

# The Difference Factors of Sago Farm Household Production in Luwu Utara Regency, South Sulawesi, Indonesia

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**Abstract:** Associated with the sago potency in South Sulawesi Province, the role of sago farm households (SFHs) becomes more important because they dominate and run most sago processors. However, a limited number of studies have focused on SFHs in Indonesia, particularly in South Sulawesi Province. This study's goal is to identify the factors contributing to differences among SFHs' production of sago. A total of 54 valid questionnaires were collected from SFHs in the Malangke Barat subdistrict, a subdistrict in Luwu Utara Regency, during July and August 2015. The obtained data were analyzed using statistical independent *t*-test analysis to determine statistical differences between the means of two groups. Based on the test (significant at the 1% level), SFH1 has higher working hours, higher income, and higher motivation than SFH2. SFH1 allocates 5.34 hours/day, while SFH2 only allocates 2.46 hours/day for sago processing. SFH1 can earn IDR 8.69 million/month (1 USD = 13,000 IDR exc. rate April 25, 2017), while SFH2 can only earn IDR 2.19 million/month from sago. Furthermore, SFH1 believes that sago is profitable and promising, while SFH2 is only involved in sago production to support their economic lifestyle without any further goals. Undeniably, motivational training and support from related stakeholders can encourage the SFHs to work to achieve a better livelihood.

**Keywords:** difference factors, motivation, sago farm households, sago production, South Sulawesi

## Introduction

In our previous research, we have shown that local people's consumption of sago demonstrates that sago has many uses. Today, sago has become an important raw material for the food industry, and it is predicted that the demand for sago will increase in the future (Metaragakusuma et al., 2016). Furthermore, sago-based food, namely *kapurung* (a traditional food of Tana Luwu, South Sulawesi), is growing popular and becoming more acceptable even in non-sago-producing areas. The image of sago has also changed from poor to better and healthier (Genda, 2014; Metaragakusuma, 2015). These situations surely provide opportunities for the home industry to grow and influence the economy for sago farmers/smallholders indirectly.



**Fig. 1.** *Kapurung* made by local people in Pengkajjoang Village

According to data of the Agricultural Census by the Central Statistical Agency in 2013, 67.9% of sago palm clusters in South Sulawesi can be found in Luwu Utara Regency (68,104 clusters), while 90.2% of sago palm clusters in Luwu Utara Regency can be found in Malangke Barat subdistrict (61,427 clusters).

Regarding the sago potency in the Malangke Barat subdistrict mentioned above, the role of sago farm households (SFHs) becomes more important because they dominate and run most sago processors.

Farm households are interesting to study because their profiles are different from each other, and every profile has a certain role in forming farm household behaviors (Subagio, 2008; Yunita et al., 2012). The formed behavior will influence farmers' capacities to produce sago. However, only a limited number of studies have focused on SFHs in Indonesia, particularly in South Sulawesi Province. Thus, this paper's goal is to identify factors contributing to differences among SFHs' production of sago.

## Materials and Methods

### 1. Study site

This research focused on the Malangke Barat subdistrict, Luwu Utara Regency, South Sulawesi Province, Indonesia. This area covers an area of 350 km<sup>2</sup> with a population of 6,435 households. It consists of 13 villages, but only 7 villages have sago areas, with 441 sago smallholders. There are 23 wet starch processors, which are located in 2 villages (Pengkajoang and Waelawi Village). These are operated 100% by local people.

