Analysis of Factors Affecting The Farmer’s Term of Trade of Fruit Farmers

J Sulaksana
Lecturer at Faculty of Agriculture, Universitas Majalengka Jl. K.H. Abdul Halim No. 103, Majalengka West Java Indonesia
Email : jsulaksana@unma.ac.id

Abstract. National development is basically aimed at improving people's welfare. Community welfare has been and will be the main priority of national development, especially the development of agricultural sector. In agricultural development, Farmer’s Term of Trade is used as an indicator to calculate the welfare of farmers. This study was conducted with the aim to determine the exchange rate of horticulture farmers in Majalengka Regency and factors affect that exchange rate. This study uses two analytical methods, namely the concept of subsistence and multiple linear regression. Based on the concept of subsistence, this study concludes that the exchange rate of farmers in horticultural sub-sector in Majalengka Regency is quite high in the range of 105.96%. Whereas, by using multiple linear regression analysis, it can be seen that factors that affect Farmer’s Term of Trade are land area that has a positive effect (2.909), selling prices that have a positive effect (159.889), fertilizer prices that have a negative effect (186.07), the amount family dependents that have a negative effect (91.811), labor wages that have a positive effect (132.339) ,irrigation that have a negative effect (97.10), transportation (26.937) and inflation (132.79).

1. Introduction
National economic development will succeed if it is supported by the development of various sectors, one of which is the agricultural sector. According to Simatupang in Rachmat [1], agricultural sector is a local resource-based economic sector that plays a significant role in the development of a country. The agricultural sector plays a crucial role in national development, among others, through the provision of basic food needs, foreign exchange earnings through exports, and absorption of massive labor, especially in rural areas. Likewise, according to Simatupang [2], agricultural development has contributed to the success of national development, such as in formation of GDP (Gross Domestic Product), employment, the increase in people's income, foreign exchange earnings through exports, and suppressed inflation.

As it occurs in Majalengka Regency, based on 2017 Majalengka BPS (Central Bureau of Statistics) data, more than 36% of Majalengka population worked in agricultural sector [3]. It means, compared to other sectors, agricultural sector is still a priority scale for the community to depend their lives on. That way, the development of the region should also be more focused on agriculture that leads to modern transformation or industrialization of agriculture (agro-industry) which is able to provide added value to agriculture. Therefore, they can get welfare for their life and also get food sufficiency.

One of the business sectors of agriculture in Majalengka Regency is horticultural crops, especially fruit farming. Its contribution to the economy of farming community can be seen from its high production. However, in principle, the success of agricultural development is not only seen from the
increased production of agricultural commodities but also measured by the level of farmers' welfare using Farmer’s Term of Trade (FTT) as Sugiana et al [4] stated.

Farmer’s Term of Trade (FTT) is the ratio between the price index received by farmers and the price index paid by farmers. The higher Farmer’s Term of Trade (FTT), the relatively more prosperous the farmers' lives are [5],[6],[7],[8],[9],[10]. Therefore, it is necessary to know more about the level of welfare of fruit farmers in Majalengka Regency by using the indicator of Farmer’s Term of Trade (FTT).

2. Methods
Research location is at Majalengka Regency, West Java Province, Indonesia. Some center of fruit farming has been taken as research location, that is Kertajati, Majalengka and Panyingkir District. 30 farmers has been taken as respondents whom came from Kertajati Village, Pasir Muncang Village and Panyingkir Village. Research was conducted from August 2018 until September 2018.

Data in this study are primary data obtained from observations and interviews with farmers as the object research and secondary data from the Central Statistics Agency (BPS) of Majalengka Regency, the Agriculture Office of Majalengka Regency, and the Agricultural Extension Center in each district where data are collected.

The research sample was determined purposively on 30 fruit farmers (Mango and Guava) in horticultural centers such as Kertajati, Majalengka, and Panyingkir Districts [3].

There are two analytical methods used in this study:

2.1. The concept of subsistence is used to analyze Farmer’s Term of Trade (FTT)
The concept of subsistence states the value of farmers' commodities that can be exchanged for a number of values of goods needed by farmers to fulfill their daily needs [11]. Through this Exchange Rate of Subsistence (NTS), the level of farmers' purchasing power can be determined by describing the exchange rate of farm income from farmers' expenses to meet their daily needs. Based on the concept of subsistence, the Farmer’s Term of Trade (FTT) is calculated based on the following formula:

\[
NTS = \frac{\sum P_{xi} Q_{xi}}{(P_{yi} Q_{yi}) + (P_{zi} Q_{zi})} \times 100
\]

NTS : Term of Trade of Subsistence; Pxi : Agricultural commodities prices; Qxi : Agricultural commodities production; Pyi : Input prices of production; Qxi : Number of production input ; Pzi : Prices of products that farmers need; Qzi : Number of products that farmers need.

