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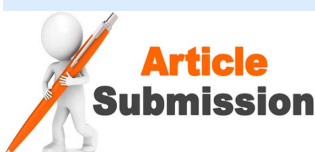
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- Call for paper
- Copyright Form
- Publication Ethics and Editorial Policies
- Publication charges
- Anti-Plagiarism Policy
- Article Tracking
- Certificate and Acceptance
- Cover page
- Review Procedure
- FAQs

EDITOR SECTION

- Editorial Board
- Join as Reviewer

SUBMIT ARTICLE



INDEXED-IN

- Impact Factor
- Indexed In

SUBMIT BOOK

- Submit Book
- Guidelines for Book

INFORMATION

- For Readers

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CURRENT ISSUE



MONTHLY ARCHIVE

- February 2019
  - January 2019
  - December 2018
  - November 2018
  - October 2018
  - September 2018
  - August 2018
  - July 2018
  - June 2018
  - May 2018
- 1 2 3 4 5 next > last >>

OUR JOURNALS

- Journals2
- Journals1

SUBJECT AREA

- All Branches of
- Life Sciences
- Physical Sciences
- Health Science
- Social Science and Humanities
- Physiotherapy, Pharmacy

For Authors

For Librarians

For Indexing

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 OUR JOURNALS

Journals3  
Journals2  
Journals1



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October -2015



September - 2015

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 JOURNAL CONTENT

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**English title:**

International Journal of Current Innovation Research

**ISSN:**

2395-5775

**GICID:**

*n/d*

**DOI:**

10.24327/Ijcir

**Website:**

<http://journalijcir.com/> (<http://journalijcir.com/>)

**Publisher:**

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[Cover page](#)

[Review Procedure](#)

[FAQs](#)

## EDITOR SECTION

[Editorial Board](#)

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[Impact Factor](#)

[Indexed In](#)

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Policies](#)

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[Anti-Plagiarism Policy](#)

[Article Tracking](#)

[Certificate and Acceptance](#)

[Cover page](#)

[Review Procedure](#)

[FAQs](#)

**EDITOR SECTION**

[Editorial Board](#)

[Join as Reviewer](#)

**SUBMIT ARTICLE**



**Article  
Submission**

**INDEXED-IN**

[Impact Factor](#)

[Indexed In](#)

**SUBMIT BOOK**

[Submit Book](#)

[Guidelines for Book](#)

**INFORMATION**

[For Readers](#)

[For Authors](#)

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[For Indexing](#)

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- Scirus
- Ulrich Web
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**CURRENT ISSUE**



**MONTHLY ARCHIVE**

[February 2019](#)

[January 2019](#)

[December 2018](#)

[November 2018](#)

[October 2018](#)

[September 2018](#)

[August 2018](#)

[July 2018](#)

[June 2018](#)

[May 2018](#)

[1](#) [2](#) [3](#) [4](#) [5](#) [next >](#) [last >>](#)

**OUR JOURNALS**

**SUBJECT AREA**

- All Branches of
- Life Sciences
- Physical Sciences
- Health Science
- Social Science and Humanities
- Physiotherapy, Pharmacy
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[More](#)

**JOURNAL CONTENT**

[By Issue](#)

[By Author](#)

[By Title](#)





## ANNOUNCEMENT

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## ABOUT IJCIR

[Call for paper](#)

[Copyright Form](#)

[Publication Ethics and Editorial  
Policies](#)

[Publication charges](#)

[Anti-Plagiarism Policy](#)

[Article Tracking](#)

[Certificate and Acceptance](#)

[Cover page](#)

[Review Procedure](#)

[FAQs](#)

## EDITOR SECTION

[Editorial Board](#)

[Join as Reviewer](#)

## SUBMIT ARTICLE



## Article Submission

## INDEXED-IN

[Impact Factor](#)

[Indexed In](#)

## SUBMIT BOOK

[Submit Book](#)

[Guidelines for Book](#)