### 2. Data source and analyzing

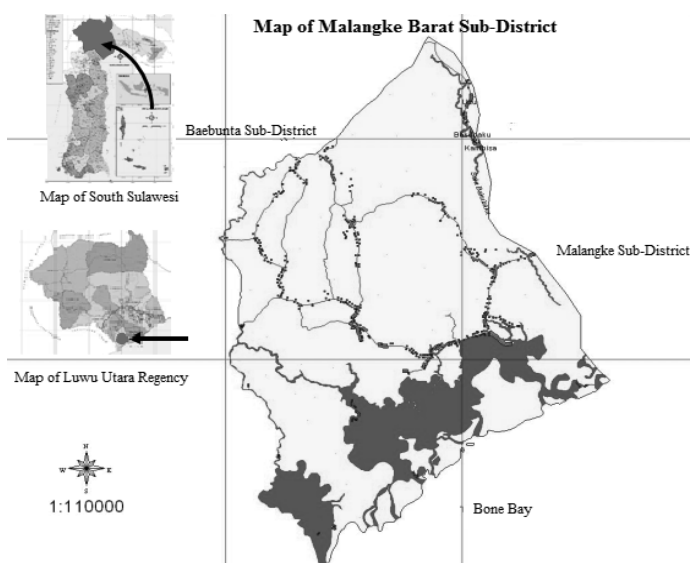
For the purpose of this research, a quantitative study was made using a structured questionnaire. A total of 54 valid questionnaires were collected from 19 sago processors during July and August 2015. Respondents were divided into two groups: (a) those with high sago production—more than 2.0 ton/month on average in the SFH1 group, 18 respondents (33.3%); and (b) those with low sago production—less than 2.0 ton/month on average in the SFH2 group, 36 respondents (66.7%) (see Table 1). The standard value (2.0 ton/month) is taken from the total production of 54 respondents (109 ton/month) divided by 54 (see Table 2). Table 2 also shows each respondent's total working hours, so that the production/hour of each farmer can be calculated.

The obtained data were analyzed by independent *t*-test statistical analysis, which is a formula for comparing the means of two groups commonly used in social research. This method is designed to inspect any factors of significant differences that could occur between dependent and independent variables. The dependent variable for this study is sago production and the independent variables are selected from socio-demographics, sago consumption, and sago processing factors. In addition, a descriptive statistical method, namely frequency and cross tabulation, was also used

to describe the basic features and provide simple summaries of the data.

### Results and discussion

In this part, the differences between SFH1 and SFH2 will be shown. Differences in all variables will be examined from 3 categories; farmer's respondent profile, sago consumption, and sago processing variables. We attempt to answer the following questions: Do these factors have any influence on sago production? Are there any factor causing significant differences between SFH1 and SFH2?



**Fig. 2.** Study site in Malangke Barat

**Table 1.** Sago production, working hours, and production category (SFH1/SFH2)

| Sago farmer ID | AP/mo (t) | AWh/day (h) | Group | Sago farmer ID | AP/mo (t) | AWh/day (h) | Group |
|----------------|-----------|-------------|-------|----------------|-----------|-------------|-------|
| 1              | 2.48      | 5.60        | SFH1  | 28             | 1.20      | 4.00        | SFH2  |
| 2              | 2.40      | 4.00        | SFH1  | 29             | 1.60      | 7.00        | SFH2  |
| 3              | 2.75      | 7.00        | SFH1  | 30             | 1.60      | 7.00        | SFH2  |
| 4              | 3.40      | 7.00        | SFH1  | 31             | 1.55      | 7.00        | SFH1  |
| 5              | 0.70      | 1.35        | SFH2  | 32             | 3.40      | 7.00        | SFH2  |
| 6              | 20.53     | 4.67        | SFH1  | 33             | 0.70      | 1.35        | SFH2  |
| 7              | 0.17      | 0.29        | SFH2  | 34             | 0.70      | 1.35        | SFH2  |
| 8              | 0.13      | 0.29        | SFH2  | 35             | 0.70      | 1.35        | SFH2  |
| 9              | 0.13      | 0.29        | SFH2  | 36             | 1.40      | 3.50        | SFH2  |
| 10             | 2.80      | 7.00        | SFH1  | 37             | 1.40      | 3.50        | SFH2  |
| 11             | 0.67      | 2.25        | SFH2  | 38             | 1.40      | 3.50        | SFH2  |
| 12             | 3.17      | 4.69        | SFH1  | 39             | 0.33      | 1.05        | SFH2  |
| 13             | 3.00      | 7.50        | SFH1  | 40             | 0.33      | 1.05        | SFH2  |
| 14             | 2.38      | 3.75        | SFH1  | 41             | 0.33      | 2.50        | SFH2  |
| 15             | 1.05      | 1.03        | SFH2  | 42             | 1.58      | 2.50        | SFH2  |
| 16             | 2.50      | 5.20        | SFH1  | 43             | 1.58      | 1.50        | SFH2  |
| 17             | 2.40      | 3.60        | SFH1  | 44             | 1.00      | 1.50        | SFH2  |
| 18             | 2.00      | 1.20        | SFH2  | 45             | 1.00      | 1.75        | SFH2  |
| 19             | 1.20      | 5.60        | SFH2  | 46             | 1.25      | 1.25        | SFH2  |
| 20             | 0.70      | 5.60        | SFH2  | 47             | 0.83      | 0.34        | SFH2  |
| 21             | 0.60      | 0.75        | SFH2  | 48             | 0.35      | 0.34        | SFH2  |
| 22             | 1.58      | 2.50        | SFH1  | 49             | 0.35      | 5.20        | SFH2  |
| 23             | 2.20      | 1.60        | SFH1  | 50             | 1.50      | 5.20        | SFH2  |
| 24             | 7.33      | 5.67        | SFH1  | 51             | 1.00      | 5.20        | SFH2  |
| 25             | 4.50      | 6.30        | SFH1  | 52             | 2.40      | 3.60        | SFH2  |
| 26             | 0.20      | 0.50        | SFH2  | 53             | 2.00      | 1.98        | SFH2  |
| 27             | 2.48      | 5.60        | SFH1  | 54             | 4.50      | 6.30        | SFH1  |
| Total          | 73.5 ton  | 100.8 hours |       | Total          | 36.0 ton  | 87.8 hours  |       |

