Comparative analysis production of fruit and sunti acid using the Hayami method

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Abstract. Agroindustry sector has a role important to improve the economic society level of Aceh, Indonesian. The opportunities in business to develop agroindustry from Averrhoa bilimbi L. was a relative major potential included the fruit candy and sunti acid. This study aims to calculated added value of fruit candy and sunti acid using the hayami method. The result was obtained primary and secondary data. The primary data were obtained directly results of interviews with business actors using questionnaires. Furthermore, the secondary data were obtained from literature review studies. The data was collected using the observation, interviews, and documentation. The average added value obtained by fruit candy of each kilogram was found the output value in Rp.150,000. Whereas, the sunti acid was a lower value in Rp. 65,000. This means that a kilogram was used can provide added value of Rp. 11,250 from fruit candy and Rp. 15,625 from sunti acid. The added value ratio was used to quantify the advancement achieved for productivity from A. bilimbi in agroindustry to involve the additional value from local products. Then, the highest profit until 60% in sunti acid product, and 44.44% in fruit candy. The retribution for the owner of the production factor was found the value the entrepreneur profit to 9.76% (Rp. 51,250/kg) for fruit candy and 26.37% (Rp.35,625/kg) for sunti acid. The descriptive data analysis method was expected to suggest the development of agroindustry based on the local commodity product, mainly the fruit candy and sunti acid to supported the food security.

1. Introduction
Aceh is a potential Province for Averrhoa bilimbi L. product processing activities to be a driving factor for efforts to increase Agroindustry [1]. Aceh besar Regency was a famous A. bilimbi industry center in Indonesia [2]. Recently, the new product from A. bilimbi agroindustry area in addition to sunti acid was known as fruit candy. Fruit candy and sunti acid are made from fresh A. bilimbi which has a unique taste. Processing of fruit candy was a better option to preserve the fruit of A. bilimbi. On the other hand, it was the extended shelf life of the fruit, the human consumption of fruit candy wherever, and maintaining the product for a lengthy [3]. Besides, sunti acid was also a fermented product from A. bilimbi used as a seasoning in Aceh cuisines [4]. It is a type of pickle which undergoes spontaneous fermentation with dry salting (added using NaCl), and assisted by drying under the sun [5].

The processed sunti acid in Aceh Besar Regency have been exported to countrie in Denmark by 45 kg products [6]. No one research described the export production of fruit candy. The existence of fruit candy and sunti acid industry were change the fresh fruit from A. bilimbi into a new product to higher economic value since course through the processing process should be able to provide the added value. It was the costs were incurred to the new higher prices and formed the profits more a higher through to the processed product [7]. This matter was encourage the author to established research to find out...
further about the added value obtained from the fruit candy and sunti acid processing business. To improved products to a better quality, the price of processed products will be higher and ultimately will increase the added value obtained [8].

In this research, we were focussed on the fruit candy and sunti acid from A. bilimbi for supplier chain management. We studied the structure and profile of fruit candy and sunti acid, then we analyzed the added value and performance in each workforce. Finally, we were recommended which one had the higher added value from fruit candy or sunti acid to improve the supply chain performance. Thus, this study is expected to be beneficial not only for the work force associated, however with the fulfillment of consumer needs in quality products [9-10]. This study aims to analyze the added value of fruit candy and sunti acid from A. bilimbi L. using the hayami method.

2. Materials and method

The data was derived from the primary and secondary data. The primary data were obtained immediately from the results of interviews to business actors using the questionnaires. Furthermore, the secondary data were obtained from the literature review for studies [11-12]. Then, the data was collected using the observation, interviews (interviews), and documentation method, and described in Table 1.

| No | Variable                                      | Variable                                      |
|----|-----------------------------------------------|-----------------------------------------------|
|    | Output, input and price                        | Income and profit (Rp/kg)                     |
| 1  | Output/total product (kg/period)               | 1                                             |
| 2  | Input/raw material (kg/period)                 | 2                                             |
| 3  | Work force (HOK/period)                        | 3                                             |
| 4  | Conversion factor                              | 4 = 1/2                                       |
| 5  | Coefficient of workforce (HOK/kg)              | 5 = 3/2                                       |
| 6  | Price of output (Rp/kg)                        | 6                                             |
| 7  | Wage of workforce (Rp/HOK)                     | 7                                             |
| 8  | Raw material prices (Rp/kg)                    | 8                                             |
| 9  | Other input contribution (Rp/kg)               | 9                                             |
| 10 | Output value (Rp/kg)                           | 10 = 4 x 6                                     |
| 11 | Added value (Rp/kg)                            | 11a = 10 – 9 – 8                               |
| a  | Ratio of added value (%)                       | 11b = (11a/10)x100%                           |
| b  |                                             | 11b = (11a/10)x100%                           |
| 12 | Income of workforce (Rp/kg)                    | 12a = 5 x7                                     |
| a  | Segment of workforce (%)                       | 12b = (12a/11a)x100%                          |
| b  |                                             | 12b = (12a/11a)x100%                          |
| 13 | Income (Rp/kg)                                 | 13a =11a-12a                                  |
| a  | The profit rate (%)                            | 13b = (13a/11a)x100%                          |
| b  |                                             | 13b = (13a/11a)x100%                          |
| 14 | Profit margin (Rp/Kg)                          | 14 = 10 - 8                                   |
| 15 | Labor income (%)                               | 15a = 12a/14 x100%                            |
| a  | Other input contribution (%)                   | 15b = (9/14) x 100%                           |
| b  |                                             | 15b = (9/14) x 100%                           |
| c  | Entrepreneur profit (%)                        | 15c = (13a/14)x100%                           |
|    | The retribution for the owner of the production factors |
3. Result and Discussion

