential breakdown for limit switch after 306.16 hours of usage. Then the value of MTTR showed that the average time required to repair the breakdown of limit switch is 33.01 minutes. The summary of distribution types, parameter values, and the value of MTTF and MTTR for each component are presented in **Table 3** below.

Table 3. Value of MTTF and MTTR

Komponen	Data	Distribusi	β	α	θ	μ	σ	Index of Fit	MTTF (jam)	MTTR (menit)
Limit Switch	Damage	Weibull	2.973	-17.353	342.703	-	-	0.9954	306.16	-
	Repair	Lognormal	-	-	-	3.4829	0.168	0.979	-	33.01
Contact Relay	Damage	Normal	0.0012	-4.9418	-	398.70	80.68	0.9677	398.70	-
	Repair	Lognormal	-	-	-	3.0066	0.2045	0.9784	-	20.64
Solenoid Valve	Damage	Normal	0.010	-5.9154	-	558.91	94.485	0.9724	558.91	-
	Repair	Lognormal	-	-	-	3.5371	0.2017	0.9795	-	35.07
Flexible Hose	Damage	Lognormal	-	-	-	7.1203	0.2238	0.9799	1268.23	-
	Repair	Normal	0.1125	-3.3718	-	29.958	8.885	0.9768	-	29.95
Air Regulator	Damage	Lognormal	-	-	-	2464.33	0.078	0.9895	2464.33	-
	Repair	Weibull	6.4187	-22.6808	34.2456	-	-	0.9754	-	31.95

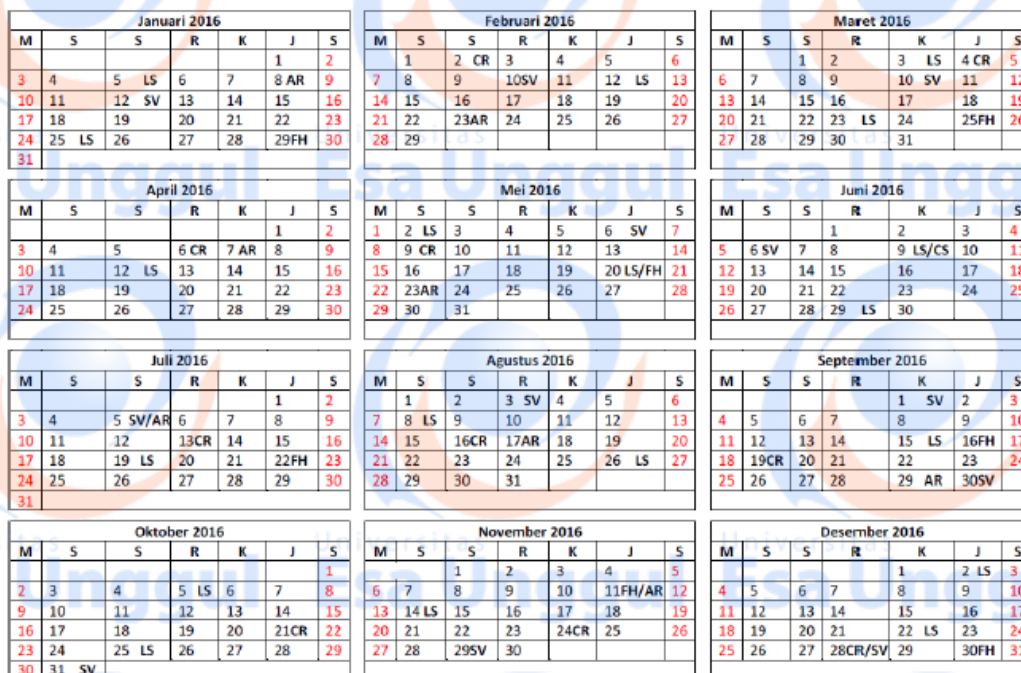


Figure 3. Maintenance Schedule FBW Component Replacement for 2016

3.6 Maintenance Schedule

Maintenance schedule in **Figure 3** above is proposed actions to maintenance activities throughout 2016. This schedule is expected

to help company reduce the level of breakdown failure or unplanned downtime.

4. CONCLUSIONS AND SUGGESTIONS

4.1. Conclusions

Based on the results of data processing and data analysis that have been done before, there are a couple of conclusions as follow.

- a. FMEA analysis provides five highest RPN value which are lies in *Limit Switch* with RPN's value around 336, *Contact Relay* with RPN's value around 210, *Solenoid Valve* with RPN's value around 210, *Flexible Hose* with RPN's value around 144, and *Air Regulator* with RPN's value around 84.
- b. LTA analysis provides 5 types of maintenance activities with a number of components as follows.
 - *Scheduled On-Condition Task* for 12 components. Two of them are *Solenoid Valve* and *Flexible Hose*;
 - *Failure Finding Task* for 3 components, namely *PCB*, *Thyristor* and *Pressure Gauge*;
 - *No Scheduled Maintenance Task* for 5 components, e.g. *Limit Switch*, *Contact Relay* and *Air Regulator*;
 - *Scheduled Discard Task* for 6 components, e.g. *Timer*, *Roller* and *Handblock*; last
 - *Scheduled Restoration Task* for 2 components, namely *Suction Filter* and *Motor Induction*.
- c. RCM II analysis provides 23 proposed actions to maintain and repair the FBW component machine, one of them is to consider synchronizing the servo amplifier along with the servo valve every overhaul time. this action is done by the maintenance division every 6 months.
- d. The realibility analysis of those 5 components with the highest RPN gives the following results.
 - *Limit Switch* : MTTF value is 306.16 and MTTR value is 33.01.
 - *Contact Relay* : MTTF value is 398.70 and MTTR value is 20.64;
 - *Solenoid Valve* : MTTF value is 558.91 and MTTR value is 35.07;
 - *Flexible Hose* : MTTF value is 1268.23 and MTTR value is 29.95; last

- *Air Regulator* : MTTF value is 2464.33 and MTTR value is 31.95.

4.2 Suggestions

Based on the research that has been done, gained some suggestions as follows.

- a. The application of the proposed action by RCM method can be implemented properly if every party in the company involved in the activities and do their job in accordance with a predetermined schedule.
- b. The company proposed to perform the documentation of maintenance process or history with computerized system and use separate software. It aims to facilitate the maintenance analysis to keep company's assets and reduce the risk of losing the maintenance data.
- c. The company proposed to always update the data on potential failure's aspects within the production floor in order to overcome the failure in the future.
- d. To the study on the same field then expected to conduct reliability analysis and maintenance scheduling along with the cost of maintenance and reparation of each machine.
- e. For the study on the same field, further recommended to analyze the inventory, both the needs and the supplies, of the machine's spare parts.

5. REFERENCES

- (a) Bangun, Irawan Harnadi., dkk. Perancangan Pemeliharaan Mesin Produksi dengan Menggunakan RCM II pada Mesin *Blowing Om* (Studi Kasus PT Industri Sandang Nusantara Unit Patal Lawang) Jurusan Teknik Industri Universitas Brawijaya, Malang, Indonesia
- (b) Cheulho, Bae., et al. 2009. *A Study on Reliability Centered Maintenance Planning of A Standard Electric Motor Unit Subsystem Using Computational Techniques* (Journal of Mechanical Science and Technology 23, p.1157-1168) School of Mechanical

- Engineering, Sunkyukwan University, Suwon, Korea
- (c) Ebeling, C.E. 1997. *Reliability and Maintainability Engineering*, McGraw-Hill International Editions
- (d) Kerstens, N.F.H. 2009. *Investigation and Control of Factors Influencing Resistance Upset Butt Welding* (Proefschrift Thesis) Department of Materials Science and Technology, Delft University of Technology, Mekelweg 2, 2628 CD Delft, The Netherlands
- (e) Kim, D.C., et al. 2009. *Effect of Flash Butt Welding Parameters on Weld Quality of Mooring Chain* (International Scientific Journal 2(38): 112-117) Advanced Welding & Joining R&D Dept., Korea Institute of Industrial Technology, Songdo-Dong, Yeonsu-Gu, Incheon, Korea
- (f) Moubray, John. 1991. *Reliability Centered Maintenance*. Oxford: Butterworth-Heinemann
- (g) Nikpay, et al. 2014. *Using Failure Mode and Effect Analysis (FMEA) in the Risk Analysis of Industrial Poultry Production for Decreasing Threats of Poultry by Analyzing Points of Failure* (International Journal of Poultry Science 13(12): 718-728) Department of Industrial Engineering, Karaj Branch, Islamic Azad University, Karaj, Iran
- (h) Prabhakar, P. Deepak and Jagathy Raj V.P. 2013. *A New Model for Reliability Centered Maintenance in Petroleum Refineries* (International Journal of Scientific & Technology Research Vol.2, Issue.5) Mangalore Refinery and Petrochemicals Ltd. Mangalore, India
- (i) Putra, Eko Lisyantaka Rusma. 2011. *Reliability Centered Maintenance (RCM)*. Semarang
- (j) Ramli, Rizauddin and Arffin, M. Nizam. 2012. *Reliability Centered Maintenance in Schedule Improvement of Automotive Assembly Industry* (American Journal of Applied Sciences 9 (8), p.1232-1236) Department of Mechanical and Materials Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia
- (k) Sari, Weny Yuliana dan Prasetyawan, Yudha. 2012. *Perancangan Kebijakan Perawatan dan Penentuan Persediaan Spare Part di Sub Sistem Evaporasi Pabrik Urea Kaltim-3 PT Pupuk Kalimantan Timur* (Jurnal Teknik ITS Vol.1, No.1) Teknik Industri, Fakultas Teknologi Industri, ITS
- (l) Stephens, Matthew P. 2004. *Productivity and Reliability – Based Maintenance Management*. Ohio: PEARSON
- (m) Villacourt, Mario. 1992. *Failure Mode and Effect Analysis (FMEA): A Guide for Continuous Improvement for the Semiconductor Equipment Industry*. SMATECH.
- (n) Walpole, R.E. 1982. *Pengantar Statistik*, PT. Gramedia Pustaka Utama, Jakarta

SUPPLY CHAIN ANALYSIS OF CASSAVA AGROINDUSTRY TO IMPROVE NATIONAL FOOD SECURITY

Iphov Kumala Sriwana, Nofi Erni

Industrial Engineering, Esa Unggul University, West Jakarta, Indonesia
iphov.kumala@esaunggul.ac.id

ABSTRACT

The considerably high consumption of rice needs to be solved by conducting substitution for other foods able to meet prerequisites of food security. Cassava is a second-greatest crop product, after rice. Problems occurring in the agro-industrial supply chain of cassava in order to fulfill availability of substitutes for rice include productivity, consistency of qualities, availability of human resources and technologies and market information. To cope with those issues, strategy planning conducted using AHP was proposed. Priorities of strategy implementation resulted are as follows: Institutions, GAP, socialization and promotion as well as food industrialization. Implementing proposed strategies above may contribute to enhancing functions of cassava as a substitute for rice in the attempt to promote national food security.

Key words : Institutions, GAP, socialization and promotion, food industrialization

1. INTRODUCTION

1.1. Background

Indonesia can possibly position itself as the basis for food security. This argument contained in the Masterplan for Acceleration and Expansion of Indonesia's Economic Development 2011-2025 (MP3EI) is due to global dynamics occurring and considering potentials and opportunities of geographical and resource advantages present in Indonesia and taking into account the principle of sustainable development.

Food security comprises an activity holding an important role in maintaining viability of the people in Indonesia and for lowering the poverty line in Indonesia. This is not an issue easy to cope with since the number of Indonesia population rises increasingly. As the number of population grows, food demands continuously increases.

According to the Minister of Home Affairs, Gamawan Fauzi, in sinarharapan.co, the number of Indonesia population, by September 2014 was 245,862,034 people and pursuant to Moniaga (2011), the Minimum Physical Needs (KFM) relied on the calorie requirement per person per day is 2600 or equal to 256 kilograms of rice per

person per year. This fact may worsen the food availability of rice unless followed by an increase in availability of agricultural land and rice productivity.

Moniaga (2011)) argued that the agricultural land as a place in which farmers perform activities increasingly experiences a decline in its total amount. This situation happens because of more increased pressure of population put on agricultural land. The number of population steadily grows and activities of development conducted have been widely consuming functions of agricultural land to produce foods and eventually switched to other utilizations such as residences, office buildings, etc.. As a result, the capability of agricultural land to fulfill national food demands continually reduces.

As stated by KEMNKOPMK (2015), the role of food commodities in the poverty line is more significant rather than that of non-food commodities (residences, clothing, education and health). Contribution of the Food Poverty Line to the Poverty Line in September 2014 was recorded at 73.47 percent. Food commodities greatly influencing the value of the Poverty Line in urban areas is relatively similar to those in rural areas, one of them is rice.

The Minister of Agriculture, Suswono, in the online *Republika* dated 4 April 2012 said that the consumption of rice as a staple food per capita in Southeast Asia was considerably high. Today the consumption of rice in Indonesia is amounted to 316 grams per capita per day, even though the sufficient amount is only 275 grams per capita per day. Whereas the consumption of root and tuber crops is only at 40 grams per capita per day, of the ideal amount 100 grams per capita per day. Conforming to Cahyadi (2012), this fact exists as Indonesian people have opinions that rice is an unchangeable staple food.

Setiawan (2012), stated that consumption of rice in Indonesia constitutes the highest in the world. The high consumption of rice should be immediately overcome by implementing substitution for other foods able to meet requisites of food security. The food security is established when community is able to access foods that are safe, nutritious and in affordable price making up a basis for healthy and active life.

One of commodities that can be an alternative for carbohydrate source is cassava. Unfortunately, cassava agro-industries also deal with various problems including low productivity of cassava in Indonesia which is about 12.22 tons/Hectare on average and is highly fluctuating. From 1998 to 2005, Special District of Yogyakarta particularly Gunung Kidul Regency faced the fluctuation in productivity of cassava between 127 quintals/Hectare and 174 quintals/Hectare and the highest was reported at 812,321 tons (Martono and Sasongko, 2007) Further, based on information gained from Ministry of Industry of Directorate General of Agro-industries, the national land area of cassava plantation in 2010 was around 1.7 million Hectares accompanied with average production of only 13.6 tons per Hectare.

To tackle problems regarding productivity in cassava above, a thorough analysis should be carried out in order to identify causes of the low productivity in cassava mentioned. The analysis can be performed through the agro-industrial supply chain analysis of cassava, so as different problems occurring in it can be defined and improvement in order to create sustainable

food security of agro-industrial cassava can be conducted in the attempt to develop local food-based agro-industries. Availability of raw materials constituting local resources is the main factor. Furthermore, other factors needed to be envisaged are processing technologies, human resources, markets and government policies.

Once improvement based on the design for a supply chain model is obtained, model designing of the food security system of cassava agro-industries is conducted in several steps commencing from the food availability aspect, the food affordability aspect to the food consumption aspect

1.2. Purpose

- Identify problems in cassava agro-industry supply chain
- Control problems hindering the sustainability of cassava agro-industry as a source of food security

2. THEORETICAL BACKGROUND

2.1. Cassava

Cassava (*Manihot utilisima*) is a crop and commodity that has been strongly cultivated for a long time by farmers. Cassava is perceived as the main cultivation on the basis of results of survey and market analyses reporting that numerous industries such as food industries, pharmacy industries, chemical industries, building material industries, paper industries and biofuel industries utilize cassava as their raw materials in a remarkably high amount (Badan Agribisnis Departemen Pertanian. 1999; Wargiono et al. (2006), Hasanuddin, dan Suyamto, 2006; Wargiono and Supiandi (2007).