Note. AP/mo (t): Average Production/ month in ton

AWh/day (h): Average Working Hours/ day in hour

**Table 2.** Calculated of sago production and working hours for SFH1 and SFH2

| Description                      | Total of samples | Average per farmer | SFH1 Group    | SFH2 Group   |
|----------------------------------|------------------|--------------------|---------------|--------------|
| Production ton/month<br>(kg/day) | 109.4            | 2.03               | 4.15<br>(207) | 0.97<br>(48) |
| Working hours/day                | 188.6            | 3.50               | 5.34          | 2.46         |
| Productivity<br>kg/hour/ person  |                  |                    | 38.8          | 19.7         |

Note. 1) Total sample is 54 farmers

2) Total sample of SFH1 is 18 farmers

3) Total sample of SFH2 is 18 farmers

Table 3, below, shows the results of analyzing data to answer these questions.

As the independent *t*-test was employed to analyze data, the mean from each group is read by finding the value assignment in the table. Statistically, this method will result in Sig<sup>1</sup>. From here, the variables that are significantly different between the two groups can be identified, and they are marked consecutively by \*, \*\*, and \*\*\* at the 10%, 5%, and 1% levels, respectively.

### 1. Socio-demographic profile of respondents

The socio demographic profile of respondents is shown in the first group of Table 3. In terms of gender, 100 % of the respondents were male. This result conforms with the result of a previous study in Moluccas, which indicated that working on sago is

not flexible because the process of extracting sago is done mostly by men (Hermin, 2007). More than 90 % of the respondents were married and in their productive years (21–60 years of age), largely in the 31- to 40-year group (40.7%). More than half (59.3%) of respondents had graduated from elementary school (low educated), and have 3 to 4 family members. They engage in other agricultural activities besides sago (81.5%) at almost the same time, namely fishpond management, maize cultivation, and patchouli cultivation. Furthermore, their monthly income from sago ranged from IDR 2.1 to 4 million (29.6%).

### 2. Difference factors of sago farm household production (SFH)

Based on the independent *t*-test, as shown in Table

**Table 3.** Farmers' characteristics in 3 categories (socio-demographic, sago consumption, and sago processing), variable definition and comparable variables of sago production (SFH1 and SFH2)