## July 2017

S.No	Title & Authors Name	Certificate	Page
1	<b>Postoperative neurological complications following cardiac surgery</b> Dipannita Adhikary., Redoy Ranjan., Sabita Mandal and Asit Baran Adhikary <a href="#">ABSTRACT</a> <a href="#">DOWNLOAD FILE</a>	<a href="#">Certificate</a>	724-726
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3	<b>Vitamin d deficiency - a risk factor for auto immune thyroiditis</b> C Jayakumari., B. Jayakumar., P.K. Jabbar., Abilash Nair., Saboorabeegum M and Raina T Pillai <a href="#">ABSTRACT</a> <a href="#">DOWNLOAD FILE</a>	<a href="#">Certificate</a>	715-718
4	<b>A study of the premier art educational institutions of odisha: exploring the significance of art education in the state</b> Subrat Kumar Mulla and Ranjan Kumar Mallik <a href="#">ABSTRACT</a> <a href="#">DOWNLOAD FILE</a>	<a href="#">Certificate</a>	712-714
5	<b>Forecast of corn stick production as one of processed corn in improving the economy of corn home industry in gorontalo province</b> Amir Halid., Mohammad Iqbal Bahuwa., Zainudin Antuli and Irawati Abdul <a href="#">ABSTRACT</a> <a href="#">DOWNLOAD FILE</a>	<a href="#">Certificate</a>	707-711
6	<b>Screening rice for salinity tolerance by phenotypic in population om1490/pokkali/om1490 cross at seedling stage</b> Nguyen Thi Lang., Le Quang Loc., Pham Thi Thu Ha., Bui Phuoc Tam and Bui Chi Buu <a href="#">ABSTRACT</a> <a href="#">DOWNLOAD FILE</a>	<a href="#">Certificate</a>	700-706



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Call for paper submission October-2018  
Last date for paper submission:  
openAcceptance Notification: within 4-6  
days from the date of manuscript  
submissionPublication...

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- [Call for paper](#)
- [Copyright Form](#)
- [Publication Ethics and Editorial Policies](#)
- [Publication charges](#)
- [Anti-Plagiarism Ploicy](#)
- [Article Tracking](#)
- [Certificate and Acceptance](#)
- [Cover page](#)
- [Review Procedure](#)
- [FAQs](#)

**EDITOR SECTION**

- [Editorial Board](#)
- [Join as Reviewer](#)

**SUBMIT ARTICLE**



**INDEXED-IN**

- [Impact Factor](#)
- [Indexed In](#)

**SUBMIT BOOK**

- [Submit Book](#)
- [Guidelines for Book](#)

**INFORMATION**

- [For Readers](#)
- [For Authors](#)
- [For Librarians](#)
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**Forecast of corn stick production as one of processed corn in improving the economy of corn home industry in gorontalo province**

**Author:** Amir Halid., Mohammad Ikbal Bahuwa., Zainudin Antuli and Irawati Abdul

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**CURRENT ISSUE**



**MONTHLY ARCHIVE**

- [February 2019](#)
  - [January 2019](#)
  - [December 2018](#)
  - [November 2018](#)
  - [October 2018](#)
  - [September 2018](#)
  - [August 2018](#)
  - [July 2018](#)
  - [June 2018](#)
  - [May 2018](#)
- 1 2 3 4 5 next > last

**OUR JOURNALS**

- [Journals3](#)
- [Journals2](#)
- [Journals1](#)

**SUBJECT AREA**

- [All Branches of](#)
- [Life Sciences](#)
- [Physical Sciences](#)
- [Health Science](#)
- [Social Science and Humanities](#)
- [Physiotherapy, Pharmacy](#)
- [Agriculture Science](#)
- [Engineering and Technology](#)
- [Yoga Research](#)

[More](#)

**JOURNAL CONTENT**

- [By Issue](#)
- [By Author](#)
- [By Title](#)