Cassava is perceived as a cash crop. As a crop, it produces the greatest amount of starch per land area unit up to sevenfold that of sugar cane per hectare widely deriving products such as *gaplek*, cassava flour, ethanol, liquid sugar, sorbitol, MSG, aromatic flour and pellet. In addition, cassava is also a carbohydrate source for approximately 500 million people in the world.

2.2. Supply Chain

As reported by Chopra and Meindel (2007), a supply chain is integrity among planning, coordination and control of entire processes and activities incorporated in it aimed to meet consumer demands at the lowest prices. The supply chain does not merely consist of producers and suppliers but also it has dependency on flows in logistics,

transportations, storages, or warehouses, retailers and consumers their selves.

3. RESEARCH METHOD

The reason cassava is picked as one of food security resources substituting for rice is that cassava is able to be processed to be numerous products as seen in Fig 1.

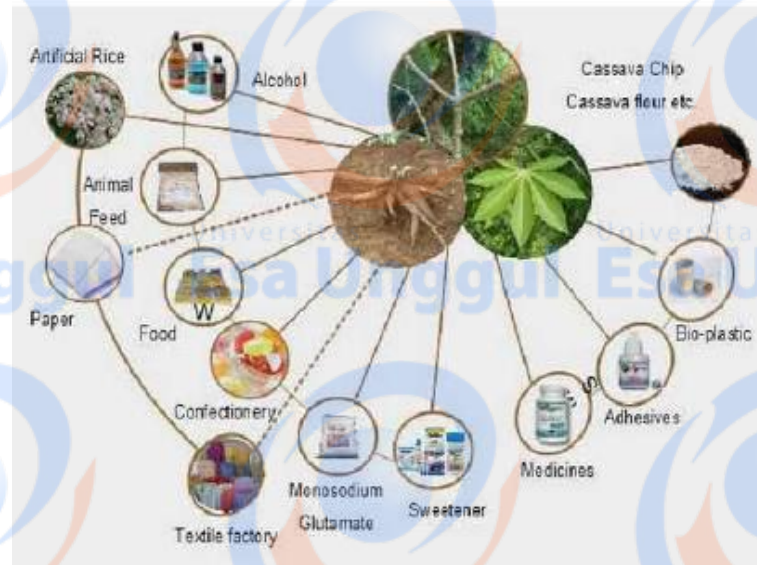


Figure 1 Trees cassava industry

Source : <https://foodiepelago.files.wordpress.com/2013/10/gernas-singkong-sejahtera-b.jpeg>

- Fresh cassava: food products (chips/crackers, fermented cassava, *lemet*, etc.)
- Intermediate products
 - *Oyek* flour → food products (*oyek* rice, etc.)
 - *Gaplek* flour → food products (*tiwul*, cookies, etc.)
 - *Caasava* flour → food products (breads, noodles, biscuits, etc.)
- Tapioca:
 - Traditional food products (*biji salak*, layer cakes, crackers, etc.)
- Modern food products (porridge, instant milk, seasoned flour, biscuits/snacks, meat products, etc.)
- Modified starch
 - gelatinized starch, oxidized starch, starch phosphates, etc.
 - breads (bakery), iced cream, meat products, candies, etc.
- Hydrolyzed starch
 - dextrin, maltodextrin, glucose syrup, high fructose syrup (HFS), sorbitol, etc.
 - formula milk, instant milk porridge, snacks, sauce, candies, jams/jellies, etc.
- Monosodium Glutamate (MSG)

A wide range of food products are made of cassava, nevertheless Indonesian people have not yet used it as a rice alternative. This condition needs to be analyzed so as appropriate solutions can be drawn. The first step is performed by analyzing the agro-industrial supply chain of cassava. The second step is performed by identifying different problems occurring in relation to agro-industries of cassava as a source of national food security. The third is performed by implementing proposed strategies using AHP to overcome problems occurring. These are illustrated in Fig 2.

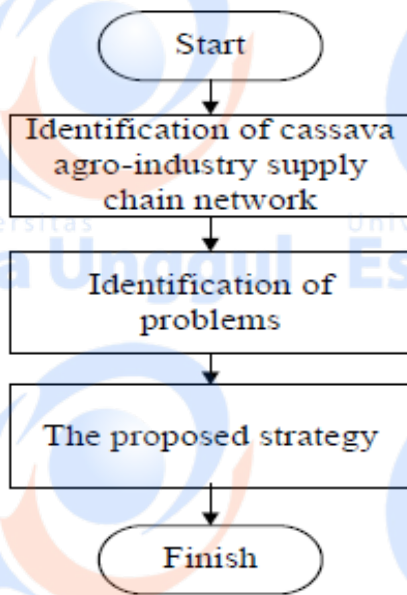


Figure 2 Research stage

agricultural products (Vorst, 2006) and it can be seen in Table 1.

Table 1. Indicators of logistic network performance for supply chain of casava

Indicators of performance	Description
Availability of the product	<ul style="list-style-type: none"> Having potentials of abundance and availability throughout the year due to the suitable climate to growth of cassava plants The species cultivated is the sweet cassava characterized by nearly black outer root peel and leaves mostly preferred as a green vegetable source and cooked as meals.
Qualities of the product	<ul style="list-style-type: none"> Inconsistency qualities of the product are due to lack of knowledge of farmers and small-medium industries.
Responsiveness	<ul style="list-style-type: none"> The time cycle of supply chain demands in not consistent. One of its causative factors is the technical/technological constraint, in which performance of machines and cassava processor tools, availability of human resources and availability of raw materials are not consistent.
Reliability of Shipment	<ul style="list-style-type: none"> Shipment cannot be promptly undertaken due to factors of human resources and technologies.
The total cost of supply chain	<ul style="list-style-type: none"> The total cost of supply chain charged by farmers is not clearly measured since prices are set by the processing industries or traders. Lack of interest of farmers to market their cassava crops their selves reflects uncertainty in the marketing network.

4. RESULT AND DISCUSSION

4.1. The Network of Cassava Agro-industrial Supply Chain

Based on the observation conducted at Kandri Village Semarang, it is indicated that the cassava agro-industrial supply chain is not overly long, which means cassava originated from farmers can be processed immediately to be different products including modern *getuk*, *wingko babat* and fried *getuk*. Supply chain network overview can be seen in Figure 3.

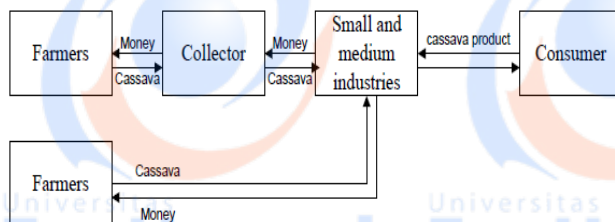


Figure 3 Cassava Supply chain

4.2. Problem Identification

Problem identification is relied on problems occurring throughout agro-industrial supply chain of cassava. This is undertaken on the basis of literature investigation and direct observation and is guided by indicators of logistic performance for supply chain of

4.3. Problem Analysis

Pursuant to Zahra (2011), barriers to raw material inputs comprise unavailability of continuity in the supply of raw materials meeting standard of qualities and rate of prices expected by manufacturers. To date, the supply chain of cassava existing commonly are only the trade system not well-organized thereby merely favoring certain parties. While, other problems associated to indicators of agricultural supply chain performance are as follows.

4.3.1. Availability of the product

Availability of cassava in Indonesia is potentially abundant despite its low productivity. One of its underlying reasons is well-processing (GAP and GHP) of cassava not conducted.

Availability of cassava as a raw material may be able to be used for feeding Indonesia. As investigated in <http://www.ift.or.id/2012/03/beras-singkong-layak-sebagai-makanan.html>, it is found that one of cassava processing products is cassava rice. Its raw material consists of combination between white cassava and yellow cassava containing a low HCN level. In fact, technology of cassava rice has been developing in Philippines and some areas in Indonesia. The method to make it is relatively simple in which cassava is soaked for several days before cleaned thoroughly

to remove odors and dirt, followed by processed as flour and dried. Drying generally is undertaken under open sun. This cassava rice enables comparatively long storage when drying is completely performed or the relatively low water content is gained. It tastes nearly same as paddy rice. The cassava rice may be consumed with side dishes just as paddy rice.

4.3.2. Qualities of the product

One product derived from cassava as explained in the availability of the product section mentioned is cassava rice. The serving size of 100 grams of paddy rice is equal to one handful of cassava rice. Each of 100 grams of cassava rice contains 34 grams of carbohydrates and 121 calories. Furthermore, the cassava rice comprises 40 grams of phosphorus and 34 grams of potassiums (<http://www.ift.or.id/2012/03/beras-singkong-layak-sebagai-makanan.html>).

In spite of the fact that nutritional contents of cassava rice is not inferior to that of paddy rice, people still believe that rice cooked from cassava is less prestigious. The other reason is that some Indonesian people still embrace paradigm paddy rice only selected as a staple food. Furthermore nowadays cassava is commonly consumed by some lower class communities prone to food shortages. That situation is resulted from limitedness of community awareness and lack of socialization covering cassava processing thereby needing an effort to approach communities directly to provide understandings for them concerning benefits of cassava rice as a substitute for paddy rice. This attempt is conducted to achieve food security through diversification of cassava products as alternative foods.

4.3.3. Responsiveness

The performance of machines and cassava processing tools not optimal, limitedness of human resources and limitedness of raw materials result in the inconsistency time cycle of supply chain demands thus cassava products are not readily available.

4.3.4. Reliability of shipment

To ship the product promptly, optimal production planning favored by human resources and technologies has to be set.

4.3.5. Total cost of the supply chain

To be able to gain benefits from supply chain actors particularly farmers, clear information on market prices should be delivered in order that farmers are becoming motivated to process the cassava appropriately.

4.4. Strategy Planning

Some strategies suggested to deal with problems in utilizing cassava as a source of a rice alternative are described as follows.

4.4.1. Good Agricultural Practices

Conforming to explanation in availability of the product section above, it is indicated that the main problem in cassava agro-industries is GAP. Therefore, in order to reach high productivity GAP has to be applied.

4.4.2. Socialization and promotion

The culture of consuming imported food needs to be fixed though campaigns and promotions. Japan despite the fact that it is a powerful and developed country starts thinking to change its food consumption pattern by not merely depending on imported foods (wheat and meat) and changing towards local resources based-food consumption (Rahmawati, 2013). Problems regarding socialization were also stated by Zahra (2011), that there was lack of socialization and promotion of potentials and benefits of cassava flour utilization.

4.4.3. Food industrialization

Indonesia as a developing country consisting of a large number of population has to start implementing local resources based-food diversification. The Food Diversification Program is very acceptable to our societies constituting which is through 'industrialization' of alternative foods incorporating production, distribution,

marketing and promotion activities (Rahmawati, 2013).

4.4.4. Institution

Problems of delays in shipment occur due to lack of human resources, market information not recognized and performance of small and medium industries not well-integrated thus the presence of institution is required. This was argued by Zahra (2011) that the main institutional barrier is lack of understanding of an expected institutional

model among related parties, and consequently sectors touching the cassava commodity are not truly harmonious.

In the logistic performance analysis of supply chain above, 4 strategies used to conquer problems occurring in the cassava agro-industrial supply chain are suggested. Implementation of those strategies should be conducted gradually. To recognize all of those the level of interest of the strategies was selected using AHP. The hierarchical structure of AHP is presented in Fig 4.

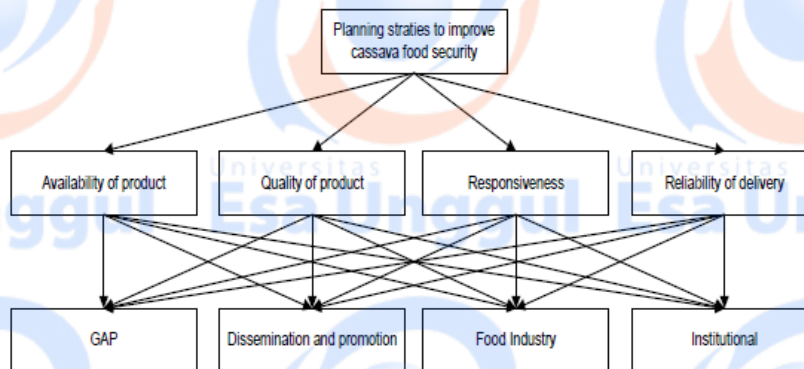


Figure 4 the hierarchical structure of cassava food security

Hierarchical structure in Figure 4, then processed using software expert choice. The weight of the interests acquired is the institutional strategy(0547), GAP (0254), food industry (0105) and the dissemination and promotion (0094). It can be seen in Figure 5.

5. CONCLUSION

Based on results of problem identification, it is indicated that there are some problems in the cassava agro-industrial supply chain in order to meet availability of substitutes for rice. Those problems include productivity, consistency of qualities, availability of human resources and technologies and market prices. Whereas, priorities of strategy implementation are following: Institution, GAP, socialization and promotion as well as food industrialization. Implementing those proposed strategies above may contribute to enhancing functions of cassava as a substitute for rice in the attempt to promote national food security

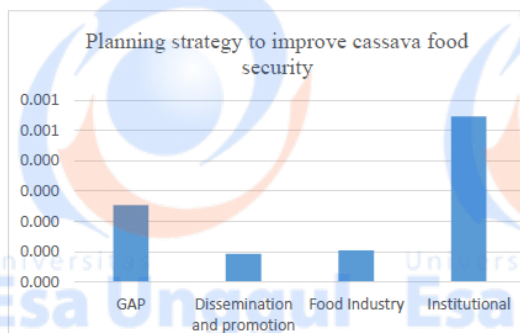


Figure 5. The weight of the interests

Institutional is a major strategy because it can design a good cooperation between supply chain actors and able to provide information to farmers on market prices and the processing of cassava good.

6. REFERENCES

(a) Chopra, S. and Meindel, P. (2007) *Supply Chain Management: Strategy, Planning & Operations*, Pearson Prentice Hall.

- (b) Martono, B. and Sasongko (2007). Prospek pengembangan ubi kayu sebagai bahan baku bioethanol Di propinsi Daerah Istimewa Yogyakarta. *Secondary, Prospek pengembangan ubi kayu sebagai bahan baku bioethanol Di propinsi Daerah Istimewa Yogyakarta*, www.distan.pemda-diy.go.id.
- (c) Moniaga, V. (2011) 'Analisis daya dukung lahan pertanian', *J. ASE*, Vol.7 No. 2, pp.61- 68
- (d) Rahmawati, F. (2013). Diversifikasi olahan singkong dan pisang. *Secondary, Diversifikasi olahan singkong dan pisang*, Tanjung Enim.
- (e) Setiawan, B. (2012). Optimalisasi diversifikasi pangan guna mewujudkan ketahanan pangan nasional yang berkelanjutan. *Secondary, Optimalisasi diversifikasi pangan guna mewujudkan ketahanan pangan nasional yang berkelanjutan*.
- (f) Vorst, V. (2006) *Performance Measurement In Agri-Food Supply-Chain Network: An Overview*, Springer Science Business Media.
- (g) Wargiono (2006) *Cassava : Solusi Pemberagaman Kemandirian Pangan.* , Jakarta, Grassindo.
- (h) Wargiono, Hasanuddin, J. and Suyanto (2006). Teknologi Produksi Ubikayu Mendukung Industri Bioethanol. *Secondary, Teknologi Produksi Ubikayu Mendukung Industri Bioethanol*, Puslitbangtan Bogor.
- (i) Wargiono, J. and Supiandi, S. (2007). Skenario Pengembangan Ubikayu Mendukung Program Penyediaan Bahan Baku Biofuel. *Secondary, Skenario Pengembangan Ubikayu Mendukung Program Penyediaan Bahan Baku Biofuel*, Puslitbangtan Bogor.
- (j) Zahra, N. (2011). *Analisa rantai pasokan agroindustri tepung ubi jalar*. IPB.

