

Analysis of rice supply in the Nusantara Capital City

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Abstract. Located in East Kalimantan Province, Nusantara Capital City (IKN) will be the new capital city of Indonesia. This plan will increase the population due to migration and economic growth in IKN. It will directly impact the increasing demand for food, especially rice. This study aims to analyse the sources of rice supply in IKN. Primary and secondary data collected in March - July 2023 from key informants in East Kalimantan, Jakarta, and South Sulawesi Province were analysed descriptively and quantitatively. IKN rice demand has been estimated to increase to 37.5 metric tons by 2024, along with an increase in population. The rice supply in East Kalimantan, derived from local production, fulfils only 49% of the total demand, whereas in IKN, it fulfils only 5%. In 2024, the total regional government rice reserve in regencies and cities near IKN was only 1.02% of the IKN rice demand. Most alternative rice supplies come from East Java and South Sulawesi Provinces. The policy implications are as follows: (1) increasing rice production by intensifying and extensifying farming; (2) expanding food reserves by increasing volume and building infrastructure; and (3) developing Regional Food Enterprises (BUMD) for rice supply chain efficiency.

1 Introduction

The government will move the nation's capital city of Indonesia from Jakarta to East Kalimantan Province based on Law Number 3 of 2022, namely the Nusantara Capital City (IKN). The aim of moving the nation's capital city to IKN is to (1) reduce the burden on Jakarta and its buffer areas (Bogor, Depok, Tangerang, and Bekasi); (2) encourage equitable development in eastern Indonesia; (3) change the development mindset that gives the impression of being Java-centric; (4) ensure that Indonesia has a capital city that represents the national identity, diversity, and appreciation of Pancasila; (5) improve public services to create efficient and effective central government management; and (6) ensure that Indonesia has a capital city that implements smart, green, and beautiful cities to increase regional and international competitiveness [1]. IKN development is divided into five stages: (1) stage 1 in 2022-2024; (2) stage 2 in 2025-2029; (3) stage 3 in 2030-2034; (4) stage 4 in 2035-2039; and (5) stage in 5 2040-2045.

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Moving the nation's capital city will directly and indirectly impact the increasing population in East Kalimantan Province as the location for IKN. The direct impact occurs due to labour migration, especially central government employees and their families, which will begin in 2024, as stated in Presidential Decree Number 63 of 2022. The indirect impact occurs gradually due to the development of the IKN economy, and the National Development Planning Agency predicts that the Gross Regional Domestic Product will increase by 0.1% [2]. The main consequence of the increasing population is increasing food needs, especially for rice commodities. Rice is the staple food of most people in Indonesia, including in East Kalimantan.

Food demand in East Kalimantan Province is relatively small because it is not a tourist centre, and the population is relatively small. However, the population increase due to migration to the capital city will automatically increase the demand for food, especially rice. Problems arise considering that East Kalimantan Province, in general, is not a food and agricultural production centre province. According to Haptari [3], East Kalimantan Province is still facing a problem of growth without development, namely that economic growth is occurring but has not been able to improve people's welfare. One reason is related to food independence and sovereignty. East Kalimantan's dependence on food supplies from surrounding areas is still high.

The population in IKN is predicted to reach 488 thousand people in 2024 and 1.9 million people in 2045, based on Presidential Decree Number 63 of 2022. In 2019, the availability of rice in East Kalimantan was insufficient, and most of it was still supplied by South Sulawesi and East Java [4,5]. Due to the increasing population and limited availability of rice, the gap between availability and demand is increasing. If there is a shortage in rice supply, it will trigger an increase in rice prices in the nation's capital city. This study aims to analyse the sources of rice supply to IKN and formulate strategies to meet their needs. The detailed objectives are: (1) to calculate the estimated population and demand for rice in IKN, (2) to analyse production potential and rice reserves in IKN, and (3) to map the rice supply chain in IKN.

2 Methodology

This study was carried out in DKI Jakarta Province (central agency), East Kalimantan Province which includes two districts, namely North Penajam Paser (PPU) and Kutai Kartanegara (KKR), two cities, namely Balikpapan (BPN) and Samarinda (SMD), as well as in South Sulawesi Province which includes Makassar City (MKS) and Parepare City (PRE). The study was carried out from March to July 2023.