| Characteristics (Variable name in the model)                    | Value Assignment | Number of respondents        | Respondent Group |            | Mean (SD) |         | Sig <sup>1</sup> |
|---|------------------|------------------------------|------------------|------------|-----------|---------|------------------|
|   |                  |                              | SFH1             | SFH2       | SFH1      | SFH2    |                  |
| Number of respondents   |                  | 54                           | 18 (33.3%)       | 36 (66.7%) |           |         |                  |
| Category 1: Socio-demographic profile of farmers                |                  |                              |                  |            |           |         |                  |
| <i>Gender</i>   |                  |                              |                  |            | 1.00      | 1.00    | .000a            |
| Female  | =0               | 54 (100%)                    |                  |            | (.000)    | (.000)  |                  |
| Male  | =1               |                              |                  |            |           |         |                  |
| <i>Age (years)</i>  |                  | Actual age                   |                  |            | 40.94     | 41.28   | 0.107            |
| 21 – 30   |                  | 7 (13%)                      | 3 (16.7%)        | 4 (11.1%)  | (11.40)   | (10.42) |                  |
| 31 – 40   |                  | 22 (40.7%)                   | 7 (38.9%)        | 15 (41.7%) |           |         |                  |
| 41 – 50   |                  | 14 (26%)                     | 3 (16.7%)        | 11 (30.6%) |           |         |                  |
| 51 – 60   |                  | 8 (14.8%)                    | 4 (22.2%)        | 4 (11.1%)  |           |         |                  |
| More than 60 years old  |                  | 3 (5.5%)                     | 1 (5.5%)         | 2 (5.5%)   |           |         |                  |
| <i>Marital status</i>   |                  |                              |                  |            | 1.00      | 0.89    | -2.092           |
| Unmarried   | =0               | 4 (7.4%)                     | 0 (0%)           | 4 (11.1%)  | (0.00)    | (0.32)  |                  |
| Married   | =1               | 50 (92.6%)                   | 18 (100%)        | 32 (88.9%) |           |         |                  |
| <i>Education (level)</i>  |                  | Actual years                 |                  |            | 7.50      | 7.42    | -                |
| Did not finish PS   |                  | 1 (1.9%)                     | 0 (0%)           | 1 (2.8%)   | (2.12)    | (2.21)  | 132.000          |
| Primary School  |                  | 32 (59.3%)                   | 11 (61.1%)       | 21 (58.3%) |           |         |                  |
| Junior High Sch./ equivalent                                    |                  | 15 (27.7%)                   | 5 (27.8%)        | 10 (27.8%) |           |         |                  |
| Senior High Sch./ equivalent                                    |                  | 6 (11.1%)                    | 2 (11.1%)        | 4 (11.1%)  |           |         |                  |
| <i>Household members</i>  |                  | Actual numbers               |                  |            | 4.00      | 4.31    | 0.954**          |
| 1 – 2   |                  | 2 (3.7%)                     | 0 (0%)           | 2 (5.6%)   | (0.91)    | (1.43)  |                  |
| 3 – 4   |                  | 32 (59.3%)                   | 13 (72.2%)       | 19 (52.8%) |           |         |                  |
| 5 – 6   |                  | 18 (33.3%)                   | 5 (27.8%)        | 13 (36.1%) |           |         |                  |
| 7 – 8   |                  | 2 (3.7%)                     | 0 (0%)           | 2 (5.6%)   |           |         |                  |
| <i>Besides sago, do you have other agricultural activities?</i> |                  |                              |                  |            | 0.94      | 0.92    | -0.223           |
| No  | =0               | 10 (18.5%)                   | 5 (27.8%)        | 5 (13.9%)  | (0.54)    | (0.37)  |                  |
| Yes   | =1               | 44 (81.5%)                   | 13 (72.2%)       | 31 (86.1%) |           |         |                  |
| <i>Income from sago/month on average</i>                        |                  | Actual amount in IDR million |                  |            | 8.69      | 2.19    | -3.878***        |
| Up to 1 million   |                  | 8 (14.8%)                    | 0 (0%)           | 8 (22.2%)  | (7.05)    | (1.34)  |                  |
| 1.1 – 2 million   |                  | 9 (16.7%)                    | 7 (38.9%)        | 9 (25.0%)  |           |         |                  |
| 2.1 – 4 million   |                  | 16 (29.6%)                   | 4 (22.2%)        | 16 (44.4%) |           |         |                  |
| 4.1 – 6 million   |                  | 10 (18.5%)                   | 5 (27.8%)        | 3 (8.3%)   |           |         |                  |
| More than 10 million  |                  | 11 (20.4%)                   | 2 (11.1%)        | 0 (0%)     |           |         |                  |

