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Contribution and projections of corn food needs: Emperical evidence in Kutai Kartanegara Regency, Indonesia

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Abstract

This research aims to analyze the contribution and projection of corn food needs. Case study in Kutai Kartanegara Regency, Indonesia. The data used is secondary data sourced from the Kutai Kartanegara Regency Agriculture and Livestock Service and the Central Statistics Agency. The analytical tools used are for sub-district contributions in meeting corn food needs using cross-table analysis, for projections using simple regression analysis, and for projections of needs through population growth using geometric population growth rates. The research results show that the difference between production and corn needs without the National Capital of the Archipelago (*IKN*), or with the presence of *IKN*, is a surplus. The contribution of Kutai Kartanegara Regency in meeting the needs of *IKN* corn, both assuming a population of 1.5 million people and 4.5 million people, has been able to contribute in the high category. Six example sub-districts have also been able to contribute with high criteria. Samboja Sub-District contributes to the need for high category *IKN* corn. Muara Jawa, Sebulu and Muara Kaman Sub-districts contributed in the low category. Meanwhile, Loa Janan and Tenggarong Seberang Sub-districts have not been able to contribute.

Keywords: Corn food; Food needs; Contribution; Projections

1 Introduction

The need for corn food continues to increase along with population growth. Determining factors for population growth include the number of births and deaths, as well as population migration. Kutai Kartanegara Regency being designated as the National Capital of the Archipelago/*Ibu Kota Nusantara (IKN)* will have an impact on increasing the population. The population of Kutai Kartanegara Regency continues to increase from year to year as per the 2010 census results, it was 626 680 people and increased to 729 382 according to the 2020 census results. [1].

As the population increases and consumer preferences increase, the need for food also increases. Therefore, one thing that is important is the availability and sufficiency of corn food. Kutai Kartanegara Regency, which consists of 20 sub-districts, is required to immediately prepare itself to be able to act in order to fulfill this food requirement.

Natural Resources are potential which are a gift from Allah SWT which are quite available in Kutai Kartanegara Regency. This potential can be utilized for food supply purposes. However, when utilizing these natural resources, balance and sustainability must be maintained and considered. If the potential of natural resources is exploited on a large scale without considering the ecological balance system that has been formed, it is feared that an even greater disaster will result. Although the existence of natural resources owned by a region is the right of a region, its use must be responsible,

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especially for its sustainability. Development planning must accommodate plans for the exploitation, capability and sustainability of natural resources owned for the benefit of present and future generations.

Potential resources consist of (1) natural and environmental resources and (2) human resources. So far, the potential of these resources, especially in Kutai Kartanegara Regency, has not been explored and managed optimally. Natural and environmental resources include, among other things, physical material potential and biological potential, while human resources include the potential quantity and quality of humans, interactions and social structures. The wealth and potential of natural resources and the environment can be seen, including the potential for agricultural land, water and air, forests, seas and coasts as well as mining materials. Meanwhile, the wealth of human resources is demonstrated by a very large population and workforce as well as the strength of interaction and social networks. So far, these various resources have been utilized, although in practice they have not been managed optimally so they have not been able to provide significant contributions and benefits to economic development and improving the quality of people's lives. Moreover, with the existence of *IKN*, Kutai Kartanegara Regency should be able to utilize the great potential it has, including being able to make meaningful contributions, especially food contributions. This region will be able to increase its corn food contribution, if it is able to continue to increase its corn production.

Production is defined as the use or utilization of resources that transforms one commodity into another, completely different commodity [2]. Production is, to put it briefly, the process of converting input into output. The process by which producers convert different production components into commodities and services is known as production. [3]. Based on their relationship to the level of production, production factors are divided into fixed input factors and variable input factors. Fixed production factors are production factors whose amount of use does not depend on the amount of production. Meanwhile, variable production factors are production factors whose amount of use depends on the level of production. The relationship between physical output and physical input is called the production function [2]. The production function determines the maximum output that can be produced from a given amount of input, under certain conditions of skill and technical knowledge [4].