2.2. Multiple linear analysis with SPSS tools is used to measure the factors affect Farmer’s Term of Trade (FTT).
The data needed include land area, selling price, fertilizer price, number of family dependents, labor costs, the presence of transportation irrigation, and inflation rate by using the following formula:

\[
Y = a + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + b6X6 + b7X7 + b8X8 + e
\]

3. Result and Discussions
3.1. Analysis of Fruit Farmer’s Term of Trade in Majalengka Regency (FTT)
One of the indicators/measuring tools that can be used to assess the level of farmers' welfare is Farmer’s Term of Trade index (FTT). According to Ekaria and Hasyyati [12], FTT is a proxy of the level of farmers' welfare in Indonesia. Farmer’s Term of Trade is a comparison between the price index received by farmers and the price index paid by farmers [13].

Farmer’s Term of Trade (FTT) observed in horticultural sub-sector especially in fruits includes prices of commodities produced by farmers, prices paid by farmers for production costs, and prices
paid by farmers for household consumption needs. Farmer groups being monitored in the horticulture sub-sector are based on data analysis of the mango and guava farming.

The research results showed that Farmer’s Term of Trade (FTT) in horticulture sub-sector was in quite high range with an average value of 105.96%. Of the 33 respondents, the highest FTT value of 186.82% was found and the smallest was 28.42%. The instability of Farmer’s Term of Trade (FTT) in Majalengka Regency is allegedly due to regional differences resulting in differences in selling prices, labor wages, the amount of family allowances owned by each farmer, decreased purchasing power of farmers on consumer products, and (the still) increased purchasing power on production inputs. Budhi and Aminah [14] stated that the gap of Farmer’s Term of Trade (FTT) of each respondent was due to farmers limitations in applying cultivation techniques such as the use of superior seeds, fertilizing, irrigation, pest control, and handling of crops during harvest and post-harvest. Several studies have shown that farmers tend to apply minimum technology in line with the principle of minimizing the input and maintenance the costs [14] [15].

According to BPS exchange rate concept, Farmer’s Term of Trade (FTT) is defined as the ratio between the price received by farmers and the price paid by farmers. The concept of exchange rates can be applied by calculating the exchange rate for fertilizer, land, and labor costs; and also calculating the ratio between price of products sold/received by farmers and price of fertilizer, land rent, and labor costs. The result of Farmer’s Term of Trade calculation to the horticultural sub-sector, when observed from the components of Farmer’s Term of Trade (FTT), is the index received by farmers (It) and the index paid by farmers (Ib) are both above 100. It means the price received by farmers is bigger compared to the price incurred. This indicates that fruit farmers have a fairly high level of welfare.

### 3.2. Factors Affect Fruit Farmer’s Term of Trade (FTT) in Majalengka Regency

Each sub-sector in agricultural sector has different Farmer’s Term of Trade (FTT) due to several affecting factors. As in this study, the factors affecting Farmer’s Term of Trade (FTT) in horticultural sub-sector (fruit farmers) used include the area of land being cultivated, product selling price, price of production facilities (fertilizer), number of farmers' family dependents, Wage of labor, supporting facilities such as irrigation and transportation, and inflation.

#### Table 1. Results of Analysis of Factors Affect Fruit Farmer’s Term of Trade

| Predictor                | Coeff  | SE Coeff | T   | P     |
|--------------------------|--------|----------|-----|-------|
| Constant                 | -147.94 | 74.37    | -1.99| 0.297 |
| X1 (Land size)           | 2.909  | 6.764    | 0.43| 0.741 |
| X2 (Product selling price)| 159.889| 8.160    | 19.59| 0.032 |
| X3 (Price of fertilizer) | -186.07| 18.93    | -9.83| 0.065 |
| X4 (Family dependents)   | -91.811| 5.541    | -16.57| 0.038 |
| X5 (Wage of Labor)       | 132.339| 8.095    | 16.35| 0.039 |
| X6 (Irrigation)          | -97.10 | 10.42    | -9.32| 0.068 |
| X7 (Transportation)      | 26.937 | 4.073    | 6.61| 0.096 |
| X8 (Inflation rate)      | 132.79 | 13.46    | 9.87| 0.064 |

S = 11.0989  R-Sq = 99.9%  R-Sq(adj) = 99.2%

Based on the results of multiple linear regression analysis, variable X1 (land area) has a positive effect on variable Y (Farmer’s Term of Trade) of 2.909, which means if the land area increases by 1 percent, the Farmer’s Term of Trade will increase by 2.909 percent with the assumption ceteris paribus (other factors are considered constant). It shows that the increase in the area of horticultural crops, especially chillies, tomatoes, and potatoes is not directly proportional to the welfare of farmers. The assumption is that the more land is used for horticultural cultivation, the greater the production costs incurred but it is not proportional to farmers’ income. Accordingly, it is expected that
landowners will not only focus and rely on the area of land they have but put more attention to the optimization strategy of increasing farm intensity that will increase the quality of harvest yields.