# FORECAST OF CORN STICK PRODUCTION AS ONE OF PROCESSED CORN IN IMPROVING THE ECONOMY OF CORN HOME INDUSTRY IN GORONTALO PROVINCE

Amir Halid\*., Mohammad Ikbal Bahuwa., Zainudin Antuli and Irawati Abdul

## Abstract

The research object is to know about the profile of maize farmer enterprise in Gorontalo regency, production of corn stick shrimp and original varian from Limboto lake, the forecasting of corn stick shrimp analysis on 5 years ahead with the method of double exponential, the increasing of income with BEP method. This research conducted since August till September 2016 using discriptive analysis. The results of this research werethe groups of farmers enterprise, the more much of members and land worked as corn farmer found at Dunggala village in Batudaa sub-district which consist of 8 gorups, 187 members, and the land worked of maize about 157,3 Ha. Production economics analysis of home industry for corn stick which was shrimp taste from limboto Lake will get profit if the income above of break event is IDR.120,000.00. If production is over of break even point is 11,975 gram and will follow of the price over of break even point about IDR. 52,500.00. Forecasting analysis of corn stick shrimp in five years ahead is in 2016 (24.664,2), 2017 (29.599,58), 2018 (34.534,24), 2019 (39.469,26) and 2020 (44.404,28). Forecasting analysis of corn stick shrimp which is original variant from Limboto lake in 5 years ahead is in 2016 (21.239,21), 2017 (21.939,82), 2018 (22.640,43), 2019 (23.341,04) and 2020 (24.041,65).

**Key Words:** Corn Production, BEP Analysis, Forecasting

## INTRODUCTION

Since Gorontalo became a Province on February 2nd 2000, the government has put the position of agriculture as the entry point of corn that prospected for export but has not been cultivated optimally by using technological inputs, without ignore the aspects of sustainable corn farming. Corn has many advantages beside as people daily needs and also can be process to some products such as corn sticks, corn oil, corn starch, poultry feed, fish feed, and other function as food. In addition, corn grain can process a variety of products, corn waste can make variety of products such as corn waste into ruminant feed, corn waste into organic fertilizer, corncob into charcoal, and corn husk become flower, paddodol, the basic material of clothes, tablecloth and some of unique products.

Based on the survey stated that the corn seed (yield) in Gorontalo only used for daily meal also sold to other places like export to another city in Indonesia or another countries. Seed corn (yield) is not process into processed products that enhance the economic value of products. The price comparison of corn kernels 1kg is IDR. 3,200. If it has been processed into animal feed prices reached 5 times from the original price when unprocessed. Processing the kernels into a basic ingredient of animal feed will increase the economic value of products.

The role of the agricultural sector contributed most (28%) to the GDP of Gorontalo District, together with the services sector (23%). Because most of people in Gorontalo district work in the agricultural sector of food crops (rice and corn), plantation crops (coconut) and fisheries. The developing of agribusiness corn in Gorontalo district need to be improved because of the potential for development is big enough and has wide land. The steps of problem solving of maize plantations must follow local characteristics, social, economic and institutional capacities in the community because almost 90% of corn plantation is small holder agriculture. Baruwadi & Fadel (2012), suggested that household contribution income farmers from maize farming in Gorontalo was 64.03%, which proved the high dependence of farmers on corn as a source of household income. In Anonymous (2012) explained that in the last five years, the national corn demand for industrial materials feed, food and beverages increased by 10% -15% per year. In 2010 corn in Gorontalo mostly exported to several countries such as Malaysia, South Korea, Japan, and Philippines amount of 34,200 tons. To export, Gorontalo corn production is also absorbed by the local market through regions amount of 104,810 tons which is 88,225 tons Surabaya and Jakarta of 16,858 tons. Friedmann (1990) showed that empowerment is a believed to be a "alternative development" on the model of development center growth.

