Towards the New National Capital (IKN) in Indonesia: Premises and Challenges of Food Security

Rumo à Nova Capital Nacional (IKN) na Indonésia: Premissas e Desafios da Segurança Alimentar

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Abstract

One of the successes of regional independence is food security. The essence of this paper dedicates the linkage between small and medium industry (SMI), population (Pop), food consumption (FC), and economic growth of agriculture, forestry and fisheries (EG_AFF) on food security (FS) towards a holistic New National Capital (IKN) in Indonesia. The comparative linear regression technique frames the data set starting from 2015 to 2021. Cross-regions that are qualified in "geospatial IKN" are focused into four clusters. From this analysis approach, it resulted in two important factors: (1) when SMI, Pop, FC, and EG_AFF increased, the simultaneous effect on FS increased; and (2) SMI has partial effect on FS in Balikpapan, Pop has partial effect on FS in Kutai Kartanegara, and FC has partial effect on FS in Balikpapan, Penajam Paser Utara (PPU), and Samarinda. This finding detects that SMI, Pop, FC, and EG_AFF guarantee food security in the short term. Finally, FC stimulates long-term food security in Balikpapan, PPU, and Samarinda, but has no implications in Kutai Kartanegara. The contemporary agenda is building an integrated agro-industrial system, considering alternative suggestions related to food productivity, and revitalizing revolutionary public facilities to separate food production centers from the new central government zone.

Keywords: Capital relocation; IKN; Comparative linear regression

Resumo

Um dos sucessos da independência regional é a segurança alimentar. A essência deste artigo dedica-se à ligação entre a pequena e média indústria (SMI), população (Pop), consumo alimentar (FC) e crescimento econômico da agricultura, silvicultura e pescas (EG_AFF) na segurança alimentar (FS) para uma Nova Capital Nacional (IKN) na Indonésia. A técnica de regressão linear comparativa enquadra esse conjunto de dados de 2015 a 2021. As regiões cruzadas que são qualificadas em "IKN geoespacial" são focadas em quatro clusters. Esta abordagem de análise resultou em dois importantes fatores: (1) quando SMI, Pop, FC e EG_AFF aumentaram, o efeito simultâneo em FS aumentou; e (2) SMI tem efeito parcial sobre FS em Balikpapan, Pop tem efeito parcial sobre FS em Kutai Kartanegara e FC tem efeito parcial sobre FS em Balikpapan, PPU e Samarinda. Tal achado detecta que SMI, Pop, FC e EG_AFF garantem a segurança alimentar no curto prazo. Finalmente, o FC estimula a segurança alimentar de longo prazo em Balikpapan, PPU e Samarinda, mas não tem implicações em Kutai Kartanegara. A agenda contemporânea está construindo um sistema agroindustrial integrado, considerando sugestões alternativas relacionadas à produtividade alimentar e revitalizando equipamentos públicos revolucionários para separar os centros de produção de alimentos da nova zona do governo central.

Palavras-chave: Realocação de capital; IKN; Regressão linear comparativa

1 Introduction

The election of East Kalimantan as the new State Capital (IKN) in 2024 has become a relevant topic discussed by scholars and the Indonesian community for the past few years. The formation of regulations about the transfer of IKN, cannot be separated from the approval of the political council as contained in the regulated by "Law Number: 3 of 2022 concerning IKN" as the foundation for the relocation of the State Capital (Haryanti 2022). As is known, the center of Indonesia will be moved from Jakarta to Sepaku, precisely located in Penajam Paser Utara (PPU) in East Kalimantan Province (Saputra, Jostgebi & Halkis 2021). It is predicted that this transfer will need a large financial injection of around IDR 50 trillion–IDR 100 trillion in a phased scheme. In the planning pillar, the cost of transferring to a new IKN is not spent all at once, but in the long term or 1 decade with the average allocation of government spending for this program is IDR 10 trillion per year (Hutasoit 2018).

The reason for the inequality of the population in East Kalimantan, also has an impact on economic inequality. This is the reason that bridging the new IKN in East Kalimantan since the rules governing IKN was passed on August 18, 2022. On the unprecedented status, where the center of government was originally in Jakarta to move to East Kalimantan, apart from economic factors, urbanization growth. Every year, Jakarta experiences the most increase in urbanization compared to others. For example, in 2017, Indonesia was ranked 9th or the most populous city in the world (Aziz 2019).

In terms of demographics, the total population living in East Kalimantan reflects a sharp increase in population (Roy et al. 2022). Apart from urban people (from villages to cities), the flow and expectations of transmigration activities to East Kalimantan Island are still ongoing until now. Areas such as Mahakam Ulu Regency have even become prima donna or invasions of migrants based on extraordinary desires despite the lack of infrastructure (Irawan et al. 2021). About IKN, the actual birth rate in East Kalimantan is a demographic bonus, not a human resource conflict. If the increase in births (natality) is not large compared to other provinces in Java, Sulawesi and Sumatra. Interestingly, as many as 6 regions in 2019 to 2020 showed a significant increase in population, but 4 regions (Paser, Kutai Kartanegara, Berau, and Samarinda) were but, decreasing. In fact, the decline in the male and female population is indicated by the unstoppable death rate (mortality) due to the pandemic. Paser, Kutai Kartanegara, Berau, and Samarinda were accused of being the "epicenters" of the turmoil of transmission and infection from the Coronavirus disease or what is known "Covid-19". Other areas, such as Balikpapan, which are considered to have the opportunity to spread the epidemic, appear the opposite or can actually suppress control due to the government's firmness, concern, and awareness of its citizens in fighting Covid-19 (Roy et al. 2021).