The analysis of added value of processed fruit candy and sunti acid was carried out using the Hayami method described in Table 2.

Table 2. The analysis of added value from fruit candy and sunti acid.

| No | Variable                              | The value of fruit candy | The value of sunti acid |
|----|---------------------------------------|--------------------------|------------------------|
|    | Output/total product (kg/period)       | 1                        | 1.5                    |
| 2  | Input/raw material (kg/period)         | 2                        | 4                      |
| 3  | Work force (HOK/period)                | 3                        | 1                      |
| 4  | Conversion factor                      | 4 = 1/2                  | 0.38                   |
| 5  | Coefficient of workforce (HOK/kg)      | 5 = 3/2                  | 0.25                   |
| 6  | Price of output (Rp/kg)                | 6                        | 150,000                |
| 7  | Wage of workforce (Rp/HOK)             | 7                        | 25,000                 |
|    | Output value (Rp/kg)                   |                          | 56.250                 |
|    | Added value (Rp/kg)                    | 11a = 10 – 9 – 8         | 11.250                 |
|    | b Ratio of added value (%)             | 11b = (11a/10)x100%      | 20.00                  |
|    | Income of workforce (Rp/kg)            | 12a = 5 x7               | 6.250                  |
|    | b Segment of workforce (%)             | 12b = (12a/11a)x100%     | 0.56                   |
|    | Income (Rp/kg)                         | 13a =11a-12a             | 5.000                  |
|    | b The profit rate (%)                  | 13b = (13a/11a)x100%     | 44.44                  |
|    | The retribution for the owner of the production factors |
|    | 14 Profit margin (Rp/Kg)               | 14 = 10 - 8              | 51.250                 |
|    | 15a Labor income (%)                   | 15a =(12a/14) x100%      | 12.20                  |
|    | b Other input contribution (%)         | 15b = (9/14) x 100%      | 78.05                  |
|    | c Entrepreneur profit (%)              | 15c = (13a/14)x100%      | 9.76                   |

The retribution for the owner of the production factors:

The added value in fruit candy and sunti acid from *Averrhoa bilimbi* L. products was carried out per one production process. The output of fruit candy is as much as 1.5 kg/period with the input of the product being 4 kg/period. Whereas, the output of sunti acid was found 2.5 kg/period with the similarity input of the product (4 kg/period). Workforce was the number of working days of humans who are directly involved in one production process of making fruit candy and sunti acid to be involved in the production required 0.25 HOK/kg for fruit candy and sunti acid.

The average added value obtained from fruit candy of each kilogram was found to be the output value in Rp. 150,000. Although, the sunti acid was a lower value in Rp. 65,000. This means that a kilogram used can provide an added value of Rp. 11,250 from fruit candy and Rp. 15,625 from sunti acid. The added value ratio was used to measure the advancement achieved for productivity from *A. bilimbi* in agroindustry to involve the additional value from local products. Then, the highest profit was 60% in sunti acid products, and 44.44% in fruit candy. Furthermore, the retribution for the owner of the
production factor was found to value the entrepreneur profit to 9.76% (Rp. 51,250/kg) for fruit candy and 26.37% (Rp. 35,625/kg) for sunti acid.

There are two ways to calculated added value, i.e added value to processing and added value to marketing [13]. That factors of affect the added value for processing was categorized for technical and market factors [14]. The technical factors influenced the production capacity, a total of raw materials used and workforce [15-16]. Then, the market factors which influence output are the prices, wage of the workforce, the raw material prices, and the other input value besides the raw materials and workforce [16]. The total of added value due to the processing process was obtained from reducing the cost of raw materials, and other inputs value of the product produced, excluding workforce. Besides, the technical factors and the market factors extremely influence to determine the added value [17-20].

4. Conclusions

The added value in fruit candy and sunti acid processed food was influenced by the price of output, the contribution of other inputs, and the price of raw materials. Based on the calculation of added value using the hayami method, the added value of fruit candy products was found Rp. 11.250/kg and an added value ratio of 20%. Whereas, the added value of sunti acid products was found Rp. 15.625/kg and an added value ratio of 38.46%. The added value and profit obtained by the fruit candy and sunti acid processing industry was sincerely influenced by the production prices used. On the other hand, to obtain added value and higher profits, the fruit candy and sunti acid industry have been established to make production costs more efficient.

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