

INTERNATIONAL CONFERENCE



The Second International Conference on
Engineering and Technology Development

2nd ICETD 2013

27, 28, 29 August 2013, Bandar Lampung, Indonesia



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Faculty of Engineering and Faculty of Computer Science,
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2nd ICETD 2013

THE SECOND INTERNATIONAL CONFERENCE
ON ENGINEERING AND TECHNOLOGY DEVELOPMENT

28 -30 January 2013
Bandar Lampung University (UBL)
Lampung, Indonesia

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PREFACE

The Activities of the International Conference is in line and very appropriate with the vision and mission of Bandar Lampung University (UBL) to promote training and education as well as research in these areas.

On behalf of the Second International Conference on Engineering and Technology Development (2nd ICETD 2013) organizing committee, we are very pleased with the very good response especially from the keynote speaker and from the participans. It is noteworthy to point out that about 80 technical papers were received for this conference.

The participants of the conference come from many well known universities, among others : University Kebangsaan Malaysia – Malaysia, APTIKOM – Indonesia, Institut Teknologi sepuluh November – Indonesia, Surya Institute – Indonesia, International Islamic University – Malaysia, STMIK Mitra Lampung – lampung, Bandung Institut of Technology – Bandung, Lecture of The Malahayati University, B2TP – BPPT Researcher – lampung, Starch Technology Center – Lampung, Universitas Islam Indonesia – Indonesia, Politeknik Negeri Malang – Malang, University of Kitakyushu – Japan, Gadjah Mada University – Indonesia, Universitas Malahayati – Lampung, Lampung University – lampung, Starch Technology Center – Lampung, Universitas Riau – Riau, Hasanuddin University – Indonesia, Diponegoro University – Indonesia, King Abdulaziz University – Saudi Arabia, Parahyangan Catholic University – Indonesia , National Taiwan University–Taiwan, Surakarta Christian University – Indonesia, Sugijapranata Catholic University – Indonesia, Semarang University – Indonesia, University of Brawijaya – Indonesia, PPKIA Tarakanita Rahmawati – Indonesia, Kyushu University, Fukuoka – Japan, Science and Technology Beijing – China, Institut Teknologi Sepuluh Nopember – Surabaya, Researcher of Starch Technology Center, Universitas Muhammadiyah Metro – Metro, National University of Malaysia – Malaysia.

I would like to express my deepest gratitude to the International Advisory Board members, sponsor and also to all keynote speakers and all participants. I am also gratefull to all organizing committee and all of the reviewers who contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector of Bandar Lampung University (UBL) who give us endless support to these activities, so that the conference can be administrated on time

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Table Of Content

Organizing Committee	i
Table Of Content.....	v
Keynote Speaker	
1. Recent Advances in Biofuel Cell and Emerging Hybrid System Abdul Aziz Ahmad and Raihan Othman	1
2. Waste Utilization Study Tailing Gold Mine in Way Linggo-Lampung, as Fine Aggregate Materials for Producing Mortar Materials based on concept of Green Technology Lilies Widodojoko & Susilawati	8
3. Infrastructure Health Monitoring System (SHM) Development, a Necessity for Maintance and Investigation Prof. Dr. Priyo Suprobo, Faimun, Arie Febry	17
4. Four Phases Quality Function Deployment (Qfd) By Considering Kano Concept, Time And Manufacturing Cost Prof. Dr. Moses L Singgih, Dyah L. Trenggonowati, Putu D. Karningsih	22

