Value Added Analysis of Yard-Based Agroindustry for Food Security

R M Wardhani¹, Wuryantoro², P G Adinurani³

¹Faculty of Agriculture, Merdeka University of Madiun, Jl. Serayu 79 Madiun 63133, Indonesia
Corresponding author : ratnamustika@unmer-madiun.ac.id

Abstract. Optimization of land utilization is the best solution in providing value-added for agroindustry products. In the food security the existence of Agroindustry is highly needed, but the problem of agroindustry now a days is the continuity of raw material availability. This study goals is to analyzing the added value of plants grown in the yard-based including fruit crops, vegetable crop sand medicinal plants into agro-industry products. The method used is descriptive method applied in some areas that empower fruit, vegetable and medicinal plants as supplier of raw material of agroindustry, while the method of data analysis is using Value Add Analysis method, using Hayami method (1987). The results showed that: 1) Fruit plants processed into processed products can be the highest value added ratio was processed into 58.97% (Emping Melinjo product), 58.29% (Guava juice), 50.03% (Banana Chips), 49.10% (Papaya Sauce), and Mango Syrup is 39.06%. 2). Vegetable plants that are processed into processed products can find out the highest value-added ratio is processed into Sledri Chips by 80.24%, Kangkung Chips by 78.35%, Bayem Chips by 77.37%, Tomato Sauce by 42.40% and Chilli Sauce is 29.01%. 3) Plants Medicines that are processed into processed products can be known the highest value added ratio is processed into Pandan Colour products by 90%, Turmeric Herbs by 65%, Ginger Syrup by 64.80%

1. Introduction
Food security is the best solution in people's lives, then the existence of agroindustry is expected through the utilization of yard-based. Most of rural economics rely on producing and trading of primary (fresh) products whose value has been declining in terms of customer expense proportion. [1].Therefore the importance of Added value analysis in developing into processed products which means will increase the role of agro-industry. Value added is the added value of a commodity because it undergoes a process of processing, lifting, or storing in a production.[2]. In addition there is another opinion about saying that the added value in the processing process can be defined as the difference between the value of the product and the cost of raw materials and other inputs, excluding labour [3] While the margin is the difference between the value of the product and the price of raw materials alone. In the margin covered components of production factors such as labour, other inputs, and cost for processing.[4]. With optimization of the yard-based can increase the development of agroindustry through continuous availability of agro-industry raw materials so that with the available raw materials in appropriate quantities and time is a requirement for sufficiency and sustainably production. The types of plants that can be developed in the yard-based include; fruit plants, vegetable plants and medicinal plants.[5] The increased Added value of agricultural products can certainly contribute to increase the economic growth.[6]. The large economic growth of course has an impact to the increasing of business field and the income of the society whose estuary ultimately is improving the society welfare. Ref. [7]
said that one of the advantage of yard-based is to increase income and can improve nutrition because it can increase income if properly managed.[8]. By planting a variety of plants can reap two benefits at once, which is to be utilized by the family and the excess can be sold, especially when used as a raw material for agro-industry so that the yields of these crops get added value by being processed products [9].

2. Materials and Methods

2.1. Place

Research was conducted in 4 districts: Ngawi, Madiun, Magetan and Madiun City, East Java Indonesia. The research respondents are the people who empower the yard with a variety of fruit crops, vegetables, medicines used as providers of agro-industry raw materials.

3. Materials and tools

The method used is descriptive method applied in some areas that empower fruit crops, vegetables and medicines as providers of agroindustry raw materials, useful for analysing data that is qualitative that describes, summarizes the various conditions, various situations where the research in accordance with field conditions, while the analytical method data using Added value Analysis method using the method of Hayami [10] which is useful to know how much added value contained in one kilogram of processed products. From figure below can be calculated how much labour income which shows how much one kilogram of processed products provide income for the workers. If employment income to Added value (%) is high, then such agroindustry is more involved in providing income for its workers. While the rest of the Added value that is not used as a labour exchange for (advantage) producer [11].