Department of Agribusiness, Faculty of Agriculture, State University of Gorontalo, Indonesia

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**Received:** May, 5 2017 | **Accepted:** June, 22 2017 | **Published Online:** July, 28 2017

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**Conflict of interest:** None declared | **Source of funding:** Nil

At the first the development of alternative put forward some trusts: the first, country was the development problem showed development of alternatives to eject even against the country; the second, people could make a mistake and the public is an independent association; the third, community actions had capable and sufficient to realize the alternative development without state interference. Hasan, A.M, *et.al*, 2016 suggested that community empowerment: The development concept was rooted in the community, said that the concept of community empowerment included the notion of community development (community development) and development focused on the community (community based development).

### METHODS

This research was done in the district and sub district Bongomeme and Tibawa Gorontalo regency and started from January to December 2016. Furthermore, the method of respondents selecting was conducted using different methods in the two groups of respondents (home and organization groups). For households, the method used was simple random sampling method, while the agency unit used purposive method. Total sample of households took 200 respondents consist of 40 respondents from each sample location.

While the organization groups interviewed unit adapted to the number of units existing organization in each country, it is estimated the number of units organization interviewed about 15-20 organization for each sample location. The research method used in the program, activities and output produced for each year of implementation of activities. In the first year of 2016 included the corn stick production output as a role on economic farmer, control the use of tools / technology products processing corn, developing the ability to access the market. The output of 2018 will give products processed competitive, skills to access market information and market forecasting.

### Observation

Observation techniques were used to obtain data and information on the resource potential of agriculture to research data and other relevant information.

### Interview

Interview techniques were used to obtain data and information, formulate strategies and corn farmer empowerment activities to increase the income of corn farmer data and other relevant information.

### Questionnaire

Mechanical questionnaire used to obtain data and information on the resource potential analysis of maize agriculture based on comparative advantage, competitive and influence to empower farmers through

processing corn maize and corn waste into productive economic commodity corn to increase farmers income.

### Focus Group Discussion (FGD)

Techniques of Focus Group Discussion (FGD) was used to complete the data and research information, during the conduct data collection and information the draft of research reports.

## RESULTS AND DISCUSSION

Maize Farmer Profile in Gorontalo District  
Data of Group, Member Total, and Land Area in Sub-district of Batudaa, Gorontalo District

**Table 1** Data of Group, Member Total, and Land Area in Sub-district of Batudaa, Gorontalo District

Number.	Village Name	Total Group of Village	Total of members in Group	Land Area (Ha)
1	Barakati	3	69	62
2	Iluta	2	49	41.5
3	Bua	2	53	40.1
4	Huntu	5	101	103.6
5	Pilobuhuta	5	112	105.9
6	Payunga	3	47	39.75
7	Dunggala	8	187	157.3
8	Ilohungayo	4	75	65.5
	<b>Total</b>	<b>32</b>	<b>693</b>	<b>615.65</b>
	<b>Average</b>	<b>4</b>	<b>87</b>	<b>76.96</b>

Table 1 showed that the number of groups in each village is different, there are composed of two groups of farmers of corn, even up to 8 groups of corn farmers, an average of 4 groups of crop farmers to every village in the Batudaa village. The groups that exist in each of these villages have the members of the group which is quite diverse and numerous, ranging from 49 members of the group, up to 187 members of the group to the village. Dunggala village district, Batudaa has a number of groups, including 8 corn farmer groups and also the number of group including 187 members of farmers of maize compared with other villages in the district Batudaa.

The total of corn farmer groups contained in the smallest villages such as Bua and Iluta village which only consisted of two corn farmer groups, while the number of group members at least in the Payunga village is the 49 members of the group. On average, the number of members of maize farmer groups in 8 villages in the district Batudaa is reached 87 people, with total members is 693. Besides that, the number of groups and members showed the highest of total compared to other villages in the district Batudaa, corn farmers Dunggala, Pilobuhuta, and Huntu which the corn cultivated is the widest reached 157.3 Ha; 105.9 Ha; and 103.6 Ha. The smallest corn crop in Bua Village is area of 40.1 hectares. The total area of cultivated corn crop in Batudaa can be reached 615.65 Ha; with an average area of arable corn crop is 76.96 hectares for every village in Batudaa.

