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Analysis of Income Level of The Nipa Roofing Craftsman (*Nypa fruticans* Wurmb) in Kumai Subdistrict, Central Kalimantan

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Abstract. One of the efforts to increase income is utilizing non-timber forest products in the form of home industries. One of the non-timber forest products utilized by the community and have a business opportunity is the Nipa plant (*Nypa fruticans* Wurmb). It grows along rivers near estuaries to rivers with brackish water influenced by tides and is included in the mangrove/brackish forest type. The research aimed to analyze the utilization level of nipa (*Nypa fruticans* Wurmb), examine the income level of the nipa roof craftsman, measure the contribution level of the nipa roofing business to family income, and analyze the relationship between the income level and the utilization of nipa (*Nypa fruticans* Wurmb). Data was sampled using the census method. The respondents were the craftsmen of nipa roofs (only ten people were still active in making nipa roofs). The required data includes the utilization of nipa resource products, production costs, total revenue, selling price, income from the nipa roofing business, and income from other family members. The results showed that the total production of nipa palm roofs was 303,840/year. The average income of nipa roof craftsmen was Rp10,732,200/year. The income contribution of the nipa roof craftsmen to family income was medium (55%). The utilization of nipa forest resource products had a very strong and positive relationship in increasing the income of nipa roof craftsmen with a correlation value of 0.842.

Keyword: Contribution, Income, Kumai Subdistrict, Nipa Roof Craftsmen, *Nypa fruticans*

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1 Introduction

The community carries out various economic activities, including producing, distributing, and selling goods or services to earn income and profits to meet the needs in life, such as clothing, food, and housing. It is in line with the notion that income is important for the survival and livelihood of a person, directly or indirectly [1].

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A husband, as the head of the family, is responsible for the welfare of his family. For instance, meet the family needs, guarantee survival, and ensure health and education. Apart from being a wife, a woman also acts as a housewife responsible for the household [2].

The facts show that women are not only housewives in households in terms of meeting the socio-economic demands of the family. Income from husbands is still insufficient, so women inevitably have to participate in looking for a livelihood to increase income in order to be able to meet the needs of their families. The limitations on women or homemakers regarding education, age, and availability of job opportunities cause a homemaker to working in the informal sector. It is possible because the form of work in the informal sector is relatively identical to the characteristics of women's/mother's work households [2]. The pattern of thought above is supported by the opinion of Hutajulu in [2], who stated that the informal sector is a field of economic activity that does not necessarily require formal education and advanced skills or a letter to provide goods and services. Sihite in [2] also stated that women's participation in activities that generate income to support the household economy has existed for a long time. This role stems from their involvement in the agricultural sector and plantation.

One of the efforts to increase income is utilizing non-timber forest products in the form of home industries. Through this activity, non-timber forest resource products can give economic and profit value, including increasing income. It follows the role of the home industry, which can help to reduce the number of unemployed and improve the community's welfare. One of the non-timber forest products utilized by the community and have a business opportunity is the Nipa plant (*Nypa fruticans* Wurmb). It grows along rivers near estuaries to rivers with brackish water influenced by tides and is included in the mangrove/brackish forest type [3]. It is known that the area of Indonesian mangrove forests in 2021 is 3,364,076 hectares based on the official national mangrove map released by the Ministry of Environment and Forestry [4]. Meanwhile, the area of mangrove forests in Central Kalimantan province is estimated to be approximately 346,540 hectares spread along the coast [5].

The community in the research location, i.e., in Kumai Subdistrict, still uses the nipa plant as a source of additional income. Most of those who use nipa plant are women or homemakers [6]. The dominant type of nipa utilization in the research location is nipa roof processing. Based on that, analyzing the income level of the nipa roof craftsman community in Kumai Subdistrict, Central Kalimantan, is important.

The research aimed to analyze the utilization level of nipa (*Nypa fruticans* Wurmb), examine the income level of the nipa roof craftsman, measure the contribution level of the nipa roofing business to family income, and analyze the relationship between the income level and the utilization of nipa (*Nypa fruticans* Wurmb).

2 Research Method

This research was conducted in Kumai Hulu Village, Kumai Subdistrict, West Kotawaringin Regency, Central Kalimantan Province (Figure 1). Data were sampled from February – June 2022.