Speaker

1. Comparative Analysis for The Multi Period Degree Minimum Spanning Tree Problem
Wamiliana, Amanto, and Mustofa Usman..... 39
2. Choosing The Right Software In Supporting The Successful of Enterprise ERP Implementation
Yodhie Yuniarthe, Idris Asmuni..... 44
3. Climate Adaptive Technology In Maintaining Vernacularism Of Urban Kampong Case study: Kampung Adat (Indiginous) Mahmud, Bandung District, West Java
Marcus Gartiwa..... 50
4. The Prospect Of Diesohol In Facing Fossil Fuel Crissis
M.C. Tri Atmodjo..... 63
5. The Potential Of Agriculture And Forestry Biomass Wastes As Source Of Bioenergy
Hardoyo..... 66
6. The Importance of Education Facility as Sustainable Urban Generation Tool
Fritz Akhmad Nuzir, Haris Murwadi and Bart Julien Dewancker 71
7. The implementation of Secton Method for Solving Systems of Non Linear Equations
Nur Rokhman 80
8. Quality Control Analysis Into Decrease The Level Defects On Coffee Product
Heri Wibowo, Sulastri and Emy Khikmawati 85
9. Public Transpotion Crisis In Bandar Lampung
Ida Bagus Ilham Malik 89
10. Geospatial Analysis of Land Use Change in Way Kuripan Watershed, Bandar Lampung City
Candra Hakim Van Rafi'1., Dyah Indriana Kusumastuti2., Dwi Jokowinarno..... 99
11. Material Utilization Technology Of Agriculture And Forestry Waste
Hardoyo..... 105
12. The Supply Chain System Of Cassava On The Tapioca Industry
Hardoyo..... 108
13. Glass Technology In Natural Light Glasses On Aperture Element In The Architecture World
Muhammad Rija & MT Pedia Aldy 113

14. An Eksperimental Permeable Asphalt Pavement Using Local Material Domato Stone On Quality Of Porous Asphalt
Firdaus Chairuddin, Wihardi Tjaronge, Muhammad Ramli, Johannes Patanduk 117
15. Coordination Of Architectural Concepts And Construction Systems
Eddy Hermanto. 129
16. Seismic Assessment of RC Building Using Pushover Analysis
Riza Ainul Hakim...... 136
17. Viscosity and Liquidity Index Relation for Elucidating Mudflow Behavior
Budijanto Widjaja and Shannon Hsien-Heng Lee...... 143
18. The Use of Pozzolanic Material for Improving Quality of Strontium Liquid Waste Cementation in Saline Environment during Nuclear Waste Immobilization Process
Muhammad Yusuf, HayuTyasUtami, Tri SulistiyoHariNugroho, SusetyoHarioPutero 148
19. Geospatial Analysis Of Land Use And Land Cover Changes For Discharge At Way Kualagaruntang Watershed In Bandar Lampung
Fieni Yuniarti, Dyah Indriana K, Dwi Joko Winarno...... 153
20. Wifi Network Design For High Performance
Heru Nurwarsito, KasyfulAmron,BektiWidyaningsih 161
21. Studi on The Efficiency Using Nature Materials in The Structural Elements of Reinforced Concrete Beam
Yasser, Herman Parung, M. Wihardi Tjaronge, Rudy Djamaluddin...... 167
22. The Research Of Slow Release Nitrogen Fertilizer Applied In Sugarcane (Saccharum Officinarum) For Green Energy Bioethanol
M.C. Tri Atmodjo, Agus Eko T. Nurul Rusdi, Sigit Setiadi, and Rina...... 179
23. Energy Utilization Technology Of Agriculture And Forestry Waste
Hardoyo...... 185
24. Implementation Of Fuzzy Inference System With Tsukamoto Method For Study Programme Selection
Fenty Ariani and Robby Yuli Endra. 189
25. The Analysis of Video Conference With ITU Standarization (International Telecommunication Union) That Joining in Inherent At Bandar Lampung University
Maria Shusanti F, Happy Reksa 201