| Characteristics (Variable name in the model)                          | Value Assignment          | Number of respondents | Respondent Group |            | Mean (SD) |         | Sig <sup>1</sup> |
|---|---------------------------|-----------------------|------------------|------------|-----------|---------|------------------|
|   |                           |                       | SFH1             | SFH2       | SFH1      | SFH2    |                  |
| <i>Household expenditure</i>  | Act.number IDR            |                       |                  |            | 3.90      | 1.97    | -2.558**         |
| < 1 million   |                           | 3 (5.6%)              | 0 (0%)           | 3 (8.3%)   | (3.14)    | (0.88)  |                  |
| 1.1 – 2 million   |                           | 18 (33.3%)            | 0 (0%)           | 18 (50%)   |           |         |                  |
| 2.1 – 4 million   |                           | 30 (55.6%)            | 16 (88.9%)       | 14 (38.9%) |           |         |                  |
| 4.1 – 6 million   |                           | 2 (3.7%)              | 1 (5.6%)         | 1 (2.8%)   |           |         |                  |
| > 10 million  |                           | 1 (1.9%)              | 1 (5.6%)         | 0 (0%)     |           |         |                  |
| <b>Category 2: Sago Consumption</b>                                   |                           |                       |                  |            |           |         |                  |
| <i>Do you/your family members consume sago?</i>                       |                           |                       |                  |            | 1         | 0.97    | -704             |
| No  | =0                        | 1 (1.9%)              | 0                | 1 (2.8%)   | (0)       | (0.17)  |                  |
| Yes   | =1                        | 53 (98.1%)            | 18 (100%)        | 35 (97.2%) |           |         |                  |
| <i>Total family sago consumption/ month (kg)</i>                      | Actual weight             |                       |                  |            | 16.42     | 7.86    | -2.006*          |
| None  |                           | 1 (1.9%)              | 0 (0%)           | 1 (2.8%)   | (16.23)   | (11.32) |                  |
| Up to 10 kg   |                           | 43 (79.6%)            | 11 (61.1%)       | 32 (88.9%) |           |         |                  |
| 11 – 25 kg  |                           | 5 (9.3%)              | 3 (16.7%)        | 2 (5.6%)   |           |         |                  |
| 26 – 35 kg  |                           | 1 (1.9%)              | 1 (5.6%)         | 0 (0%)     |           |         |                  |
| More than 35 kg   |                           | 4 (7.4%)              | 3 (16.7%)        | 1 (2.8%)   |           |         |                  |
| <i>Mainly, sago is consumed as:</i>                                   |                           |                       |                  |            | 1.17      | 1.44    | 1.575            |
| Main staple food/ <i>dange</i>  | =1                        | 39 (72.2%)            | 15 (83.3%)       | 24 (66.7%) | (0.38)    | (0.91)  |                  |
| Raw material for traditional food/ <i>kapuring</i>                    | =2                        | 14 (25.9%)            | 3 (16.7%)        | 11 (30.6%) |           |         |                  |
| Raw material for making cakes   | =3                        | 0 (0%)                | 0 (0%)           | 0 (0%)     |           |         |                  |
| Raw material for making beverages                                     | =4                        | 0 (0%)                | 0 (0%)           | 0 (0%)     |           |         |                  |
| Other   | =5                        | 0 (0%)                | 0 (0%)           | 0 (0%)     |           |         |                  |
| N/A   | =6                        | 1 (16.7%)             | 0 (0%)           | 1 (2.8%)   |           |         |                  |
| <i>Frequency of sago consumption</i>                                  |                           |                       |                  |            | 1.39      | 1.81    | 1.211            |