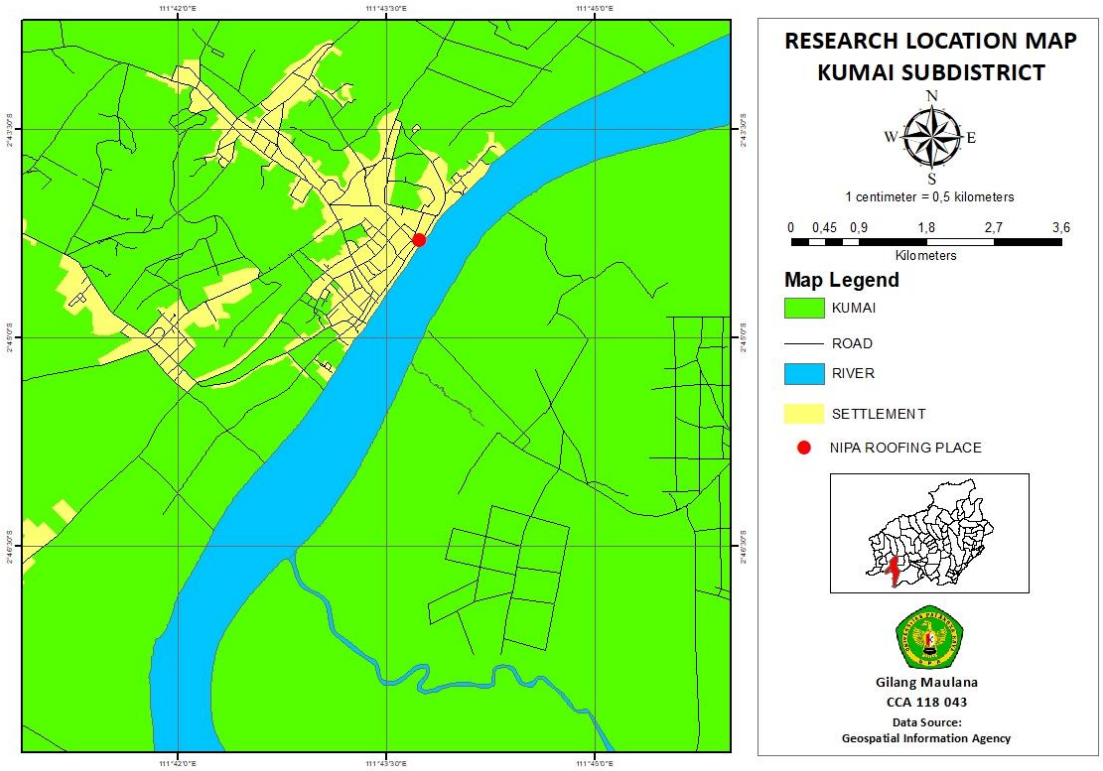

Figure 1 Research Location Map

The study used primary and secondary data. Primary data was obtained through direct observation in the field and interviews with respondents. Secondary data is literature obtained from scientific publications, journals, and previous studies. The data on the general condition of the research site, social and economy of the community were provided by Central Statistics Agency for West Kotawaringin Regency and the Central Statistics Agency for Central Kalimantan Province. Data was sampled using the census method. The respondents were the craftsmen of nipa roofs (only ten people were still active in making nipa roofs).

2.1 Data Analysis

a. The level of the utilizing nipa (N. *fruticans*) forest resource products was calculated using the following formula [8]:

$$TP = B \times V \quad (1)$$

with: TP : Total utilization of nipa leaves (kg/year)

B : Weight of nipa leaves used to produce the nipa roof (kg/bunch)

V : Number of nipa leaves used to produce the nipa roof (bunch)

b. The income level of the nipa roof craftsmen was analyzed using the following formula [9]:

$$I = TR - TC \quad (2)$$

$$TR = P \times Q \quad (3)$$

$$TC = TFC + TVC \quad (4)$$

with: I : The craftsmen income from nipa roofing business (Rp/year)

TR : Total revenue from the sale of nipa roofs (Rp/year)

P : Selling price per output (Rp)

Q : Production quantity

TC : Total costs incurred to make a nipa roof (Rp/year)

TFC : Total fixed costs incurred to make the nipa roof (Rp/year)

TVC : Total variable costs incurred to make a nipa roof (Rp/year)

c. The nipa roof business contribution level to the family income was measured using the following formula [10]:

$$K = (x/y) \times 100\% \quad (5)$$

with: K : Nipa roof business contribution to the family income (%)

X : Income from nipa roofing business (Rp/year)

Y : Total family income (Rp/year)

The contribution of the nipa roof business to family income was assessed from the percentage of income earned by respondents from the nipa roof business to the total family income. The percentage of respondents' income was then divided into three classes from small to high contribution (Table 1).