**Data of Group, Member Total, and Land Area in Sub-district of Pulubala, Gorontalo District**

**Table 2** Data of Group, Member Total, and Land Area in Sub-district of Pulubala, Gorontalo District

Number.	Village Name	Total Group of Village	Total of members in Group	Land Area (Ha)
1	Pulubala	20	400	427.5
2	Tridarma	13	295	300.93
3	Molalahu	13	318	276
4	Toyidito	25	705	579.5
5	Molamahu	30	584	624.71
6	Bakti	28	529	640.5
7	Pongongaila	21	495	504.5
8	Mulyonegoro	20	405	439
9	Puncak	32	563	701.21
10	Ayumolingo	21	406	435.25
11	Bukit Aren	20	377	391
	Total	243	5077	5320.1
	Average	22	462	483.65

Table 2 showed that the villages in Pulubala district have a lot of corn farmer, from 13 to 32 groups in the village. This indicates that the majority of people work in Pulubala is corn farming. The members of each group and village is approximately 300 members of the group, even some villages has 500 more members of the group. The high of the village in the Pulubala has a number of groups, including 30 maize farmer groups with a total membership of the second largest group after the 563 members of the Molamahu village of corn farmer groups. Corn farmer group premises smallest number in a neighboring village and Tridarna Maolalahuie village, each consisting of 13 corn farmer groups, while the number of members of each group 295 group members and 318 members of the group. The average number of members of corn farmer groups in 11 villages in Pulubala is 462 people of total members of 5077 members. The village which has the largest corn crop cultivated in the district is located in the village Pulubala with the land area is 701.21 hectares. Bakti and Molamahu with corn crop the second largest and third, respectively in the amount of 640.5 Ha; and 624.71 Ha. The average area of cultivated corn crops in villages in the district Pulubala is 483.65 Ha; with the total area cultivated corn crop reached 5320.1 hectares. Production Analysis of Limboto lake Shrimp Corn Stik

**1. Break Event Point (BEP) Analysis**

$$\begin{aligned}
 \text{BEP Revenue (Rp)} &= \frac{FC}{1 - \frac{VC}{TR}} \\
 &= \frac{96,000}{1 - \frac{61,500}{300,000}} \\
 &= \frac{96,000}{1 - 0.20} \\
 &= \frac{96,000}{0.80}
 \end{aligned}$$

$$\begin{aligned}
 \text{BEP Revenue (Rp)} &= 120,000 \\
 \text{BEP production (gram)} &= \frac{FC}{P - \frac{VC}{Q}} \\
 &= \frac{119,500}{10,000 - \frac{61,500}{3,000}} \\
 &= \frac{119,500}{10,000 - 20.5} \\
 &= \frac{119,500}{9,979.5} \\
 \text{BEP production (gram)} &= 11.975
 \end{aligned}$$

$$\begin{aligned}
 \text{BEP Harga(Rp)} &= \frac{TC}{Q} \\
 &= \frac{157,500}{3,000} \\
 \text{BEP price(Rp)} &= 52,500 \\
 \text{BEP price(Rp)} &= \frac{TC}{Q} \\
 &= \frac{157,500}{3,000} \\
 \text{BEP price(Rp)} &= 52,500
 \end{aligned}$$

**BEPaccepting = IDR. 120,000**

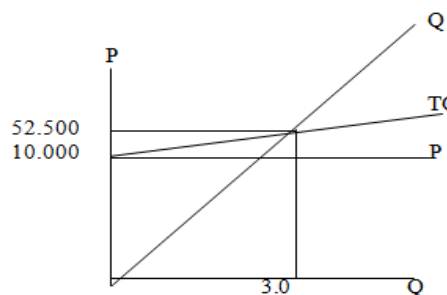
The domestic industry would benefit if acceptance is obtained exceeds the limit of IDR120,000 of the BEP, otherwise households industry will losses if the receipts obtained less than the BEP.