26. The E-internal audit iso 9001:2008 based on accreditation form assessment matrix in study program for effectiveness of monitoring accreditation Marzuki, Maria Shusanti F.	207
27. The Developing Of e-Consultations For Effectiveness of Mentoring Academy Ahmad Cucus, Endang K	214
28. The Evaluation of information system performance in higher education case study with EUCS model at bandar lampung university Reni Nursyanti, Erlangga.	221
29. The Analysis Of History Collection System Based On AndroidSmartphone With Qr Code Using Qr CodeCase Study: Museum Lampung Usman Rizal, Wiwin Susanty, Sutrisno.	230
30. Application of Complaint Handling by Approach Model of ISO 10002 : 2004 to Increase Complaint Services Agus Sukoco and Yuthsi Aprilinda.	235
31. Towards Indonesian Cloud Campus Taqwan Thamrin, Iing Lukman, Dina Ika Wahyuningsih	252
32. Bridging Router to ADSL Modem for Stability Network Connection Arnes Yuli Vandika and Ruri Koesliandana.	257
33. The Effect of Use Styrofoam for Flexural Characteristics of Reinforced Concrete Beams Yasser , Herman Parung, M. Wihardi Tjaronge, Rudy Djamaluddin	261
34. The Estimation Of Bioethanol Yield From Some Cassava Variety M.C. Tri Atmodjo	273
35. Effect of Superficial Velocity of Pressure Difference on The Separation of Oil And Water by Using The T-Pipe Junctionl Kms. Ridhuan and Indarto.	277
36. The use of CRM for Customer Management at Cellular Telecommunications Industry Ayu Kartika Puspa.	293
37. Indonesian Puslit (Centre Of IT Solution) Website Analysis Using Webqual For Measuring Website Quality Maria Shusanti Febrianti and Nurhayati.	297
38. The E-internal audit iso 9001:2008 based on accreditation form assessment matrix in study program for effectiveness of monitoring accreditation Marzuki, Maria Shusanti F.	307

39. Enhancing Quality Software Through CMMI-ISO 9001:2008 and ISO 9126 Agus Sukoco	320
40. Value Analysis Of Passenger Car Equivalent Motorcycle (Case Study Kartini Road Bandar Lampung) Juniardi, Aflah Efendi	337
41. Alternative Analysis Of Flood Control Downstream Of Way Sekampung River Sugito, Maulana Febramsyah.	347
42. Analysis Of Fitness Facilities And Effective Use Of Crossing Road Juniardi, Edi Haryanto.	353
43. Study On Regional Development Work Environment Panjang Port Lands In Support Bandar Lampung City As A Service And Trade Ir. A. Karim Iksan, MT, Yohn Ferry.	359
44. Analytical And Experimental Study Bamboo Beam Concrete Hery Riyanto, Sugito, Juli	370
45. Comparative Analysis Of Load Factor Method Static And Dynamic Method (Case Study Akdp Bus Route Rajabasa - Bakauheni) A. Ikhsan Karim, MT., Ahmad Zulkily.	378
46. Optimization Utilization Of Water Resources dam Batutegei Using Method Of Linear Program Aprizal, Hery Fitriyansyah	386
47. Characteristics Generation Traffic Patterns And Movement In Residential Area (Case Study Way Kandis Residential Bandar Lampung) Fery Hendi Jaya, Juniardi,	392
48. Use Study On Slight Beam Reinforced Concrete Floor Plate in Lieu Of Secondary Beam Hery Riyanto, Sugito, Lilies Widodjoko, Sjamsu Iskandar	399
49. Observation Of The Effect Of Static Magnetic Field 0.1 Mt On A-Amylase Activity In Legume Germination Rochmah Agustrina, Tundjung T. Handayani, and Sumardi.	405
50. Effectiveness Analysis Of Applications Netsupport School 10 Based Iso / Iec 9126-4 Metrics Effectiveness Ahmad Cucus, Nelcy Novelia	413
51. Comparative Performance Analysis Of Banking For Implementing Internet Banking Reza Kurniawan	418

THE SUPPLY CHAIN SYSTEM OF CASSAVA ON THE TAPIOCA INDUSTRY

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Abstract : *The quantity, quality and continueity guarantee of raw material supply is a one of define factor for the succesfull of production process. To solve the problems of raw material supply on tapioca industry, it is important to develop a correct raw material supply management. That management must be accurate on quantity, quality, continuity and price. One of the developed management is supply chain management*

