

**SUGAR CANE AGRIBUSINESS MARKETING ANALYSIS ON DRY LAND
PEOPLE IN NGAWI DISTRICT, EAST JAVA, INDONESIA
(Special review of farmers' share price, the price transmission elasticity, and
market integrated, and so the structure of the people sugar market)**

Agus Santosa¹

Abstract

The purposes of the research are to analyze the people's cane marketing activities covering: (1) margin analysis and farmer's price share, (2) analysis of price transmission elasticity and market integration, and also (3) analysis of established market structure. The research is brought about in cane-farming-on-dry-land in the district of Ngawi, which is chosen with purposive sampling, then the sub district of Pitu as representation of the District of Ngawi is also picked up with purposive sampling, while as the sites of the research, two villages namely Ngancar and Papungan are taken with simple random sampling method. In current research 87 farmers for sample are obtained with stratified random sampling method. The traders chosen as sample are decided with purposive sampling considering that the traders chosen can represent the trader population and it is intended to avoid repeated sampling on the same traders. In this research, 25 retailers from about 85 retailers and 10 wholesalers from total 36 wholesalers in Ngawi are sampled. From 87 farmer in the sample, all their cane crops are collected by 25 retailers and 10 wholesalers chosen, so that it is expected that traders in the sample can represent other retailers and wholesalers in Ngawi. The results of the research show that (1) in marketing process phase show that the longer the cane marketing chain (the first and the second marketing pattern) make the marketing margin the larger so the lower farmer's share price, (2) the longer the cane marketing chain, the lower the transmission elasticity (not quite perfect) and market integrity occurs in the long run, which makes the marketing pattern less efficient, (3) on the short chained marketing pattern (the third marketing pattern) tends to make the marketing margin narrower, the farmer price share gets larger, the price transmission elasticity gets higher (perfect) and market integrity occurs in the short run (ideal for cane marketing), and it all means that marketing pattern will be relatively more efficient.

Keywords : *Margin, famer's share price, the price transmission elasticity, market integrity, Sugar Cane*

Introduction

Viewed from the micro side of farming, the dry land cane farming needs such a huge fund and long lead-time to obtain the results that the farmers have expected. Therefore, it requires a large investment supply. The issues in relation to farming investment supply often weaken the farmers, either in the farming process or post-harvest time. Limited farming investment reserve by farmer bolsters cost-cutting with its purpose to minimize the cost such as reducing fertilizer dosage, fertilizer quality and making

¹ Agribusiness Study Program, Agricultural Faculty, Nation Development University (UPN) "Veteran" Yogyakarta, Indonesia, e-mail: agussantosa1108@yahoo.com

careless choice on seedling, nothing but the cheap. Besides, they do not comply with the technical stages of cane farming process, such as fertilizing schedule, spacing, fertilizing pattern and maintenance. On the other hand, investors, such as wholesalers and retailers often abuse farmer's limited investment, in order to get multiple profits. In this case, the retailer and wholesaler offer the far more instant and easier loan, but they impose high interest about 36 to 60% per year. Additionally, the farmers are made to sell their cane crops to the wholesaler and retailer. In such circumstances, the farmers do not have strong bargaining power anymore, because it is impossible for them to sell their crops to other parties. It is worsened by their low ability in getting information about cane and sugar price in the market.

The problem kindred to the cane farming come from on-farm and out-farm factors. The *on-farm* factor relates to the farming techniques, which influence the farming implementation, while *out-farm* factors such as governmental and sugar mill policies affect the implementation of the farming and harvesting. The governmental policies such as fertilizer price raise, sugar provenue price raise, fuel price raise, the farming loan program and the decision on profit sharing between farmer and the sugar mill will influence the farming decisions and farmer advantages and so will the sugar mill policies. Sugar mill policies such as openness in establishing the farmer's cane rendemen, transparency in determining the farmer's crop scaling and subsidy on transportation means will influence the cane shipment carried out by the farmer and the amount of farmer profit.

According to the reasons above, it is noteworthy that the cane farmers are still on weak position, either in cane farming or crop marketing. On the other hand, the governmental policies are still needed in order to support the effort to empower the farmers through the improvement of farmer's revenue and welfare. In details, the problems of interest are:

(1) In what extent is the marketing margin and price share obtained by the cane farmers on-dry-land for each marketing pattern in the sites of interest? (2) In what extent is the price transmission elasticity on the farmer level to the price on the wholesaler level and how far is the market integration between market on the farmer level and market on the wholesaler level under different marketing patterns of people's cane farming on-dry-lands in the sites of interest? (3) How is the market structure formed in the marketing of people's-cane-farming-on-dry-lands in the sites of interest?