| Every day   | =1                        | 35 (64.8%)            | 14 (77.8%)       | 21 (58.3%) | (0.98)    | (1.28)  |                  |
| Three times a week  | =2                        | 11 (20.4%)            | 3 (16.7%)        | 8 (22.2%)  |           |         |                  |
| Once a week   | =3                        | 4 (7.4%)              | 0 (0%)           | 4 (11.1%)  |           |         |                  |
| Several times a month   | =4                        | 3 (5.6%)              | 1 (5.6%)         | 2 (5.6%)   |           |         |                  |
| Once a month  | =5                        | 1 (1.9%)              | 0 (0%)           | 1 (2.8%)   |           |         |                  |
| N/A   | =6                        | 0 (0%)                | 0 (0%)           | 0 (0%)     |           |         |                  |
| <i>Your opinion about sago as an alternative food/rice substitute</i> |                           |                       |                  |            | 6.11      | 6.06    | -160             |
| Strongly disagree   | =1                        | 0 (0%)                | 0 (0%)           | 0 (0%)     | (1.08)    | (1.26)  |                  |
| Disagree  | =2                        | 0 (0%)                | 0 (0%)           | 0 (0%)     |           |         |                  |
| Somewhat agree  | =3                        | 0 (0%)                | 0 (0%)           | 0 (0%)     |           |         |                  |
| Neutral   | =4                        | 12 (22.2%)            | 3 (16.7%)        | 9 (25%)    |           |         |                  |
| Quite agree   | =5                        | 0 (0%)                | 0 (0%)           | 0 (0%)     |           |         |                  |
| Agree   | =6                        | 14 (25.9%)            | 7 (38.9%)        | 7 (19.4%)  |           |         |                  |
| Strongly agree  | =7                        | 28 (51.9%)            | 8 (44.4%)        | 20 (55.6%) |           |         |                  |
| <b>Category 3: Sago Processing</b>                                    |                           |                       |                  |            |           |         |                  |
| <i>Sago land ownership</i>  |                           |                       |                  |            | 0.67      | 0.67    | 0.000            |
| No  | =0                        | 18 (33.3%)            | 6 (33.3%)        | 12 (33.3%) | (0.49)    | (0.48)  |                  |
| Yes   | =1                        | 36 (66.7%)            | 12 (66.7%)       | 24 (66.7%) |           |         |                  |
| <i>How many clusters of sago do you have?</i>                         | Actual number of clusters |                       |                  |            | 52.94     | 28.78   | -1.073           |
| None  |                           | 18 (33.3%)            | 6 (33.3%)        | 12 (33.3%) | (74.83)   | (79.57) |                  |
| Less than 50  |                           | 26 (48.1%)            | 6 (33.3%)        | 20 (55.6%) |           |         |                  |
| 50 – 150  |                           | 4 (7.4%)              | 3 (16.7%)        | 1 (2.8%)   |           |         |                  |
| 151 – 200   |                           | 5 (9.3%)              | 3 (16.7%)        | 2 (5.6%)   |           |         |                  |
| 301 – 400   |                           | 1 (1.9%)              | 0 (0%)           | 1 (2.8%)   |           |         |                  |
| <i>Working hours on sago/ day on average</i>                          | Actual hours              |                       |                  |            | 5.34      | 2.46    | -5.172***        |
| Less than 3 hours   |                           | 25 (46.3%)            | 1 (5.6%)         | 24 (66.7%) | (1.59)    | (2.07)  |                  |
| 3 – 5 hours   |                           | 10 (18.5%)            | 5 (27.8%)        | 5 (13.9%)  |           |         |                  |
| 5 – 8 hours   |                           | 19 (35.2%)            | 12 (66.7%)       | 7 (19.4%)  |           |         |                  |