The second aspect is the problem of natural disasters. The Jakarta area is experiencing land subsidence. In addition, about 50% of the Jakarta area experienced a decrease in flood safety under 10 years. In fact, ideally, a big city has a flood safety level of at least 50 years. Soil in Jakarta has decreased by around 35 cm – 50 cm in a decade (2007–2017). Another natural disaster factor is volcanic activity, including "Krakatoa" and "Gede". The Jakarta area has major obstacles, such as: the potential for earthquakes, tsunamis, floods, and land subsidence (Herdiana 2022).

After that, clean water degradation. The polemic over the clean water crisis is a threat on the Java island (Mutaqin, Muslim & Rahayu 2021). In 2016 alone, the Java experienced a severe water crisis. One of the indicators of the clean water crisis is the reduced availability of water, for example the case in Central Java. Fourth, is population, whereas many as 56.56% of the population in Indonesia resides on the Java. Java Island is the most densely populated island in Indonesia. While other islands, the percentage of population density is less than Java. Indeed, the Java is ranked first with a population percentage of 56.10% (FISIP–Universitas Indonesia 2020). In the second position, the population in Kalimantan will increase to 6.15% in 2020.

Next, are economic reasons. In 2020, the Java is in the first rank, which contributes significantly to Indonesia through its Gross Domestic Product (GDP) of 59.14%. The second position is the GDP of Sumatra GDP: 21.40%, Kalimantan's GDP: 8.12%, Sulawesi's GDP: 6.19%, while the GDP of Bali and Nusa Tenggara: 2.95% (Herdiana 2020). The smallest contribution to GDP is on the islands of Maluku and Papua, which only contribute 2.24% for Indonesia.

Ideally, the conditions for relocating the capital city of a country include 4 criteria: a strategic area, the availability of land that reduces investment costs, an expansive economic chain, free from the risk of earthquakes, volcanic eruptions, tsunamis, and wars (Abd Manan & Suprayitno 2020; Baharuddin et al. 2022; Dyastari & Candra 2022; Salya 2022). Besides the Indonesia which determined the transfer of the capital city, dubbed "Nusantara", lessons from 5 countries that have succeeded in moving the center have been tested (CNBC Indonesia 2022). The experiences of the five nations are Nigeria: from Lagos to Abuja in 1991 (Unumen & Adepoju 2019), Pakistan: from Karachi

to Islamabad in 1961 (Ishenda & Guoqing 2019), Brazil: from Salvador to Rio de Janeiro in 1763 (Garmany & Richmond 2019) and from Rio de Janeiro to Brasília in 1960 (Kelly 2020), Turkey: from Istanbul to Ankara in 1923 (Kacar 2010), and India: from Kolkata to New Delhi in 1931 (Johnson 2015). The dark side, considering the dark history of countries that failed to rise when the capital moved, such as South Korea: from Seoul to Sejong in 2007 (Lee, Lee & Park 2018), Australia: Canberra in 1908 to prevent and mediate competition between Melbourne v.s Sydney (Azmy 2021), Tanzania: from Dar es Salaam to Dodoma in 1970 (Kirey 2020), Kazakhstan: from Almaty to Nursultan or now changed to Astana in 1997 (Arslan 2014), Myanmar: from Yangon to Naypyidaw in 2005 (Gomà 2010), and Malaysia: from Kuala Lumpur to Putrajaya in 1995–1999 (Mubaroq & Solikin 2019).

Referring to the above perspective, which raises optimism and contradiction about the relocation of the capital city which does not always run smoothly and guarantees equitable development, it is necessary to highlight concerns on increasingly narrow spatial planning; soaring population density and migration patterns, "geopolitical" changes, and the dynamics of the economic structure that disrupt the wheels of government. Too, in the demographic corridor, population scenarios from outside the Kalimantan island, including Java, where mass migration is the most dominant, are more than 1 million people. It is calculated that around 1.7 – 1.9 million people come to occupy the IKN (Kompas 2022). In the context of the needs of human life, the more new housing in an area, the greater the level of consumption. Adopting the "Demand Theory–Supply Theory" in agriculture, the frequency of agricultural production is highly dependent on labor productivity, land, weather, environment, climate, and many other factors (Darma et al. 2022). In other words, the exodus of food

demand is growing. Considering the Food Security Index (IKP) of East Kalimantan Province at 13th position in 2021 at 77.46 points, this is categorized as "very resilient". Of the 34 provinces, at the domestic level, Indonesia's food security in 2021 will reach 59.2 points or a decrease of 3.58% compared to 2020: 61.4 points (Global Food Security Index 2022), automatically this figure is above the national food security target. To that end, the government's concern for IKN is to map 4 main zones, namely PPU: the IKN core zone and the center of government, Balikpapan: the economic zone, Samarinda: the national strategic zone, and Kutai Kartanegara: the buffer zone (Muhtar et al. 2021).