Purposes of the Research

(1) To analyze the marketing margin and farmer's price share received by farmer on each marketing pattern of people's-cane-farming-on-dry-lands on the sites of interest, (2) To analyze the transmission elasticity of cane price compared with sugar on-the-farmer-level to the sugar price on-the-wholesale-level and to analyze market integration on-the-farmer-level with the market on-the-wholesale-level to each marketing level of people's-cane-farming-on-dry-land on the sites of interest, (3) To find out the market structure of people's-cane-farming-on-dry-land on the sites of interest.

Scope of the Research

Scope of the research comprises farming appropriateness with RC ratio approach, efficiency of production factor use with the approach of Cobb-Douglas' production function, verification of fertilizer pattern and cane shipment pattern (to different alternate sugar mills on the area of interest) optimization through linear programming approach, and the simulation of policy change and external factors to verify the governmental policy profitable to farmers and sugar mills.

Hypothesis

(1) It is assumed that the marketing margin and price share received by farmers under the shortest cane-marketing-pattern in the area of interest are higher than ones received by the other marketing people, (2) It is assumed that the price change on-the-wholesale-level has not thoroughly transmitted to farmer market and that the integration of short-run market between market on-the-wholesale-market-level and market on-the-farmer-level and in the process of on-dry-land-cane marketing in the area-of-interest has not well integrated yet, (3) The market structure shaped in the marketing of people's-cane-farming-on-dry-land on the area of interest is assumed to be oligopoly market for farmer market and oligopsony for wholesale market.

Methods of Research and Data Collection

The research was brought about in the people's-cane-farming-on-dry-land in the district of (Kabupaten) Ngawi, which was chosen through *Purposive Sampling*, then the subdistrict (kecamatan) of Pitu as the representation of Kabupaten was also chosen with *Purposive Sampling*, while the appointment of Ngancar and Papungan villages as location

samples was carried out with the method of *Simple Random Sampling*. The current research obtains 87 farmers. Just as the method of *Stratified Random Sampling*, the traders in the sample are chosen purposively (*Purposive Sampling*) considering that the traders chosen can represent trader population in the district and also to avoid repeating trader sample pick-ups over the same traders. In the present research 25 retailers were chosen from the total of 85 retailers and 10 wholesalers from total 36 wholesalers in kabupaten Ngawi. Of 87 farmers in the sample, their whole cane crops are gathered by 25 retailers and 10 wholesalers chosen above so that the traders in the sample are expected to represent other retailers and wholesalers in kabupaten Ngawi. The research uses primary and secondary data. Data collection of the research are implemented in two ways, that are: direct interview and note taking.

Data and Analysis

Investment Resource and Loan

According to the investment resource used by farmers in the sample, there are 3 farmer groups as follows: 1) Farmer group having investment resource from their own fund (it could be loan from family members or relatives) with its distribution of 36 %, 2) Farmer group having their own investment plus the loan from wholesaler and another group with their own investment plus the loan from retailer with its distribution of 31 %, 3) Farmer group with its distribution of 33 %.

Size of Farming Land

The land on which the farmer works can be rented property, profit-shared land or his own property. According to the land width worked, the farmers in the sample can be grouped into three types: (1) narrow-land farmer: < 0,5 ha with 16% distribution rate ; (2) medium-land farmer: 0,5 – 2,5 ha with distribution rate of 62 %; (3) wide-land farmer: > 2,5 ha with distribution rate of 22 %.

Analysis of Marketing Margin and Share of Farmer Price

In current research, marketing margin is calculated based on the pattern of marketing channel in the field. According to data in Table 1, first marketing pattern has the largest total marketing margin, while the third marketing pattern has zero total margin. It occurs because in the first marketing pattern, marketer consists of three parties, which

means that farmer should pay mediating trader for marketing service they give, while in the third marketing pattern the marketer is the only party, i.e. farmer himself, so that the farmer price does not detracted by service of marketing mediator. Farmer in the first marketing channel is imposed the largest deduction, of 48.75% from the final price on sugar mill level. It means the price share accepted by farmer is only 61.25%, while the rest of 38.7% goes to mediating traders. In such case farmer choosing the first marketing pattern receives less return of 0.3875 multiplied with the sum of products, multiplied with the final price on sugar mill level. This phenomenon is very uncommon, because the proportion of cost paid by farmer, the risks of farming, the long lead-time of about a year are so costly, but the appreciation they obtain is on similar level with seasonal mediating trader who almost bears no risk. While under the second marketing pattern, farmer price taken by mediating trader is only 10.47%. The figure is still tolerable and proportional. The last or the third marketing pattern is the ideal condition envisioned by farmers in general, because in such marketing, the whole price on sugar mill level is received by farmer, not detracted by service cost of mediating trader.