**BEPproduction = 11.975 Gram**

The domestic industry would benefit if production were obtained exceeds the limit BEP is 11.975 Gram otherwise, domestic industry would loss if production gained less than the BEP.

**BEPprice= IDR. 52,500**

The domestic industry would benefit if the price obtained exceeds the limit BEP is conversely IDR 52,500 domestic industry would loss if prices gained less than the BEP. The break event point corn stick curve taste shrimp Limboto Lake, below:



**Figure 1** Break Event Point Curve of Limboto Lake Shrimp Corn Stick

**Table 3** The variable cost of Shrimp Corn Stick in Limboto Lake

Variabel Cost	Total (IDR)
1 Kg Lokal Corn/Motorokiki	12,000
1 Kg Lake Shrimp	15,000
500 Gr Tapioca Flour	9,000
100 Gr Garlic	5,000
1 Sdm salt	500
250 Gr Sugar	4,000
2 Kg Fried Oil	26,000
Total	61,500

Variable cost is change in proportion to the business activity or the amount of the marginal cost of produced all units. Based on the above table, it can be seen that the number of variable of shrimp corn stick in Limboto Lake is IDR. 61,500 of a raw material which is 1Kg of local corn are IDR. 12,000.

**Tabel 4** Shrimp Corn Stick Fixed Cost

Fix Cost	Total(IDR)
plastic packaging	11,000
Labor	50,000
Gas	10,000
rental equipment for a grinders /hour	15,000
Electric/hour	10,000
Total	96,000

Fixed Cost are the costs that does not depend on the level of goods or services output that produced by the business. The table showed that the total of fixed costs of shrimp corn is IDR. 96,000 which are consists of the cost of plastic packaging, labor, gas, rental equipment for a grinders and electric.

**Tabel 5.** The total cost of Corn Stick Shrimp

Biaya Total	Total(Rp)
Variabel Cost	61,500
Fix Cost	96,000
Total Cost	157,500

The total cost was the amount of variable costs and fixed costs. Based on the table the shrimp corn stick total cost is IDR.157,500.

**Tabel 6** Shrimp Corn Stick Revenue

Description	Production	Price	Total
Revenue	3.000 gram	10.000/ 100 gram	300,000

The Revenue is all income which received from economic activities without deducting the total production expenditure. Based on the table the shrimp corn stick total revenue is IDR. 300,000

**Tabel 7** Shrimp Corn Stick Profit

Description	Total
Revenue	300,000
Total Cost	157,500
Revenue (1-2)	142,500

Profit is the total revenue after deducting the total cost of production. Based on the table, the shrimp corn stick profit is IDR. 142,500.

### Forecasting Production of Shrimp Corn Stick

Forecasting is one of the most important elements in decision making. An acceptable proposition showed that the better predictions which based on themanager as the leader to make their performance better in relation to the decision-making. There are three models for analyzing forecasting in econometric model, time series model and qualitative forecast model. Exponential Smoothing forecasting model is one of the periodic forecast models. The Exponential Smoothing method is considered sufficiently suitable for short-term and medium-term forecasting, especially when large numbers of forecasts are required such as those found at an enterprise's operational level (Efferson, 1983). Exponential Smoothing method does not distinguish between each component and the existing archetype.