| No | Output, Input and Price | Processed products |
|----|------------------------|--------------------|
| 01 | Production Results: Processed products (kg / month) | a |
| 02 | Raw Material: Raw Material (kg / month) | b |
| 03 | Labour (HK / month) | c |
| 04 | Conversion factor (1) / (2) | a / b = m |
| 05 | Labour Coefficient (3) / (2) | c / b = n |
| 06 | Product Price: Processed Product (Rp / Kg) | d |
| 07 | Average wage (Rp / HK) | e |

Revenue and Profit (Rp / kg input of raw materials)

| No | Output, Input and Price | Processed products |
|----|------------------------|--------------------|
| 08 | Input: raw material (Rp / kg) | f |
| 09 | Other input : additional material (Rp / kg of raw material) | g |
| 10 | Production Value (Rp / kg = convention factor x price of processed product) | mxd = k |
| 11 | | k-f-g = i |
| 12 | Added value per kg of raw materials (10-09-08) | i / k x100% = h% |
| 13 | Added value ratio (11/10 x 100%) | nx i = p |
| 14 | Employee benefits (Rp / kg raw material = work coefficient x average wage) | p / i x100% = q% |
| 15 | | ip = r |
| 16 | Ratio of labour (13/11 x 100%) | r / i x100% = s% |

Benefits of processing (11-13)

Processing Profit Rate (15/11 1 x 100%)

Source: Hayami et.al [10].
4. Result and Discussion

From the results of research that has been done on several respondents which utilize the yard-based with of fruit crops, vegetables and medicines can be known the potential of fruit crops, vegetables and medicines that can be developed as raw material for processed products. Here is a picture of the potential percentage of each type of fruit crops, vegetables and medicines grown in yards-based and tables of analysis of the Added value to know how much added value contained in one kilogram of processed products can be presented as follows:

4.1. Potential and Added value of Fruit Plants.

4.1.1. Potential Crops Fruit grown in the yard-based.

![Figure 1. Percentage of Fruits Potential](image)

From the picture above it can be seen that the number of species of fruit plants planted in the yard as many as 9 types of plants of 599 trees. Of the 9 types of plants that showed the highest number were planting Mango plants in 97 trees (16%), followed by 91 Guava fruit trees (15%), then banana plants with 84 trees (14%), Melinjo plants as much as 79 trees (13%) and followed by Papaya plants as many as 74 trees (12%). This shows that in the yard many people cultivate fruit crops both as protective plants and as raw materials for agro-industry to be processed into processed products. From the existing potential of the fruit plants above, of the 5 fruit plants that have the highest percentage, namely Mango, Guava, Banana, Melinjo and Papaya can be processed into Mango Syrup, Guava Juice, Banana Chips, Melinjo chips and Papaya Sauce.

4.1.2. Added value from Fruit plant.

Added value from raw materials with fruit plants into processed products Mango syrup, Guava Fruit extract, Banana Chips, Emping Melinjo, Papaya sauce presented in Table 2.

From The table above shows that each raw material from the fruit plant can be a processed into product that has different added value. This can be seen from the raw material of mango which is used as a mango extract with added value of Rp 12,500, - with the added value ratio of 39.06% of the processed raw materials. While raw materials Guava which is used as a product of Guava Fruit Extract to obtain added value of Rp.21130, - / kg, with the added value ratio of 58,29 %. As for raw material of Banana which made as product of Banana Chips get added value equal to Rp.23228, - / kg with Added value ratio 50,03 %. While raw material of Melinjo fruit plant can be made Emping Melinjo Added value Rp21586,6 / kg with Added value ratio 58,87%. The raw material from papaya plants can be used as a product of Saos Papaya get added value of Rp.4452,14 / kg, with the added value ratio of 49.10%.
### Table 2. Analysis of Added Value Raw Plant Fruit

| No | Output, Input and Price | Mango syrup | Guava Fruit extract | Banana Chips | Emping Melinjo | Papaya Sauce |
|----|-------------------------|-------------|---------------------|--------------|----------------|--------------|
| 1  | Output generated (Kg / production process) | 20          | 30                  | 32           | 25             | 22           |
| 2  | Raw Material Input (Kg / production process) | 50          | 60                  | 44.8         | 75             | 84           |
| 3  | Labor Input (HOK / production process) | 4           | 3                   | 6            | 5              | 6            |
| 4  | Conversion factor (Kg output / Kg raw material) | 0.400       | 0.500               | 0.714        | 0.333          | 0.262        |
| 5  | Labor Coefficient (HOK / Kg raw material) | 0.080       | 0.050               | 0.134        | 0.067          | 0.071        |
| 6  | Price of output (Rp / Kg) | 80000       | 72500               | 65000        | 110000         | 34620        |
| 7  | Average Wage of Labor (Rp / production process) | 25000       | 20000               | 25000        | 22500          | 20000        |