| Characteristics (Variable name in the model)               | Value Assignment              | Number of respondents | Respondent Group |            | Mean (SD)           |                   | Sig <sup>1</sup> |
|--|-------------------------------|-----------------------|------------------|------------|---------------------|-------------------|------------------|
|  |                               |                       | SFH1             | SFH2       | SFH1                | SFH2              |                  |
| <i>Spending money for sago processing/month on average</i> | Actual amount in thousand IDR |                       |                  |            | 1,950<br>(3,160.88) | 427<br>(304.11)   | -204             |
| Less than 300,000  |                               | 17(31.5%)             | 1(5.6%)          | 16(44.4%)  |                     |                   |                  |
| 300,000 – 800,000  |                               | 18(33.3%)             | 3(16.7%)         | 15(41.7%)  |                     |                   |                  |
| 800,001 – 1,300,000  |                               | 12(22.2%)             | 7(38.9%)         | 5(13.9%)   |                     |                   |                  |
| 1,300,001 – 1,800,000                                      |                               | 5(9.3%)               | 5(27.8%)         | 0(0%)      |                     |                   |                  |
| 1,800,001 – 2,300,000                                      |                               | 2(3.7%)               | 2(11.1%)         | 0(0%)      |                     |                   |                  |
| <i>Sago price per/kg (IDR)</i>                             | Actual amount                 |                       |                  |            | 2,300<br>(258.97)   | 2,146<br>(245.46) | -2.135**         |
| 1,600 – 2,000  |                               | 17 (31.5%)            | 4 (22.2%)        | 13 (36.1%) |                     |                   |                  |
| 2,001 – 2,400  |                               | 27 (50%)              | 6 (33.3%)        | 21 (58.3%) |                     |                   |                  |
| 2,401 – 2,800  |                               | 10 (18.5%)            | 8 (44.4%)        | 2 (5.6%)   |                     |                   |                  |
| <i>Type of sago processing</i>                             |                               |                       |                  |            | 1.06<br>(0.24)      | 0.94<br>(0.23)    | -1.649           |
| Conventional (micro-scale tech)                            | =0                            | 2 (3.7%)              | 0 (0%)           | 2 (5.6%)   |                     |                   |                  |
| Small-scale technology                                     | =1                            | 51 (94.4%)            | 17 (94.4%)       | 34 (94.4%) |                     |                   |                  |
| Small-scale with technological upgrading                   | =2                            | 1 (1.9%)              | 1 (5.6%)         | 0          |                     |                   |                  |
| <i>Sales of sago/month on average</i>                      | Actual amount (t)             |                       |                  |            | 4.15<br>(4.27)      | 0.97<br>(0.55)    | -3.144***        |
| Up to 2 tons   |                               | 36 (66.7%)            | 0 (0%)           | 36 (100%)  |                     |                   |                  |
| 2.1–4 tons   |                               | 11 (20.4%)            | 11 (61.1%)       | 0 (0%)     |                     |                   |                  |
| More than 4 tons   |                               | 7 (13%)               | 7 (38.9%)        | 0 (0%)     |                     |                   |                  |
| <i>The reason for involvement in sago production</i>       |                               |                       |                  |            | 2.89<br>(0.96)      | 1.89<br>(1.06)    | -3.358***        |
| To fill the empty time                                     | =0                            | 3 (5.6%)              | 0 (0%)           | 3 (8.3%)   |                     |                   |                  |
| To fulfill daily needs                                     | =1                            | 15 (27.8%)            | 3 (16.7%)        | 12 (33.3%) |                     |                   |                  |
| To support farmer's economic life                          | =2                            | 8 (14.8%)             | 0 (0%)           | 8 (22.2%)  |                     |                   |                  |
| The benefit is promising                                   | =3                            | 23 (42.6%)            | 11 (61.1%)       | 12 (33.3%) |                     |                   |                  |
| High demand  | =4                            | 5 (9.3%)              | 4 (22.2%)        | 1 (2.8%)   |                     |                   |                  |