Table 1 Percentage of Nipa Roof Business Contribution to Family Income [10]

No	Percentage Income Contribution from Nipah Roofing Business	Level

1	0 – 33.3%	Small contribution
2	33.4 – 66.6%	Medium contribution
3	66.7 − 100%	High contribution

d. The relationship between the income level of the nipa roofing craftsman and the utilization of nipa (N. fruticans) forest resource products was examined using rank correlation analysis with the formula [11]:

$$rs = 1 - \frac{6\Sigma d^2}{n(n^2-1)} \quad (6)$$

with: rs : Spearman correlation coefficient

Σd^2 : Total squared difference between rankings

Y : Number of research samples

The relationship strength between the income level of the nipa roofing craftsman and the utilization of nipa (N. *fruticans*) forest resource products was then classified using the following criteria:

Table 2 Relationship Strength Criteria [11]

Coefficient	Relationship Strength
0	No relationship
0.01 – 0.09	Relationships are meaningless
0.10 – 0.29	Weak relationship
0.30 – 0.49	Moderate relationship
0.50 – 0.69	Strong relationship
0.70 – 0.89	Very strong relationship
> 0.90	Close to perfect relationship

3 Result and Discussion

3.1 The Level of The Utilizing Nipa (N. *fruticans*) Forest Resource Products

The utilizing amount of nipa forest resource products used to make nipa roofs are presented in Table 3 below:

Table 3 Total Use of Nipa Forest Resource Products

Respondent Number	Nipa Leaf Resource Items			Total Usage (Kg/day)	Total Usage (Kg/month)	Total Usage (Kg/month)
	Working Days (Day/month)	Raw Material (Bunch/day)	Raw Material Weight (Kg/bunch)			
1	20	5	30	150	3,000	36,000
2	24	5	30	150	3,600	43,200
3	12	5	30	150	1,800	21,600
4	24	5	30	150	3,600	43,200
5	24	5	30	150	3,600	43,200
6	12	5	30	150	1,800	21,600
7	24	3	30	90	2,160	25,920
8	24	4	30	120	2,880	34,560
9	12	4	30	120	1,440	17,280

10	24	2	30	60	1,440	17,280
Total	200	43	300	1,290	25,320	303,840
Average	20	4,3	30	129	2,532	30,384

Table 3 explains the nipa leaf raw materials used to produce nipa roofs. There is a big difference between the respondents' utilization of nipa leaf raw materials. It can be seen in the working days and raw materials columns. Columns of working days and raw materials provide information on why there are differences in using raw materials for nipa leaves between one respondent and another. For example, respondent 10 works 24 days in 1 month, but the use of raw materials is lower than respondent one, who works 20 days, or respondent six, who works 12 days in 1 month. It was because respondent ten only used two bunches of nipa leaves in 1 day, in contrast to respondents 1 and 6, who used five bunches of nipa leaves in 1 day. The result is that respondent 10 has a lower total usage than respondents 1 and 6. Regarding the amount of nipa roof production for each respondent, it is presented in Table 4 below:

Table 4 Nipa Roof Production

Respondent Number	Nipah Roof Resource Items		Total Production (Roof/day)	Total Production (Roof/month)	Total Production (Roof/year)
	Total Production (Roof/day)	Roof Weight (Kg/roof)			
1	150	1	150	3,000	36,000
2	150	1	150	3,600	43,200
3	150	1	150	1,800	21,600
4	150	1	150	3,600	43,200
5	150	1	150	3,600	43,200
6	150	1	150	1,800	21,600
7	90	1	90	2,160	25,920
8	120	1	120	2,880	34,560
9	120	1	120	1,440	17,280
10	60	1	60	1,440	17,280
Total	1,290	10	1,290	25,320	303,840
Average	129	1	129	2,532	30.384

Information: The weight of the roof outside of the nipa midrib which is usually used as a leaft bone

Tables 3 and 4 showed that the production of nipa roofs in Kumai District was 303.840 roofs/year with a roof size of 1.2 m long and 0.6 m wide. The process requires 1 kg of nipa leaf raw material per roof apart from the nipa fronds, usually used as roofing bones, or the local people usually call them bengkawan.