The larger total marketing margin, the larger the farmer return distributed to related marketers, that the price share that should be received by farmer will increasingly reduce. Table 1. illustrates that in the first marketing pattern, the farmer's share is the least, i.e. 50.43%, compared with the second and the third marketing pattern, of 90.43% and 100% respectively. Farmer's share shows price proportion received by farmer from total price established in a certain commodity marketing. The larger the price proportion accepted by farmer, the more profitable the farmer's bargaining position, and it holds in opposite way if the price proportion accepted by farmer is increasingly small, then the farmer bargaining position becomes weaker. Therefore, in the third marketing pattern of current research, the farmer becomes the most profitable party, but in practice in field only few have opportunity and ability to choose the third marketing pattern. It is caused by limitation of the farmer to choose the kind of marketing, either seen from the marketing investment point, investment for the farming continuity, or the experience level of each farmer.

Basically, farmer realizes that with direct marketing pattern by directly selling cane to sugar mill --which included in the third marketing pattern--the farmer is more profitable. However, with so many limitations, there are still ones who still choose the second or even first marketing pattern. The result of field survey even reveals that the population of farmer choosing the first marketing pattern is the largest, which comprises 40% of the total sum.

The population of farmer choosing the second marketing pattern reaches the figure of 38%, while ones who choose the third marketing pattern entail the least figure of 22%. The dominant factor determining the choice over the first and second marketing pattern is the farmer's limitation to have farming investment. It has made them to borrow investment to the other party which one of its consequences is obligation to sell the crops to the party. From the total farmers in the sampel, 65% of them are bound to loan from the trader, the rest 35% are caused by non-loan factors.

Table 1. Marketing Margin and Price Distribution of Dry Land Cane Products for Each Marketing Pattern in the Sites of Interest

No.	Margin	First Marketing Pattern Value (Rp/ku)	Second Marketing Pattern Value (Rp/ku)	Third Marketing Pattern Value (Rp/ku)	
1	FARMER				
	Sell Price:	14,500	26,000	27,500	
	a. Cost :				
	1) Harvesting	-	6,000	6,000	
	2) Transportation	-	4,500	4,500	
	Total Cost	-	10,500	10,500	
	Net Price of Cane	14,500	15,500	17,000	
	FARMER SHARE	50.43%	90.43%	100.00%	
2	RETAILER	-			
	Buy Price:	14,500		-	
	a. Cost :				
	1) Harvesting	5,500	-	-	
	2) Transportation	4,500	-	-	
		Total Cost	10,000	-	-
		b. Net Revenue:	2,000	-	-
		Sell Price:	26,500	-	-
	Marketing Margin	12,000	-	-	
	RETAILER SHARE	41.74%	0.00%	0.00%	
3	WHOLESALEERS				
	Buy Price:	26,500	26,000	-	
	a. Cost :				
	1) Harvesting	-	-	-	
	2) Transportation	-	-	-	
		Total Cost	-	-	-
		b. Net Revenue:	2,250	2,750	-
		Sell Price:	28,750	28,750	-
	Marketing Margin	2,250	2,750	-	
	WHOLESALEERS SHARE	7.83%	9.57%	0.00%	
Total of Marketing Margin		14,250	2,750	-	
Total of Marketing Cost		10,000	10,500	10,500	
Total of Profit		4,250	2,750	-	

Data Source: Farmers and Sugar Factory

No-loan factors can be specified as follows, : 1) considering the narrow land that motivates the farmer to sell their crop to trader with his expectation to reach efficiency in handling the cutting dan tranporting harvested products. It is supported by data showing that 16 % of people's cane farming has narrow land and 62% doing farming in medium-sized land; 2) the farmer lives so far away from the sugar mill site, that they are reluctant to take care of sugar D.O. liquidity and farmer drip. That is the reason why farmer prefers trader to sugar mill as the buyer of his crops.

