Income and marketing analysis of potato farming in Modoinding subdistrict South Minahasa regency

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Abstract. Modoinding Subdistrict is the one of the potato plantation center in South Minahasa Regency. In this subdistrict, generally farmer plants potato. The potato farming in this subdistrict has the problems related with the objective of the farming to increase the income. The problem related with the farmer’s income is the low of potato plantation productivity and farmer’s share will affect the farmer’s income to make it lower. The other problem is the marketing problem where the farmer as a producer do not have a high bargaining position because the farmer is only a pricetaker so that his income is low. The objective of this research is to: (1) to investigate an to analyze the potato farming income in Modoinding Sub district, (2) toidentify institution, channel and function of potato marketing in Modoinding Subdistrict, (3) to investigate and to analyze potato marketing efficiency in Modoinding Subdistrict. The research result shoed that (1) there was a difference between the level of the potato farmer income that planted Superjohn Variety and Granola L., (2) there were 4 marketing channel conducted in Modoinding Subdistrict.

1. Introduction
Horticultural commodity in Indonesia is one of the agricultural products that can be developed into one of the leading products that have export potential seen from the very high demand for these commodities. Horticultural commodities can be a source of income for the community and small, medium and large scale farmers [1] The advantages of horticultural commodities are high selling value, potential for market absorption, species diversity, to land resources and technology. Horticultural supplies (fruits, vegetables, ornamental plants, and biopharmaca plants) are directed to meet the needs of domestic consumers, traditional markets, modern markets, to exports [2]. In the current development, production and productivity are continuously encouraged to be increased again as an alternative commodity. One vegetable commodity that has received attention to be developed is potatoes. The need for potatoes has increased related with changing patterns of public consumption and increased demand for potatoes from the food processing industry, hotels and restaurants. Modoinding District is one of the centers of potato plants in South Minahasa Regency. In this subdistrict, farmers are dominantly cultivating potatoes.
Table 1. Planting area, Harvest area and Potato production per Village in Modoinding

| Village            | Planting area (Ha) | Harvest area (Ha) | Productivity (Ton) | Total production (Ton) |
|--------------------|--------------------|-------------------|--------------------|------------------------|
| Mokobang           | 25                 | 20                | 20                 | 400                    |
| Wulurmaatus        | 26                 | 30                | 20                 | 600                    |
| Palelon            | 25                 | 26                | 20                 | 520                    |
| Makaaruyen         | 29                 | 34                | 20                 | 680                    |
| Pinasungkulan      | 26                 | 33                | 20                 | 660                    |
| Pinasungkulan Utara| 27                 | 30                | 20                 | 600                    |
| Linelean           | 28                 | 31                | 20                 | 620                    |
| Sinisir            | 25                 | 32                | 20                 | 640                    |
| Kakenturan         | 25                 | 26                | 20                 | 520                    |
| Kakenturan Barat   | 20                 | 28                | 20                 | 560                    |
| Total              | 256                | 290               |                    | 5800                   |

Source: BP3K Modoinding Subdistrict, 2017

Potato farming in this village is also inseparable from problems, where each farming activity aims to increase income. Problems related to farmers' income such as low productivity of potato crops and prices received by farmers are problems affecting income causing low income of farmers. This makes it difficult for farmers to improve their standard of living and develop their businesses due to limited capital. less motivated to develop their farming. The problem in marketing is low prices at the farm level. Farmers as producers do not have a high bargaining position because farmers are price takers so that income at the farm level is low [3].

2. Method

2.1. Time and place of research
This research will be conducted for 12 months in Modoinding Sub-district of South Minahasa Regency, namely North Pinasungkulan village and Makaaruyen village. Site selection is intentionally (purposive) based on the consideration that the North Pinasungkulan village represents the village that plants the potato type SuperJhon and Makaaruyen village represent II villages that plant potato type Granola.