This study used both primary and secondary data sources. Primary data were obtained through in-depth interviews with key informants in Jakarta, East Kalimantan, and South Sulawesi, consisting of the agriculture department, food security department, and trade department in North Penajam Paser District, Kutai Kartanegara District, Balikpapan City, and Samarinda City. Primary data were also obtained from the IKN Authority, the Agricultural Quarantine Agency of South Sulawesi, and wholesalers and retailers around IKN. Secondary data were collected from the Central Bureau of Statistics, the agricultural department, food security, and trade services around IKN, and data from Samarinda, Balikpapan, and Parepare Agricultural Quarantine Agency.

Data were analysed using quantitative descriptive methods. Quantitative methods involve collecting, analysing, interpreting, and writing the results of a study [6]. The analysis method is described in detail based on the following study objectives:

2.1 Calculate rice demands in IKN

The projected rice demand consists of household and non-household needs (hotels, restaurants, catering, processing industries, and special households, such as hospitals, correctional institutions, and dormitories). Household consumption results from multiplying the projected population with the per capita consumption level sourced from the BPS-Statistics Indonesia data. Meanwhile, non-household consumption results from multiplying household consumption by the non-household consumption coefficient. The non-household coefficient was obtained from the results of the BI-ICASEPS study in three cities, measuring inflation in Banten Province conducted by ICASEPS in 2023.

Specifically, the projected population in IKN refers to Presidential Decree Number 63 of 2022. The method for calculating district/city population projections in East Kalimantan Province is formulated mathematically as follows [7]:

$$P_t = P_o + (L - M) + (MigIn - MigOut) \tag{1}$$

where:

P_t : total population in year t
P_o : total population in the base year
L : total number of births
M : total number of deaths
MigIn : number of in-migration
MigOut : number of out-migration

The calculation of rice demand in East Kalimantan uses the formula of population projection multiplied by per capita consumption in the region, using Equations 2 to 4. Meanwhile, calculating the rice volume demand in IKN differentiates the per capita consumption between immigrants and residents. To calculate IKN's rice needs, we used Equations 5–7. The equations are mathematically formulated as follows:

VHDR East Kalimantan

= *TP East Kalimantan* x *PCC East Kalimantan*

(2)

VNHDR East Kalimantan

= *VHDR East Kalimantan* x *NHRDC*

(3)

TDR East Kalimantan

= *VHDR East Kalimantan* + *VNHDR East Kalimantan*

(4)

VHDR IKN

= (*TP resident* x *PCC resident*) + (*TP immigrant* x *PCC immigrant*)

(5)

VNHDR INK

= *VHDR IKN* x *NHRDC*

(6)

TDR INK

= *VHDR IKN* + *VNHDR IKN*

(7)

where:

VHDR : volume of household demand for rice
VNHDR: volume of non-household demand for rice
TDR : total demand for rice
TP : total population
PCC : per capita consumption
NHRDC : non-household rice demand coefficient

2.2 Current production and development potential

Existing rice production data are sourced from the BPS East Kalimantan for 2022. The level of fulfilment of rice needs originating from domestic production is the proportion between the production level and rice needs according to districts/cities in East Kalimantan Province.

Meanwhile, food production potential was based on the potential area and suitability of land in the two districts delineated by IKN. Potential rice production based on the Agricultural Land Resources Instrument Standard Testing Centre data for 2022.

2.3 Mapping the rice supply chain in IKN

The analysis of the rice trade chain consists of four steps. First, the food epicentre point in IKN, the closest and most significant market from the IKN development centre area, namely Pasar Rebo Village, Sepaku Sub-district, North Penajam Paser District, was determined. Second, the need for rice food in IKN is calculated based on the total calculation of rice supply to Pasar Rebo, Sepaku (Equation 8). Third, we trace food sources from strategic food commodity market players. Sources of supply to the Sepaku Sub-district range from retailers to large inter-island traders. Fourth, calculate the rice volume at each point of the distribution chain as a percentage.

3 Results and discussion

3.1 Population estimated and rice demand in IKN

Moving the nation's capital city will increase the population of IKN. The increase in food demand, especially for rice, will directly result from the increase in population. Based on the estimated results, it is known that people in IKN will experience a rapid rise in 2024-2029 (phase 2), namely 162.8% compared to the previous period (Fig. 1). During the IKN Phase 2 construction, there was a very massive movement of civil servants (ASN) and their families. Gradually, the increase in the IKN population will slow down. In phase three of IKN development (2030-2034), population growth is estimated at only 13.2%.

