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INTERNATIONAL CONFERENCE

ENGINEERING & TECHNOLOGY DEVELOPMENT
UBL ICETD
2013

The Second International Conference on Engineering and Technology Development

2nd ICETD 2013

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

PROCEEDINGS

In Cooperations With :

APTIKOM

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Hosted by :
Faculty of Engineering and Faculty of Computer Science,
Bandar Lampung University (UBL), Indonesia

2nd ICETD 2013

The Second International Conference On Engineering And Technology Development

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

PROCEEDINGS

Organized by:

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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

Bandar Lampung, 29 August 2013-08-26

Mustofa Usman, Ph.D
2nd ICETD Chairman

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Speaker

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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 affort 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, convertion 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 immediately 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 fullfilment 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 intregratted pattern of fullfimentt raw material process flow from the farmer, agent, patner, 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 affort to manage a continues and stable of raw material fullfilment

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 patner and buffer stock , the price of raw material, transportation cost and the spread of raw material production center

The generall pattern of tapioca industry supply chain with the cassava raw material is show in figure 1.

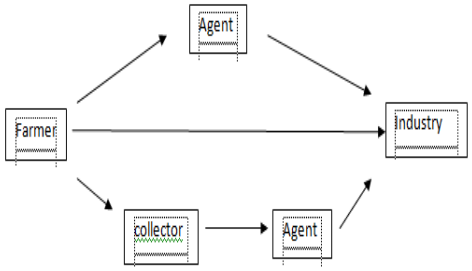

Figure 1. The generall pattern of tapioca industry supply chain with the cassava raw material

Three pattern 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, than to industry
3. The raw material were collected by collector, be sold to agent and finally to industry

The weakness of those pattern is if the farmer, agent were manipulate raw material fullfilment, that will give industry impact to find the raw material.

Some strategy to maintain the continuity of raw material fullfilment and dependency of raw material are :

a. Buffer stock
   Buffer stock is raw material stock managing by industry through plantation buffer. The areal of plantation buffer were adjusted with industrial production capacity. The minimum of areal platation buffer could be fullfiled about 50% the needed of raw material
   With the assumption the convertion 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 platation buffer about 50%, it is need 3.125 ha plantation buffer for 100 ton tapioca/day production capacity
b. Patnership Pattern
   One of industry on effort to fullfile the cassava raw material is make a colaboration between industry and

nearb on cassava cultivation. That colaboration is called patnership 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 gigure 2

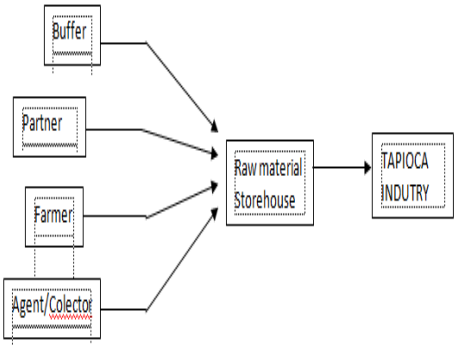

Figure 2. The conceptual design of tapioca industry supply chain

The prelimenary 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 convertion 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 :

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

The supply compotition 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 /collector abaut 30% of the needed raw material. The realization of theis supply will be adjusted to covere lack of the stock.
- The agent/coleector 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

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		1st year		2nd year		3rd year		4th year	
		Supply	(ton)	Supply	(ton)	Supply	(ton)	Supply	(ton)
1	Buffer	2000ha	40.000	2000ha	40.000	2000ha	40.000	2000ha	40.000
2	Patner	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

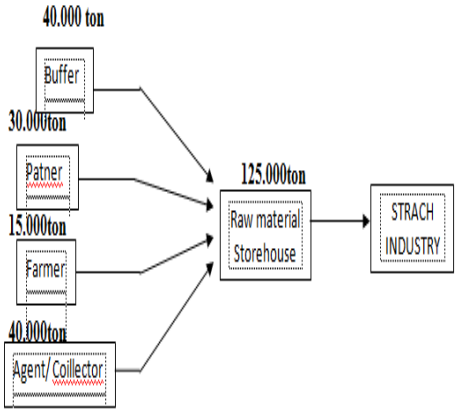

Figure 3. The preliminary design of tapioca industry supply chain

The detail design of tapioca industry supply chain

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

The elements to completing the detail design are :

- Procurement
  The proicurement 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:

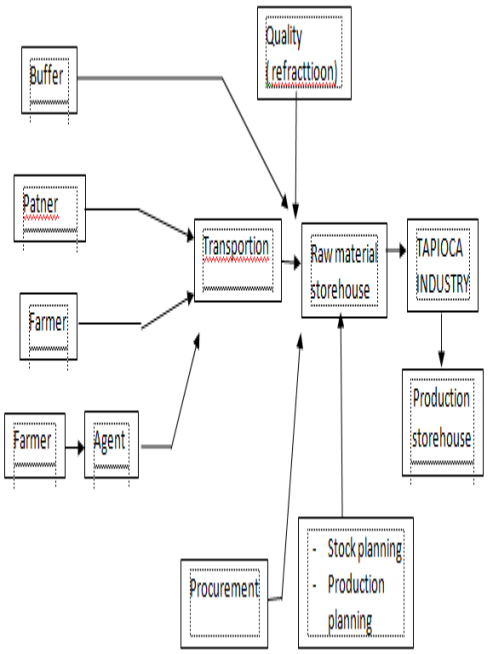

Figure 4 . The detail design of tapioca industry supply chain

4. CONCLUSION

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

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the fullfilment of cassava raw material on tapioca industry

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

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