2.2. Data collection methods
The types of data to be collected in this study include primary data and secondary data. The collection of primary data obtained through the dissemination of the questionnaire to the respondents who were potato farmers with a direct interview to the potato farmer and distributed to the gatherers located in the Modoinding subdistrict and related marketing institutions. Secondary data is obtained from institutions related to research issues such as the Central Statistics Agency, the Regional Agricultural Department of South Minahasa Regency and research literature that has been conducted as well as related books.
2.3. Sampling methods
The study uses census methods for farmer potatoes and snowball sampling for the marketing institutions involved [4]. Respondents used in the study included potato farmers in Modinding subdistrict and marketing institutions [4] of North Pinasungkulan village and 20 farmers of Makaaruyen village. Meanwhile, the number of respondents from the marketing institutions depends on how many marketing institutions are involved.

2.4. Concept of variable measurement
1. General overview of respondents: Age (year), education level (Elementary School, Junior High School, Senior High School, College), the duration of potato farming (years)
2. Basic variables
   a. Land area, which is land area planted with potatoes (ha)
   b. The Status and ownership of land, is proprietary or not proprietary
   c. Production cost of the cost of farmers incurred during the potato production process for one harvest
      • Fixed costs; Tax (Rp/yr), cost of depreciation of tools (Rp),
      • Variable cost: Labour (Rp/HOK), Seed (Rp/kg), Fertilizer (Rp/kg), Pesticides (Rp/kg)
      Transportation (Rp/day)
3. Number of potato production in one harvest (kg/ha)
4. Price at farmer level (Rp/kg)
5. Price at consumer level (Rp/kg)
6. Revenue is multiplication between production and selling price (Rp).
7. Income, difference between acceptance and expense (RP)
8. Marketing Fee: Packing fee, transportation fee (RP/kg)

3. Result and discussion

3.1. Farmer's production, production cost, acceptance and income per hectare
Production costs are the overall cost used in a single production process. Production costs include fixed costs such as tax costs, equipment depreciation costs, land lease; and the variable cost i.e. seed, fertilizer, fuel, freight costs, pesticides and labor costs [5]. The average production cost of the research results can be seen in Table 2.

| No | Cost          | North Pinasungkulan Village (Rp) | Makaaruyen Village (Rp) |
|----|---------------|----------------------------------|-------------------------|
| 1. | Tax           | 12,750,00                        | 17,000,00               |
| 2. | Land processing |                                  |                         |
|    | Rental tractor | 1,466,667,00                     | 1,383,333,00           |
|    | Rental plows  | 1,329,411,00                     | 1,323,529,00           |
|    | Fertilizer:   |                                  |                         |
|    | Urea          | 411,250,00                       | 476,250,00             |
|    | SP36          | 1,815,357,00                     | 1,794,167,00           |
|    | Belarusia     | 2,949,166,00                     | 2,521,875,00           |
|    | Organic       | 1,258,333,00                     | 1,692,000,00           |
|    | Phonska       | 1,916,947,00                     | 1,925,250,00           |
| 3. | Pesticide     | 342,250,00                       | 463,900,00             |
| 4. | Labor:        |                                  |                         |
|    | Land processing |                                  |                         |
|    | Fertilizing   | 1,183,750,00                     | 1,313,500,00           |
|    | Planting      | 2,468,250,00                     | 2,664,250,00           |

Table 2. Average production cost Per hectare
The average tax issued by the potato farmers is quite different, the tax per hectare is Rp. 51,000, 00/year for farmers in the village of North Pinasungkulan in 3 times production a year, while village farmer Makaaruyen in 4 times production. Furthermore, the highest cost of fertilization is issued by farmers in the village of Makaaruyen that makes the Granola L varieties, because of the different use of the type and quantity of fertilizers used by potato farmers.

The cost of rental of farm workers for land processing and planting differs from Rp. 115,000.00 to Rp. 125,000, 00/day. The number of workers that are in different sizes, farmers potato varieties of Superjohn average rent 10-15 people and farmers in the village of North Pinasungkulan who strive to varieties Granola L 15-25 people per hectare. Land processing carried out by the workforce consists of several stages namely clearing land, plowing land (Pajeko), making a mound and after which seedlings ready to be planted. Farmers planting varieties Granola L use more labor with the intention that the land processing is done faster maximum 4 days while for farmers varieties Superjohn time for maximum land processing 7 days. Next rental labor for harvest, farmers varieties of Superjohn average 15-25 people and farmers varieties Granola L 20-35 people. In addition, the cost of packaging issued by the potato farmer has a difference of Rp. 115,750.00 with the price of unity Sack of Rp. 2,500.00. Thus, the amount of production cost of farmers Granola L varieties is higher than the farmer varieties Superjohn.