The purpose of this paper is to make a cassava raw material supply chain on 100 ton product/day on tapioca industry in an effort to manage a continues and stable of raw material supply. The methods use in this research are to assessment of relatedness between tapioca industry raw material supply chain management with related elements and make conceptual design, pre design and detailed design of tapioca industry raw material supply chain. The result show that depending elements to make a tapioca industry supply chain design system are the information of raw material stock both from cassava farmer or suppliers, the supply information from the patner and buffer stock , the price of raw material, tranportation. Buffer and partnership pattern are two kinds of the best methods to guarantee the fulfill requirement of tapioca industry raw material. Raw material tranportation, storehouse and refraction are important components on the supply chain management. Based on 100 ton tapioca/day production capacity, conversion of raw material (cassava) to tapioca product is 5 :1, operation time is 250 days/year, it is need 125.000 ton/year raw material (cassava). The requirement suplly of raw material are obtained from cassava farmer 15.000 ton, partner 30.000 ton, buffer 40.000 ton and agent 40.000 ton.

Keywords : *tapioca industry, supply chain, cassava farmer, partnership, buffer.*

1. NTRODUCTION

The starchy material is raw material for tapioca industry, which in Indonesia there are quite a lot of species. The cassava (*Mannihot esculenta*) is one of starchy materials, that widely available. From quantity of cassava production, the stock of cassava is sufficient to fullfile as raw material of tapiuoca industry. The frequent problems in the handling cassava supply for tapioca industry are the lack of cassava supply caused by holding the cassava stock and delaying of the cassava harvesting to increase the cassava bagainng value. The over stock cassava suplly is also a frequently problem. The over stock more than 3 days cause the quality of the cassava will be dcreased. The quantity,

quality and continueity guarantee of raw material supply is a one of define factor for the succesfull of production process. It is very necessary to implement in large quantities, qualified, continuesly of cassava supply management on tapioca industry. The route of cassava from plantation area to tapioca product and accepted by consumer is long chain that has to manage well

The traditional relation pattern of raw material fullfilment management is adversarially pattern, where the relation pattern still individual concern, it not refer to the performance of all parties on raw material fulfillment management. The relation between supplier and industry just for sale-purchase only. Supplier want to move or sold of raw material immediatly with the high price. Industry want to delivere raw material with the low

price, fast and on time. To solve the raw material fulfillment problems on tapioca industry, it is important to develop a correct raw material fulfillment management. That management must be accurate on quantity, quality, continuity and price. One of the developed management is supply chain management.

The supply chain management is a management activity on efficiently raw material fulfillment with the accurate on time, quantity, cost and quality. The supply chain was stressed on integrated pattern of fulfillment raw material process flow from the farmer, agent, partner, buffer stock, distributor until to consumer. The purpose of this paper is to make a cassava raw material supply chain on 100 ton product/day on tapioca industry in an effort to manage a continuous and stable of raw material fulfillment.

The activities are :

- Assessment of relatedness between tapioca industry raw material supply chain management with the related elements
- To make conceptual design, pre design and detail design of tapioca industry raw material supply chain

2. METHODS

The methods on this research are :

1. Survey the potentially of cassava and tapioca industry at Lampung
2. Data simulation and application on the supply chain design form

3. RESULT AND DISCUSSION

Conceptual Design of Tapioca Industry Supply Chain

The result shown that depending elements to make a tapioca industry supply chain design system are the information of raw material stock both from cassava farmer or suppliers, the supply information from the partner and buffer stock, the price of raw material, transportation cost and the spread of raw material production center. The general pattern of tapioca industry supply chain with the cassava raw material is shown in figure 1.