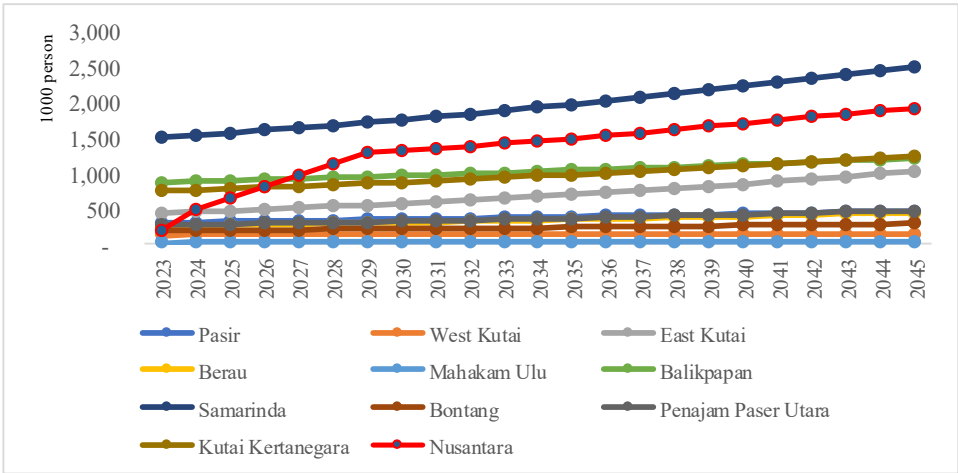


Fig. 1. Estimation of the population of East Kalimantan by district/city and estimation of the IKN population.
Source: [8]

The population estimate is used to calculate rice demand in IKN until 2045. The current need for rice in the IKN area is the need for the existing population of the district. Kutai Kartanegara and North Penajam Paser District, whose areas are included in the IKN

delineation, are supplied by the rice needs of migrant residents who are construction workers at IKN. The demand for rice in IKN in 2022 will be 14 thousand tons, with per capita consumption reaching 74 kg/year. This figure is generally higher than the per capita consumption figure for East Kalimantan. Rice demand in the IKN region is expected to increase by an average of 5.17% by 2045.

Meanwhile, rice demand is expected to increase by 2.09% annually in the East Kalimantan region. The increasing need for rice in non-central areas is a challenge for the government to ensure its availability through efforts to increase production in these areas and inter-regional trade. According to Suratha [9], an increase in population causes food needs to grow and can reduce land area and the production of food commodities.

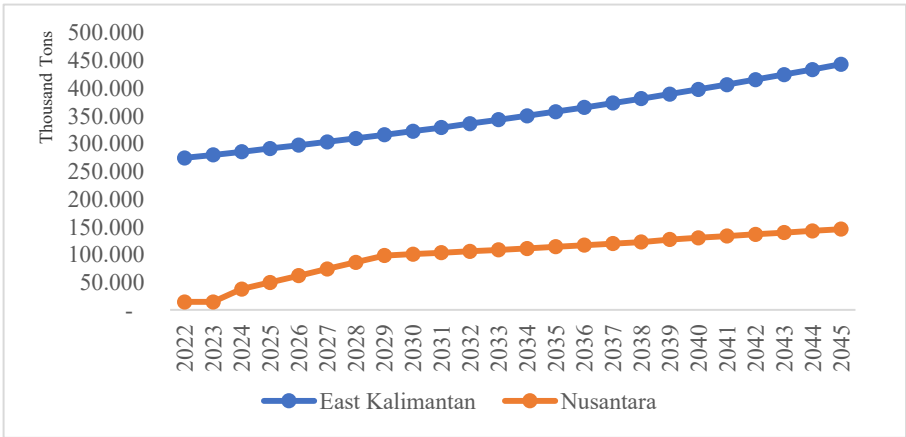


Fig. 2. Estimation of rice needs in East Kalimantan and IKN.
Source: [8]

The rice demand in IKN is estimated to reach 37.5 thousand tons in 2024 and 145 thousand tons in 2045. The highest increase in rice demand will occur in 2024-2029 (stage 2). The increasing number of rice is because the migration process for ASNs and their families will be completed in this period. During 2024-2029, the highest spike in rice demand, reaching 23 thousand tons per year, occurred in 2024 because the IKN area had officially started operating. In 2029-2045, the increase in rice demand in the IKN area will slow to around 2-3 thousand tons/year. This condition is faced with the ability of local production to provide rice for East Kalimantan of only 49% [8] and IKN of only 5% (Fig. 4).