Whereas, the variable of selling price to the exchange rate shows that variable $X_2$ (selling price) has a positive effect on variable $Y$ (Farmer’s Term of Trade) of 159.889, which means if the selling price increases by 1 percent then Farmer’s Term of Trade will increase by 159.889 percent with the assumption ceteris paribus (other factors are considered constant). While based on t-test, the selling price significantly affected the Farmer’s Term of Trade at a 95 percent confidence level proven by the $P$-value <0.05. It means when the selling price rises, the farmer welfare is also up. The selling price could be also risen because of the better of farmer group. Farmer group of mango relatively more sustain than other sub sector’s. The selling price has interdependent relationship with farmer group [16].

For fertilizer prices, the analysis shows that variable $X_3$ (fertilizer price) has a negative effect on variable $Y$ (Farmer’s Term of Trade) of -186.07, meaning that if the fertilizer price increases by 1 percent then the Farmer’s Term of Trade will decrease by 186.07 percent with ceteris paribus assumptions (other factors are considered constant). It is in line with Ardika & Budhiasa [17] who stated that production input has positive effect on paddy field farmer welfare.

Dependent costs based on the results of the regression analysis show that variable $X_4$ (dependent costs) negatively affects variable $Y$ (Farmer’s Term of Trade) of -91.811, meaning that if the dependency cost increases by 1 percent then Farmer’s Term of Trade will decrease by 91.811 percent with ceteris paribus assumptions (other factors are considered constant). This shows that more dependents of farmers will further reduce their income so that Farmer’s Term of Trade will decrease. The dependent costs significantly affected the Farmer’s Term of Trade at a 95 percent confidence level proven by the $P$-value <0.05.

Labor wages based on the results of analysis show that variable $X_5$ (labor wages) has a positive effect on variable $Y$ (Farmer’s Term of Trade) of 132.339, meaning that if labor costs increase by 1 percent then the Farmer’s Term of Trade will increase by 132.339 percent assuming ceteris paribus (other factors are considered constant). Whereas, the labor wages significantly affected the Farmer’s Term of Trade at a 95 percent confidence level proven by the $P$-value <0.05.

For the irrigation, the analysis shows that variable $X_6$ (irrigation) has a negative effect on variable $Y$ (Farmer’s Term of Trade) of -97.10, meaning that if irrigation increases by 1 percent then the Farmer’s Term of Trade will decrease by 97.10 percent with the assumption of ceteris paribus (other factors are considered constant). It shows that the presence of too much irrigation otherwise can decrease Farmer’s Term of Trade, which in turn decreases farmers' welfare.

Results of the analysis show that variable $X_7$ (transportation) has a positive effect on the $Y$ variable (Farmer’s Term of Trade) of 26.937, meaning that if transportation increases by 1 percent then Farmer’s Term of Trade increases by 26.937 assuming ceteris paribus (other factors are considered constant). It shows that the easier of transportation from horticultural production sources to the market will increase farmers' welfare.

Results of regression analysis also show that the influence of $X_8$ (inflation rate) on variable $Y$ (Farmer’s Term of Trade) has a positive correlation of 132.79. It means that the increase in inflation affect the welfare of horticulture sub-sector farmers because when the inflation rises, the selling price also rises.

Apart from partial analysis, there is also results of simultaneous analysis which show that land area ($X_1$), selling price ($X_2$), fertilizer price ($X_3$), number of dependents ($X_4$), labor wages ($X_5$), etc. simultaneously have a significant effect to Farmer’s Term of Trade. It means that the level of farmers' welfare in horticulture sector depends on yield productivity, land area, labor costs, commodity prices, and fertilizer prices. According to Supranto [18], the coefficient of determination (R$^2$) is a measure that can be used to determine the effect of independent variables on the dependent variable, and the value obtained is 99.9 percent. That is, the independent variable is able to explain the Farmer’s Term of Trade of 99.9 percent, while the remaining 0.1 percent is not included in the estimation model.
Various efforts have been made by the government to increase horticultural commodity production while achieving the target of increasing farmers’ income/welfare by developing horticultural farmers cooperatives to improve farming institutions including technological innovation through agricultural extension. These efforts are expected to develop horticultural farming at the farm level through strengthening business capital, marketing products, technological innovation, and farmer institutions.