Based on the phenomenon occuring in the field, in order to empower the farmer through improvement of income and welfare, the following improvement steps should be taken: 1) Creating and procuring public loan institution which is able to bridge the farmer's need of investment with easy conditions and low interest rate, 2) providing an association in the form of community among farmers having small- and medium-size land in certain area to solve the common problems and to enhance the admittance of their existence over related parties, and to improve efficiency in cutting and tranporting farmer's crops. With such steps, the farmer is expected to be able to work independently from the activity of providing production means to the activity of product marketing.

Analysis of Price Transmission Elasticity (E_t)

One of efficiency indicator of a commodity marketing is elasticity value of price transmission. If elasticity value of price transmission is positive and approaches one, it means that price change taking place in wholesale market can be transmitted properly to producer market (cane farmer). According to data in Table 2, in the first marketing pattern the average elasticity value of price transmission is 65%, which means that price change on the wholesale level of Rp. 100 will cause price change in farmer market of Rp. 65. The phenomenon shows that price change in wholesale market is not transmitted entirely to market on the farmer level. It indicates that price segmentation caused by mediating trader activities operating between farmer market andn wholesale market is going on.

Table 2. Elasticity of Cane Price Transmission in relation to Farmer's Sugar Price on Wholesale level for each Marketing Channel

Mill Period	E_{tr_1}	E_{tr_2}	E_{tr_3}
	First Marketing Pattern	Second Marketing Pattern	Third Marketing Pattern
I	-	-	-
II	0.62	1.02	1.02
III	0.63	1.02	1.02
IV	0.66	1.01	1.02
V	0.63	1.03	1.02
VI	0.67	0.99	1.02
VII	0.68	0.97	1.02
Average	0.65	1.01	1.02

Data Source: Farmers and Sugar Factory

Segmentation of price change occurs because the mediating trader take some of the price ampunt that should be fully accepted by farmer through marketing margin. In relation to it, the response of price change in producer market as the result of price change on the wholesale level is relatively slower than the second and third marketing pattern.

In the second type of marketing, the average value of price transmission elasticity is 84%, which means that price change on wholesale level of Rp. 100 will result in price change in farmer market of Rp. 84. The phenomenon shows that price change in wholesale market is not transmitted entirely to market on the farmere level. It occurs because activities of mediating traders from farmer market to wholesale market, in which the result in some of the price amount that should be entirely accepted by farmer, is taken by mediating traders to pay for marketing service given through marketing margin. In relation to the facts, price in producer market is less responsive to price change on wholesle level.

For the third marketing pattern, elasticity rate of price transmission is 102%. It points to responsive price on producer level to price change on wholesale market. It is to say that price change in wholesale market is transmitted perfectly to farmer market. The phenomenon can happen because in the third marketing patten, the farmer has the main direct role in marketing his product, not through mediating traders, so that every change in wholesale market will be fully accepted by farmer. On the basis of price transmission elasticity analysis, the conclusion is that the first marketing pattern is not efficient, while the second and the third are relatively efficient.

Analysis of Market Integration

To further analyze the phenomenon of price change between markets, researcher is doing analysis of market integration that is expected to find out the integrity between market on farmer level and market on wholesle level. The coefficient value of sugar price change on wholesale level ($P_{jt}-P_{jt-1}$) represented by b_2 for the first marketing patten of 0.3148 means that if price change on wholesale level ($P_{jt}-P_{jt-1}$) is of Rp 100, then the sugar price on farmer level can change of Rp. 31.48.

With such criterion it can be concluded that sugar price change on wholesale level do not have strong effect on sugar price change on farmer level. In other words, in short term there is no integration between market on farmer level and market on wholesale level. The phenomenon occurs in the sites of interest because there are too many marketers in the first marketing patten who cause price informatin from wholesale market to farmer market occurs too slowly in short term. While the coefficient value of sugar price on wholesale level in previous period (P_{jt-1}) expressed b_3 for the first marketing patten of 1.0, which means that if sugar price in wholesale market in the first manufacturing period (P_{jt-1}) increasaes of Rp. 100, in the second manufacturing period the sugar price on farmer level (P_{it}) increases of Rp. 100. Then conclusion is that that sugar price on wholesale level for the previous period (P_{jt-1}) has significant effect on sugar price on farmer level for certain period (P_{it}).