Based on the interviews with respondents, the nipa roof can last approximately two years and will last longer if the nipa roof is installed correctly and the quality of the leaves used is good. Nipa roof craftsmen obtained raw materials using motorized boats to go to the location of raw material collection in the Kumai Watershed, which is overgrown with nipa palm plants at varying distances. On average, each nipa roofing craftsman can get five bunches of nipa leaf raw material daily, which will then be processed into a nipa roof.

3.2 The income level of the nipa roof (N. *fruticans*) craftsmen

Nipa roof craftsmen's income is the total revenue from selling nipa roofs minus the total production costs when doing business with nipa roof production. The total income of nipa roof craftsmen in the research location is presented in Table 5:

Table 5 Total Income of the Nipa Roof Craftsmen

Respondent Number	Income (Rp/year)		Total Income (Rp/year)
	Total Revenue (Rp)	Total Cost (Rp)	
1	21,600,000	5,884,000	15,716,000
2	25,920,000	14,086,000	11,834,000
3	12,960,000	7,634,000	5,326,000
4	25,920,000	11,012,000	14,908,000
5	25,920,000	3,478,000	22,442,000
6	12,960,000	1,750,000	11,210,000
7	15,552,000	3,478,000	12,074,000
8	6,912,000	4,000	6,908,000
9	3,456,000	4,000	3,452,000
10	3,456,000	4,000	3,452,000
Total	154,656,000	47,334,000	107,322,000
Average	15,465,600	4,733,400	10,732.200

Table 5 shows that the respondents of nipa roofing craftsmen number one to seven have a total income per year greater than those of nipa roof craftsmen number eight to ten. It was because respondents one to seven were directly involved in taking raw materials to produce nipa roofs. Respondents one to seven were sold nipa roofs for Rp.60,000 per 100 nipa roofs they produced. It means that for one nipa roof, the price was Rp.600, while eight to ten respondents were only directly involved in processing nipa roofs or were commonly referred to as wage takers. The number of wages they receive was Rp.20,000 per 100 roofs they made. It indicates that one nipa roof was priced at Rp200 resulting in the income of respondents from eight to ten being less than respondents from one to seven. The similarity was that all respondents were nipa roof craftsmen, but respondent number eight to ten were only wage takers. The previous research in Seruway District, Aceh Tamiang Regency, regarding the income of nipa roof craftsmen showed that the average income of craftsmen was greater than that of nipa roof craftsmen in Kumai Subdistrict, West Kotawaringin Regency, which was Rp.14,587,800 per year. The dissimilarity can be seen in the selling price of the nipa roof. Nipa roof craftsmen in Seruway District collected roofs and produced them into one bond containing 100 pieces. Therefore, the collecting agent calculated the number of bundles containing 100 pieces by paying a price of Rp.120,000 per bundle or Rp.1,200 per nipa roof [2].

The average income of the nipa roof craftsman was Rp.10,732,200/year. It showed that the income of the respondents in the study was below the per capita income of West Kotawaringin Regency for women in 2021, which was Rp.11,634,000/year, as stated in the Central Statistics Agency for Central Kalimantan Province data [12].

According to the per capita income standard of West Kotawaringin Regency in 2021, the respondent's income was classified into the low-income category. It means that to obtain a decent life, nipa roofing craftsmen need assistance/subsidies from the government, either money, necessities, or subsidies in education for the children of nipa roofing craftsmen as subsidies in the health sector to ease the burden the economy of the respondent.

3.3 The Nipa Roof Business Contribution Level to The Family Income

The income contribution to the family income of the nipa roof craftsmen was determined by calculating all income sources, i.e., from working in the nipa roof business and other income sources from other family members. The value of the income contribution of nipa roof craftsmen to family income is presented in Table 6.

Table 6 The Value of Nipa Roof Craftsmen's Income Contribution to Family Income

Respondent Number	Income (Rp/year)		Total Family Income (Rp/year)	Nipa Roof Business Contribution to Total Family Income (%)
	Nipa	Non-Nipa (Income of Other Family Members)		
1	15,716,000	0	15,716,000	100
2	11,834,000	24,000,000	36,986,000	35.11
3	5,326,000	18,000,000	23,902,000	24.69
4	14,908,000	20,400,000	35,884,000	43.15
5	22,442,000	60,000,000	82,442,000	27.22
6	11,210,000	0	11,210,000	100
7	12,074,000	0	12,074,000	100
8	6,908,000	0	5,756,000	100
9	3,452,000	42,000,000	44,876,000	6.41
10	3,452,000	18,000,000	20,876,000	13.78
Total	107,322,000	182,400,000	289,722,000	550
Average	10,732,200	18,240,000	28,972.200	55

The result showed that the value of the income contribution of the nipa roof craftsmen on family income was in the medium criteria (55%). It indicates that the contribution of income made by nipa roof craftsmen to their family income has a real influence on their family life. The income contribution has greatly helped the respondent's household income in meeting family needs [10].