### Revenue and Profit

| No | Input price of raw materials (Rp / Kg) | 17500          | 15000               | 20000        | 15000          | 4500         |
|----|--------------------------------------|----------------|---------------------|--------------|----------------|--------------|
| 9  | Other input donations (Rp / Kg) | 2000          | 120                 | 3200          | 80             | 115          |
| 10 | Output Value (Rp / Kg) | 32000         | 36250               | 46428,57     | 36666,67       | 9067,14      |
| 11 | Added Value (Rp / Kg) | 12500         | 21130               | 23228,57     | 21586,67       | 4452,14      |
| 12 | Labor Revenue (Rp / Kg) | 2000          | 1000                | 3348,51      | 1500,00        | 1428,57      |
| 13 | Labor Seotion (%) | 16.00         | 4.73                | 14.41        | 6.95           | 32.09        |
| 14 | Profit (Rp / Kg) | 10500.00      | 20130               | 19880,36     | 20086,67       | 3023,57      |
| 15 | Profit share (%) | 32.81         | 55.53               | 54.82        | 54.78          | 33.35        |

### Source : Analysis data primary

#### 4.2. Potential and Added value of Vegetable Crops

##### 4.2.1. Potential of Vegetables Crops grown in the yard-based.

From the diagram above it can be seen that the number of types of vegetable plants planted in the yard is 15 types of plants with a number of 789 plants. Of the 15 types of vegetable plants, there were 5 vegetable plants that had the highest percentage of all vegetable crops grown to be processed further, namely Tomato plants as many as 93 trees (12%), then followed by Chilli as many as 83 trees (11%) Furthermore, vegetable plants that are widely cultivated are Spinach plants as many as 75 trees (10%), while Sledri vegetable plants are widely cultivated in the highlands as many as 68 trees (9%) and then Kangkung vegetables are 66 trees (8%).

##### 4.2.2. Added Value from Vegetable plants.
Added value from raw materials of vegetable plants into processed products such as Tomato Sauce, Chilli Sauce, Spinach Chips, Celery Chips, Kale Chips are presented in Table 3.

### Table 3. Analysis of Added Value Made Vegetable Raw Plant.

| NO | Output, Input and Price | Tomato Sauce | Chilli Sauce | Spinach Chips | Celery Chips | Kale Chips |
|----|-------------------------|--------------|--------------|---------------|--------------|------------|
| 1  | Output generated (Kg / production process) | 50 | 30 | 26 | 20 | 22.5 |
| 2  | Raw Material Input (Kg / production process) | 80 | 65 | 45 | 48 | 55 |
| 3  | Labour Input (HOK / production process) | 6 | 4 | 3 | 4 | 5 |
| 4  | Conversion factor (Kg output / Kg raw material) | 0.625 | 0.462 | 0.578 | 0.417 | 0.409 |
| 5  | Labour Coefficient (HOK / Kg raw material) | 0.075 | 0.062 | 0.067 | 0.083 | 0.091 |
| 6  | Price of output (Rp / Kg) | 42000 | 38000 | 65000 | 85000 | 70000 |
| 7  | Average Wage of Labour (Rp / production process) | 20000 | 25000 | 20000 | 25000 | 20000 |
| 8  | Input price of raw materials (Rp / Kg) | 15000 | 12000 | 6000 | 5000 | 4000 |
| 9  | Other input donations (Rp / Kg) | 120 | 450 | 2500 | 2000 | 2200 |
| 10 | Output Value (Rp / Kg) | 26250 | 17538 | 37556 | 35416.67 | 28636.36 |
| 11 | Added Value (Rp / Kg) | 11130.00 | 5088.46 | 29056 | 28416.67 | 22436.36 |
| 12 | Add Value Ratio (%) | 42.40 | 29.01 | 77.37 | 80.24 | 78.35 |
| 13 | Labour Revenue (Rp / Kg) | 1500 | 1538 | 1333.33 | 2083.33 | 1818.18 |
| 14 | Labour Section (%) | 13.48 | 30.23 | 4.59 | 7.33 | 8.10 |
| 15 | Profit (Rp / Kg) | 9630 | 3550 | 27722.22 | 26333 | 20618.18 |
| 16 | Profit share (%) | 36.69 | 20.24 | 73.82 | 74.35 | 72.00 |