### Table 3. Average production, cost of production, acceptance and revenue Per hectare

| Farmer’s Area | Production (Kg) | Price (Rp) | Revenue (Rp) | Production cost (Rp) | Income (Rp) |
|---------------|-----------------|------------|--------------|----------------------|-------------|
| Pinasungkulan | 13,570          | 7,000.00   | 94,990,000.00| 21,073,600.00        | 73,916,400.00|
| Makaaruyen    | 16,358          | 7,000.00   | 114,506,000.00| 24,030,400.00        | 90,475,600.00|

The average production, cost of production, acceptance and income per hectare of farmers in the village of North Pinasungkulan which is working on the potato varieties of Superjohn lower than the farmer in the village Makaaruyen that is working on potato varieties Granola L. This is because the potato farmers varieties of Granola L can produce 4 times a year while the varieties of Superjohn 3 times a year.

#### 3.2. Marketing channels

Marketing to Manado Bersehati market requires considerable costs, especially transportation costs. This is due to a distance away from the manufacturer's place, so the total cost difference between the collector and retailer is quite large. Reseller Merchants only issue packing and redistribution fees so that the profit earned is much greater than the collector trader.
Table 4. Cost, profit, marketing margin and share for marketing channels to Manado Bersehati market

| Cost                                      | Price (Rp/kg) | Share (%) |
|-------------------------------------------|---------------|-----------|
| 1. Farmer’s selling price                 | 7,160         | 46.70     |
| 2. Collectors selling price to Bersehati market retailer traders: |              |           |
|   • Packaging                             | 41.67         | 0.27      |
|   • Sorting and packing                    | 166.67        | 1.08      |
|   • Loading and unloading                  | 166.67        | 1.08      |
|   • Transportation                         | 312.5         | 2.04      |
| 3. Total cost                             | 50.00         | 0.33      |
| 4. Profit                                 | 737.51        | 4.81      |
| 5. Marketing margin                       | 1,802.49      | 11.75     |
| 6. Retailer selling price                 | 15,334        |           |
|   • Packaging                             | 71.42         | 0.47      |
|   • Retribution                           | 50.00         | 0.33      |
| 7. Profit                                 | 121.42        | 0.79      |
| 8. Marketing margin                       | 5,512.58      | 35.95     |
|                                           | 5,634         | 36.74     |

| Total marketing costs                     | 858.93        |
| Total profit                              | 7,315.07      |
| Total marketing margin                    | 8,174         |

3.3. Marketing channels 2

![Figure 2. Marketing channels 2](image)

Table 5. Costs, benefits, marketing margins and shares for marketing channels to Kotamobagu market

| Cost                                      | Price (Rp/kg) | Share (%) |
|-------------------------------------------|---------------|-----------|
| Farmers selling price                     | 7,086         | 48.86     |
| Selling price of collecting traders to Kotamobagu market retailers: |              |           |
|   • Packaging                             | 41.67         | 0.28      |
|   • Sort and packing                       | 166.67        | 1.15      |
|   • Loading and unloading                  | 166.67        | 1.15      |
|   • Transportation                         | 33.34         | 0.23      |
|   • Retribution                           | 675.02        | 4.64      |
| Total cost                                | 1,239.98      | 13.77     |
| Profit                                    | 1,914         | 21.26     |
| Marketing margin                          |               |           |
Table 5 showed that the marketing costs incurred by the collecting traders are greater than the retailers. This is because the collecting traders bear all transportation costs from the farmers. The collecting traders carry directly from farmers to consumers. The highest profit is obtained by the retailer because the retailer does not incur transportation / transportation costs.

3.4. Marketing channels 3

![Marketing channels 3](image)

The total cost incurred by the collector is greater than that of the retailer, this is because the collector brings potatoes directly from the farmer to the market, so that the retailer does not incur transportation costs. The transportation used by collectors is car pickup which is their own car.