The contribution value of the nipa roof business to the respondents' income was at very large criteria (100%). The study results indicate that a nipa roofing business as a non-timber forest product provides employment opportunities and reduces unemployment near this business. The community around the forest have long used non-timber forest products in Indonesia to fulfill their daily life. The collection and exploitation of non-timber forest products have a significant role in reducing unemployment and as a source of livelihood [13].

3.4 The Relationship of the Income Level of the Nipah Roof Craftsmen to the Utilization of Nipa (*Nypa fruticans* Wurmb) Forest Resource Products

The relationship between the income level of the nipa roof craftsman and the utilization of nipa resource products based on the rank correlation is shown in Table 7.

Table 7 Calculation of Rank Correlation

Description			Nipah Roof Craftsman Income	Use of Nipah Resource Goods
Spearman's rho	Nipah Roof Craftsman Income	Correlation Coefficient	1	0.842**
		Sig. (2-tailed)		0.002
		N	10	10
	Use of Nipah Resource Goods	Correlation Coefficient	0.42**	1
		Sig. (2-tailed)	0.002	
		N	10	10

**) Correlation is significant at the 0.01 level (2-tailed)

The Spearman correlation (rho) of 0.842 and the probability or significance (Sig)/p-value of 0.002 indicated that the value of the use of nipa resource products has a very strong relationship (significant) on the income level of nipa roof craftsmen with the result between 0.70-0.89 [11]. The craftsman's income from being a roofing craftsman is proven to add significantly to family income. Therefore, the craftsmen continue the business to increase their family income.

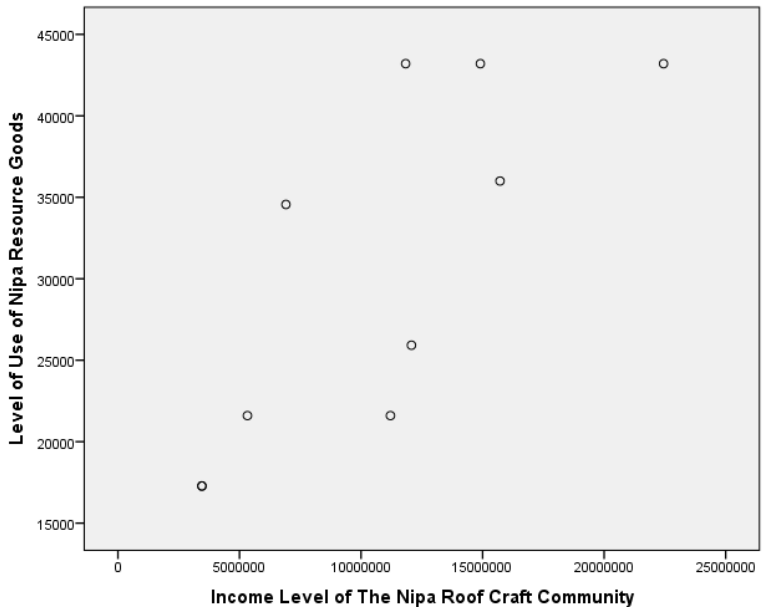

Figure 2 The Relationship between the Income Level of the Nipa Roof Craftsmen and the Level of Utilization of Nipa Leaf Resource Products

The relationship between the income level of nipa roof craftsmen and the utilization of nipa leaf resource products at the research location was positive and very strong (correlation value = 0.842). It suggests that the income of respondents from the nipa roofing business was 84.2%,

while the remaining 15.8% is from other sources, such as assistance or subsidies received by respondents. The business of making nipa roofs at the research site was known to have existed for a long time and has been carried out for generations to fulfill family income and has become a feature of local wisdom. Nevertheless, the study's results showed that the average income of nipa palm roof craftsmen only reached 92.24% of income per year in West Kotawaringin Regency for women in 2021.

4 Conclusions

Total production of nipa palm roofs was 303,840/year. The average income of nipa roof craftsmen was Rp10,732,200/year. The income contribution of the nipa roof craftsmen to family income was medium (55%). The utilization of nipa forest resource products had a very strong and positive relationship in increasing the income of nipa roof craftsmen with a correlation value of 0.842.

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