From The table above shows that each raw material from vegetable crops can be processed product and it has different Added value. This can be seen from the raw material of tomatoes that serve as tomato sauce with added value of Rp 11130,- with the added value ratio of 42.40% of the processed raw materials. While the raw materials of Chili as a product of Chili Sauce with added value of Rp.5088, and 46 / kg, with a added value ratio of 29.01%. The Spinach raw material is used as Spinach Chips products get added value of Rp.29056, / kg with added value ratio of 77, 37 %. While raw material of Celery vegetable crops can be made celery chips get add value of Rp 28416.67 / kg with added value ratio 80,24%. The raw materials of Kale vegetable plants can be used as Kale Chips product and get added value of Rp.22436,36 / kg , with the added value ratio of 78.35%.

4.3. Potential and Added value of Medicinal Plants.

4.3.1. Potential Crops Medicines grown in the yard-based
Figure 3. Percentage of Potential Medicinal Plants

From the diagram above it can be seen that the number of types of medicinal plants planted in the yard is 15 types of plants with a number of 611 plants. Of the 15 types of medicinal plants, 3 medicinal plants that have the highest percentage of all the number of fruit trees planted to be processed further can be ginger plants as many as 80 trees (13%), then followed by turmeric plants as much as 67 (11%) and medicinal plants that are widely planted in yards are 63 or 10% Pandan plants.

4.3.2. Added value from Medicinal plants.
Added value from raw materials with Medicinal Plants into processed products such as Ginger Syrup, Turmeric Herb, pandanus dyes are presented in Table 4.

Table 4. Analysis of Added Value of Medicinal Plants

| No | Output, Input and Price | Ginger Syrup | Turmeric Herb | Pandanus Herb |
|----|------------------------|--------------|---------------|---------------|
| 1  | Output generated (Kg / production process) | 25 | 40 | 30 |
| 2  | Raw Material Input (Kg / production process) | 60 | 80 | 75 |
| 3  | Labor Input (HOK / production process) | 4 | 6 | 5 |
| 4  | Conversion factor (Kg output / Kg raw material) | 0.417 | 0.5 | 0.4 |
| 5  | Labor Coefficient (HOK / Kg raw material) | 0.067 | 0.075 | 0.067 |
| 6  | Price of output (Rp / Kg) | 75000 | 60000 | 130000 |
| 7  | Average Wage of Labor (Rp / production process) | 20000 | 17500 | 25000 |
| 8  | Revenue and Profit | 9000 | 7500 | 5000 |
| 9  | Input price of raw materials (Rp / Kg) | 2000 | 3000 | 200 |
| 10 | Other input donations (Rp / Kg) | 31250 | 30000 | 52000 |
| 11 | Output Value (Rp / Kg) | 20250 | 19500 | 46800 |
| 12 | Add Value Ratio (%) | 64.80 | 65.00 | 90.00 |
| 13 | Labor Revenue (Rp / Kg) | 1333 | 1313 | 1667 |
| 14 | Labor Section (%) | 6.58 | 6.73 | 3.56 |
| 15 | Profit (Rp / Kg) | 18916.67 | 18187.50 | 45133.33 |
| 16 | Profit share (%) | 60.53 | 60.63 | 86.79 |
| 17 | Reply Services for Production Factors | | | |
| 18 | Margin (Rp / Kg) | 22250.00 | 22500.00 | 47000.00 |
| 19 | a. Labor Revenue (%) | 5.99 | 5.83 | 3.55 |
| 20 | b. Other input donations (%) | 3086.42 | 4615.38 | 222.22 |
| 21 | c. Profit (%) | 85.02 | 80.83 | 96.03 |

Source: Analisis of primary data
From the table above shows that each raw material from medicinal plants can be a processed product which has different added value. This can be seen from the raw material of ginger which is made as a ginger syrup with added value of Rp20250,-/kg with added value ratio by 64.80% from the processed raw material. While the raw material of turmeric that is processed as a product of herbal turmeric with add value of Rp19500,-/kg, with the added value ratio of 65.00%. As for the raw material of pandanus used for pandanus dye products gain added value of Rp46800,-/kg with a ratio of 90.00% added value.

