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Asset Valuation Model of Muntok White Pepper

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Keywords:	Abstract
Akaike's Information Criterion; Biological Asset; Stochastic Modelling Approach; Schwarz Information Criterion; Valuation	Findings from the previous studies of asset valuation models on the plantation commodities were still provided double-edged evidence. Hence, this study aimed to examine the best model for economic valuation on the Muntok White Pepper through the Stochastic Modelling Approach. South Bangka, West Bangka, and Belitung Regency were selected as the study locations. Study participants were pepper farmers in the white pepper cultivation central area in Bangka Belitung. Primary data of the price, income, cash-flow, and production cost of the pepper commodity collected through observation and interview sessions with the participants. These data provided information for the volume production, cultivated land area, production cost, and land maintenance. Multiple regression models enrolled to analyze the collected data. The best asset valuation model was selected by employing Akaike's Information Criterion (AIC) dan Schwarz Information Criterion (SIC).Results revealed that the market price approach had provided the best model for the asset valuation of the Muntok White Pepper. The price of the pepper was set speculatively by the farmer.

INTRODUCTION

Muntok White Pepper is a popular biological asset from pepper companies in Indonesia. Muntok White Pepper is cultivated on agricultural land in Bangka Belitung Island. Muntok White Pepper has been designated as the best type of white pepper worldwide, even since the Dutch colonial period (Directorate General of Intelectual and Property Right, 2015). Muntok White Pepper is the trademark established for this type of white pepper. Muntok is an harbour in the West Bangka area, Kepulauan Bangka Belitung Province. It had been used as a transit harbor for the trading activity for the past three centuries (University of Bangka Belitung of Institute of Research and Community Service and BI, 2015).

Muntok White Pepper presents several superior qualities that fuel its popularity among European consumers (Institute of Pepper Development and Promotion, 2009). The pepper cultivation area in Bangka Belitung contains different nutrients that eventually influence the taste of pepper harvested. Laboratory tests had conducted to examine the piperine content on the Muntok White Pepper. Their reports suggest that the piperine content in this type of pepper was up to 5.7% or generally higher than the usual type of pepper.

Indonesia was successfully exporting white pepper commodities in 2018 with a total of 42,000 metric tons or equal to 152 million USD. Further, this commodity also has been donating an immense amount of national devisen and established Indonesia as the biggest exporter of white pepper commodities (International Pepper Community, 2018). The majority of exported pepper commodities is cultivated in Bangka Belitung with the trademark of Muntok White Pepper. Pepper considers as a productive plant and could age for more than a period (> 1 year). It widely utilized as raw material for agricultural products such as pepper powder. Unfortunately, Muntok White Pepper has been dealing with weak productivity (Institute of Pepper Development and Promotion, 2009). Moreover, measurement issues were also encountered during the cultivation period.

Valuation issues need to be seriously noticed and managed. Reed and Clarke (1990) emphasized that the vital issue of a biological asset was related to complicated asset management. The price uncertainty is price argument (P) using a geometric Brownian motion with the assumption of the proportional growth value from biological assets highly depends on the age of the product rather than its size. On the other hand, it shows that price and size as unstable variables and tends to vary (Yoshimoto, 2002; Postali & Picchetti, 2006; Kung & Schmid, 2015; 2006).

Contrary to the previous study, Sledacek (2010) discovered that the international standard of the accounting presentation of the biological assets and agriculture production was during the harvesting period, not at the harvesting period. Agriculture activity related to the sale, production process, or agriculture reproduction such as seeding, planting, maintenance, water source management, etc.

Biological assets highly depend on the age of the asset and the stochastic environment. These characteristics indicate that biological assets were quite unstable, due to their dependency on their surrounding. Therefore, the best model of biological asset valuation is required to be identified.

This study's novelty was a stochastic model development to assist the decision-making process for the commodity asset valuation. We aimed to (1) analyze the change of the valuation of the Muntok White Pepper for five years by employing stochastic

Modelling with a production volume approach and (2) analyze the valuation change using the market price approach.

RESEARCH METHOD

South Bangka Selatan Regency, West Bangka Regency, and Belitung Regency were selected as the study location. They have been producing the highest volume of white pepper commodities in Bangka Belitung Province and Indonesia.

Data were collected from May to September 2020. The study population was 43,580 white pepper farmers in the South Bangka Regency, West Bangka Regency, and Belitung Regency. Slovin formula involved to estimate the number of participants required in this study. Two-hundred-and-three study farmers were recruited as study participants. Area sampling was then enrolled to determine the number of participants from each study location. Sekaran and Bougie (2010) defined area sampling as a cluster sampling technique applied to recruit study participants according to the study locations. The participants required were 112, 44, and 47 farmers from South Bangka Regency, West Bangka Regency, and Belitung Regency, respectively.

In-depth interviews with randomly selected white pepper farmers had conducted to collect the study data. We gathered the information of the cultivated land area, white pepper seed, land maintenance, harvesting period, and the total weight of the harvested white pepper.