4. Conclusions
Based on the results of research it can be concluded that Farmer’s Term of Trade (FTT) in horticulture sub-sector (fruits farmer) is in a fairly high range of 105.96 %. Factors that affect Farmer’s Term of Trade are land area that has a positive effect on Farmer’s Term of Trade (2.909), selling prices that have a positive effect (159.889), fertilizer prices that have a negative effect (186.07), the amount family dependents that have a negative effect (91.811), labor wages that have a positive effect (132.339), irrigation that have a negative effect (97.10), transportation (26.937) and inflation (132.79).

References
[1] Rachmat, Muchjidin 2000 Analisa Nilai Tukar Petani Indonesia. Disertasi. Institut Pertanian Bogor.
[2] Simatupang 1992 Pertumbuhan Ekonomi dan Nilai Barter Sektor Pertanian. Jurnal Agroekonomi. Volume 2 Nomor 1. Pusat Penelitian Sosial Ekonomi Pertanian.
[3] Badan Pusat Statistik 2017 Kabupaten Majalengka dalam Angka. Majalengka.
[4] Sugiana, et al. The Study on Farmer’s Welfare. International Journal of Life Sciences, Volume 2 No 1, April 2018: 29-41.
[5] Masyhuri. 2007. Revitalisasi Pertanian Untuk Mensejahterakan Petani. Makalah Konpernas XV dan Kongres XIV PERHEPI; 3-5 Agustus 2007; Surakarta.
[6] Kristinek, Jennifer J & Anderson, David P. Exchange Rate and Agriculture : A Literature Review. Working Paper. Agricultural and Food Policy Center. Texas A&M University. February 2002
[7] Mazwan, Muhammad Zul, & Masyhuri. Factors Affecting Farmer’s Term of Trade Of Sugarcane Farmer Plasma In PTPN XI. Agro Ekonomi Vol. 29/Issue. 2, December 2018, Page. 323 -334
[8] Akbar et al. 2019 Affecting Factors Farmer’s Term of Trade (FTT) of Food Crops South Kalimantan Province. IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 12, Issue 7 Ser. I (July 2019), PP 83-91.
[9] Rosni. 2017 Analysis of Welfare of Sailor at Dahari Selebar Village Talawi Sub District Batubara Regency. Journal of Geography e-ISSN: 2549–7057 | p-ISSN: 2085–8167 Vol 9 No. 1.
[10] Pradipta, Mutiara 2018 The Level Of Welfare Of Rice Farmers Family In The Village Of Sumberagung Sub-District Of Sleman. Jurnal Pendidikan dan Ekonomi, Volume 7, Nomor 1.
[11] Asmara R. & Hanani N. & Fahriyah F., 2016 "Farmers’ welfare level based on Farmer’s terms of Trade (FTT) index," Russian Journal of Agricultural and Socio-Economic Sciences, CyberLeninka:Редакция журнала Russian Journal of Agricultural and Socio-Economic Sciences, vol. 60(12), pages 33-38.
[12] Ekaria dan Hasyati. 2014 Kajian Penghitungan Nilai Tukar Petani Tanaman Pangan (FTTP) di Jawa, Bali dan Nusa Tenggara Tahun 2011-2013. Jurnal Aplikasi Statistika dan Komputasi Statistik. Volume 6 Nomor 2 Tahun 2014.
[13] Badan Pusat Statistik. 2015. Kabupaten Majalengka dalam Angka. Majalengka.
[14] Budhi dan Aminah. 2010. Swasembada Kedelai : Antara Harapan dengan Kenyataan. Jurnal Forum Penelitian Agro Ekonomi.Volume nomor tahun 2010.
[15] AA, Sutawijaya et al. 2013. Analysis of Farmer Welfare of fish farmer at Cipedak, Jagakarsa, Jakarta Selatan. Jurnal Agribisnis, Vol. 7, No. 1, Juni 2013, [59 - 76]
[16] Sulaksana, J. 2011. The Process in Motivational Change in Farmer’s Group : A Case Study in
Majalengka Regency, West Java Province. Journal of Applied Sciences 11 (14) : 2500-2512.

[17] Ardika & Budhiasa. 2017. Welfare Farmer Analysis at Bangli Village, Baturity District, Tabanan Regency. PIRAMIDA Vol. XIII No. 2 : 87 – 96

[18] Supranto. 2005. Ekonometri. Bogor : Ghalia Indonesia.