The aim of increasing sustainable corn production is to increase the contribution to regional corn needs. Research by Saputro et al. [5] stated that the contribution of corn production is an indicator that can show how much Banyumas Regency's production contributes to supporting production in Central Java. In the last 10 years, production contribution in Banyumas Regency has been considered to be still insufficient. The contribution of corn farming to family income was researched by Yusnita et al. [6] which states that corn farming contributes to family income is in the medium category. Research related to the contribution of corn was researched by [7], [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], and [18].

The sustainable contribution of corn food is also determined by its availability in the future. It is necessary to know whether the availability of corn food will increase or decrease in the future through production projections and corn demand projections. Research by Saputro, et.al [5] stated that the projected corn production in Banyumas Regency for the next few years will increase. The results of research on corn projections which show projected results increasing every year were studied by Ladoni, et al. [19]. Meanwhile, corn production projections showing a downward trend were researched by Fitriwati S, et al. [20]. The projected increase in corn consumption was studied by Al-Qarazi et al. [21]. If corn production is related to needs, it experiences a surplus as per the research results of Faisol, et al. [22].

Given the establishment of *IKN*, agricultural development's focus, particularly on producing corn food, has taken precedence. Kutai Regency's contribution to *IKN*'s food needs is something that needs to be studied. For this reason, it is necessary to carry out in-depth research on the contribution and projections of food needs. The expansion of corn farming has a critical and strategic role in fostering job creation and regional economic growth, which has an impact on raising living standards and community welfare. Thus, this research aims to analyze the contribution and projection of corn food needs to *IKN* corn needs.

2 Material and methods

This research uses a quantitative descriptive research design. The research was carried out in Samboja Sub-District, Muara Jawa Sub-District, Loa Janan Sub-District, Sebulu Sub-District, Tenggarong Seberang Sub-District, and Muara Kaman Sub-District, Kutai Kartanegara Regency, East Kalimantan Province, Indonesia. The data used is secondary data. Secondary data was obtained from collecting data from previous research results and literature reviews that were relevant to the research. In addition, data is already held by other institutions, such as the Central Statistics Agency (*BPS*).

The analysis method using simple linear regression is used to analyze production as well as production projections and demand projections. This analysis uses computer assistance from the SPSS version 20 program. The formula used is as follows [23] and [24].

$$Y = a + bX + e \dots \dots \dots (1)$$

$$a = \frac{\sum Y}{n}$$

$$b = \frac{\sum XY}{\sum X^2}$$

Information:

Y = Value of the specified variable

a = constant

b = regression coefficient

e = bully error

To find out the amount of corn food needs in each sample sub-district, it is determined based on population. The population is calculated based on geometric population growth rate analysis. This analysis only takes into account population growth only at the end of the year of a period. This method calculates population growth in a rough way, that is, without calculating death and migration rates. The formula used is quoted from the following Mantra [25].

$$Pt = Po(1 + r)^t \dots \dots \dots (2)$$

$$(1 + r)^t = \frac{Pt}{Po}$$

$$r = \left(\frac{Pt}{Po} \right)^{1/t}$$

Information:

Po: population in the base year

Pt: population in year t

t: time period (in number of years)

r: average population growth rate per year

The population is then multiplied by the annual usage per person to project demands or consumption. Cross-tabulated analysis is used to determine the sub-district's contribution to IKN needs fulfillment. A modified version of the formula found by Tirani [24] is employed.

$$Z = \frac{Xi}{Yi} \times 100\% \dots \dots \dots (3)$$

Information:

Z = contribution of corn food to IKN's food needs

Xi = corn production in each sub-district after deducting for own consumption (kg or tons)

Yi = total IKN food requirements for corn

2.1 Decision making criteria:

If $Z > IKN$'s food needs, then the contribution of corn from that subdistrict is high.

If $Z \leq$ the average *IKN* food requirement, then the contribution of corn from that sub-district is low.