Acknowledgements

This paper is dedicated to menristekdikti. This paper is part of the 2016 Higher Education grant applied research.

AUTHOR BIOGRAPHIES

Iphov Kumala Sriwana is a lecturer in Department of Industrial Engineering, Faculty of Industrial Engineering, Esa unggul University, Jakarta. She received her Doctor of Agro-Industrial Technology Bogor in 2016. Her research interests are in the area of Supply chain, simulation, productivity, Production Planning & Control, systems.

MAKING A PLYWOOD BOAT CATAMARANS MODEL FOR HANDLING OF FLOOD EMERGENCY IN AREAS OF DURI KEPA

Indra Gunara Rochyat, Asnawati, Wahyu Albin Tabrani
Product Design Department – Design & Creative Industry Faculty
Esa Unggul University
Jalan Arjuna Utara – Tol Tomang, Kebon jeruk – Jakarta 11510
indragunara@esaunggul.ac.id, asnaaw@gmail.com, wahyualbin@gmail.com

ABSTRACT

Rain with high intensity and very heavy can result in flooding in some flood-prone areas, especially in big cities are dense settlements and communities, such as Jakarta. The heavy rains that occur at the end of the year seems to be something that is feared by almost all citizens of Jakarta, especially in flood prone areas. Researchers focusing on the place where this research was conducted that is Patra Local Market, Duri Kepa, West Jakarta. The main problem facing is when the flood comes the access road to the site is disconnected. The purpose of this study is to create an emergency transportation for people in need at the time of flooding across the region and a use of alternative materials as material. The method used in this research product creation as one of the efforts that can be taken is to use transport boat made of plywood to replace the the rubber boat that is not owned by the local people. Transportation in the form of boat types of catamaran with plywood material of it seemed to be a considerable a good alternative in the flood hit area.

Key words: Flood, Boat, Water Transport, Jakarta

1. INTRODUCTION

Floods in the capital of the country is seemed to be something that is difficult to be remedied. So it often used as a candidate's a campaign theme of DKI Jakarta with promises to overcome the flood completely.

Factors causing in Jakarta flooded among them apart from heavy rainfall, since December 2012 in Jakarta has a poor drainage system is, the breakdown of the various dikes in Jakarta, as well as increased volume of 13 rivers across in Jakarta. Flooding also caused by people who are not balanced with good behaviors protecting the environment well, not littering and provides 2 types of trash cans, organic and inorganic as the example.

Rainfall in mid January 2013, in Jakarta was recorded at record for rainfall of up to 250-300 mm, exceeding the in Jakarta Flood conditions in 2002, which reached 200 mm, but there is still below the conditions of Jakarta Flood of 2007, which reached 340 mm. BPPT director, Tri Handoko Seto, stated that atmosphere of waves, monsoons, and the diurnal oscillations caused to high rainfall. Air masses from the

South China Sea and India moving south towards the low pressure center in Australia. These air mass is then subjected to deflection around Jakarta, as a result of low pressure in the Indonesian Ocean, in the southwest of Jakarta.

1.1. Problem Identification

Since end of the year, there have been some damage dikes, begins from the embankment in Kali Adem, Muara Angke, Penjaringan, North Jakarta, on December 13th, 2012. This dike damages caused 500 houses submerged in sea water, as well as the two residents swept away. Finally, hundreds of illegal huts was demolished to enables easy the entry of the machine to fix the dike. Lurah Pluit explained the pounding high tides which eroded dikes that caused this damage.

On the Date January 15, 2013, following a dike in South Kedoya, Kebun Jeruk, collapsed causing floods as high as two meters. This dike is also noted to have a bad of construction as it is only created of

sandbags, so it would not hold of water Pesangrahan River. Residents were evacuated to the east rail Pesing, but most stay in their own homes.

a lot of people trapped in their own homes due to the floods that surrounds it, so they can not perform its activities. This situation is exacerbated by the increasing water level which requires them evacuate up to the top level of the 2nd floor and some have evacuate to the roof of the house. This situation can last long enough if rain does not subsided. This situation worsen the supply of food and clean water, so this situation and require immediate with quite seriously by the authorities.

1.2. Problems Formulation

- a) Whether the use of of plywood materials able to be used in an emergency situation?
- b) Whether local authorities in handling the the flood situation feel helped by the presence of emergency the boat based of plywood?

1.3. Design Purposes

- assist the authorities in the process of evacuation of flood victims in the area durikepa
- to accelerate the procurement process of rescue boats for flood victims
- to test of use the boat with the model catamaran model based on plywood
- recommending of use of plywood material within the structure of the boat builders for quick handling emergency response.

2. THEORETICAL BACKGROUND

2.1. Catamaran

A catamaran is a multi-hulled watercraft featuring two parallel hulls of equal size. It is a geometry-stabilized craft, deriving its stability from its wide beam, rather than from a ballasted keel as with a monohull sailboat. Being ballast-free and therefore lighter than a monohull, catamarans often have a shallower draft (draught) than comparably-sized monohulls. The two hulls combined also often have a smaller hydrodynamic resistance than comparable monohulls, requiring less propulsive power from either sails or motors. The catamaran's wider stance on the water can reduce both heeling and wave-induced motion, as compared with a monohull, and can give reduced wakes. Catamarans range in size from small (sailing or rowing vessels) to large (naval ships and car ferries). The structure connecting a catamaran's two hulls ranges from a simple frame strung with webbing to support the crew to a bridging superstructure incorporating extensive cabin and/or cargo space. Catamarans have two distinct primary performance characteristics that distinguish them from displacement monohull vessels: lower resistance to passage through the water and greater stability (initial resistance to capsize). Choosing between a monohull and catamaran configuration includes considerations of carrying capacity, speed, and efficiency. At low to moderate speeds, a lightweight catamaran hull experiences resistance to passage through water that is approximately proportional to the square of its speed. A displacement monohull, by comparison experiences resistance that is at least the cube of its speed. Catamarans rely primarily on form stability to resist heeling and capsize. (*Phipps, 1998*).

2.2. Wooden Boat

In a genuine wooden boat all pieces are of natural wood and all pieces are fastened to each other using mechanical fasteners. (*Ruhlman, 1987*).

2.3. Plywood Boat

For most amateurs, plywood is the material of choice. Plywood is one of the cheapest and easiest building materials, one that the average do-it-yourselfer is both familiar and comfortable with. Plywood is also, pound for pound, stronger than steel. Because of its high strength to weight, plywood construction yields a boat that is much lighter and performs better than a "chopper gun" fiberglass boat. Plywood boats are frequently built in school wood shops or by youth groups as individual or group projects. To take full advantage of the material, our Plans and Patterns detail simplified construction methods geared to the abilities of the amateur. No difficult woodworking procedures, such as steam bending, are ever required. (**Thomas,2001**)

3. RESEARCH METHOD

Phenomenological method is based on the empirical truth of, logic, ethics and transcendence, on the basis of this truth, phenomenology requires the unity of between the subjects researchers with supporting the object of research. The involvement of researchers in the field subject and appreciation of the phenomenon experienced to be one of the main characteristics.

Qualitative research is a research approach that is selected. Qualitative research, (**Creswell, 2008**) defines it as an approach or searches for exploring and understanding a central phenomenon.

To investigate the central phenomenon investigators interviewed of study participants or participants to ask questions that commonly and rather extensive. The information submitted by participants are collected. Such information is usually in the form of text and words. The data was then analyzed. The results of the analysis may be a portrayal or description or they can be in the form of topics. From the data the researchers interpret to catch the deepest meanings. After that researchers made a personal reflection (self-reflection) and translate it with studies of other scientists made earlier. (**Samiawan, 2010**)

In this study we search the data in the disaster area in durikepa

4. RESULT AND DISCUSSION

Land transportation is interrupted, many car or public transport, such as minibuses, or three-wheeler could not pass through the area, because the water level does not allow road vehicles can cross. Instead of being able to pass through, even many who try to force the vehicles passing through the flooded area it is sinking, the vehicle body partially submerged and then broke down the middle of the road, the engine in the vehicle entered a lot of water so that vehicles forced their way into even die unexpectedly.

The boat can be used by victims to transport all document-document or goods that they consider important.

Rubber boat was often used by the government to sent a rescue army and also just check the circumstances surrounding neighborhood affected areas. However transportation of rubber boats was not enough if only have had government, the government can have a variety of the boat with different materials and different models for the preparation help the flood victims.

The advantages and disadvantages of Use rubber boats:

Advantages :

- 1) Can be minimized to enables easy mobilization.
- 2) Easy operationalized.
- 3) Offers financed deliveries to the area because they can be folded

Disadvantages

- 1) Not so strong and impact resistant against sharp objects or easily damaged and leak when affected by sharp objects.
- 2) Have a technical life of about 5 years Not suitable for flood rescue in urban areas, many sharps.
- 3) If damage occurs a local artisan could not repair it.

To material itself, rubber material also has advantages and disadvantages of each, which is:

Advantages:

- 1) elastic or rubber has a good of resilience,
- 2) Rubber is a good plasticity, easy processing,
- 3) Rubber is not easy to wear (not easily exhausted due to friction), and not easy to heat.

Disadvantages:

If affected by the sun during the dry season, the rubber will shrink or shrivel.

However, in the passing area that rubber boats are not always safe. Many areas in the Jakarta area is quite dangerous rubber boats to get through the flooded area. TNI and the government could also use the boat with a wood material with a design or model using a single boat with catamaran hull modifications.

The documentation we do to make a mock-up the boat 1: 1 with the model catamaran based of plywood:



Making a Model
Figure 1

Many benefits to be gained than using a rubber boat, including:

- 1) Strong and impact resistant or sharp object. Durable when in put in the correct place.
- 2) Suitable for flood rescue in urban areas, a lot sharp object.
- 3) No leaking due to rat bite.
- 4) Aesthetically able to match the rubber boat, can be painted and labeled.

Besides, there are advantages there are also disadvantages of Use of wood or of plywood boat are:

- 1) There can be diminished to facilitate mobilization.
- 2) More expensive at the the cost of delivery to the area.
- 3) The termite wooden boats are vulnerable if stored in a place that is not right.

But we can explain not only about our boat material, here we will briefly describe about the design that we use for our boat, which is boat of plywood with a catamaran design.

Advantages of single hull boat design modifications with catamarans:

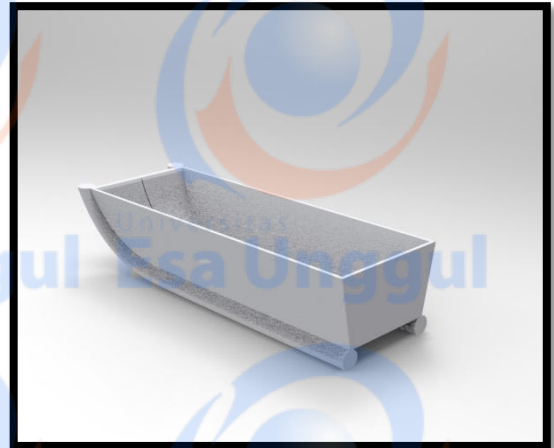
- 1) Catamaran ship design referred to as the best design for boats because it can accommodate the needs for speed, stability and large capacity in a ship.
- 2) The design concept was inspired by cano catamarans used by Polynesian society. They found that two pieces of wood logs are merged into one would not be reversed.
- 3) The concept was subsequently continued to evolve with broad application in modern shipbuilding.
- 4) Advantages of this model catamaran is faster than when conventional models. This design is also very stable when used in high speed.

- 5) Catamaran widely used in water sports, including the yacht race. Now this model of catamaran also used in the water mass transport, such as ferries and cargo ships.

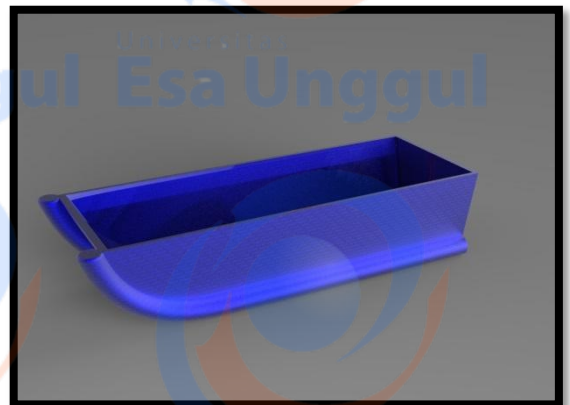
Disadvantages:

- 1) Due to its size fairly large, it takes enough room to put down the boat.
- 2) Ignorance of the community of flooding, especially in the capital about importance of having the boat or personal water transport that is based of plywood or wood
- 3) Cost to make a boat from of plywood material is quite expensive.

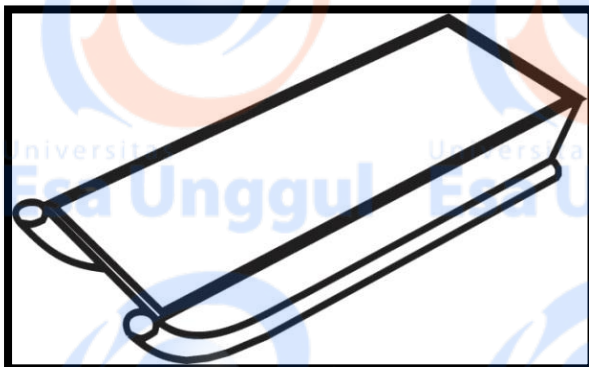
Not only form designs that we created, but we also thought about any color what will be used to better beautified the aesthetic in the manufacture of this boat. we use the color navy blue, yellow, gray and red. Each color has a different meaning course.



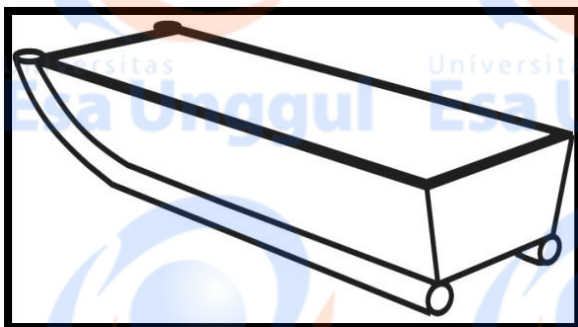
Form in Render
Figure 3



Rendering
Figure 4



Final Sketch 1
Figure 2



Final Sketch 2
Figure 3

5. CONCLUSION

Due to the frequent Duri Kepa regional areas affected by the floods, local residents are expected to have boat or personal water transportation, flood control at least for a while. Like having your own boat which can be made with materials that are made of wood or of plywood with the design of the catamaran under the boat. Due to the design of catamaran ship referred to as the the best design for the catamaran ship can accommodate the needs for speed, stability and large capacity in a ship.

- a) Whether the use of of plywood materials able to be used in an emergency situation?



*The 9th International Seminar on Industrial Engineering and Management (9th ISIEM)
Grand Inna Muara Padang, West Sumatera, Indonesia, September 20-22, 2016*

Answer: *Desain Produk*, Jakarta: Pasca Sarjana Universitas Trisakti. 2014.

based on the results of the manufacturing-based boat catamaran based of plywood design that can be used in an emergency.

b) Whether local authorities in handling the the flood situation feel helped by the presence of emergency the boat based of plywood?