3.2 Production potential and rice reserves in IKN

The availability of rice can be sourced from production, reserves, and net trade between regions [10]. On the production side, East Kalimantan has not been able to meet its rice needs. According to Pratama et al. [11] and Adi et al. [12], East Kalimantan is one of the regions experiencing a rice deficit, where rice production is around 142 thousand tons, while rice demand reaches 328 thousand tons. Hence, it shares a deficit of approximately 209 thousand tons.

The three largest rice-producing districts in 2022 in East Kalimantan are the Kutai Kartanegara, Paser, and North Penajam Paser Districts, with a total harvest area of over 40,000 hectares (Fig. 3). As much as 46% of rice production in East Kalimantan comes from Kutai Kartanegara District, with a production centre in Tenggarong Sub-district. Rice production in the Paser and North Penajam Paser Districts contributes 19% and 18% of the total rice production in East Kalimantan, respectively. The rice production centres in Paser

District are in Long Kali, Pasir Belengkong, and Long Ikis Subdistricts. Meanwhile, the rice production centre in North Penajam Paser District is in the Babulu Sub-district.

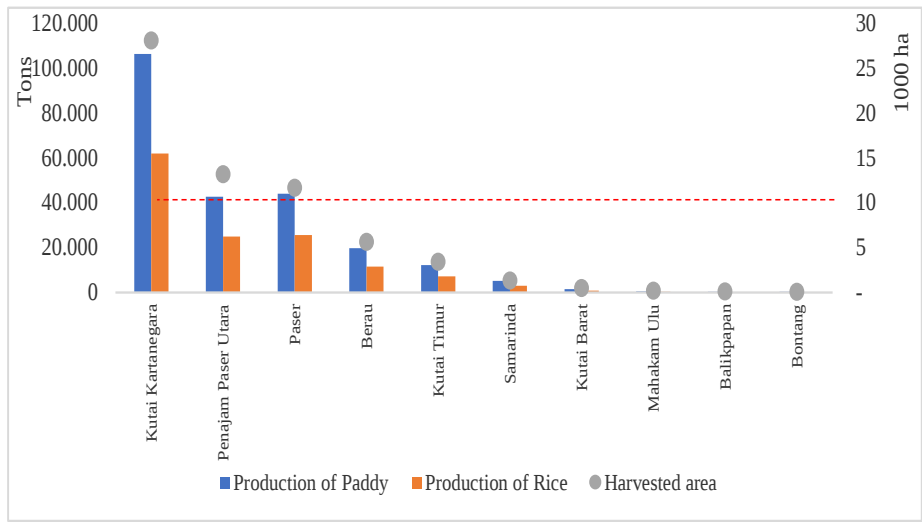


Fig. 3. Paddy, rice production, and harvested area by the district in East Kalimantan, 2022.
Source: [8]

Rice productivity in East Kalimantan is around 36.25 quintals/ha. Bontang City has the highest productivity in East Kalimantan, namely around 39.98 quintals/ha, while the lowest is Mahakam Hulu District, with a productivity of 24.29 quintals/ha. Rice productivity in East Kalimantan is still low because the planted rice varieties are local. Local rice takes around 5-6 months to harvest. Most farmers grow local rice once a year, and some will plant superior rice varieties in the next planting season [13].

North Penajam Paser District and Kutai Kartanegara District, which support food production in IKN, still have potential land that the government can utilise. Husnain [14] explains that rice can grow in Penajam Paser Utara and Kutai Kartanegara Sub-districts. The area of rice land utilisation in North Penajam Paser District is only 5.78%, and in Kutai Kartanegara District, it is 1.67% (Table 1). Rice land has not been optimally utilised in the North Penajam Paser and Kutai Kartanegara Districts.

Table 1. Existing and potential rice land areas in North Penajam Paser and Kutai Kartanegara Districts.