3 Results and discussion

The agricultural sector is a source of food which is a potential renewable resource. The results from this sector are basic needs in fulfilling the nutritional adequacy of the community so that they can determine the level of food security in an area, apart from that, it is also one of the basic ingredients in the processing industry sector.

3.1 Population and Projections

Various impacts caused by the relocation of the National Capital of the Nusantara (*IKN*) are population growth. As presented in Table 1, the population of Kutai Kartanegara Regency and the sample subdistricts has increased. The results of population projections based on analysis of geometric population growth rates continue to increase. This analysis only takes into account population growth only at the end of the year of a period. This method calculates population growth in broad terms (rough), that is, without calculating death and immigration rates (*ceteris paribus*), the calculation refers to equation (2).

Table 1 Population and Projected Population of Kutai Kartanegara Regency and Example Sub-Districts, 2010-2030

No.	Year	Total Population						
		Kutai Kartanegara Regency	Samboja Sub-District	Muara Jawa Sub-District	Loa Janan Sub-District	Sebulu Sub-District	Tenggarong Seberang Sub-District	Muara kaman Sub-District
1	2010	626680	54515	33923	56071	36420	61441	33909
2	2011	648206	56619	35562	57785	37070	63762	34615
3	2012	635444	58347	36988	29087	37433	65656	35055
4	2013	682931	58665	37277	63309	39294	65293	36419
5	2014	700439	61837	39932	61647	38090	69477	35876
6	2015	717788	63467	41236	62921	38363	71467	36255
7	2016	735,016	64,982	42,665	64,110	38,619	73,372	36,588
8	2017	752091	66632	44141	65282	38834	75257	36899
9	2018	769337	68291	45648	66445	39033	77155	37195
10	2019	786123	69903	47145	67543	39183	79001	37447
11	2020	729382	66617	41561	67471	40925	67877	45885
12	2021*	739515	67842	42335	68616	41361	68495	47164
13	2022*	749788	69090	43124	69780	41802	69118	48479
14	2023*	760204	70361	43928	70964	42248	69746	49830
15	2024*	770765	71655	44746	72168	42698	70381	51220
16	2025*	781473	72973	45580	73393	43153	71021	52648
17	2026*	792329	74315	46429	74638	43613	71667	54115
18	2027*	803336	75682	47294	75904	44078	72319	55624
19	2028*	814496	77074	48175	77192	44548	72977	57174
20	2029*	825811	78492	49073	78502	45022	73641	58768
21	2030*	837283	79935	49987	79834	45502	74311	60407

Source: BPS various years; * Projection Results

If it is assumed that the State Civil Apparatus (*ASN*) who have moved are 1.5 million people and 4.5 million people (assuming families have 1 child) without considering residents from other groups, then the population projection shows an increasing trend as presented in Table 2.

Table 2 Projections for the population of Kutai Kartanegara Regency, assuming an increase of 1.5 million and 4.5 million *IKN* moving in 2024, 2010-2030

No.	Year	Residents of Kutai Kartanegara Regency without <i>IKN</i>	Population of Kutai Kartanegara Regency + 1.5 million with <i>IKN</i>	Population of Kutai Kartanegara Regency + 4.5 million with <i>IKN</i>
1	2010	626680	626680	626680
2	2011	648206	648206	648206
3	2012	635444	635444	635444
4	2013	682931	682931	682931
5	2014	700439	700439	700439
6	2015	717788	717788	717788
7	2016	735016	735016	735016
8	2017	752091	752091	752091
9	2018	769337	769337	769337
10	2019	786123	786123	786123
11	2020	729382	729382	729382
12	2021*	739515	739515	739515
13	2022*	749788	749788	749788
14	2023*	760204	760204	760204
15	2024*	770765	2270765	5270765
16	2025*	781473	2432937	5647190
17	2026*	792329	2466736	5725641
18	2027*	803336	2501004	5805183
19	2028*	814496	2535748	5885829
20	2029*	825811	2570975	5967595
21	2030*	837283	2606692	6050498

Source: BPS various years; * Projection Results

3.2 Corn Production and Projections

The demand for food is in line with population growth. The existence of *IKN* will provide opportunities for producers (Supply) to increase their production. However, on the other hand, if you are unable to increase production, it will have an impact on food availability. This research analyzes six sub-districts out of 20 sub-districts in Kutai Kartanegara Regency which are expected to contribute to *IKN*'s food needs.