Answer:

Yes, they are very helped about the presence of this boat in their area of flooding

6. REFERENCES

(a) Phipps, Brian (1998), *The Catamaran Book*, Wiley, 55-80

(b) Ruhlman, Michael (1987), *Wooden Boat, In Pursuit of the Perfect Craft at An American Boatyard*. Pinguins Books , p 86

(c) Thomas Firth, Jones (2001), *New Plywood oars and view others*, Sheridan House, Dobbs Ferry, NY 10522, CA, 31

(d) Semiawan, Conny R.. *Metode Penelitian Kualitatif*. Jakarta: PT Grasindo. 2010.

(e) Creswell, John. W. (2008), *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, University of Nebraska – Lincoln, Fourth Edition, Sage Publications Ltd., CA. 203-233

(f) Smallman. R. E, Bishop. R.J. (2006). Erlangga. *Edisi Keenam Metalurgi Fisik moder & Rekayasa Material*. Jakarta : Ciaracas. 24-50

(g) Monk Edwin. 1993. Courier Corporation. *How to Build Wooden Boats: With 16 Small-Boat Designs*. Sage Publications Ltd , Canada. 45

(h) Joedawinata, HDII, Ahadiat. *Applied Aesthetics, Diktat Kuliah Magister*

(i) John Fyson, (1985). *DESIGN OF SMALL FISHING VESSELS*, Fishing News Books Ltd., Farnham, England,19

(j) Pasaribu, B.P., (1987) . *Material Kayu Utuh dan Kayu Sambungan untuk Konstruksi Kapal Penangkap Ikan.* , Buletin PSP Volume I No.2. Bogor: Departemen Pemanfaatan Sumberdaya Perikanan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor. 39-48

(k) SULISTYADI, Kohar, (2003) *Perancangan Sistem Kerja dan Ergonomi*, Publisher. Jakarta Universitas Sahid, 20 -33

(l) Moleong, Lexi J.. *Metodologi Penelitian Kualitatif*. Bandung: Remaja Rosda Karya. 2000.

AUTHOR BIOGRAPHIES

Indra Gunara Rochyat is a lecturer in Department of Interior Design, Faculty of Design and Creative Industry, Esa Unggul University, Jakarta. Received Master of Art and Art History from Senior University International in 2000. And received his second Master of Product Design from Trisakti University in 2016. My Research interests are in the area of Product Design specially Boat Design and Interior Design. Im a member of the Indonesian Ascociation and a Member of AMKRI, Indonesian Furniture Designer Ascociation. A Member of Design and Creative Industry Faculty at Esa Unggul University as Head of Interior Design Department ,email address is <indragunara@esaunggul.ac.id>

PREFACE

Dear Presenters and Delegates,

On behalf of the Organizing Committee, I am honored to welcome you to the 9th International Seminar on Industrial Engineering and Management (ISIEM). This seminar is organized by the Industrial Engineering Department from eight Universities, namely Trisakti University, Telkom University, Tarumanagara University, Atma Jaya Catholic University of Indonesia, Al Azhar Indonesia University, Esa Unggul University, Pasundan University, and Bung Hatta University.

The theme “**Collaborative Innovation Towards Borderless Industrial and Economic System**” which in accordance with the current economic era, we hope that through the exchange of ideas, experiences and recent progress in Industrial Engineering and Management from academicians, engineers, professionals and practitioners from Universities, research institutions, government agencies and industries be able to help us to deal with future challenges.

We hope that our presenter and delegates will gain many shared ideas and great experiences from this conference and also acquire additional insights from our honorable speakers, **Gursel Ilipinar, PhD** from ESADE Business School – Barcelona, **Profesor Emeritus Dato’ Ir. Dr. Zainai Bin Mohamed** from UTM Razak School of Engineering and Advance Technology – Malaysia, **Milko-Pierre Papazoff** from Vice President of French External Trade Counsellor (Malaysian Chapter).

The success of this seminar is due to the hard efforts of many people who we gratefully acknowledge. Special thank to all reviewers, speakers, and presenters, also highly appreciate to the committee for mutual effort and invaluable contribution.

Finally, we hope you will enjoy this conference and the natural beauty of Padang city – Indonesia and see you in the next ISIEM.

Best wishes,

Chair of the 9th ISIEM 2016

Dr. Wisnu Sakti Dewobroto, M.Sc

COMMITTEE

STEERING COMMITTEE

1. Dr. Ir. Tiena G. Amran, M.Sc. (Trisakti University)
2. Rino Andias Anugraha, S.T., M.M. (Telkom University)
3. Ir. Arief Suwandi, M.T. (Esa Unggul University)
4. Hotma Antoni Hutahaean, S.T., M.T. (Atma Jaya Catholic University of Indonesia)
5. Ir. Toto Ramadhan, M.T. (Pasundan University)
6. Budi Aribowo, S.T., M.Si. (Al Azhar Indonesia University)
7. Dr. Lamto Widodo S.T., M.T. (Tarumanagara University)
8. Yesmizarti Muchtar, S.T, M.T. (Bung Hatta University)

OPERATING COMMITTEE

Chairman

Dr. Wisnu Sakti Dewobroto, M.Sc (Trisakti University)

Co-Chairman :

Rino Andias Anugraha, S.T., M.M. (Telkom University)

Secretary

Dr. Lamto Widodo S.T., M.T. (Tarumanagara University)

Treasury

Pratya Poeri Suryadhini., S.T., M.T. (Telkom University)

Leaflet :

1. Rahmi Maulidya, S.T., M.T. (Trisakti University)
2. Widya Nurcahayanty T., S.T., M.T., MBA (Al Azhar Indonesia University)

Public Relation

1. Dr. Ir. Nofi Erni, M.M. (Esa Unggul University)
2. Dr. Lamto Widodo, S.T., M.T. (Tarumanagara University)
3. Yusrizal Bakar, S.T, M.T (Bung Hatta University)

Sponsorship :

1. Dr. Rina Fitriana, S.T., M.M. (Trisakti University)
2. Niken Parwati, S.T., M.M. (Al Azhar Indonesia University)

Proceeding :

1. Rahmi Maulidya, S.T., M.T. (Trisakti University)
2. Nunung Nurhasanah, S.T., M.Si. (Al Azhar Indonesia University)
3. Endro Wahyono (Tarumanagara University)

Seminar :

1. Dr. Ir. Nofi Erni, M.M. (Esa Unggul University)
2. Iphov Kumala Sriwana, S.T., M.Si. (Esa Unggul University)
3. Andre Sugioko, S.T., M.T. (Atma Jaya Catholic University of Indonesia)
4. Wilson Kosasih, S.T, MT (Tarumanagara University)
5. I Wayan Sukania, S.T., M.T. (Tarumanagara University)
6. Aidil Ikhsan, S.T, M.T (Bung Hatta University)

7. Eva Suryani, S.T., M.T.

(Bung Hatta University)

Acomodation :

1. Vivi Triyanti, S.T., M.Sc.

(Atma Jaya Catholic University)

2. Dr. Ir. Nofi Erni, M.M.

(Esa Unggul University)

3. Lestari Setiawati, S.T., M.T.

(Bung Hatta University)

Website :

1. Ir. Wahyu Katon, M.T.

(Pasundan University)

2. Dr. Ir. Yogi Yogaswara, M.T.

(Pasundan University)

3. Wawan Tripiawan, ST., MT.

(Telkom University)

4. Rayinda Pramuditya Soesanto, ST.

(Telkom University)

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

Universitas
Esa Unggul

REVIEWER

1. Dr. Paul Hong (University of Toledo, Ohio, USA)
2. Farhad Moeeni, Ph.D. (Arkansas State University)
3. Ahmad Syamil, Ph.D. (Binus School University)
4. Fajar Kurniawan, S.T., M.Si. (Saint Mary's University of Hongkong)
5. Assc. Prof. Dr. Chuvej Chansa-Ngavej (Shinawatra University, Thailand)
6. Dr. Ir. Tiena G. Amran (Trisakti University)
7. Prof. Parwadi Moengin (Trisakti University)
8. Dr. Ir. Nofi Erni, M.M. (Esa Unggul University)
9. Roesfiansjah, Ph.D (Esa Unggul University)
10. Prof. Ir. Hadi Sutanto, MMAE., Ph.D. (Atma Jaya Catholic University of Indonesia)
11. Dr. Ir. Syarif Hidayat, M.Eng.Sc, M.M. (Al Azhar Indonesia University)
12. Dr. Ir. Hj. Tjutju Tarlih Dimiyati, MSIE. (Pasundan University)
13. Dr. Ir. Hj. Arumsari, M.Sc. (Pasundan University)
14. Dr. Lamto Widodo, S.T., M.T. (Tarumanagara University)
15. Dr. Luciana Andrawina, M.T. (Telkom University)
16. Dr. Dida Diah Damayanti, M.Eng.Sc (Telkom University)
17. Inna Kholidasari, S.T., M.T., Ph.D. (Bung Hatta University)
18. Ayu Bidiawati J.R, S.T.,M.T. (Bung Hatta University)

KEYNOTE SPEECH

#1

Prof. Emeritus Dato' Ir. Dr. Zainai Bin Mohamed
UTM Razak School of Engineering and Advanced Technology
UTM International Campus



#2

Gursel Ilipinar, PhD
Innovation Management Expert
ESADE Business School - Barcelona



#3

Milko-Pierre Papazoff
VP of French External Trade Counsellor (Malaysian Chapter)



AGENDA

September 20, 2016

- 18:00 - 18:30 Registration
18:30 - 19:30 Dinner
19:30 - 19:40 Padang Dance by Bung Hatta University
19:40 - 19:45 Welcoming Speech from Head of Committee ISIEM 9th
19:45 - 20:00 Opening Ceremony by Bung Hatta University Rector
20:00 - 21:00 Keynote Speech # 1
Prof. Emeritus Dato' Ir. Dr. Zainai Bin Mohamed
**(UTM Razak School of Engineering and Advanced Technology,
UTM International Campus – Malaysia)**
Moderator: Dr. Adianto, M.Sc.
21:00 - 21:15 Photo Session with all participants

September 21, 2016

- 6:30 - 8:00 Breakfast and Registration
8:00 - 9:00 Keynote Speech # 2
Gursel Ilipinar, PhD
**(Innovation Management Expert
ESADE Business School – Barcelona)**
Moderator: Ir. Wahyukaton, M.T.
9:00 - 10:00 Keynote Speech # 3
Milko-Pierre Papazoff
VP of French External Trade Counsellor (Malaysian Chapter)
Moderator: Dr. Ir. Syarif Hidayat, M.Eng.Sc, M.M.
10:00 - 10:30 Question and Answer
10:30 - 11:15 Coffee and Tea Break
11:15 - 12:35 Parallel session #1
12:35 - 13:30 Lunch break
13:30 - 16:30 Parallel session #2
15:00 - 15:15 Coffee and Tea Break
18:30 - 20:00 Dinner

September 22, 2016

08:00 - 09:30 Parallel session #3

09:30 - 17:00 City Tour



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul




Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul



Universitas
Esa Unggul

*The 9th International Seminar on Industrial Engineering and Management (9th ISIEM)
Grand Inna Muara Padang, West Sumatera, Indonesia, September 20-22, 2016*

PARALLEL SESSION

SEPTEMBER 21, 2016 SESSION 1 ROOM 1

Moderator : Dr. Lamto Widodo, S.T., M.T.

Time	Paper	Code	Paper Code
11.15-11.25	<p>MAINTENANCE PERFORMANCE MEASUREMENT TRANSJAKARTA BUS AT PERUM DAMRI SBU BUSWAY CORRIDOR I & VIII USING MAINTENANCE SCORECARD</p> <p>Didien Suhardini, Iveline Anne Marie, Amal Witonohadi, Auliandi Fahriditya Putra Jurusan Teknik Industri, Fakultas Teknologi Industri, Universitas Trisakti, Jakarta, Indonesia</p>	IM	110
11.25-11.35	<p>IDENTIFICATION OF SUPPLY CHAIN PERFORMANCE INDICATORS AND STRATEGIC OBJECTIVES USING THE BALANCED SCORECARD</p> <p>Dwi Kurniawan, Adela Anggun Pertiwi, Lisye Fitria Industrial Engineering Department, Institut Teknologi Nasional, Bandung, Indonesia</p>	SCM	26
11.35-11.45	<p>IMPROVEMENT TO QUALITY OF TELECOMMUNICATION SERVICE BY MINIMIZE FAILURE OF SIMKARI APPLICATION DEVICE (A CASE STUDY IN PT DATALINK SOLUTION)</p> <p>M. Hudori Department of Logistic Management, Citra Widya Edukasi Polytechnic of Palm Oil, Bekasi, Indonesia</p>	QM	79
11.45-11.55	<p>POSITIONING ANALYSIS FOR HIGHER EDUCATION BASED ON PERCEPTUAL MAPPING USING MULTIDIMENSIONAL SCALING</p> <p>Hafizh Suharja, Yati Rohayati, Rio Aurachman School of Industrial and System Engineering, Telkom University, Bandung, Indonesia</p>	IM	16
11.55-12.05	<p>IMPROVING THE SERVICE QUALITY OF DISTANCE EDUCATION USING INTEGRATION SERVICE QUALITY FOR HIGHER EDUCATION AND KANO</p> <p>Istianah Nedia, Yati Rohayati, Maria Dellarosawati Idawicasakti School of Industrial and System Engineering, Telkom University, Bandung, Indonesia</p>	QM	40
12.05-12.15	<p>DESIGN OF STANDARD OPERATING PROCEDURE (SOP) OF DESIGN AND DEVELOPMENT OF PRODUCT ACCORDING TO ISO 9001:2015 CLAUSE 8.3 BASED ON RISK BASED THINKING BY BUSINESS PROCESS IMPROVEMENT METHOD AT CV. XYZ</p> <p>Rindy Aprilina Gita Prastyanti¹, Sri Widaningrum, Heriyono Lalu Faculty of Industrial Engineering, Telkom University, Bandung, Indonesia</p>	QM	52
12.15-12.25	<p>DESIGN OF NONCONFORMITY AND CORRECTIVE ACTION STANDARD OPERATING PROCEDURE BASED ON INTEGRATED REQUIREMENTS FROM ISO 9001 AND ISO 14001</p> <p>Rahmah Fadhilah, Sri Widaningrum, Heriyono Lalu Industrial Engineering Department, Telkom University of Engineering, Bandung Indonesia</p>	QM	53

SEPTEMBER 21, 2016 SESSION 1 ROOM 1

Moderator : Dr. Lamto Widodo, S.T., M.T.

Time	Paper	Code	Paper Code
12.25-12.35	DESIGN AND ANALYSIS PHYSICAL AND LOGICAL SECURITY USING TIA-942 AND ISO/IEC 27000 SERIES IN DATA CENTER OF PDII-LIPI Mukhlis Anugrah Pratama, Mochammad Teguh Kurniawan, Information System Major, Industrial Engineering Faculty, Telkom University, Bandung, Indonesia	DSS	68

SEPTEMBER 21, 2016 SESSION 1 ROOM 2

Moderator : Dr. Ir. Syarif Hidayat, M.Eng.Sc, M.M.