**Table 6. Costs, profits, marketing margins and shares for marketing channels to Manado Bersehati Market**

| Cost                                      | Price (Rp/kg) | Share (%) |
|-------------------------------------------|---------------|-----------|
| Farmers selling price                      | 7,086         | 50.61     |
| Selling price of collecting trader to Bersehati | 9,200         |           |
| Market Retailer:                          |               |           |
| • Packaging                               | 166.67        | 0.30      |
| • Sort and packing                        | 277.78        | 1.19      |
| • Loading and unloading                   | 166.67        | 1.98      |
| • Transportation                          | 33.34         | 1.19      |
| • Retribution                             | 686.13        | 0.24      |
| Total cost                                | 1,427.7       | 7.45      |
| Profit                                    | 2,114         | 10.19     |
| Marketing margin                          |               | 15.10     |

| Retailer merchant selling price            | 14,000        |           |
| • Packaging                               | 77.14         | 0.55      |
| • Retribution                             | 33.34         | 0.24      |
| Total cost                                | 110.48        | 0.78      |
| Profit                                    | 4,689.52      | 33.49     |
| Marketing margin                          | 4,800         | 34.28     |

| Total marketing cost                      | 796.61        |           |
| Total profit                              | 6,803.52      |           |
| Total marketing margin                    | 6,914         |           |
3.5. **Marketing channel 4**

![Figure 4. Marketing channel 4](image)

In this marketing channel, large traders incur large costs because the distance from farmers to consumers is far enough so that transportation is carried out twice with large transportation costs.

**Table 7. Costs, profits, marketing margins and shares for marketing channels Bitung Harbor**

| Costs                          | Price (Rp/kg) | Share (%) |
|-------------------------------|--------------|-----------|
| Farmers selling price         | 6,696        | 72.78     |
| Selling prices of wholesalers | 9,200        |           |
| Marketing cost                |              |           |
| - Packaging                   | 66.67        | 0.72      |
| - Sortation                   | 58.34        | 0.63      |
| - Packing                     | 166.67       | 181       |
| - Transportation 1            | 30.00        | 0.32      |
| - Transportation 2            | 375          | 4.07      |
| - Loading and unloading       | 166.67       | 1.81      |
| Total marketing costs         | 863.35       | 9.38      |
| Total profits                 | 1,640.65     | 17.83     |
| Marketing margins             | 2,504        | 22.21     |

3.6. **Farmer’s share**

Farmer's share is the comparison between the price received by potato farmers and the price paid by end consumers. The amount of farmer share will affect the value of marketing margins and the more marketing institutions involved will affect farmers share.

**Table 8. Farmer's share**

| Marketing channel | Price at farmer level (Rp/kg) | Prices at the consumer level (Rp/kg) | Farmer’s share (%) |
|-------------------|--------------------------------|-------------------------------------|--------------------|
| 1                 | 7,160                          | 15,000                              | 47.74              |
| 2                 | 7,086                          | 14,500                              | 48.86              |
| 3                 | 7,086                          | 14,000                              | 50.61              |
| 4                 | 7,160                          | 18,000                              | 39.78              |

3.7. **Marketing efficiency**

Marketing efficiency can be measured by comparing marketing costs, marketing profits, marketing margins and farmer shares.

**Table 9. Marketing efficiency in potato marketing channels**

| Marketing channel | Total marketing cost (Rp/kg) | Total profit margin (Rp/kg) | Total marketing margin (Rp/kg) | Farmer’s share (%) |
|-------------------|------------------------------|----------------------------|--------------------------------|--------------------|
| 1                 | 863.35                       | 1,640.65                   | 2,504                          | 39.78              |
| 2                 | 821.45                       | 6,426.98                   | 7,414                          | 48.86              |
| 3                 | 796.61                       | 6,803.52                   | 6,914                          | 50.61              |
4. Conclusion
The level of income of potato farmers between Superjohn varieties and Granola L varieties is different. Although in the same land area, the number of farmers producing Granola L variety seed is higher than the production of Superjohn seed farmers. This is influenced by the factor of using different varieties of potato seeds, because the seeds of the Granola L variety have higher potential in potato production than the Superjohn variety, thus causing the number of farmers to produce Granola L variety higher than the Superjohn variety farmers. There are 4 marketing channels that occur in North Pinasungkulan Village and Makaaruyen Village. The best marketing channel is marketing channel 3, because the total marketing margin is the smallest and the farmer's share is the highest.

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