Between 2018 and 2020, the subdistricts of Tenggarong Seberang and Muara Jawa saw a decrease in corn production. The subdistricts of Samboja, Sebulu, Muara Kaman, and Kutai Kartanegara regency had fluctuations in corn production. This is caused by the Covid 19 outbreak. Example sub-districts that have the highest corn production were Samboja and Sebulu Sub-Districts. Based on simple regression analysis using SPSS version 20 with other factors considered *ceteris paribus*, the projected results for corn production have increased (explained in Table 3). This indicates favorable circumstances for Kutai Kartanegara Regency to serve as the Nusantara National Capital (*IKN*). As an *IKN*, Kutai Kartanegara Regency will promote the development of neighboring territories into buffer and satellite cities. The growth and development of this satellite city will result in the population's food needs increasing as well. Kutai Kartanegara Regency should anticipate this condition from the start if it does not want to be faced with increasingly complex problems. If in 2024 *IKN* is operational while Kutai Kartanegara has not taken a stance on increasing corn production, it is certain that it will be left behind.

Table 3 Corn Production and Projections in Example Sub-Districts and Kutai Kartanegara Regency, 2015-2030

No	Year	Sub-District						Kutai Kartanegara (Ton)
		Samboja (ton)	Muara Jawa (Ton)	Loa Janan (Ton)	Sebulu (Ton)	Tenggarong seberang (Ton)	Muara Kaman (Ton)	
1	2015	627	-	-	-	-	-	1576
2	2016	576	24	138	248	51	-	3316
3	2017	1508	447	208	1876	726	217	1311
4	2018	2166	502	220	2422	287	891	13377
5	2019	3049	253	139	1253	916	30	23391
6	2020	2248	123	43	1721	645	256	9297
7	2021*	540	128	108	384	53	86	3599
8	2022*	1002	167	115	732	207	145	6431
9	2023*	1464	205	121	1080	361	203	9262
10	2024*	1927	244	128	1427	514	262	12094
11	2025*	2389	283	135	1775	668	320	14925
12	2026*	2852	322	141	2122	822	378	17756
13	2027*	3314	361	148	2470	976	437	20588
14	2028*	3776	399	154	2818	1129	495	23419
15	2029*	4239	438	161	3165	1283	554	26250
16	2030*	4701	477	167	3513	1437	612	29082

Source: Kutai Kartanegara Regency Agriculture and Livestock Service and BPS various years, 2024; * Projection Results

3.3 Corn Production, Needs and Projections, Kutai Kartanegara Regency

Kutai Kartanegara Regency, apart from being rich in mineral and mining natural resources, is also rich in agricultural resources. To study Kutai Kartanegara Regency's food production, needs and projections regarding *IKN*, the study was limited to the corn commodity. The sample sub-districts chosen are Samboja Sub-District, Muara Jawa Sub-District, Loa Janan Sub-District, Sebulu Sub-District, Tenggarong Seberang Sub-District, and Muara Kaman Sub District.

3.3.1 Comparison of corn production and needs, the population does not take into account *IKN*

The need for corn is calculated based on corn consumption per capita per year according to the Food Security Agency of the Ministry of Agriculture, which is 1.7 kg/capita/year. Based on the calculation results in Table 4, the difference between production and demand shows that the results are surplus and increasing in the period 2015 to 2019.