Table 3. Result of Market Integration Analysis in The FirstMarketing Pattern for Commodity of People's-cane-farming-on-dry-land in District of Ngawi 2011

Variable	Code	Parameter Estimate	Prob > T	α (%)
Intercep	A_0	-5101.05	0.1809	18
LPIT1	b_1	0.12921	0.8177	82
DPJT1	b_2	0.38413	0.3572	35
LPJT1	b_3	1.00071	0.1741	17
IMC	B_1/b_3	0.12912		
R-square	:	0.9687		
Adj R-sq	:	0.9217		

Data Source: Farmers and Sugar Factory

Index of Market Connection (IMC) in the first marketing pattern represented by (b_1/b_3) of 0.129 means that between wholesale market and market on farmer level approaches the achievement of balance and integration in the long run, thus the marketer in

the first marketing pattern approaches success in connecting geographically separate markets through information and commodity in long term. In other words, the market integration occurs in long term, which means that it needs enough time to integrate information from wholesale market with farmer market. The phenomenon occurs because of too many mediating traders under such marketing pattern, that make the shipment flow, management flow and information flow deal with transformation of multiple hands and it consequently needs longer time to send information from wholesale market to farmer market. On the other hand, the time required for farmer to market his sugar is relatively limited to sugar manufacturing period. It is now clear that people's cane marketing needs the achievement of short term market integration which takes only short time to send price information from wholesle market to farmer market. Thus the first marketing pattern is not in conformity with the availability of people's cane manufacturing period.

Coefficient value of sugar price change on wholesale level ($P_{jt} \cdot P_{jt-1}$), expressed in b_2 , for the second marketing pattern is of 0.3795, which means that if price change on wholesale level ($P_{jt} \cdot P_{jt-1}$) is of Rp 100, then the sugar price on farmer level will change of Rp. 37.95. With this criterion it can be concluded that sugar price change on wholesale level has insignificant effect on sugar price change on farmer lecel. In other words, in short term there is no integration between market on farmer level and market oon wholesle level. This phenomenon occurs as the result of too many marketers involved in the second marketing pattern. It causes price information from wholesale market to farmer market goes on slowly in shot term. While the coefficient value of sugar price on wholesale level in previous period (P_{jt-1}), represented in b_3 , for the second marketing pattern is of 0.7495, that means that if sugar price in wholesale market in the first manufacturing period (P_{jt-1}) increases of Rp 100, then in the second manufacturing period, the sugar price on farmer level (P_{it}) increases of Rp 75. Thus we can make conclusion that sugar price on wholesale level in previous period (P_{jt-1}) has significant effect on sugar price on farmer level in certain period (P_{it}).

Table 4. Result of Market Integration Analysis in The Second Marketing Pattern for Commodity of People's-cane-farming-on-dry-land in District of Ngawi 2011

Variable	Code	Parameter Estimate	Prob > T	α (%)
Intercep	A ₀	-2881.13	0.0259	3
LPIT1	b ₁	0.47655	0.0477	5
DPJT1	b ₂	0.3795	0.0279	3
LPJT1	b ₃	0.74951	0.0281	3
IMC	b ₁ /b ₃	0.6358		
R-square	:	0.999		
Adj R-sq	:	0.997		

Data Source: Farmers and Sugar Factory

Index of Market Connection (IMC) for the second marketing pattern expressed in (b₁/b₃) is of 0.6358 which means that in long term there won't be no integration of wholesale market and market on farmer level, that marketer in the second marketing pattern has not succeeded yet to connect the geographically separate markets, through information and long term commodity. So the second marketing pattern is relatively in conformity with the availability of people's cane manufacturing period compared with the first marketing pattern. The reason is that for the second marketing pattern, the market integration has been approached in short term.

Table 5. Result of Market Integration Analysis in The Thirt Marketing Pattern for Commodity of People's-cane-farming-on-dry-land in District of Ngawi 2011

Variable	Code	Parameter Estimate	Prob > T	α (%)
Intercep	A ₀	50.6978	0.5756	0.58
LPIT1	b ₁	0.49906	0.2861	0.29
DPJT1	b ₂	0.95385	0.0001	0.0001
LPJT1	b ₃	0.49644	0.2816	0.28
IMC	b ₁ /b ₃	1.0053		
R-square	:	1.00		
Adj R-sq	:	1.00		

Data Source: Farmers and Sugar Factory

Coefficient value of sugar price change on wholesle level ($P_{jt}-P_{jt-1}$), expressed in b₂, for the third marketing pattern is of 0.953. It means that if there is price change on wholesale level ($P_{jt}-P_{jt-1}$) of Rp 100, then the sugar price on farmer lecel will change of Rp 95.3. Under this criterion we can make conclusion that sugar price change on wholesale level has no strong effect on sugar price change on farmer level, and it can at once reach

the market integration in short-term between market on farmer level and market on wholesale level. The phenomenon happens because the only marketer in the third marketing pattern is the farmer himself, so that the price information flow from wholesale market to farmer market goes on so fast in short term. *Index of Market Connection* (IMC) in the third marketing pattern, expressed in (b_1/b_3) is of 1.0. It means that between wholesale market and farmer market, there won't be any balance or integration in long term.