Time	Paper	Code	Paper Code
11.15-11.25	INCREASING PRODUCTIVITY WITH OBJECTIVE MATRIX METHOD CASE STUDY ON BUILDING MAINTENANCE MANAGEMENT PIO PT. XXX R Bagus Yosan, Muhammad Kholil, Winny Soraya Industrial Engineering, Mercubuana University, Jakarta, Indonesia	IM	42
11.25-11.35	LEAN PROJECT MANAGEMENT TO MINIMIZE WASTE, CASE STUDY : INDARUNGVI PROJECT, PT SEMEN PADANG Nilda Tri Putri, Sarvina Department of Industrial Engineering, Faculty of Engineering, Andalas University, Padang, Indonesia	QM	38
11.35-11.45	APPLICATION OF LEAN MANUFACTURING IN THE PRODUCTION OF SPUN PILE USING WASTE ASSESMENT MODEL AND VALUE STREAM ANALYSIS Syarif Hidayat, Siti Nurlina Industrial Engineering Department, Faculty of Science and Technology, University Al Azhar Indonesia, Jakarta, Indonesia	PS	11
11.45-11.55	THE IMPLEMENTATION OF CORPORATE SOCIAL RESPONSIBILITY OF STARBUCKS COMPANY Charly Hongdiyanto Ciputra University, Indonesia	IM	72
11.55-12.05	A MODIFIED ECONOMIC PRODUCTION QUANTITY (EPQ) WITH SYNCHRONIZING DISCRETE AND CONTINUOUS DEMAND UNDER FINITE HORIZON PERIOD AND LIMITED CAPACITY OF STORAGE Jonrinaldi, Henmaid, Nurike Oktavia Department of Industrial Engineering, Andalas University, Padang, Indonesia Master Program of Industrial Engineering, Andalas University, Padang, Indonesia	PS	44
12.05-12.15	APPLICATION OF VALUE STREAM MAPPING IN THE NVOCC FCL SERVICE PROCESS TO MINIMIZE DELAY IN SUBMISSION OF THE DOCUMENT (A CASE STUDY IN PT YUSEN LOGISTICS INDONESIA) M. Hudori, Nismah Panjaitan Department of Logistic Management, Citra Widya Edukasi Polytechnic of Palm Oil, Bekasi, Indonesia Department of Industrial Engineering, Sumatera Utara University, Medan, Indonesia	QM	76
12.15-12.25	WAREHOUSE LAYOUT DESIGN USING SHARED STORAGE METHOD Alan Dwi Wibowo, Rahmat Nurcahyo, Cut Khairunnisa Department of Agro-Industrial Technology, Universitas Lambung Mangkurat, Indonesia Departemen of Industrial Engineering, Universitas Indonesia,	PS	22

SEPTEMBER 21, 2016 SESSION 1 ROOM 2

Moderator : Dr. Ir. Syarif Hidayat, M.Eng.Sc, M.M.

Time	Paper	Code	Paper Code
	Indonesia		
12.25-12.35	CABLE CLAMP PRODUCTION CAPACITY PLANNING USING ROUGH CUT CAPACITY PLANNING (RCCP) METHOD (A CASE STUDY IN PT FAJAR CAHAYA CEMERLANG) M. Hudori Department of Logistic Management, Citra Widya Edukasi Polytechnic of Palm Oil, Bekasi, Indonesia	PS	80

SEPTEMBER 21, 2016 SESSION 1 ROOM 3

Moderator : Dr. Ir. Yogi Yogaswara, M.T.

Time	Paper	Code	Paper Code
11.15-11.25	DEVELOPMENT OF ONLINE KNOWLEDGE MANAGEMENT CYCLE INDICATORS USING SECI APPROACH: CASE STUDY IN AN ENERGY COMPANY Aldio Fikri Siddik, Amelia Kurniawati, Umar Yunan Kurnia Septo Hedyanto Industrial Engineering Department, Telkom University, Bandung, Indonesia Information System Department, Telkom University, Bandung, Indonesia	DSS	51
11.25-11.35	MANAGEMENT INFORMATION SYSTEM FOR ORDER FULFILLMENT: A CASE STUDY Johanes Fernandes Andry, Halim Agung, Yana Erlyana Faculty Technology and Design, Bunda Mulia University, Jakarta, Indonesia	DSS	3
11.35-11.45	Risk Factor Analysis of Liquefied Natural Gas (LNG) Supply Process Chain in Indonesia Rahmat Nurcahyo, Farid Akbar, Yadrifil Kampus UI Depok Indonesia	SCM	14
11.45-11.55	ENHANCING PENDULUM NUSANTARA MODEL IN INDONESIAN MARITIME LOGISTICS NETWORK Komarudin, Muhammad Reza, Armand Omar Moeis System Engineering, Modeling and Simulation (SEMS) Laboratory, Department of Industrial Engineering, Universitas Indonesia	OR	49
11.55-12.05	PURCHASING CONSORTIUM SYSTEM USING COMMON REPLENISHMENT EPOCH (CRE) MODEL BY DESIGNING MOBILE INFORMATION SYSTEM FOR SMALL and MEDIUM ENTERPRISES (SMEs) Yudha Prasetyawan, Imam Baihaqi, Shinta Dewi Industrial Engineering Department, Sepuluh Nopember Institut of Technology, Surabaya, Indonesia Business and Management Department, Sepuluh Nopember Institut of Technology, Surabaya, Indonesia Agroindustrial Technology Department, Universitas Internasional Semen Indonesia, Indonesia	DSS	10
12.05-12.15	DESIGN E-COMMERCE ANGON BASED ON MARKETPLACE TO INCREASE REVENUE FOR LIVESTOCK'S ACTORS (SELLING MODULE) Atika Elysia, Irfan Darmawan, Muhammad Azani Hasibuan Department of Industrial Engineering, Telkom University, Bandung, Indonesia	IM	65

SEPTEMBER 21, 2016 SESSION 1 ROOM 3

Moderator : Dr. Ir. Yogi Yogaswara, M.T.

Time	Paper	Code	Paper Code
12.15-12.25	CONTROL SYSTEMS DESIGN FOR AUTO JUDGEMENT CHECK MACHINE IN ROTOR ASSEMBLY LINE USING PROGRAMMABLE LOGIC CONTROLLER Syahril Ardi, Moh Faiza Abu Rizal Production and Process Manufacture, Polytechnic Manufacture Astra, Jakarta, Indonesia	PS	31
12.25-12.35	OPERATIONAL RISK IDENTIFICATION IN ADMINISTRATION SERVICES OF HIGHER EDUCATION Robby Anzil Firdaus, Rahmat Nurcahyo, Anafi Yuan Septiari, Supriadi Industrial Engineering Departement, Universitas Indonesia, Indonesia	IM	17

SEPTEMBER 21, 2016 SESSION 2 ROOM 1

Moderator : Niken Parwati, S.T., M.M.

Time	Paper	Code	Paper Code
13.30-13.40	SHELVES RE-DESIGN TO CONSIDER ASPECTS OF ERGONOMICS IN KOPETRI MINI MARKET, KARAWANG Dene Herwanto, Sukanta University of Singaperbangsa Karawang, Karawang, Indonesia	6	ER
13.40-13.50	COGNITIVE ERGONOMIC ANALYSIS OF PROFESSIONALS IN INDUSTRIAL DESIGNER APPAREL (Case Study: Designer at PT. Kurnia ASTASURYA) Erwin M Pribadi, Ari Robiana Rijalah Industrial Engineering Department, Universitas Pasundan, Bandung, Indonesia	13	ER
13.50-14.00	DESIGN CONCEPT OF WASHING GALLON USING DESIGN METHOD RATIONAL Antonio Bennarivo Nainggolan, Mira Rahayu, Teddy Syafrizal Industrial Engineering Department, Telkom University, Bandung, Indonesia	56	ER
14.00-14.10	DESIGNING ERGONOMIC CONVEYANCE TOOLS FOR SULFUR MINERS IN THE IJEN CRATER Anny Maryani, Dyah Santhi Dewi, Elsa Camelia Harmadi, Pamungkas Dwi Admaja Industrial Engineering Department, ITS Surabaya, Indonesia	61	ER
14.10-14.20	AUTOMATIC POLARIZING FILTER SYSTEM FOR WELDING MASK Muhammad Ridwan Andi Purnomo, Riadhho Clara Shinta, Rizqi Ramadhani, Ahmad Rizal Yassaruddin, Muhammad Iqbal Sabit Department of Industrial Engineering Universitas Islam Indonesia	47	ER
14.20-14.30	DESIGN GALLON WASHING TOOLS USING ERGONOMIC FUNCTION DEPLOYMENT METHOD Bintang Sri Perdana, Mira Rahayu, Teddy Syafrizal Industrial Engineering Department, Telkom University, Bandung, Indonesia	57	ER
14.30-14.40	ERGONOMIC ANALYSIS FOR THE ARMOURED PERSONNEL CARRIER DRIVER Halim Mahfudh, Lilik Zulaihah, Reda Rizal Department of Industrial Engineering, Universitas Pembangunan Nasional Veteran Jakarta	91	ER

SEPTEMBER 21, 2016 SESSION 2 ROOM 1

Moderator : Niken Parwati, S.T., M.M.

Time	Paper	Code	Paper Code
14.40-14.50	APPLICATION OF ANALYTICAL HIERARCHY PROCESS TO CHOOSE CRITERIA FOR MOBILE PHONES Dessi Mufti, Yesmizarti Muchtiar, Iswanto Industrial Engineering Department, Universitas Bung Hatta, Padang, West Sumatera, Indonesia	83	IM
14.50-15.00	DESIGNING A PERSONAL SURVIVAL KIT IN FLOOD DISASTERS THROUGH PARTICIPATORY DESIGN APPROACH Grace Novelia, Johanna Renny Octavia Industrial Engineering Department, Parahyangan Catholic University, Bandung, Indonesia	89	ER
15.00-15.10	DESIGN IMPROVEMENT FOR POTATOES CULTRY TOOLS "POTTY" USING PRODUCT ARCHITECTURE ANALYSIS Rahmat Ramadhani Bayu, Dicha Keci Barakin, Rendra Gilang Yuniarto, Muhammad Iqbal Industrial Engineering, Telkom University, Bandung, Indonesia	30	ER
15.10-15.20	STUDY OF SHAFT POSITION IN GAS TURBINE JOURNAL BEARING Rizky Arman, Iman Satria Mechanical engineering Dept, Faculty of Industrial Technolgy, Bung Hatta University, Padang, Indonesia	105	PS
15.20-15.30	APPLICATION METHODS P-C-P TO IMPROVE QUEUE SERVICE QUALITY IN SUPERMARKET CASHIER AT THE PEAK DEMAND CONDITION Yesmizarti Muchtiar, Muhibbullah Azfa Manik, Emil Endrison Department of Industrial Engineering, Bung Hatta University, Padang, Indonesia	78	QM
15.30-15.40	DESIGN E-COMMERCE ANGON BASED ON MARKETPLACE TO INCREASE PURCHASING EFFICIENCY FOR LIVESTOCK'S ACTOR (PURCHASE MODULE) Pratiwi Galuh Putri, Irfan Darmawan, Muhammad Azani Departemen of Industrial Engineering Telkom University, Bandung, Indonesia	67	IM
15.40-15.50	DEVELOPING INFORMATION SYSTEM OF LIBRARY ON E-SCHOOL QR-CODE BASED IN 13 NATIONAL HIGH SCHOOL USING EXTREME PROGRAMMING METHODOLOGY Timbul Prawira Gultom, Nia Ambarsari, Muhammad Azani H. Department of Industrial Engineering, Telkom University, Bandung, Indonesia	71	DSS
15.50-16.00	USING EDUQUAL AND KANO'S MODEL TO IMPROVE THE SERVICE QUALITY OF TRAINING AND CERTIFICATION PROGRAM Iftitah Pratomo, Yati Rohayati, Sari Wulandari School of Industrial and System Engineering, Telkom University, Bandung Indonesia	23	IM
16.00-16.10	DEVELOPMENT DETAIL DESIGN GALLON WASHER USING DESIGN FOR ASSEMBLY (DFA) Mohamad Walid Anshar Ichsan Shahib, Mira Rahayu, Teddy Sjafrizal Industrial Engineering Department, Telkom University, Bandung, Indonesia	55	ER

SEPTEMBER 21, 2016 SESSION 2 ROOM 1

Moderator : Niken Parwati, S.T., M.M.

Time	Paper	Code	Paper Code
16.10-16.20	MAKING A PLYWOOD BOAT CATAMARANS MODEL FOR HANDLING OF FLOOD EMERGENCY IN AREAS OF DURI KEPA Indra Gunara Rochyat, Asnawati, Wahyu Albin Tabrani Product Design Department – Design & Creative Industry Faculty, Esa Unggul University, Jakarta, Indonesia	102	ER
16.20-16.30	STUDY OF LIFT MARKET THROUGH GAP ANALYSIS Niken Parwati, Nurhanisa Maysa, Aprilia Tri Purwandari Department of Industrial Engineering, Faculty of Science and Technology, Universitas Al Azhar Indonesia	93	IM

SEPTEMBER 21, 2016 SESSION 2 ROOM 2

Moderator : Inna Kholidasari, S.T., M.T., Ph.D.

Time	Paper	Code	Paper Code
13.30-13.40	MAXIMUM PROFIT CALCULATION BASED ON THE QUANTITY OF DEMAND VEGATABLES WITH THE SINGLE ORDER QUANTITY METHOD Annura Minar Gayatri, Nunung Nurhasanah, Ahmad Juang Pratama Industrial Engineering, Faculty of Science and Technology, Univerisity of Al Azhar Indonesia, Jakarta, Indonesia	84	PS
13.40-13.50	DETERMINING THE INVENTORY POLICY FOR V-BELT USING PROBABILISTIC METHOD Sukanta, Dene Herwanto University Singaperbangsa of Karawang, Indonesia	7	PS
13.50-14.00	SYSTEM DYNAMICS BASED BALANCED SCORECARD TO SUPPORT DECISION MAKING IN STRATEGY OF PERFORMANCE IMPROVEMENT (A CASE STUDY IN THE UNIVERSITY) Linda Theresia, Yenny Widianty, Dawi Karomati Baroroh Department of Industrial Engineering, Institut Teknologi Indonesia, Serpong, Indonesia Industrial Engineering, Universitas Gadjah Mada, Yogyakarta, Indonesia	8	DSS
14.00-14.10	DRUG INVENTORY POLICY PROPOSAL USING PROBABILISTIC METHODS TO INCREASE THE SERVICE LEVEL Sabila Syafitri Pambudi, Dida Diah Damayanti, Budi Santosa Chulasoh Departemen of Industrial Engineering, Telkom University, Bandung, Indonesia	74	PS
14.10-14.20	AN AUTOMATED GUIDED VEHICLE SIMULATION THROUGH ROBOTINO TO HELP LEARNING COURSE INDUSTRIAL AUTOMATION Tatang Mulyana, Haris Rachmat, Prasetia Pramudita Yuliarso Laboratory of Production Manufacturing and Automation, Faculty of Industrial Engineering, Telkom University, Bandung, Indonesia	33	PS
14.20-14.30	THE IMPLEMENTATION OF ANALYTIC HIERARCHY PROCESS ON THE SELECTION OF SUPPLIER IN START-UP BUSINESS: A CASE STUDY Ahmad Setyo Irawan, Liliani International Business Management, Universitas Ciputra, Surabaya, Indonesia	27	SCM

SEPTEMBER 21, 2016 SESSION 2 ROOM 2

Moderator : Inna Kholidasari, S.T., M.T., Ph.D.