The anticipated outcomes of production and demands are likewise showing an increase and surplus. This paints a favorable image of the encouraging production that Kutai Kartanegara Regency has achieved through its maize revolution initiative. In light of the MDG's requirement for sustainable development, this program ought to be implemented as a sustainable program. As the population grows, so too will the need for food, such as maize. This is consistent with Rachmatica et al.'s findings. [27]

Table 4 Corn production and demand in Kutai Kartanegara Regency does not consider IKN, 2015-2030

No	Year	Production (kg) (a)	Consumption (kg) (b)	Difference (kg) (a) - (b)
1	2015	1575732	1220240	355492
2	2016	3316003	1249527	2066476
3	2017	13110000	1278555	11831445
4	2018	13377000	1307873	12069127
5	2019	23390858	1336409	22054448
6	2020	9297230	1239949	8057281
7	2021*	3599476	1257175	2342301
8	2022*	6430819	1274640	5156179
9	2023*	9262162	1292347	7969815
10	2024*	12093505	1310301	10783204
11	2025*	14924848	1328503	13596345
12	2026*	17756191	1346959	16409232
13	2027*	20587534	1365671	19221863
14	2028*	23418877	1384643	22034234
15	2029*	26250220	1403879	24846341
16	2030*	29081563	1423382	27658181

Source: Results of data processing by researchers, 2024; * Projection results data

3.3.2 Comparison of corn production and demand the population is assumed to increase by 1.5 million people

The population of Kutai Kartanegara Regency will increase along with the existence of *IKN*. At the beginning of the move of the National Capital to East Kalimantan which was planned to be implemented in 2024 it was assumed that 1.5 million *ASN* would move. With this additional *ASN*, the population of Kutai Kartanegara is also assumed to increase. With population growth, the need for food, including corn, also increases. It is known that Malthus put forward his theory of the relationship between population and needs. It is said that population increases based on a geometric series while food increases increase based on an arithmetic series. For the corn commodity in the period 2015 to 2019, the difference between production and demand experienced a surplus. Likewise, if it is assumed that the population of Kutai Kartanegara will increase by 1.5 million and starting in 2024, this difference also indicates a surplus. This condition shows that Kutai Regency is still able to provide food for *IKN's* needs. Complete calculations are presented in Table 5.

Table 5 Production and demand for corn in Kutai Kartanegara Regency, assuming the population will increase by 1.5 million people, 2015-2030

No.	Year	Production (kg) (a)	Consumption (kg) (b)	Difference (kg) (a) - (b)
1	2015	1575732	1220240	355492
2	2016	3316003	1249527	2066476
3	2017	13110000	1278555	11831445
4	2018	13377000	1307873	12069127
5	2019	23390858	1336409	22054448
6	2020	9297230	1239949	8057281
7	2021*	3599476	1257175	2342301

8	2022*	6430819	1274640	5156179
9	2023*	9262162	1292347	7969815
10	2024*	12093505	3860301	8233204
11	2025*	14924848	4135994	10788854
12	2026*	17756191	4193451	13562740
13	2027*	20587534	4251707	16335827
14	2028*	23418877	4310772	19108105
15	2029*	26250220	4370658	21879562
16	2030*	29081563	4431376	24650187

Source: Results of data processing by researchers, 2024; * Projection results data

3.3.3 Comparison of corn production and demand assuming the population will increase by 4.5 million people

ASNs who move to IKN are of course followed by their families. In this calculation it is assumed that ASN has one wife and one child, thus the population of Kutai Kartanegara Regency is assumed to increase by 4.5 million people. Based on the calculation results, the projected difference between production and needs shows a surplus. This means that Kutai Kartanegara Regency is still able to provide the need for corn even though the population has increased by 4.5 million. This food security will have an impact on the security of IKN, so that IKN can be built well and run as it should. Complete calculations are presented in Table 6.