Based on the facts, for the third marketing pattern, the market integration is reached in short term, so that means it needs short time to integrate information from wholesale market to farmer market. The phenomenon occurs because without mediating traders, the flow of goods shipment, management flow, information flow will transform more quickly, which means that it takes such a short time to send information from wholesale market to farmer market. The nature of integrity in the third marketing pattern agrees with the farmer sugar marketing period which is relatively limited, only during sugar mill manufacturing period. In regard of the facts, the people's cane marketing expects to achieve the short term market integrity which only needs limited time to send price message from wholesale market to farmer market. So the third marketing pattern goes consistently with the availability of people's cane manufacturing period.

Market Structure

On farmer level, the analysis of farmer size and buyer (trader) size comparison leads to conclusion that the market structure established is **Oligopsony Market**, because the farmer size is larger than cane buyer size which only consists of several persons. It is in effect for the first, second and third marketing pattern. Particularly for the third marketing pattern, farmer market can be grouped into oligopsony market structure since farmer still has some options to pick up although they sell cane directly to sugar mill.

Conclusion

(1) The marketing margin of the smallest and largest farmers' Share prices received by farmers in direct marketing pattern (third), that is: the sugarcane farmers sold directly to the sugar factory, (2) The price is perfect transmission occurs in a pattern of direct marketing (third), that is: the results of its own sugar cane farmers sold directly to the sugar factory, (3) In short-term, market alignment between the wholesale market to the farmers market occurred in the pattern of direct marketing (third) and reverse the long-term market

integration between the wholesale market to the farmers market occurs in the first marketing patterns, therefore concluded that the pattern of the three marketing as the most efficient in terms of marketing tansmisi price elasticity and market integrity index is formed, 4) based on the number of sellers and buyers when viewed from the side of sellers (farmers) and buyers (traders), concluded that the marketing pattern of sugarcane in the district of Ngawi is oligopsoni.

Recomendation

Based on the research results, the researcher suggest the followings : (1) To improve their welfare through farmer production and return improvement, there should be cane farming loan program from government with easy conditions and low interest rate for people's cane farmers in sub district of Pitu of Ngawi district, (2) Farmers should be independent, so they can sell their produce directly to the sugar factory

References

- Azzaino, Z. 1981. *Pengantar Tataniaga Pertanian*. Departemen Ilmu-ilmu Sosial Ekonomi. Fakultas Pertanian. IPB. Bogor.
- Balai Penelitian Perkebunan Gula, 1984. *Pergulaan di Indonesia dan Prospeknya di Masa Mendatang*. BP3G. Pasuruan-Jatim.
- Dahl, D.C. and Hammond, J.W. 1977. *Market and Price Analysis The Agriculture Industry*, Mc. Graw-Hill Book Company, New York.
- Dewan Gula Indonesia. 1988. *Laporan Survei Analisis Produksi dan Konsumsi Gula Pasir dan Pemanis Lain*. DGI. Jakarta.
- Nasendi, B.D. dan Anwar. 1985. *Program Linear dan Variasinya*. Penerbit PT. Gramedia. Jakarta.
- PSE dan P3GI. 1996. *Dinamika Ekonomi Tebu Rakyat dan Industri Gula Indonesia*. Studi Panel Petani Tebu. PSE dan P3GI. Buku II. Bogor.
- Ratnawati, A, 1997. *Kajian Efisiensi Sistem Agribisnis Gula Tebu Dan Alternatif Kebijakan Dalam Pengembangan Produksi, Serta Distribusi Gula Tebu Di Indonesia*.
- Ravallion, M. 1986. *Testing Market Integration*. Journal of Agriculture Economics. American Agriculture Economic.

Agus Santosa

Setiadji, I.W. 1996. *Tinjauan Kebijakan Harga Gula Pasir dan Jual Beli Tebu di Indonesia*. Studi Pustaka. Fakultas Pertanian. IPB.