5. Conclusion
The results shown can be concluded that the added value of plants grown in the yard-base is as follows:
1) Fruit plants processed into Mango Syrup, Guava Fruit Extract, Banana Chips, Emping Melinjo, Papaya Sauce each creates an added value of Rp. 12500,-/kg, Rp.21130,-/kg, Rp.23228,57/kg, 21586,6/kg, Rp.4452,14/kg. 2) Vegetable plants processed into Tomato Sauce, Chili Sauce, Spinach Chips, Celery Chips, Kale Chips each gain added value of Rp11130,-/kg, Rp5088,46/kg, Rp.29056,-/kg, Rp.28416,67/kg, Rp.22436,36/kg. 3) Medicinal plants processed into Ginger Syrup, Turmeric Herbs, Pandanus dye each gains an added value of Rp.20250,-/kg, Rp.19500,-/kg, Rp.46800,-/kg.

References
[1] T. Bantacut, “Pembangunan Ketahanan Ekonomi dan Pangan Perdesaan Mandiri Berbasis Nilai Tambah,” J. Pangan, vol. 22, no. 2, pp. 397–406, 2013.
[2] A. Setiyanto, “Approach and Implementation of Priority Agricultural Commodity Zone Development,” Forum Penelit. Agro Ekon., vol. 31 No 2, no. Tanaman Pangan, pp. 171–195, 2013.
[3] R. OELVIANI, “Sistem pertanian terpadu di lahan pekarangan mendukung ketahanan pangan keluarga berkelanjutan: Studi kasus di Desa Plukaran, Kecamatan Gembong, Kabupaten Pati, Jawa Tengah,” vol. 1, no. Hanani 2012, pp. 1197–1202, 2015.
[4] I. D. A. Bgs, E. K. A. Artika, I. D. A. Ayu, and K. Marini, “ANALISIS NILAI TAMBAH (VALUE ADDED ) BUAH PISANG MENJADI KRIPIK PISANG DI KELURAHAN BABAKAN KOTA MATARAM (Studi Kasus Pada Industri Rumah Tangga Kripik Pisang Cakra ) PENDAHULUAN Latar Belakang Perumusan Masalah Tujuan Penelitian,” GaneÇ Swara Vol., vol. 10, no. 1, pp. 94–98, 2016.
[5] Suhartini, “PERAN KEANEKARAGAMAN TANAMAN DI LAHAN PEKARANGAN DALAM KEHIDUPAN MASYARAKAT KABUPATEN SLEMAN,” vol. 23, no. 39870423, pp. 946–952, 2007.
[6] R. M. Wardhani, I. R. Puspitawati, and L. Belakang, “Nilai tambah mocafrican al agroindustri singkong sebagai upaya pemberdayaan sumberdaya lokal,” no. 2006, 2014.
[7] S. Murtiati, “Pekarangan Sebagai Pendongkrak Pendapatan Ibu Rumah Tangga di Kabupaten Boyolali,” 2009.
[8] Saragih, Pengembangan Agribisnis Dalam Pembangunan Ekonomi Nasional Menghadapi Abad ke-21. 1995.
[9] U. Hasanah, F. Pertanian, and U. Gadjah, “Analisis Nilai Tambah Agroindustri Sale Pisang di Kabupaten Kebumen The Value Added Analysis of Sale Pisang Agroindustry in Kebumen Regency,” vol. 18, no. 3, pp. 141–149, 2015.
[10] Hayami, Y., Y. Kawagoe, M. Morookadan, and Siregar. 1987. Agricultural Marketing ang Processing in Up Land Java A Perspective From A Sunda Village : CGPRT Centre. Bogor
[11] W. RM, “Peranan agroindustri dalam meningkatkan nilai tambah komoditi pisang, nangka dan garut,” Agritek, vol. 11, no. 1 Maret, pp. 45–52, 2010.