This study mainly analyzed the valuation change of Muntok White Pepper in five years by using a Stochastic Modelling with a production volume approach, involving the parameter of annual price from the farmer's perspective (X1), reproduction cost (X2), plant age (X3), and volume (Y1).

Secondly, we also analyzed the valuation change by employing the market price approach, evaluated by the market price (Y2). We applied Akaike's Information Criterion (AIC) and Schwarz Information Criterion (SIC) to determine the best value model.

RESULT AND DISCUSSION

Analysis on the Valuation of Muntok White Pepper with Stochastic Modelling, the Production Volume Approach

This model applied stochastic modeling for the asset valuation with a few changes. Yoshimoto (2002) utilized this model for the valuation process of three types of exported wood. This valuation conducted with the price approach per cubic meter unit. In the other, this study used asset valuation on the white pepper commodity on the price per kilogram. The farmers had mentioned that no crop rotation applied in white pepper cultivation, especially those commodities that aged more than five years. Therefore, no parameter of crop rotation involved in this study. Parameters employed in this model were annual price from the farmer's perspective (X1), asset reproduction cost (X2), plant/age (X3), number/volume (Y1), and the logarithm of price (Y2). These parameters were examined by the Richards Growth Function and tested by the Geometric Brownian Motion with Akaike's Information Criterion (AIC) and Schwarz Information Criterion (SIC).

Table 1. Price Model Test ($\widehat{y_1}$)

$\hat{y}_1$	Year														
	1			2			3			4			5		
	AIC	SIC	Sig	AIC	SIC	Sig	AIC	SIC	Sig	AIC	SIC	Sig	AIC	SIC	Sig
x_1	16.47	16.51	0.41	16.43	16.47	0.89	16.43	16.46	0.10	16.44	16.47	0.45	16.44	16.48	0.99
x_2	16.47	16.51	0.92	16.43	16.46	0.51	16.44	16.48	0.50	16.44	16.47	0.35	16.44	16.48	0.60
x_3	16.45	16.48	0.02	16.41	16.45	0.05	16.43	16.46	0.06	16.43	16.46	0.08	16.43	16.46	0.08
$x_1 + x_2$	16.48	16.53	0.34	16.44	16.49	0.97	16.44	16.49	0.12	16.44	16.49	0.41	16.45	16.50	0.94
$x_1 + x_3$	16.45	16.50	0.20	16.42	16.47	0.96	16.43	16.47	0.11	16.43	16.48	0.35	16.44	16.46	0.95
$x_2 + x_3$	16.46	16.51	0.81	16.42	16.47	0.69	16.43	16.48	0.33	16.43	16.48	0.52	16.44	16.49	0.78
$x_1 + x_2 + x_3$	16.46	16.53	0.16	16.43	16.50	0.98	16.44	16.50	0.32	16.44	16.50	0.32	16.45	16.51	0.93

Source: processed primary data, 2020

Table 1 reveals the result of the asset valuation test on the first year, $\hat{y}_1$ and $\hat{y}_2$ represented the production volume of the white pepper and log price (market price set for the Muntok White Pepper commodity), respectively. The comparison between the value of AIC and SIC on the panel A ($\hat{y}_1$) and B indicated that the model of panel B $\widehat{(y_2)}$ had presented the best regression for the model of $\hat{y}_2 = a + b_1 x_1$. The minimum value of AIC and SIC was 1.90 and 1.93, respectively. It described that the annual price from the farmer's perspective (x_1) had influenced the market price of the white pepper, significance value less than 5% (Yoshimoto, 2002).

The significancy value of the asset production cost (x_2) and plant age (x_3) was 0.00 and 0.014, respectively. This values indicated that the parameter of asset production cost and plant age delivered significant effect on the market price of the Muntok White Pepper. Therefore, a good first-year asset valuation of the Muntok White Pepper done by measuring the annual price from the farmer's perspective, asset production cost, and plant age partially.

Analysis on the Valuation of Muntok White Pepper with Stochastic Modelling, the Market Price Approach

Statistical analysis found that partially or simultaneously, all sudy parameters had influenced the $\hat{y}_2$, but the parameter of x_3 on the sixth model with the significance value of 0.00 or > 5% (Table 1 and Table 2) did not affect the the $\hat{y}_2$. This finding relfected that the annual price from the farmer's perspective, the expenditure for gaining the asset, and plant age had affected the market price. The model of $\hat{y}_2$ in the second year could be applied for the asset valuation, even though the value of AIC and SIC was lower in comparison with the first year.