Halid, A, *et.al*, 2016 stated that sometimes the pattern can be broken down (decomposed) into sub-patterns showing each selected periodic series component. With this separation can help improve the accuracy of forecasting and Helps better understand time series behavior (Efferson, 1983). Forecasting for shrimp corn sticks and maize flavor sticks original Limboto Lake using Double Exponential Smoothing method can be seen in the table below

**Table 8** Forecasting Production of Shrimp Corn Stick with Double Exponential Smoothing ( $\alpha=1$ ) Method.

Year	Production	S'	S''	a <sub>t</sub>	b <sub>t</sub>	Forecast
2006	4.992	4.992	4.992	-	-	-
2007	5.952	5.088	5.001,6	5.174,4	9.501	-
2008	6.720	5.251,2	5.026,56	5.476,84	24,71	5.5183,9
2009	11.040	5.106,91	6.553,25	6.553,25	-159,19	5.500,84
2010	24.960	7.743,07	5.310,53	10.115,61	260,98	6.394,06
2011	26.880	9.656,76	5.799,16	13.514,36	424,34	10.416,59
2012	11.520	9.843,08	6.203,55	13.482,51	400,35	13.938,7
2013	24.960	11.354,77	6.718,67	1.590,87	509,97	13.882,86
2014	25.920	12.811,29	7.327,93	18.294,65	5.483,36	16.500,84
2015	32.640	14.794,16	9.859,14	19.729,18	4.935,02	24.138,01
2016*						24.664,2
2017*						29.599,58
2018*						34.534,24
2019*						39.469,26
2020*						44.404,28

Source: Proceed Data, 2017

Based on Table 8, showed that forecasting in 2008 (5.5183,9), 2009 (5.500,84), 2010 (6.394,06), 2011(10.416,59), 2012 (13.938,7), 2013 (13.882,86), 2014 (16.500,84), and 2015 (24.138,0). Forecasting in the future 5 years is in 2016 (24.664,2), 2017 (29.599,58), 2018 (34.534,24), 2019 (39.469,26) and 2020 (44.404,28).



**Table 9** Forecasting Production of Shrimp Corn Stick of Original Variant From Limboto Lake With Double Exponential Smoothing ( $\alpha=1$ ) Method

Year	Production	S'	S''	$a_t$	$b_t$	Forecast
2006	4.800	4.800	4.800	-	-	-
2007	5.760	4.896	4.809,6	4982,4	9.504	-
2008	7.200	5.126,4	4.841,28	5.411,52	31,36	14.486,4
2009	11.040	5.717,76	4.928,93	6.506,59	86,77	5.442,88
2010	23.040	7.449,98	5.180,16	9.719,8	249,68	6.593,36
2011	26.496	9.354,58	5.597,6	13.111,56	413,27	9.969,48
2012	11.040	9.523,12	5.990,15	13.056,09	388,63	13.524,83
2013	23.808	10.951,6	6.486,3	15.416,9	491,18	13.444,752
2014	26.880	12.544,44	7.092,11	17.996,77	599,76	15.908,73
2015	28.800	14.169,1	7.799,9	20.538,6	700,61	18.596,53
2016*						21.239,21
2017*						21.939,82
2018*						22.640,43
2019*						23.341,04
2020*						24.041,65

## CONCLUSION

Corn Farming Profile in the district of Gorontalo Data group, the number of members and the largest corn crop cultivated area in the district of Batudaa and Dunggala village are 8 groups, 187 of the number of members of the group, and 157.3 Ha of arable area corn crop. As for the District Pulubala, the amount of data contained in the largest group, namely Puncak Desa some 32 groups, for the highest number of members in the Toyidito village, there is a number of 705 members and the largest corn crop cultivated area located at Peak Village is an area of 701.21 ha. Production analysis of shrimp corn stick Home industry of shrimp corn stick will be gained profit which is the revenue larger than the break event point value is IDR.

120,000, if the production obtained exceeds the limit break-even point is 11.975 gram and if the price obtained exceeds the limit break-even point is IDR. 52,500. Forecasting analysis of corn stick shrimp are in 5 years ahead is in 2016 (24.664,2), 2017 (29.599,58), 2018 (34.534,24), 2019 (39.469,26) and 2020 (44.404,28). Forecasting analysis of corn stick shrimp which is original variant from Limboto lake in 5 years ahead are in 2016 (21.239,21), 2017 (21.939,82), 2018 (22.640,43), 2019 (23.341,04) and 2020 (24.041,65).

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