Table 6 Production and demand for corn in Kutai Kartanegara Regency, assuming the population will increase by 4.5 million people, 2015-2030

No.	Year	Production (kg) (a)	Consumption (kg) (b)	Difference (kg) (a) - (b)
1	2015	1,575,732	1,220,240	355,492
2	2016	3,316,003	1,249,527	2,066,476
3	2017	13,110,000	1,278,555	11,831,445
4	2018	13,377,000	1,307,873	12,069,127
5	2019	23,390,858	1,336,409	22,054,448
6	2020	9,297,230	1,239,949	8,057,281
7	2021	3,599,476	1,257,175	2,342,301
8	2022	6,430,819	1,274,640	5,156,179
9	2023	9,262,162	1,292,347	7,969,815
10	2024	12,093,505	8,960,301	3,133,204
11	2025	14,924,848	9,600,223	5,324,625
12	2026	17,756,191	9,733,590	8,022,601
13	2027	20,587,534	9,868,810	10,718,724
14	2028	23,418,877	10,005,909	13,412,968
15	2029	26,250,220	10,144,912	16,105,308
16	2030	29,081,563	10,285,847	18,795,716

Source: Results of data processing by researchers, 2024; * Projection results data

3.4 Contribution of Example Districts in Meeting *IKN* Corn Needs

IKN's food needs come from various regions and even come from imports. To reduce the occurrence of imports, Kutai Kartanegara Regency and the buffer sub-district are expected to be able to contribute to this food need. This research is limited to the contribution of the sample subdistricts analyzed as explained above. It is hoped that other sub-districts and other commodities can be studied again in the future. Analysis of sub-district and district contributions to *IKN* food needs uses the formula as in equation (3). Furthermore, the analysis of the contribution to corn food needs by each sample sub-district and district is explained as follows.

3.4.1 *The contribution of the example sub-district to the need for IKN corn is assumed to be a population of 1.5 million people moving*

Additionally, corn is a staple diet in a number of Indonesian locations. The government's corn revolution initiative is inextricably linked to the growth of corn output in this district. Nearly every subdistrict in the Kutai Kartanegara Regency is covered by this program. The contribution of corn to *IKN* needs with the assumption of a population of 1.5 million people moving is presented in Table 7.

Table 7 Contribution of sample sub-districts to the need for *IKN* corn with the assumption that the population will move 1.5 million people, 2024-2030

No	Year	Resident	Need	Sub-district and Regency Contribution (100%)							
				Samboja	Ma. Jawa	Loa Janan	Sebulu	Tenggarong Sbr.	Ma. Kaman	Six sub-districts	Kutai Kartanegara
1	2024	1500000	2550000	70.79	6.59	-4.31	2.75	-2.67	6.84	79.99	422.87
2	2025	1520838	2585425	87.61	7.95	-4.31	4.03	-2.09	8.91	102.11	525.88
3	2026	1541966	2621342	103.96	9.26	-4.30	5.27	-1.51	10.92	123.60	625.99
4	2027	1563387	2657758	119.85	10.54	-4.30	6.47	-0.96	12.87	144.48	723.24
5	2028	1585106	2694680	135.27	11.78	-4.30	7.65	-0.41	14.77	164.75	817.69
6	2029	1607126	2732115	150.25	12.98	-4.30	8.78	0.11	16.60	184.44	909.42
7	2030	1629453	2770069	164.80	14.15	-4.30	9.89	0.63	18.38	203.55	998.47

Source: Results of researcher data processing, 2024

Examples of sub-districts that have not been able to contribute corn to *IKN* in 2024 are Loa Janan Sub-district and Tenggarong Seberang Sub-district. Loa Janan Sub-District is experiencing a deficit, and it is projected that this deficit will decrease in 2030. Tenggarong Seberang Sub-District is projected to be able to contribute 0.63 percent of corn to *IKN*. Muara Jawa and Muara Kaman subdistricts have been able to contribute to *IKN*'s corn needs. Muara Jawa Sub-District contributed 6.59 percent and is projected to continue to increase until 2030. Muara Kaman Sub-District contributed 6.84 percent, also projected to continue to increase. These two sub-districts are categorized as still having a low level of contribution to *IKN*'s corn food needs. Samboja Sub-District is classified as high in the category of being able to contribute to the need for *IKN* corn. In 2024, the contribution of *IKN* corn will be 70.79 percent and will continue to increase in 2030 by 164.80 percent. The six sample sub-districts combined have been able to contribute corn to *IKN*. In 2024 it will be 79.99 and will continue to increase until 2030 to 203.55 percent.