Time	Paper	Code	Paper Code
14.30-14.40	OPTIMAL PREVENTIVE MAINTENANCE OF TWO-PHASE MAINTENANCE POLICY FOR LEASED PRODUCT Hennie Husniah, Andi Cakravastia, Bermawi P. Iskandar Department of Industrial Engineering, Langlangbuana University, Bandung, Indonesia Department of Industrial Engineering, Bandung Institute of Technology, Bandung, Indonesia	28	PS
14.40-14.50	A SIMPLE MATHEMATICAL MODEL OF TECHNOLOGICAL TRANSFER WITH TWO COMPETING FOLLOWERS (A PRELIMINARY RESULT) Hennie Husniah, Asep K. Supriatna Department of Industrial Engineering, Langlangbuana University, Bandung, Indonesia Department of Mathematics, Padjadjaran University, Bandung, Indonesia	29	OR
14.50-15.00	INCREASING PRODUCTIVITY OF PT. XYZ THROUGH THE UTILIZATION OF STANDARD TIME AND THE TWO HANDED PROCESS FOR PANEL BOX PRODUCTION Arnolt Kristian Pakpahan; Didiem Suhardini; Arum Tri Astuti Organizational and Business Development Laboratorium, Industrial Engineering, Faculty of Industrial Engineering, Trisakti University	100	IM
15.00-15.10	JOB SHOP SCHEDULING AT IN-HOUSE REPAIR DEPARTMENT IN COLD SECTION MODULE CT7 ENGINE TO MINIMIZE MAKESPAN USING GENETIC ALGORITHM AT PT XYZ Michael Whizo Mayto, Pratya Poeri Suryadhini, Murni Dwi Astuti Industrial Engineering Study Program, Industrial Engineering Faculty, Telkom University, Bandung, Indonesia	99	PS
15.10-15.20	CAPACITATED VEHICLE ROUTING PROBLEM WITH TIME WINDOWS FOR MILK COLLECTION AT KPBS PANGALENGAN Tjutju Tarliah Dimiyati Industrial Engineering Department, Pasundan University, Bandung, Indonesia	34	OR
15.20-15.30	AN APPLICATION OF DIFFERENTIAL EVOLUTION ALGORITHM IN SPARE PART LOGISTICS Said Badrul Nahar , Sakesun Suthummanon, Wanatchapong Kongkaew. Industrial and Systems Engineering, Prince of Songkla University, Songkla, Thailand	109	SCM
15.30-15.40	DETERMINATION OF FAILURE RISK FOR TRANSFORMER SYSTEM BASED ON CLASSIFICATION TECHNIQUE Iveline Anne Marie, Anung B Ariwibowo, Docki Saraswati, Amal Witonohadi Faculty of Industrial Technology, Industrial Engineering Department, Trisakti University, Jakarta, Indonesia Faculty of Industrial Technology, Informatics Engineering Department, Trisakti University, Jakarta, Indonesia	90	DSS
15.40-15.50	INFORMATION SYSTEM STRATEGIC PLANNING BASED ON TOGAF ADM FRAMEWORK IN 1ST REVENUE FUNCTIONS DEPARTMENT OF REVENUE AND FINANCIAL MANAGEMENT BANDUNG REGENCY Theresia Yudith Dwi Prisila, Yuli Adam Prasetyo, Ridha Hanafi Department of Industrial Engineering Telkom University, Bandung, Indonesia	66	DSS

SEPTEMBER 21, 2016 SESSION 2 ROOM 2

Moderator : Inna Kholidasari, S.T., M.T., Ph.D.

Time	Paper	Code	Paper Code
15.50-16.00	ANALYSIS & EVALUATION OF PLANT PRODUCTION LAYOUT PT ARKHA JAYANTI PERSADA USING GROUP OF TECHNOLOGY CONCEPT WITH GENETIC ALGORITHM APPROACH Agung Yugo Ngumboro, Budi Aribowo Majoring In Industrial Engineering, Faculty of Science and Technology, Universitas Al Azhar Indonesia, Jakarta, Indonesia	58	PS
16.00-16.10	RELIABILITY ANALYSIS AND MAINTENANCE MANAGEMENT EVALUATION OF FLASH BUTT WELDING MACHINE WITH RCM II Arief Suwandi, Ulia Rahma Industrial Engineering Department of Esa Unggul University, Jakarta, Indonesia	54	PS
16.10-16.20	CONCEPTUAL FRAMEWORK IN PRINTING PRESS MAINTENANCE DESIGN BY USING DATA MINING Meldi Rendra School of Industrial and Systems Engineering, Telkom University, Bandung, Indonesia	25	DSS
16.20-16.30	VARIABLE ANALYSIS OF IMPROVING THE QUALITY OF SERVICE DELIVERY PACKAGE BY USING IMPORTANCE PERFORMANCE MATRIX METHOD AND KANO MODEL Dwi Novirani, Abu Bakar, Janet Apongtingnamba. Industrial of Engineering Institut Teknologi Nasional, Bandung, Indonesia	15	QM
16.30-16.40	AGGREGATE PRODUCTION PLANNING OF WOODEN TOYS USING MODIFIED PARTICLE SWARM OPTIMIZATION Adri Fajar Jenie, Syarif Hidayat Department of Industrial Engineering, Faculty of Science and Technology, Universitas Al Azhar Indonesia, Jakarta, Indonesia	111	PS

SEPTEMBER 21, 2016 SESSION 2 ROOM 3

Moderator : Aidil Ikhsan, S.T., M.T.

Time	Paper	Code	Paper Code
13.30-13.40	IMPLEMENTATION OF CRISP-DM MODEL IN ORDER TO DEFINE THE SALES PIPE LINES OF PT X Dadan Umar Daihani, Dina Feblian Master Program in Industrial Engineering, Faculty of Industrial Technology, University of Trisakti, Jakarta, Indonesia	59	DSS
13.40-13.50	HOW ICT ADOPTION COULD AFFECT INDONESIAN SMEs ORGANIZATIONAL PERFORMANCE Lucy Chairael, Fuad Salleh, Setyawan Widyarto, Vera Pujani Universitas Dharma Andalas Padang, Indonesia Universiti Selangor, Malaysia Universitas Andalas, Padang, Indonesia	48	IM
13.50-14.00	STRUCTURAL MODEL FOR SUSTAINABLE CAMPUS ASSESSMENT: A CASE OF ANDALAS UNIVERSITY Elita Amrina, Insannul Kamil, Nilda Tri Putri, Yunessa Astari Department of Industrial Engineering, Andalas University, Padang, Indonesia.	62	IM
14.00-14.10	ANALYSIS AND DESIGN ENTERPRISE ARCHITECTURE OF DEVELOPMENT ANALYSIS BUSINESS FUNCTION AT BADAN PERENCANAAN DAN PEMBANGUNAN DAERAH (BAPPEDA) WEST JAVA PROVINCE USING TOGAF ADM FRAMEWORK Anida Shafa, Yuli Adam Prasetyo, Rahmat Mulyana	69	DSS

SEPTEMBER 21, 2016 SESSION 2 ROOM 3

Moderator : Aidil Ikhsan, S.T., M.T.

Time	Paper	Code	Paper Code
	Information System,Industrial and System Engineering Faculty, Telkom University, Bandung, Indonesia		
14.10-14.20	ANALYSIS OF EARNINGS PER SHARE BEFORE AND AFTER IPO AND THE STRATEGY (CASE STUDY: COMPANIES PERFORM IPO IN INDONESIA STOCK EXCHANGE YEAR 2013) Dewa Ayu Jessica Putri, Endang Chumaidiyah, Rita Zulbetti Faculty of Industrial Engineering, Telkom University, Bandung, Indonesia	73	IM
14.20-14.30	PERCEIVED BARRIERS TO INNOVATION FOR START-UP BUSINESSES Liliani International Business Management, Universitas Ciputra	81	IM
14.30-14.40	THE DEVELOPMENT OF TECHNOLOGY READINESS ASSESSMENT FOR COMMERCIALIZATION INNOVATION AND PRODUCT DEVELOPMENT BASED ON DIGITAL BUSINESS ECOSYSTEM Elfira Febriani, Taufik Djatna Industrial Engineering Department, Faculty of Industrial Technology, Trisakti Univerity, Jakarta, Indonesia Agro Industrial Technology Department, Faculty of Agricultural Engineering and Industry, Bogor Agricultural University, Indonesia	45	IM
14.40-14.50	DEFINING THE CORPORATE METRICS MarsellinusBachtiar Engineering Faculty, Industrial Engineering Program, Atma Jaya Catholic University of Indonesia, Jakarta	87	IM
14.50-15.00	A BRIEF REVIEW IN SOME DISSERTATIONS ABOUT BUSINESS INCUBATOR PROCESS FRAMEWORK AND PERFORMANCE IN SOME COUNTRIES Lina Gozali Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, Kuala Lumpur, Malaysia	37	IM
15.00-15.10	GREEN DATA CENTER POWER MANAGEMENT DESIGN AND ANALYSIS IN PDII-LIPI USING TIA-942 STANDARD Algadilan Susanto, Mochammad Teguh Kurniawan Information System Major, Industrial Engineering Faculty, Telkom University, Bandung, Indonesia	70	DSS
15.10-15.20	RELIABILITY BASED PERFORMANCE ANALYSIS OF BASE TRANSCIVER STATION (BTS) USING RELIABILITY, AVAILABILITY, AND MAINTAINABILITY (RAM) METHOD Judi Alhilman, Rd. Rohmat Saedudin Industrial Engineering Department, School of Industrial and Systems Engineering, Telkom University, Bandung, Indonesia	35	QM
15.20-15.30	MEASURING LABORATORY ADMINISTRATION SYSTEM SATISFACTION : A CASE STUDY Rayinda Pramuditya Soesanto, Amelia Kurniawati, Muhammad Iqbal Industrial Engineering Department, Telkom University, Indonesia	9	IM
15.30-15.40	THE RELATIONSHIP BETWEEN TEACHING PROCESS AND QUALITY USING THE LINEAR STRUCTURE (LISREL) MODEL IN INDUSTRIAL ENGINEERING DEPARTMENT Tiena Gustina Amran Trisakti University, Jakarta, Indonesia	98	IM

SEPTEMBER 21, 2016 SESSION 2 ROOM 3

Moderator : Aidil Ikhsan, S.T., M.T.

Time	Paper	Code	Paper Code
15.40-15.50	ANALYSIS OF LOCAL ELEVATOR COMPANY CORPORATE CULTURE Syarif Hidayat, Ainun Jariyah, Achmad Chirzun Industrial Engineering, Faculty of Science and Technology, Univerisity of Al Azhar Indonesia, Jakarta, Indonesia	85	IM
15.50-16.00	FEASIBILITY STUDY OF BUSINESS DEVELOPMENT PT NUSAPATI PRATAMA WITH LEAN STARTUP Agung Sasongko, Wisnu S Dewobroto, Said Saleh Al-Amry. Trisakti University, Jl. Kyai Tapa No. 1 Grogol, Jakarta Barat, Jakarta, Indonesia	96	IM
16.00-16.10	PROPOSED MAINTENANCE POLICY AND SPARE PART MANAGEMENT OF GOSS UNIVERSAL PRINTING MACHINE WITH RELIABILITY CENTERED MAINTENANCE, RELIABILITY CENTERED SPARES, AND PROBABILISTIC INVENTORY MODEL Valinouski Aulia, Judi Alhilman, Nurdinintya Athari S. Industrial Engineering, Faculty of Industrial and System Engineering, Telkom University, Bandung, Indonesia	75	PS
16.10-16.20	PAYROLL ADMINISTRATION SYSTEM IMPLEMENTATION USING ODOO AT PT.PRIMARINDO ASIA INFRASTRUCTURE, TBK WITH RAPID APPLICATION METHOD Kevin Rohni Goklas Sinaga ¹ , Wahjoe Witjaksono ² , Faishal Mufied Al-Anshary ³ . Telkom University	64	IM
16.20-16.30	DEFINING TECHNOLOGY STRATEGY FOR SMALL TO MEDIUM ENTERPRISE WITHIN LEAN AND GREEN MANUFACTURING FRAMEWORK Yudha Prasetyawan Industrial Engineering Department, Institut Teknologi Sepuluh Nopember Surabaya	107	IM

SEPTEMBER 22, 2016 SESSION 3 ROOM 1

Moderator : Dr. Rina Fitriana, S.T., M.M.

Time	Paper	Code	Paper Code
08.00-08.10	VALUE PROPOSITION DESIGN AND BUSINESS MODEL GENERATION METHOD USE FOR BUSINESS INNOVATION FEASIBILITY ON THE MICROBIAL FERTILIZER – LAPTIAP BPPT Wisnu Dewobroto, Bernard Marthin Department of Industrial Engineering, Faculty of Industrial Technology, Trisakti University	97	IM
08.10-08.20	ENHANCING COMPETITIVENESS OF TEXTILE AND CLOTHING SMALL-MEDIUM INDUSTRIES THROUGH PERFORMANCE MEASUREMENT OF MATERIAL PLANNING USING SCOR METHOD Nunung Nurhasanah ¹ , Widya Tanjung Nurcahayanti ¹ , Meliantika ¹ , Endang Ripmiatin ² , Mariyatul Qibiyah ¹ , Shifa Aini Wulandari ¹ ¹ Industrial Engineering, Faculty of Science and Technology, Univerisity of Al Azhar Indonesia ² Informatics Technology, Faculty of Science and Technology, Univerisity of Al Azhar Indonesia	77	SCM

SEPTEMBER 22, 2016 SESSION 3 ROOM 1

Moderator : Dr. Rina Fitriana, S.T., M.M.

Time	Paper	Code	Paper Code
08.20-08.30	CONCEPTUAL MODEL OF SUPPLY CHAIN MANAGEMENT FOR HIGHER EDUCATION Fajar Kurniawan Saint Mary's University of Hong Kong	105	SCM
08.30-08.40	FEEDBACK FROM USERS ON A DESIGN OF WEB-BASED INVENTORY AND PRODUCT ORDERING SYSTEM FOR A UNIFORM MAKER Gamma Habie Azzaky, Endang Chumaidiyah, Wawan Tripiawan Industrial Engineering Faculty, Telkom University, Bandung, Indonesia	88	DSS
08.40-08.50	FACTORS INFLUENCING INNOVATION MANAGEMENT PRACTICES IN NIGERIA TEXTILE MANUFACTURING FIRM'S Mohammed Ndaliman Abubakar Department of Business Admin & Management, The Federal Polytechnic (FPB), Niger State, Nigeria	112	IM

SEPTEMBER 22, 2016 SESSION 3 ROOM 2

Moderator : Dr. Ir. Nofi Erni, M.M.