Location	Harvest area (ha)		% utilised
	Existing	Potential	
North Penajam Paser	13,148	226,976	5.78%
Kutai Kartanegara	28,028	1,674,443	1.67%

Source: [13]

The land potential in the North Penajam Paser and Kutai Kartanegara Districts for rice commodities is pervasive but has not been optimally utilised. At least one hectare of land added to plant rice on optimal land will increase rice production by 1.67 tons [14,15]. Optimal land use for rice commodities will support food security in IKN, considering that the need for rice will increase along with the population movement to IKN.

The land that can be used for agricultural cultivation is ex-mining land. The problem with ex-mining land is the lack of nutrients in the soil. A previous study in Loa Duri Village, Loa

Janan Sub-district, Kutai Kartanegara District, East Kalimantan Province [16], showed that former coal mining land has relatively low soil fertility, with a characteristic silty clay loam texture (smooth, excellent) with coarse material reaching 10%, soil is mostly less than 50 cm deep, nutrient content is low for total N, very low for P₂O₅, and very high for K₂O. Therefore, it is necessary to carry out specific treatments to restore soil nutrients, such as tilling the soil, liming, applying manure before planting, and applying fertiliser after planting [17,16]. The income from paddy rice farming on former gold mining land in terms of business feasibility is still above 1 ($R/C > 1$) [18,19].

The rice supply at IKN can also come from the Regional Government Food Reserves (CPPD). The commodity that CPPD managed by the BULOG Regional Office of East Kalimantan-North Kalimantan is rice. The amount of CPPD for the East Kalimantan-North Kalimantan Regional Office was 660 tons. CPPD districts/cities that geographically can act as buffers for the IKN area are Balikpapan City (35.79 tons), Samarinda City (13.35 tons), Kutai Kartanegara District (45.49 tons), North Penajam Paser District (22 tons), and the warehouse of the East Kalimantan Regional Office itself which is located in Balikpapan City (222.42 tons). The total CPPD of rice in the city/district reached 339.05 tons [20], or 1.02% of the total rice demand in IKN in 2024.

3.3 Rice supply chain

The availability of rice in IKN can also come from inter-regional trade. In the East Kalimantan region, the largest source of rice supply comes from East Java and South Sulawesi Provinces. Areas experiencing a rice deficit, such as East Kalimantan, will bring rice from other regions by considering the source and distribution distance [21]. Based on the survey results, Pasar Rebo in Sepaku Sub-district is the food epicentre closest to the current IKN. The supply of rice to the market comes from four sources: local production in Sepaku Sub-district (5%), wholesalers in North Penajam Paser District (10%), wholesalers in Samarinda City (45%), and Balikpapan City (40%) (Fig. 4). Local production has been able to supply only 5% of the total existing rice needs in IKN. If the agricultural area is determined to be at least 16.4% for food crops, following the mandate of Presidential Decree Number 64 of 2022. Therefore, the agricultural area can increase, and it is hoped to increase the local rice supply to IKN.

Rice supplies to wholesalers in North Penajam Paser District come from local production in Babulu Sub-district (2%) and rice purchases from wholesalers in Balikpapan City (8%). Babulu District is a rice production centre in North Penajam Paser District, but because the distance is quite far, it cannot directly supply IKN. Rice production originating from the Babulu Sub-district can supply IKN, provided that the type of rice produced follows consumer preferences at IKN. Most of the IKN population are immigrants from Java, especially Jakarta, Bogor, Depok, Tangerang, and Bekasi (Jabodetabek).

Apart from local production and the North Penajam Paser District, rice supplies to IKN come from Samarinda City (45%) and Balikpapan City (40%). The supply portion of the two cities is almost the same because both are economic centres in East Kalimantan Province. The price of rice from these two sources is relatively low because the supply chain is not too long. The rice supply to Samarinda is obtained from local production, Java Island, and South Sulawesi. The results of field investigations showed that 3% of the rice entering IKN through Samarinda City comes from local production in Samarinda City, 14% comes from Java Island (Surabaya and Jakarta), and 28% comes from South Sulawesi.