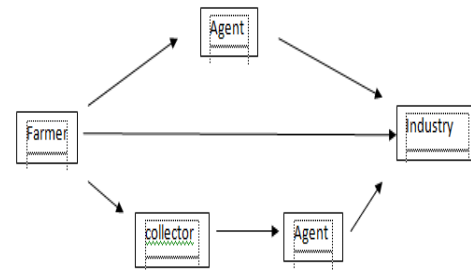


Figure 1. The general pattern of tapioca industry supply chain with the cassava raw material

Three patterns of tapioca industry supply chain with cassava raw material are :

1. The raw material direct from the farmer to industry
2. First, the raw material to agent, then to industry
3. The raw material were collected by collector, be sold to agent and finally to industry

The weakness of those patterns is if the farmer, agent were manipulate raw material fulfillment, that will give industry impact to find the raw material. Some strategies to maintain the continuity of raw material fulfillment and dependency of raw material are :

a. Buffer stock

Buffer stock is raw material stock managing by industry through plantation buffer. The area of plantation buffer were adjusted with industrial production capacity. The minimum of areal plantation buffer could be fulfilled about 50% the needed of raw material.

With the assumption the conversion factor of raw material to product is 5 kg cassava to 1 kg tapioca, plantation productivity 20 ton/ha, working day 250 day/year and the areal plantation buffer about 50%, it is need 3.125 ha plantation buffer for 100 ton tapioca/day production capacity.

b. Partnership Pattern

One of industry on effort to fulfill the cassava raw material is make a collaboration between industry and

nearb on cassava cultivation. That colaboration is called partnership pattern. Industry developing via integrated partnership will be enhance industry work performance. To develop a ideal partnership are need a synergis, tranparant and fair commitment from all involved parties . It is also need a technology support and technical counterpart management. In this partnership pattern, the industry was provide of capital funding, the farmers were provide cultivation area and plant managing until harvesting time. After harvested time, the crops were stored by industry with the agree price. The farmer benefit are guarantee marketing of the crops and spare from price fluctuation. The industry benefit is raw material fulfillment guarantee.

The conceptual design of tapioca industry supply chain was illustrated in the figure 2

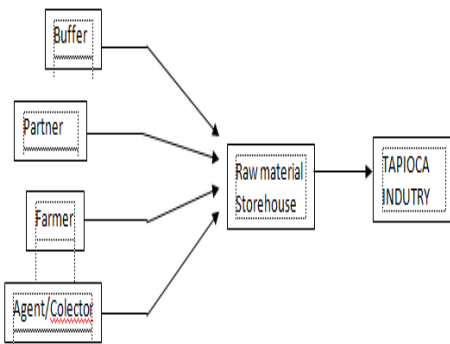


Figure 2. The conceptual design of tapioca industry supply chain

The preliminary design of tapioca industry supply chain

The preliminary design of tapioca industry supply chain was determined on full caspacity production, i.e on the 4th years production schedule from the industry starting production. The production stage scenario was started from 60% production capacity on the first year, 70% on the 2 nd years and so on until 100% full capacity production.

The base of the preliminary design of tapioca industry supply chain are :

- Capacity production is 100 ton tapioca/day.
- The conversion of cassava raw material to tapioca product is 5 : 1
- Operation time is 250 days/year

The need of cassava raw material/year for 4 year first production was showed in the table 1

Table 1 . The need of cassava raw material for 4 years first production :

	1 st year	2 nd year	3 rd year	4 th year
Load factor	60 %	70 %	80 %	100 %
Production (ton)	60	70	80	100
Raw material (ton)/day	300	350	400	500
Raw material (ton)/year	75.000	87.500	100.000	125.000

The supply compositon of raw material from supplier were defined by factual condition bellows :

- Buffer productivity is 20 ton/ha
- Raw materials supply from the partnership is 20% of the needed raw material and than be increased about 5 % every year from 1st years until 4th year full capacity production
- Raw material supply from the farmer is 10% of the needed raw material until the 4th year production
- Raw material supply from the agent /colector about 30% of the needed raw material. The realization of this supply will be adjusted to cover lack of the stock.
- The agent/colector supply is about 30% and realization purchasing be adjusted with requirement to cover lack of the stok.