Time	Paper	Code	Paper Code
08.00-08.10	BUSINESS INTELLIGENCE SYSTEM MODEL PROPOSALS TO IMPROVE THE QUALITY OF SERVICE AT PT GIA Rina Fitriana, Johnson Saragih, M. Andika Firmansyah System and Industrial Simulation Laboratory, Department of Industrial Engineering, Faculty of Industrial Technology, Trisakti University, Jakarta, Indonesia	86	QM
08.10-08.20	WORK RISK ASSESSMENT TOWARDS WOOD FURNITURE PRODUCTION ACTIVITIES USING MANUAL TASK RISK ASSESSMENT METHOD AND RODGERS MUSCLE FATIGUE ANALYSIS METHOD Cindy Wibisono, Vivi Triyanti Department of Industrial Engineering, Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia	4	ER
08.20-08.30	EXPERIMENTAL DESIGN OF CLASS CHARACTERISTIC FACTORS AGAINST ENERGY EXPENDITURE, MENTAL FATIGUE AND PERFORMANCE USING ANOVA METHOD Albertus Steven, Vivi Triyanti Industrial Engineering Studies Program – Faculty Of Engineering Atma Jaya Indonesian Catholic University, Jakarta, Indonesia	32	ER
08.30-08.40	WORKLOAD ANALYSIS OF THE CONTAINER UNLOADING PROCESS WORKER Lamto Widodo, I Wayan Sukania, Cynthia Kristiani Industrial Engineering Department, Engineering Faculty, Tarumanagara University, Jakarta, Indonesia	1	ER
08.40-08.50	DETERMINING THE ROUTE FOR SOLID WASTE TRANSPORTATION FROM TPS TO SPA USING VRP – NEAREST NEIGHBOR FOR 10m³ VEHICLE ON SERVICE AREA SOUTHERN BANDUNG AND EASTERN BANDUNG Wahyukaton, Anni Rochaeni, Sunarya Industrial Engineering Pasundan University, Bandung, Indonesia Environmental Engineering Pasundan University, Bandung, Indonesia	21	OR

SEPTEMBER 22, 2016 SESSION 3 ROOM 2

Moderator : Dr. Ir. Nofi Erni, M.M.

Time	Paper	Code	Paper Code
08.50-09.00	STUDY OF LIFT MARKET THROUGH GAP ANALYSIS Niken Parwati, Nurhanisa Maysa, Aprilia Tri Purwandari Department of Industrial Engineering, Faculty of Science and Technology, Universitas Al Azhar Indonesia, Jakarta, Indonesia	93	IM
09.00-09.10	PROPOSED DESIGN OF TABLE AND SEAT WORK IN AFBRAMEN WORKSTATION USING ULRICH-EPPINGER Rino Andias Anugraha, Yusuf Nugroho Doyoyekti Industrial Engineering Study Program, Industrial Engineering Faculty, Telkom University	104	ER

SEPTEMBER 22, 2016 SESSION 3 ROOM 3

Moderator : Andre Sugioko, S.T., M.T.

Time	Paper	Code	Paper Code
08.00-08.10	DESIGNING PRODUCTION SCHEDULING WITH FUZZY PERT TO SOLVE RESOURCE CONSTRAINTS THROUGH LANG'S ALGORITHM N. Nurhasanah, W.N. Tanjung, E. Ripmiatin, A. Supriyanto, S.A. Wulandari, C.A. Nurpraja, Meliantika, M. Qibtiyah Department of Industrial Engineering, University of Al Azhar, Jakarta, Indonesia Department of Informatics Engineering, University of Al Azhar, Jakarta, Indonesia	41	PS
08.10-08.20	PRODUCTION SCHEDULING OF BIG PART AT MACHINING DEPARTMENT IN PT. XYZ Rizki Wahyuniardi, Wahyukaton, Moch Rifqi Fathoni Industrial Engineering, Pasundan Universitas, Bandung, Indonesia	20	PS
08.20-08.30	DYNAMIC SIMULATION SYSTEM FOR MAIZE COMMODITIES (CASE STUDY: TUBAN, EAST JAVA) Christine Natalia, Agustinus Silalahi, Andre Sugioko, Trifenaus Prabu Hidayat, Cavin Natalio Simanjuntak Industrial Engineering, Atma Jaya Catholic University of Indonesia	18	OR
08.30-08.40	SUPPLY CHAIN ANALYSIS OF CASSAVA AGROINDUSTRY TO IMPROVE NATIONAL FOOD SECURITY Iphov Kumala Sriwana, Nofi Erni Industrial Engineering, Esa Unggul University, Jakarta, Indonesia	94	SCM
08.40-08.50	GROUP TECHNOLOGY AND DYNAMIC MODIFIED SPANNING TREE (DMoST) IMPLEMENTATION FOR DYNAMIC CELLULAR LAYOUT PROBLEM Yogi Yogaswara, Sri Wahyuni Industrial Engineering, Faculty of Engineering, Pasundan University, Bandung, Indonesia	63	OR
08.50-09.00	USING FUZZY INFERENCE SYSTEM ON PRODUCTION PLANNING CASE STUDY : PANDANUS HANDICRAFT INDUSTRY Nofi Erni, Iphov Kumala S., Roesfiansjah R., Riya Widayanti Industrial Engineering Department Esa Unggul University Jakarta, Indonesia	103	PS
09.00-09.10	CRITICALLY ASSESS THE DEVELOPMENT OF GREEN SUPPLY CHAIN MANAGEMENT IN THE FAST MOVING CONSUMER GOODS INDUSTRY Ilhamsyah Mahendra ¹ , Elizabeth Williamson ² Glasgow Caledonian University, United Kingdom	101	SCM

TABLE OF CONTENT

Preface
 Committee
 Reviewer
 Agenda
 Parallel Session
 Table of Content

DSS – Decision Support System and Artificial Intelligence			
No	Paper	Title and Author	Page
1	3	MANAGEMENT INFORMATION SYSTEM FOR ORDER FULFILLMENT: A CASE STUDY Johanes Fernandes Andry, Halim Agung, Yana Erlyana	Paper_3
2	8	SYSTEM DYNAMICS BASED BALANCED SCORECARD TO SUPPORT DECISION MAKING IN STRATEGY OF PERFORMANCE IMPROVEMENT (A CASE STUDY IN THE UNIVERSITY) Linda Theresia, Yenny Widianty, Dawi Karomati Baroroh	Paper_8
3	10	PURCHASING CONSORTIUM SYSTEM USING COMMON REPLENISHMENT EPOCH (CRE) MODEL BY DESIGNING MOBILE INFORMATION SYSTEM FOR SMALL and MEDIUM ENTERPRISES (SMEs) Yudha Prasetyawan, Imam Baihaqi, Shinta Dewi	Paper_10
4	25	CONCEPTUAL FRAMEWORK IN PRINTING PRESS MAINTENANCE DESIGN BY USING DATA MINING Meldi Rendra	Paper_25
5	51	DEVELOPMENT OF ONLINE KNOWLEDGE MANAGEMENT CYCLE INDICATORS USING SECI APPROACH: CASE STUDY IN AN ENERGY COMPANY Aldio Fikri Siddik, Amelia Kurniawati, Umar Yunan Kurnia Septo Hediyanto	Paper_51
6	59	IMPLEMENTATION OF CRISP-DM MODEL IN ORDER TO DEFINE THE SALES PIPE LINES OF PT X Dadan Umar Daihani, Dina Feblian	Paper_59
7	66	INFORMATION SYSTEM STRATEGIC PLANNING BASED ON TOGAF ADM FRAMEWORK IN 1ST REVENUE FUNCTIONS DEPARTMENT OF REVENUE AND FINANCIAL MANAGEMENT BANDUNG REGENCY Theresia Yudith Dwi Prisila, Yuli Adam Prasetyo, Ridha Hanafi	Paper_66
8	68	DESIGN AND ANALYSIS PHYSICAL AND LOGICAL SECURITY USING TIA-942 AND ISO/IEC 27000 SERIES IN DATA CENTER OF PDII-LIPI Mukhlis Anugrah Pratama, Mochammad Teguh Kurniawan	Paper_68
9	69	ANALYSIS AND DESIGN ENTERPRISE ARCHITECTURE OF DEVELOPMENT ANALYSIS BUSINESS FUNCTION AT BADAN PERENCANAAN DAN PEMBANGUNAN DAERAH (BAPPEDA) WEST JAVA PROVINCE USING TOGAF ADM FRAMEWORK Anida Shafa, Yuli Adam Prasetyo, Rahmat Mulyana	Paper_69
10	70	GREEN DATA CENTER POWER MANAGEMENT DESIGN AND ANALYSIS IN PDII-LIPI USING TIA-942 STANDARD Algadilan Susanto, Mochammad Teguh Kurniawan	Paper_70
11	71	DEVELOPING INFORMATION SYSTEM OF LIBRARY ON E-SCHOOL QR-CODE BASED IN 13 NATIONAL HIGH SCHOOL USING EXTREME PROGRAMMING METHODOLOGY Timbul Prawira Gultom, Nia Ambarsari, Muhammad Azani H.	Paper_71

DSS – Decision Support System and Artificial Intelligence			
No	Paper	Title and Author	Page
12	88	FEEDBACK FROM USERS ON A DESIGN OF WEB-BASED INVENTORY AND PRODUCT ORDERING SYSTEM FOR A UNIFORM MAKER Gamma Habie Azzaky, Endang Chumaidiyah, Wawan Tripiawan	Paper_88
13	90	DETERMINATION OF FAILURE RISK FOR TRANSFORMER SYSTEM BASED ON CLASSIFICATION TECHNIQUE Iveline Anne Marie, Anung B Ariwibowo, Docki Saraswati, Amal Witonohadi	Paper_90

ER – Ergonomics			
No	Paper	Title and Author	Page
1	1	WORKLOAD ANALYSIS OF THE CONTAINER UNLOADING PROCESS WORKER Lamto Widodo, I Wayan Sukania, Cynthia Kristiani	Paper_1
2	4	WORK RISK ASSESSMENT TOWARDS WOOD FURNITURE PRODUCTION ACTIVITIES USING MANUAL TASK RISK ASSESSMENT METHOD AND RODGERS MUSCLE FATIGUE ANALYSIS METHOD Cindy Wibisono, Vivi Triyanti	Paper_4
3	6	SHELVES RE-DESIGN TO CONSIDER ASPECTS OF ERGONOMICS IN KOPETRI MINI MARKET, KARAWANG Dene Herwanto, Sukanta	Paper_6
4	13	COGNITIVE ERGONOMIC ANALYSIS OF PROFESSIONALS IN INDUSTRIAL DESIGNER APPAREL (Case Study: Designer at PT. Kurnia ASTASURYA) Erwin M Pribadi, Ari Robiana Rijalah	Paper_13
5	30	DESIGN IMPROVEMENT FOR POTATOES CULTERY TOOLS “POTTY” USING PRODUCT ARCHITECTURE ANALYSIS Rahmat Ramadhani Bayu, Dicha Keci Barakin, Rendra Gilang Yuniarto, Muhammad Iqbal	Paper_30
6	32	Experimental Design of Class Characteristic Factors against Energy Expenditure, Mental Fatigue and Performance Using Anova Method Albertus Steven, Vivi Triyanti	Paper_32
7	55	DEVELOPMENT DETAIL DESIGN GALLON WASHER USING DESIGN FOR ASSEMBLY (DFA) Mohamad Walid Anshar Ichsan Shahib, Mira Rahayu, Teddy Syafrizal	Paper_55
8	56	DESIGN CONCEPT OF WASHING GALLON USING DESIGN METHOD RATIONAL Antonio Bennarivo Nainggolan, Mira Rahayu, Teddy Syafrizal	Paper_56
9	57	DESIGN GALLON WASHING TOOLS USING ERGONOMIC FUNCTION DEPLOYMENT METHOD Bintang Sri Perdana, Mira Rahayu, Teddy Syafrizal	Paper_57
10	61	DESIGNING ERGONOMIC CONVEYANCE TOOLS FOR SULFUR MINERS IN THE IJEN CRATER Anny Maryani, Dyah Santhi Dewi, Elsa Camelia Harmadi, Pamungkas Dwi Admaja	Paper_61
11	89	DESIGNING A PERSONAL SURVIVAL KIT IN FLOOD DISASTERS THROUGH PARTICIPATORY DESIGN APPROACH Grace Novelia, Johanna Renny Octavia	Paper_89
12	91	Ergonomic Analysis for the Armoured Personnel Carrier Driver Halim Mahfudh, Lilik Zulaihah, Reda Rizal	Paper_91
13	102	MAKING A PLYWOOD BOAT CATAMARANS MODEL FOR HANDLING OF FLOOD EMERGENCY IN AREAS OF DURI KEPA Indra Gunara Rochyat, Asnawati, Wahyu Albin Tabrani	Paper_102

ER – Ergonomics			
No	Paper	Title and Author	Page
14	104	PROPOSED DESIGN OF TABLE AND SEAT WORK IN AFBRAMEN WORKSTATION USING ULRICH-EPPINGER Rino Andias Anugraha, Yusuf Nugroho Doyoyekti	Paper_104

IM – Industrial Management			
No	Paper	Title and Author	Page
1	9	MEASURING LABORATORY ADMINISTRATION SYSTEM SATISFACTION : A CASE STUDY Rayinda Pramuditya Soesanto, Amelia Kurniawati, Muhammad Iqbal	Paper_9
2	16	POSITIONING ANALYSIS FOR HIGHER EDUCATION BASED ON PERCEPTUAL MAPPING USING MULTIDIMENSIONAL SCALING Hafizh Suharja, Yati Rohayati, Rio Aurachman	Paper_16
3	17	OPERATIONAL RISK IDENTIFICATION IN ADMINISTRATION SERVICES OF HIGHER EDUCATION Robby Anzil Firdaus, Rahmat Nurcahyo, Anafi Yuan Septiari, Supriadi	Paper_17
4	23	USING EDUQUAL AND KANO'S MODEL TO IMPROVE THE SERVICE QUALITY OF TRAINING AND CERTIFICATION PROGRAM Iffitah Pratomo, Yati Rohayati, Sari Wulandari	Paper_23
5	37	A BRIEF REVIEW IN SOME DISSERTATIONS ABOUT BUSINESS INCUBATOR PROCESS FRAMEWORK AND PERFORMANCE IN SOME COUNTRIES Lina Gozali	Paper_37
6	42	INCREASING PRODUCTIVITY WITH OBJECTIVE MATRIX METHOD CASE STUDY ON BUILDING MAINTENANCE MANAGEMENT PIO PT. XXX R Bagus Yosan, Muhammad Kholil, Winny Soraya	Paper_42
7	45	THE DEVELOPMENT OF TECHNOLOGY READINESS ASSESSMENT FOR COMMERCIALIZATION INNOVATION AND PRODUCT DEVELOPMENT BASED ON DIGITAL BUSINESS ECOSYSTEM Elfira Febriani, Taufik Djatna	Paper_45
8	48	HOW ICT ADOPTION COULD AFFECT INDONESIAN SMEs ORGANIZATIONAL PERFORMANCE Lucy Chairoel, Fuad Salleh, Setyawan Widyarto, Vera Pujani	Paper_48
9	60	STUDY OF LIFT MARKET THROUGH GAP ANALYSIS Niken Parwati, Nurhanisa Maysa, Aprilia Tri Purwandari	Paper_60
10	62	STRUCTURAL MODEL FOR SUSTAINABLE CAMPUS ASSESSMENT: A CASE OF ANDALAS UNIVERSITY Elita Amrina, Insannul Kamil, Nilda Tri Putri, Yunessa Astari	Paper_62
11	64	PAYROLL ADMINISTRATION SYSTEM IMPLEMENTATION USING ODOO AT PT.PRIMARINDO ASIA INFRASTRUCTURE,TBK WITH RAPID APPLICATION METHOD Kevin Rohni Goklas Sinaga, Wahjoe Witjaksono, Faishal Mufied Al-Anshary	Paper_64
12	65	DESIGN E-COMMERCE ANGON BASED ON MARKETPLACE TO INCREASE REVENUE FOR LIVESTOCK'S ACTORS (SELLING MODULE) Atika Elysia, Irfan Darmawan, Muhammad Azani Hasibuan	Paper_65
13	67	DESIGN E-COMMERCE ANGON BASED ON MARKETPLACE TO INCREASE PURCHASING EFFICIENCY FOR LIVESTOCK'S ACTOR (PURCHASE MODULE) Pratiwi Galuh Putri, Irfan Darmawan, Muhammad Azani	Paper_67
14	72	THE IMPLEMENTATION OF CORPORATE SOCIAL RESPONSIBILITY OF STARBUCKS COMPANY Charly Hongdiyanto	Paper_72