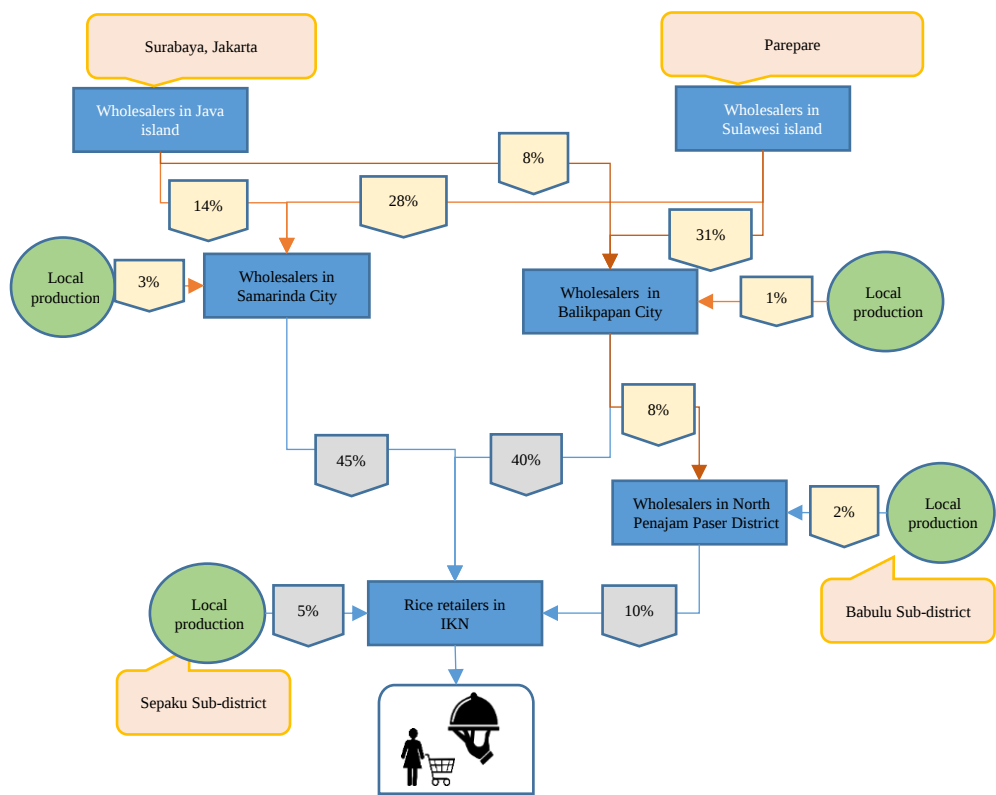


Fig. 4. Rice supply chain in IKN.

Sources of rice supplied to IKN via Balikpapan include local production (1%), Java Island (8%), and South Sulawesi (31%). Most of the rice supply comes from South Sulawesi because the distance is closer (travel by sea around 19-20 hours) than from Java Island (travel via sea around 30-31 hours). Apart from South Sulawesi and Java Island, part of the rice supply comes from South Kalimantan but only supplies it to IKN development locations, specifically in the Samboja Sub-district. Most of the residents of Samboja Sub-district are from the Banjar tribe, whose population preferences for rice are relatively the same as those of the residents of South Kalimantan.

The rice supply from Java Island comes from Surabaya and DKI Jakarta, whereas that from South Sulawesi comes from Parepare. Based on interviews with rice marketers, it is known that rice imported from East Java comes from Lamongan District, Bojonegoro District, Ngawi District, Kediri District, and Surabaya City. Meanwhile, rice imported from South Sulawesi comes from Parepare City, Sidrap District, Pangkajene Islands District, Soppeng District, Bone District, Luwu District, and Pinrang District.

4 Conclusions and policy recommendations

With the existence of IKN, there is an increase in the population, which impacts the increasing demand for rice. There are three primary nodes in the rice supply in IKN: local production, food reserves, and inter-regional trade. Local rice production is still relatively small, but rice production has the potential to increase, considering that much potential land is available that has not been utilised optimally. The rice supply at IKN mostly comes from the South Sulawesi and East Java Provinces. The high dependence on rice from outside the

island of Kalimantan makes inter-island trade the primary key to rice supply to IKN. The total CPPD for rice around the IKN location is only 1.02% of the total rice demand in the IKN area by 2024.

Based on these conclusions, policy recommendations to increase the rice supply in IKN are to accelerate the three rice supply nodes, which can be described as follows:

1. Rice production: increasing rice production through increasing productivity and the rice-planting index on existing land and extensification through ex-mining land.
2. Rice reserves: rice reserves can be increased by increasing the capacity in the BULOG warehouse of the East Kalimantan Regional Office, especially in warehouses close to the IKN area.
3. Rice trading: Forming BUMD IKN with a business concentration on rice trading. Building a business-to-business network with rice traders in production centre areas is also necessary.

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