Table 2. Price Model Test ($\widehat{y_2}$)

$\hat{y}_2$	Year														
	1			2			3			4			5		
	AIC	SIC	Sig	AIC	SIC	Sig	AIC	SIC	Sig	AIC	SIC	Sig	AIC	SIC	Sig
x_1	1.93	1.90	0.00	3.99	4.02	0.00	4.27	4.31	0.38	3.82	3,86	0.00	1.90	1.93	0.00
x_2	3.44	3.48	0.00	4.74	4.78	0.00	4.27	4.30	0.34	4.19	4,22	0.78	3.44	3.48	0.34
x_3	3.70	3.74	0.01	4.81	0.84	9.03	4.26	4.29	0.09	4.18	4,21	0.12	3.70	3.74	0.16
$x_1 + x_2$	1.89	1.95	0.00	3.92	3.97	0.00	4.28	4.33	0.30	3.83	3,88	0.00	1.89	1.95	0.00
$x_1 + x_3$	1.91	1.96	0.00	3.97	4.02	0.00	4.27	4.32	0.39	3.83	3,88	0.00	1.91	1.96	0.00
$x_2 + x_3$	3.42	3.47	0.00	4.74	4.79	0.00	4.27	4.32	0.48	4.19	4,24	0.98	3.42	3.47	0.44
$x_1 + x_2 + x_3$	1.90	1.98	0.00	3.91	3.98	0.00	3.84	3.90	0.00	3.84	3,90	0.00	1.90	1.98	0.00

Source: primary processed data, 2020

Table 1 and 2 reveals the valuation test on third year. It presents the output of the variable $\hat{y}_1$ and $\hat{y}_2$. The value of the AIC and SIC was lower on the regression equation of the variable of $\hat{y}_2 = x_1 + x_2 + x_3$ with AIC and SIC of 3.84 3.90, respectively. Table 2 showed the statistical analysis of the seventh regression.

Findings showed that the plant age influenced the production volume. Sequaciously, older plant age would produce a higher production volume. However, the finding suggested that only the annual price from the farmer's perspective (panel B) had influenced the market price change with a negative correlation between both variables (-8.686). This result emphasized that a lower price could not secure a higher market price.

Statistical test discovered unusual finding on the fourth year asset valuation. The variable of $\hat{y}_1$ on Table 1 did not reveal significant effect on the regression model. However, the variable of $\hat{y}_2$ in Table 2 showed significant correlation between the variable of x_1 to $\hat{y}_2$ on the first, fourth, fifth, and seventh regression model. Hence, it concluded that price had determined the valuation of the biological assets of Muntok White Pepper in the fourth year.

The lowest value of AIC dan SIC applied to discover the best regression model. Table 2 shows that lowest value of AIC dan SIC was 3.82 and 3.86 on the regression model of $\hat{y}_2 = a + b_1 x_1$. Statistical analysis found insignificant finding on the fifth year regression model, but Table 2 shows significant result (<5%). The value of AIC and SIC was higher than the fourth year, but statistical analysis were still showing the first regression model as the best model.

The method of AIC and SIC was employed to assess the best model for asset valuation. These methods had discovered the best model from the first to the second year. The value AIC and SIC was found lower in the first year on the second model with the value of 1.90 and 1.98, respectively. This finding indicated that the best model for the asset valuation was the Stochastic Modelling Approach with the market price approach.

Theoretically, the asset valuation of fixed, intangible, and biological assets is conducted based on the market price. The historical approach would bring misleading information for future assets. The biological asset value should have been determined by the normal price due to the uncertainty from the economic/trade situation or another situation that triggered the change on the commodity.

Lee (1999) mentioned four fundamental concepts of valuation in accounting science: valuation always correlates with the perspective of the current expected value, this information contributes essential role in the decision making process, the existence of the accounting system should have served a role as the information media, and the asset valuation should provide the past work performance. According to these concepts, the Stochastic Modelling Approach Model with the price approach delivers accurate and protective information of the past work performance.

This study finding was contrary to a study conducted by Reed and Clarke (1990). Their analysis lead to the conclusion that the optimal harvesting period did not necessarily associate with the price. Further, they also ignored the asset cost consequences. Yoshimoto (2002) mentioned that the tendency of an optimal harvesting period occurred during the down pricing period. This situation happened due to the depreciation effect of the future assets. In other words, farmers have stored

their harvested commodity during the down pricing period to anticipate the lower value of the commodity in the future.

The asset valuation of the Muntok White Pepper measured by the market price. No assets of Muntok White Pepper belonging to well-known companies (active stock). Hence, these findings were associated with pepper farmers' perspectives. Their perspective rarely described the actual situation of the value of a commodity. It may be attributed to a lack of knowledge about capital and business. In this study, Muntok White Pepper was cultivated from a small-scale business (Bosch et al., 2012).

CONCLUSION

We discovered that the stochastic model with the market price approach was ideal for Muntok White Pepper asset valuation. Yoshimoto (2002) mentioned that farmers tended to exhibit speculative behavior revealed by their tendency to store the harvested pepper and were only willing to sell it if the price were financially rewarding. Muntok White Pepper is a commodity that could be stored for a very long period depending on the level of drying process applied. To the best of our knowledge, studies related to asset valuation that relied on the farmer perspective have never been conducted. Therefore, these findings would present a novel perspective on the valuation process, especially on the valuation theories and biological assets.

RECOMMENDATION

The statistical analysis had discovered an anomaly state of asset valuation with the market price approach. This situation probably provoked by no assets of Muntok White Pepper belonging to well-known companies (active stock). The current price was set according to the farmer's perspectives. It majorly shaped by their farming experiences and tended to be quite opinionated. Therefore, future studies suggested extending the market price perspective relies on the bargaining prices in the capital market.

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