IM – Industrial Management			
No	Paper	Title and Author	Page
15	73	ANALYSIS OF EARNINGS PER SHARE BEFORE AND AFTER IPO AND THE STRATEGY (CASE STUDY: COMPANIES PERFORM IPO IN INDONESIA STOCK EXCHANGE YEAR 2013) Dewa Ayu Jessica Putri, Endang Chumaidiyah, Rita Zulbetti	Paper_73
16	81	PERCEIVED BARRIERS TO INNOVATION FOR START-UP BUSINESSES Liliani	Paper_81
17	83	APPLICATION OF ANALYTICAL HIERARCHY PROCESS TO CHOOSE CRITERIA FOR MOBILE PHONES Dessi Mufti, Yesmizarti Muchtiar, Iswanto	Paper_83
18	85	ANALYSIS OF LOCAL ELEVATOR COMPANY CORPORATE CULTURE Syarif Hidayat, Ainun Jariah	Paper_85
19	87	DEFINING THE CORPORATE METRICS MarsellinusBachtiar	Paper_87
20	93	STUDY OF LIFT MARKET THROUGH GAP ANALYSIS Niken Parwati, Nurhanisa Maysa, Aprilia Tri Purwandari	Paper_93
21	96	FEASIBILITY STUDY OF BUSINESS DEVELOPMENT PT NUSAPATI PRATAMA WITH LEAN STARTUP Agung Sasongko, Wisnu S Dewobroto, Said Saleh Al-Amry	Paper_96
22	97	VALUE PROPOSITION DESIGN AND BUSINESS MODEL GENERATION METHOD USE FOR BUSINESS INNOVATION FEASIBILITY ON THE MICROBIAL FERTILIZER – LAPTIAP BPPT Wisnu Dewobroto, Bernard Marthin	Paper_97
23	98	THE RELATIONSHIP BETWEEN TEACHING PROCESS AND QUALITY USING THE LINEAR STRUCTURE (LISREL) MODEL IN INDUSTRIAL ENGINEERING DEPARTMENT Tiena Gustina Amran	Paper_98
24	100	INCREASING PRODUCTIVITY OF PT. XYZ THROUGH THE UTILIZATION OF STANDARD TIME AND THE TWO HANDED PROCESS FOR PANEL BOX PRODUCTION Arnolt Kristian Pakpahan; Didien Suhardini; Arum Tri Astuti	Paper_100
25	107	DEFINING TECHNOLOGY STRATEGY FOR SMALL TO MEDIUM ENTERPRISE WITHIN LEAN AND GREEN MANUFACTURING FRAMEWORK Yudha Prasetyawan	Paper_107
26	110	MAINTENANCE PERFORMANCE MEASUREMENT TRANSJAKARTA BUS AT PERUM DAMRI SBU BUSWAY CORRIDOR I & VIII USING MAINTENANCE SCORECARD Didien Suhardini, Iveline Anne Marie, Amal Witonohadi, Auliandi Fahriditya Putra	Paper_110
27	112	FACTORS INFLUENCING INNOVATION MANAGEMENT PRACTICES IN NIGERIA TEXTILE MANUFACTURING FIRM'S Mohammed Ndaliman Abubakar	Paper_112

OR – Operation Research			
No	Paper	Title and Author	Page
1	18	DYNAMIC SIMULATION SYSTEM FOR MAIZE COMMODITIES (CASE STUDY: TUBAN, EAST JAVA) Christine Natalia, Agustinus Silalahi, Andre Sugioko, Trifenaus Prabu Hidayat, Cavin Natalio Simanjuntak	Paper_18

OR – Operation Research			
No	Paper	Title and Author	Page
2	21	DETERMINING THE ROUTE FOR SOLID WASTE TRANSPORTATION FROM TPS TO SPA USING VRP – NEAREST NEIGHBOR FOR 10m ³ VEHICLE ON SERVICE AREA SOUTHERN BANDUNG AND EASTERN BANDUNG Wahyukaton, Anni Rochaeni, Sunarya	Paper_21
3	29	A Simple Mathematical Model of Technological Transfer with Two Competing Followers (A Preliminary Result) Hennie Husniah, Asep K. Supriatna	Paper_29
4	34	CAPACITATED VEHICLE ROUTING PROBLEM WITH TIME WINDOWS FOR MILK COLLECTION AT KPBS PANGALENGAN Tjutju Tarliah Dimiyati	Paper_34
5	49	ENHANCING PENDULUM NUSANTARA MODEL IN INDONESIAN MARITIME LOGISTICS NETWORK Komarudin, Muhammad Reza, Armand Omar Moeis	Paper_49
6	63	GROUP TECHNOLOGY AND DYNAMIC MODIFIED SPANNING TREE (DMoST) IMPLEMENTATION FOR DYNAMIC CELLULAR LAYOUT PROBLEM Yogi Yogaswara, Sri Wahyuni	Paper_63

PS – Production System			
No	Paper	Title and Author	Page
1	7	DETERMINING THE INVENTORY POLICY FOR V-BELT USING PROBABILISTIC METHOD Sukanta, Dene Herwanto	Paper_7
2	11	APPLICATION OF LEAN MANUFACTURING IN THE PRODUCTION OF SPUN PILE USING WASTE ASSESMENT MODEL AND VALUE STREAM ANALYSIS Syarif Hidayat and Siti Nurlina	Paper-11
3	20	PRODUCTION SCHEDULING OF BIG PART AT MACHINING DEPARTMENT IN PT. XYZ Rizki Wahyuniardi, Wahyukaton, Moch Rifqi Fathoni	Paper_20
4	22	WAREHOUSE LAYOUT DESIGN USING SHARED STORAGE METHOD Alan Dwi Wibowo, Rahmat Nurcahyo, Cut Khairunnisa	Paper_22
5	28	OPTIMAL PREVENTIVE MAINTENANCE OF TWO-PHASE MAINTENANCE POLICY FOR LEASED PRODUCT Hennie Husniah, Andi Cakravastia, Bermawi P. Iskandar	Paper_28
6	31	CONTROL SYSTEMS DESIGN FOR AUTO JUDGEMENT CHECK MACHINE IN ROTOR ASSEMBLY LINE USING PROGRAMMABLE LOGIC CONTROLLER Syahril Ardi, Moh Faiza Abu Rizal	Paper_31
7	33	AN AUTOMATED GUIDED VEHICLE SIMULATION THROUGH ROBOTINO TO HELP LEARNING COURSE INDUSTRIAL AUTOMATION Tatang Mulyana, Haris Rachmat, Prasetia Pramudita Yuliarso	Paper_33
8	41	DESIGNING PRODUCTION SCHEDULING WITH FUZZY PERT TO SOLVE RESOURCE CONSTRAINTS THROUGH LANG'S ALGORITHM N. Nurhasanah, W.N. Tanjung, E. Ripmiatin, A. Supriyanto, S.A. Wulandari, C.A. Nurpraja, Meliantika, M. Qibtiyah	Paper_41
9	44	A MODIFIED ECONOMIC PRODUCTION QUANTITY (EPQ) WITH SYNCHRONIZING DISCRETE AND CONTINUOUS DEMAND UNDER FINITE HORIZON PERIOD AND LIMITED CAPACITY OF STORAGE Jonrinaldi, Henmaidi, Nurike Oktavia	Paper_44

PS – Production System			
No	Paper	Title and Author	Page
10	54	RELIABILITY ANALYSIS AND MAINTENANCE MANAGEMENT EVALUATION OF FLASH BUTT WELDING MACHINE WITH RCM II Arief Suwandi, Ulia Rahma	Paper_54
11	58	ANALYSIS & EVALUATION OF PLANT PRODUCTION LAYOUT PT ARKHA JAYANTI PERSADA USING GROUP OF TECHNOLOGY CONCEPT WITH GENETIC ALGORITHM APPROACH Agung Yugo Ngumboro, Budi Aribowo	Paper_58
12	74	DRUG INVENTORY POLICY PROPOSAL USING PROBABILISTIC METHODS TO INCREASE THE SERVICE LEVEL Sabila Syafitri Pambudi, Dida Diah Damayanti, Budi Santosa Chulasoh	Paper_74
13	75	PROPOSED MAINTENANCE POLICY AND SPARE PART MANAGEMENT OF GOSS UNIVERSAL PRINTING MACHINE WITH RELIABILITY CENTERED MAINTENANCE, RELIABILITY CENTERED SPARES, AND PROBABILISTIC INVENTORY MODEL Valinouski Aulia, Judi Alhilman, Nurdinintya Athari S.	Paper_75
14	80	CABLE CLAMP PRODUCTION CAPACITY PLANNING USING ROUGH CUT CAPACITY PLANNING (RCCP) METHOD (A CASE STUDY IN PT FAJAR CAHAYA CEMERLANG) M. Hudori	Paper_80
15	84	MAXIMUM PROFIT CALCULATION BASED ON THE QUANTITY OF DEMAND VEGATABLES WITH THE SINGLE ORDER QUANTITY METHOD Annura Minar Gayatri, Nunung Nurhasanah, Ahmad Juang Pratama	Paper_84
16	99	JOB SHOP SCHEDULING AT IN-HOUSE REPAIR DEPARTMENT IN COLD SECTION MODULE CT7 ENGINE TO MINIMIZE MAKESPAN USING GENETIC ALGORITHM AT PT XYZ Michael Whizo Mayto, Pratya Poeri Suryadhini, Murni Dwi Astuti	Paper_99
17	103	USING FUZZY INFERENCE SYSTEM ON PRODUCTION PLANNING CASE STUDY : PANDANUS HANDICRAFT INDUSTRY Nofi Erni, Iphov Kumala S., Roesfiansjah R., Riya Widayanti	Paper_103
18	105	STUDY OF SHAFT POSITION IN GAS TURBINE JOURNAL BEARING Rizky Arman, Iman Satria	Paper_105
19	111	AGGREGATE PRODUCTION PLANNING OF WOODEN TOYS USING MODIFIED PARTICLE SWARM OPTIMIZATION Adri Fajar Jenie, Syarif Hidayat	Paper_111

QM – Quality Engineering & Management			
No	Paper	Title and Author	Page
1	15	VARIABLE ANALYSIS OF IMPROVING THE QUALITY OF SERVICE DELIVERY PACKAGE BY USING IMPORTANCE PERFORMANCE MATRIX METHOD AND KANO MODEL Dwi Novirani, Abu Bakar, Janet Apongtrinamba	Paper_15
2	35	RELIABILITY BASED PERFORMANCE ANALYSIS OF BASE TRANSCEIVER STATION (BTS) USING RELIABILITY, AVAILABILITY, AND MAINTAINABILITY (RAM) METHOD Judi Alhilman, Rd. Rohmat Saedudin	Paper_35
3	38	LEAN PROJECT MANAGEMENT TO MINIMIZE WASTE, CASE STUDY : INDARUNGVI PROJECT, PT SEMEN PADANG Nilda Tri Putri, Sarvina	Paper_38
4	40	IMPROVING THE SERVICE QUALITY OF DISTANCE EDUCATION USING INTEGRATION SERVICE QUALITY FOR HIGHER EDUCATION AND KANO Istianah Nedia, Yati Rohayati, Maria Dellarosawati Idawicasakti	Paper_40

QM – Quality Engineering & Management			
No	Paper	Title and Author	Page
5	52	DESIGN OF STANDARD OPERATING PROCEDURE (SOP) OF DESIGN AND DEVELOPMENT OF PRODUCT ACCORDING TO ISO 9001:2015 CLAUSE 8.3 BASED ON RISK BASED THINKING BY BUSINESS PROCESS IMPROVEMENT METHOD AT CV. XYZ Rindy Aprilina Gita Prastyanti, Sri Widaningrum, Heriyono Lalu	Paper_52
6	53	DESIGN OF NONCONFORMITY AND CORRECTIVE ACTION STANDARD OPERATING PROCEDURE BASED ON INTEGRATED REQUIREMENTS FROM ISO 9001 AND ISO 14001 Rahmah Fadhilah, Sri Widaningrum, Heriyono Lalu	Paper_53
7	76	APPLICATION OF VALUE STREAM MAPPING IN THE NVOCC FCL SERVICE PROCESS TO MINIMIZE DELAY IN SUBMISSION OF THE DOCUMENT (A CASE STUDY IN PT YUSEN LOGISTICS INDONESIA) M. Hudori, Nismah Panjaitan	Paper_76
8	78	APPLICATION METHODS P-C-P TO IMPROVE QUEUE SERVICE QUALITY IN SUPERMARKET CASHIER AT THE PEAK DEMAND CONDITION Yesmizarti Muchtiar, Muhibbullah Azfa Manik, Emil Endrison	Paper_78
9	79	IMPROVEMENT TO QUALITY OF TELECOMMUNICATION SERVICE BY MINIMIZE FAILURE OF SIMKARI APPLICATION DEVICE (A CASE STUDY IN PT DATALINK SOLUTION) M. Hudori	Paper_79
10	86	Business Intelligence System Model Proposals to Improve the Quality of Service at PT GIA Rina Fitriana, Johnson Saragih, M. Andika Firmansyah	Paper_86

SCM – Supply Chain Management			
No	Paper	Title and Author	Page
1	14	RISK FACTOR ANALYSIS OF LIQUIFIED NATURAL GAS (LNG) SUPPLY PROCESS CHAIN IN INDONESIA Rahmat Nurcahyo, Farid Akbar, Yadrifil	Paper_14
2	26	IDENTIFICATION OF SUPPLY CHAIN PERFORMANCE INDICATORS AND STRATEGIC OBJECTIVES USING THE BALANCED SCORECARD Dwi Kurniawan, Adela Anggun Pertiwi, Lisye Fitria	Paper_26
3	27	THE IMPLEMENTATION OF ANALYTIC HIERARCHY PROCESS ON THE SELECTION OF SUPPLIER IN START-UP BUSINESS: A CASE STUDY Ahmad Setyo Irawan, Liliani	Paper_27
4	77	ENHANCING COMPETITIVENESS OF TEXTILE AND CLOTHING SMALL-MEDIUM INDUSTRIES THROUGH PERFORMANCE MEASUREMENT OF MATERIAL PLANNING USING SCOR METHOD Nunung Nurhasanah, Widya Tanjung Nurcahayanti, Meliantika, Endang Ripmiatin, Mariyatul Qibtiyah, Shifa Aini Wulandari	Paper_77
5	94	SUPPLY CHAIN ANALYSIS OF CASSAVA AGROINDUSTRY TO IMPROVE NATIONAL FOOD SECURITY Iphov Kumala Sriwana, Nofi Erni	Paper_94
6	101	CRITICALLY ASSESS THE DEVELOPMENT OF GREEN SUPPLY CHAIN MANAGEMENT IN THE FAST MOVING CONSUMER GOODS INDUSTRY Ilhamsyah Mahendra, Elizabeth Williamson	Paper_101
7	105	CONCEPTUAL MODEL OF SUPPLY CHAIN MANAGEMENT FOR HIGHER EDUCATION Fajar Kurniawan	Paper_105
8	109	AN APPLICATION OF DIFFERENTIAL EVOLUTION ALGORITHM IN SPARE PART LOGISTICS Said Badrul Nahar, Sakesun Suthummanon, Wanatchapong Kongkaew	Paper_109



*The 9th International Seminar on Industrial Engineering and Management (9th ISIEM)
Grand Inna Muara Padang, West Sumatera, Indonesia, September 20-22, 2016*