These six example sub-districts can contribute to the need for high category *IKN* corn. The subdistrict that provided the highest contribution was Samboja Subdistrict. As shown in Table 7. Kutai Kartanegara Regency has been able to contribute corn to *IKN* needs. This district's contribution is categorized as high in contributing to *IKN*'s corn needs. Based on this data, all *IKN* corn needs can be met by Kutai Kartanegara Regency. This also shows an increasing trend. It is clear that the corn revolution program has been able to boost corn production in Kutai Kartanegara Regency. This needs to be maintained and improved.

3.4.2 *The contribution of the example sub-district to the need for IKN corn is assumed to be a population of 1.5 million people moving*

The next analysis is to analyze if it is assumed that the *IKN* population is 4.5 million people. Is Kutai Kartanegara Regency able to contribute to *IKN*'s corn needs, and what about the six example sub-districts?. The results of calculations using the same method as above for sub-district and district contributions are presented in Table 8.

Table 8 Contribution of sample sub-districts to the need for IKN corn with the assumption that the population will move 4.5 million people, 2024-2030

No	Year	Resident	Need	Sub-district and Regency Contribution (100%)							
				Samboja	Ma. Jawa	Loa Janan	Sebulu	Tenggarong Sbr.	Ma. Kaman	Six sub-districts	Kutai Kartanegara
1	2024	4500000	7650000	23.60	2.20	-1.44	0.92	-0.89	2.28	26.66	140.96
2	2025	4562515	7756276	29.20	2.65	-1.44	1.34	-0.70	2.97	34.04	175.29
3	2026	4625898	7864027	34.65	3.09	-1.43	1.76	-0.50	3.64	41.20	208.66
4	2027	4690161	7973274	39.95	3.51	-1.43	2.16	-0.32	4.29	48.16	241.08
5	2028	4755317	8084039	45.09	3.93	-1.43	2.55	-0.14	4.92	54.92	272.56
6	2029	4821379	8196344	50.08	4.33	-1.43	2.93	0.04	5.53	61.48	303.14
7	2030	4888358	8310209	54.93	4.72	-1.43	3.30	0.21	6.13	67.85	332.82

Source: Results of researcher data processing, 2024

There are four example sub-districts that can contribute corn to *IKN*, namely Samboja, Muara Jawa, Sebulu and Muara Kaman sub-districts. Samboja Su-District provides the highest contribution to *IKN* corn needs. These four sub-districts' contributions are still in the low category. Loa Janan and Tenggarong Seberang sub-districts have not been able to contribute to *IKN's* corn needs. If combined, the six sample sub-districts are still able to contribute corn to *IKN*, even though it is still in the low category. Based on Table 8, Kutai Kartanegara Regency has been able to contribute to the need for *IKN* corn. Contribution to *IKN* for Kutai Kartanegara Regency is in the high category. For this reason, the corn revolution program must be maintained and sustainable.

4 Conclusion

Based on the analysis of research results and discussions that have been carried out, projections of food needs in the National Capital of the Nusantara (*IKN*) are obtained, projections of the food contribution of each sample sub-district towards fulfilling projected food needs in the National Capital of the Nusantara (*IKN*). In detail, the research conclusions are presented as follows.

The difference between production and the corn needs of Kutai Kartanegara Regency, whether without considering the presence of *IKN*, is experiencing a surplus. Likewise if it is projected to experience a surplus. All sample sub-districts have a surplus of the corn commodity, the same is true if projected until 2030.

The contribution of Kutai Kartanegara Regency in meeting the needs of *IKN* corn, both assuming a population of 1.5 million people and 4.5 million people, has been able to contribute in the high category. Six example sub-districts have also been able to contribute with high criteria. Samboja Sub-District contributes to the need for high category *IKN* corn. Muara Jawa, Sebulu and Muara Kaman Sub-Districts contributed in the low category. Meanwhile, Loa Janan and Tenggarong Seberang Sub-Districts have not been able to contribute.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest in respect to this article.

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