The raw material supply analysis was showed in the table 2 :

Table 2. The raw material supply analysis

		1 st year		2 nd year		3 rd year		4 th year	
		Supply (ton)	Supply (ton)	Supply (ton)	Supply (ton)	Supply (ton)	Supply (ton)	Supply (ton)	Supply (ton)
1	Buffer	2000ha	40.000	2000ha	40.000	2000ha	40.000	2000ha	40.000
2	Partner	20%	15.000	25%	20.000	30%	25.000	35%	30.000
3	Farmer	10%	7.500	10%	7.500	10%	7.500	10%	7.500
4	Agent	20-30%	12.500	20-30%	17.500	20-30%	22.500	20-30%	40.000
	Total		75.000		87.500		100.000		125.000

The preliminary design of tapioca industry supply chain was defined on full capacity production scale, which on the 4th production schedule. The preliminary design of tapioca industry supply chain was illustrated in the figure 3

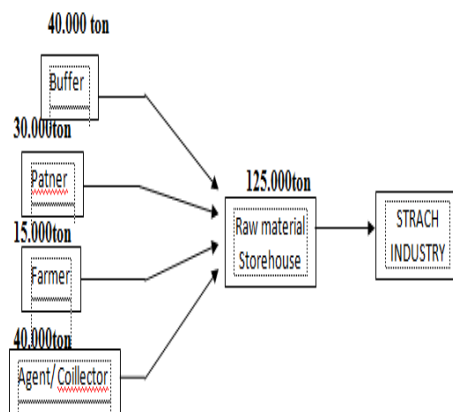


Figure 3. The preliminary design of tapioca industry supply chain

The detail design of tapioca industry supply chain

The detail design was made by completing and perfecting of the preliminary design with incorporate all of integrate elements, adjusted with real objective condition

The elements to completing the detail design are :

- Procurement
The procurement is a activity to find the raw material by the industry to solve lack of raw material stock
- Raw material transportation

Raw material transportation is one of element that be incorporate on the detail design, cause raw material delivery problems could impacte to industry performance

- Storehouse
The storehouse is a important infrastructure , which use as raw material management workroom to raw material planning.
- Refraction
The refraction is provision be required to define of raw material quality. The refraction value is 2.5 – 3.0 % of raw material total weight.

The detail design of tapioca industry supply chain was illustrated in the figure 4:

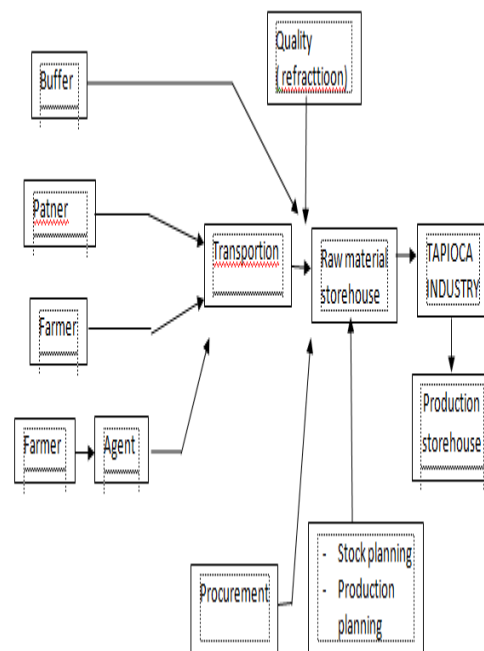


Figure 4 . The detail design of tapioca industry supply chain

4. CONCLUSION

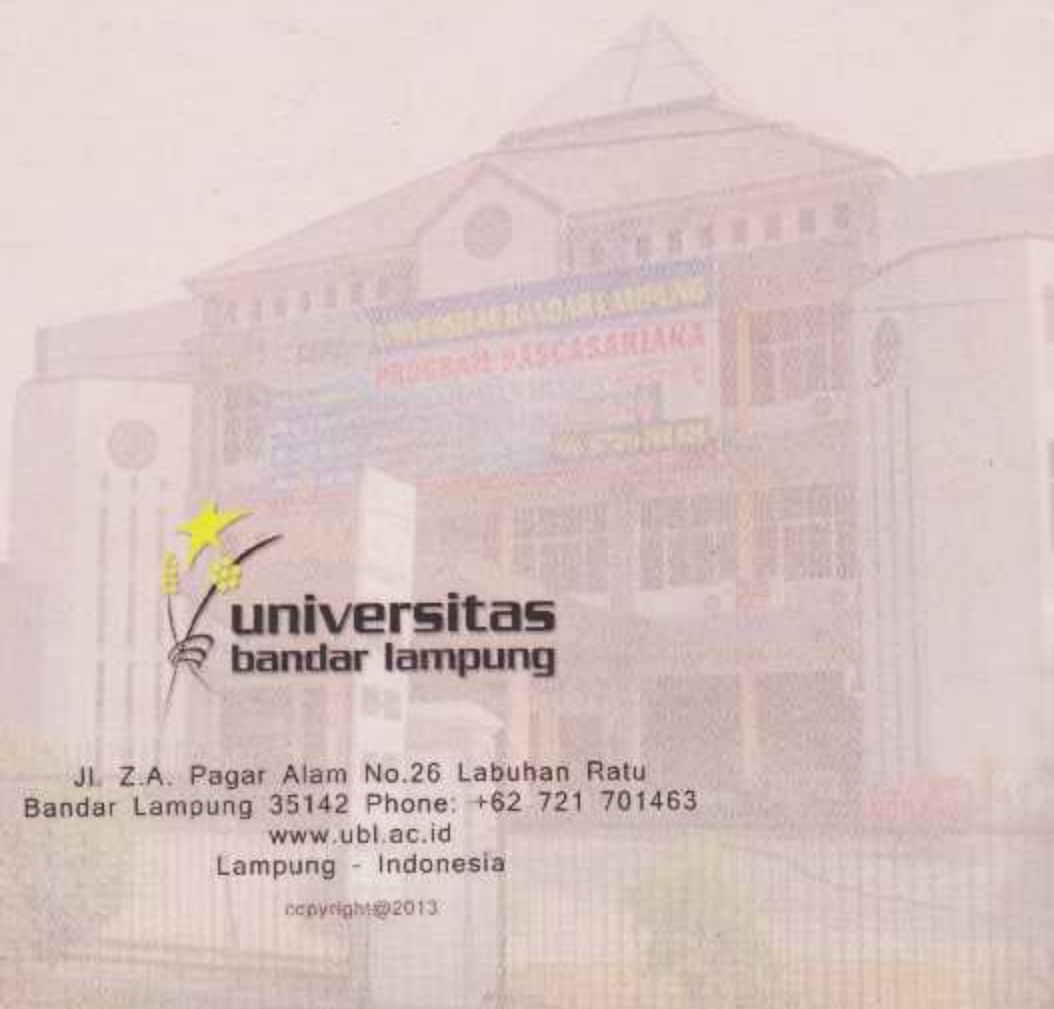
1. Supply chain is important to be applied on tapioca industry to solve the quacity, quality and continuity of raw material fullfilment problems
2. Buffer and partnership patner are two kind of important ways to guarantee

the fulfillment of cassava raw material on tapioca industry

3. Transportation, storehouse and refracton are important component on supply chain management
4. For production capacity 100 ton tapioca/day with operation time 250 days/year, was require cassava about 125.000 ton/year. The need of cassava will be covered from the farmer 15.000 ton, partner 30.000 ton, buffer 40.000 ton and from agent/collector 40.000 ton

5. Reference

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