Note: Based on *t*-test sig<sup>1</sup>: \*\*\*significant at the 1% level, \*\*significant at the 5% level, \*significant at the 10% level. SD: standard deviation

3, 8 variables show significant differences, including 3 variables in category 1 (household members\*\*, income from sago\*\*\*, and household expenditure\*\*), 1 in category 2 (total of family sago consumption\*), and 4 in category 3 (working hours\*\*\*, sago price\*\*, sales of sago\*\*\*, and the reason for involvement in sago processing\*\*\*).

In category 1, the household size is lower in SFH1, even though the mean values in these two groups are slightly similar, while the value of standard deviation (SD) is statistically different. The mean sago income of SFH1 is IDR 8.69 million, and their expenditure per household is 3.90 million. This is higher as compared to that of SFH2, which earned only IDR 2.19 million for income and expended IDR 1.97 million.

For category 2, SFH1 demonstrated greater sago consumption. They consume 16.42 kg/month, which is higher than that of SFH2, which only consumes 7.86 kg/month. It is important to note that the mean number of household members for SFH1 and SFH2 is same, 4 persons/family.

In category 3, members of SFH1 can be identified as allocating more time to processing sago, selling sago at a higher price, selling more, and being more highly motivated than members of the SFH2 group. SFH1 allocates 5.34 hour/day for sago processing on average, and it sells sago for IDR 2,300/kg with total sales averaging 4.15 ton/month or 207 kg/day (assumed working day is 20 days/ month). This is higher than for SFH2, which allocates only 2.46 hour/day and sells sago for IDR 2,146/kg, with total average sales of 0.97 ton/month or 48 kg/day (see Table 2). SFH1 also had more motivation for producing sago than did SFH2.

Furthermore, sago land ownership was not found to be a factor in the differences in category 3, whereas commonly it has been suggested that land ownership is one of the production inputs for agricultural products. In sago production, having sago land is not essential because those who want to work in sago production may buy sago trunks from sago smallholders. This has been the practice of local people at the site area for the past few decades.



From 8 variables found, 3 are identified as most important, due to their significance at the 1% level (marked with \*\*\*), which means this result is 99% certain. These factors are working hours, income, and motivation.

Working hours are defined here as the amount of time that someone spends at work during a day. The number of working hours influences the amount of production. Table 3 shows that SFH2 allocates fewer working hours than does SFH1. The more the working hours, the higher the production. In addition, farmers' productivity in producing sago can be determined from the total production per day, which suggests that 38.8 kg of sago is produced per hour by SFH1 and 19.7 kg per hour by SFH2 (see Table 2).

Production is not only influenced by the number of hours worked but also by the type of sago processor. However, in this case, the variable of the sago processing type was not found to be a factor of statistically significant difference (see Table 3) because most respondents (94.4%) were using small-scale technology to process sago. Nevertheless, sago production has been shown to be much higher (19.7 and 38.8 kg/hour) as compared to research results reported of sago production output per hour in different areas of Papua, New Guinea, where people process sago manually (micro-scale technology) (range 1.9 kg to 3.7 kg/hour). Hyndman (1979) reported 1.9 kg/hour among the Wopkaimin of the Western Province, Schindlbeck (1980) reported 3.7 kg/hour among the Sawos of the East Sepik Province, Ulijaszek and Poraituk (1981) reported 3.5 kg/hour among the Koravake of the Gulf Province, Suda (1995) reported 2.9 kg/hour among the Siuhamason of the Western Province, and Laufa (2004) reported 2.0 kg/hour of sago starch produced among Sago Using Agrarian Societies (SUAS) in the Malalaua area.

In terms of income, the amount of sago production impacts households economically. The more sago that can be sold, the more money can be earned. Income is determined by the amount of sago sold, and the amount of sago sold is determined by the amount of

sago produced. Increased sago production will increase the cost of production as well as sales and income potential.

The variable of the reason for sago production was also found to be a significant factor. Motivation refers to the reasons underlying behavior and the attribute that moves us to do or not do something. Something motivates farmers to process sago and then extract sago at a certain production level. Both SFH1 and SFH2 are groups categorized as being motivated by a desire for economic advantage or a fear of economic disadvantage. Nevertheless, their motives are quite different. This indicates that farmer's motivation is important because it acts as a psychological catalyst for the farmer to reach his goal.

## Conclusion

The results of this study are very important regarding the influence of different factors on sago production; this information can be used for formulating a sago production development strategy.

The three most important factors in sago production were identified as causing significant differences: working hours, income, and motivation. It makes sense that working hours can impact income; it has been proven by some researchers that working hours and income are directly proportional. However, there is interesting finding in this study, which is that a farmer's motivation is one of the most important factors.

It can be concluded that motivation can influence the number hours of a SFH works, since motivation is an element that influences people to be willing to do or not do something. Undeniably, motivational training and support from related stakeholders can encourage a sago farm household (SFH) to achieve a better livelihood.

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