Generally, rankings referring to urban and rural areas are reported annually. At the district scale, based on 416 regions, there are striking differences. The PPU is ranked 16 (86.24 points), while Kutai Kartanegara is ranked 41 (84.73). If compared between cities in Indonesia, from 98 regions, Samarinda's food security ratio reaches 83.72 (28th rank) and Balikpapan is much better at 88.68 (3rd rank). Figure 1 displays the IKP scores among Balikpapan, PPU, Kutai Kartanegara, and Samarinda. Throughout 7 periods (2015–2021), the highest average IKP was Balikpapan: 85.5 points and followed by Samarinda: 82.39 points. Then, PPU: 82.14 points in rank 3 and Kutai Kartanegara: 82.01 points in rank 4. Although PPU is below the average IKP Balikpapan and IKP Samarinda, the score is consistent. This is in contrast to the three regions: Samarinda, Balikpapan, and Kutai Kartanegara whose IKP scores had decreased in 2019 and 2021. In detail, from year to year, the IKP in Balikpapan stood out in 2018 (88.74 points). In PPU and Kutai Kartanegara, the most impressive IKP scores were in 2020: 86.24 points and 84.73 points, respectively. Also, 85.19 points as the highest IKP score for Samarinda in 2018. Uniquely, there are 6 IKP classifications for each group.
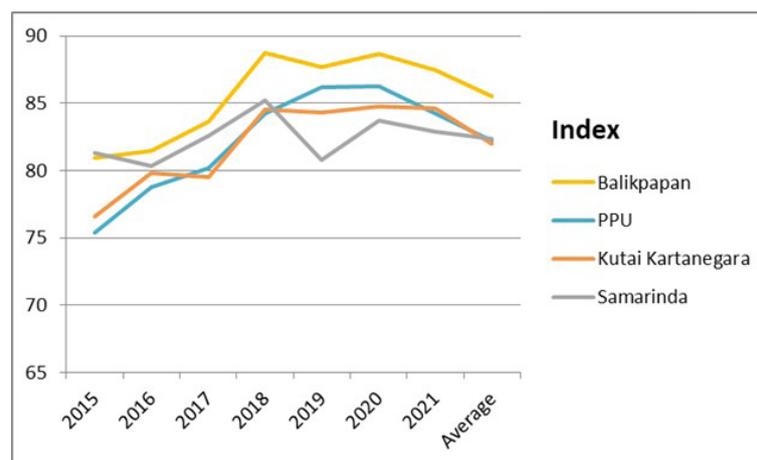

Figure 1 Chart of IKP, 2015–2021. Source: compilation from Food Security Agency (2022).

In practice, the IKP standards were adjusted at the provincial level, especially East Kalimantan in the interval: 65.96–74.4 "high" and > 74.4 "very high". At the city level it is also different from the district, where for city scores: > 65.75–75.68 "high" and > 75.68 "very high" and district scores: > 61.13–70.64 "high" and > 70.64 "very high". A reasonable reason for this difference in scores is that the characteristics of districts in Indonesia generally have a large area than cities, and districts are considered to be the backbone and food-producing areas. But, urban areas do not fully have modern agriculture or even relatively function as urban clusters that tend to use agricultural commodities to be processed to produce certain products.

Talking about the relationship between food security and population consumption, it is also connected with Gross Regional Domestic Product (GRDP) and industrial strength. Wijaya, Darma and Darma (2020) explained that agriculture, forestry, and fisheries are not the fundamental sectors in East Kalimantan, but the mining and quarrying sector. Even so, the contribution from the agriculture, forestry and fisheries sectors is quite high and has bright prospects. Without ignoring its role, the advantages of this sector can trigger an increase in inclusive economic growth and become a priority sector in the future. The spatial interaction between regions in East Kalimantan proves that the Kutai Kartanegara hierarchy represents Quadrant I (developed but depressed regions), while PPU, Balikpapan, and Samarinda are oriented towards Quadrant III (fast developing regions). Only East Kutai is in Quadrant I (developed and fast-growing area). The condition of household income, which reflects the welfare of the population, is accumulated into per capita expenditure. Wahyuningsih et al. (2020) explained that there is a disparity between per capita consumption in East Kalimantan, so that the trend of household income is dominant towards non-food consumption compared to food. The high cost of transportation, health services, and education rates in East Kalimantan is triggered by the lack of comprehensive infrastructure. This is defined as the industrial sector has not yet pushed implications for sustainable food security.

Examining the above reality, the focus in this paper is to identify the relationship between industry, population, food consumptions, and economic growth of agriculture, forestry, and fisheries on food security in IKN (see Figure 2). The motivation and ultimate goal is to distribute an initial review that assesses the issue of food vulnerability as a consequence of IKN development to cut the burden of poverty, protecting hunger, and mitigate stunting. The systematics of the paper is formulated in four phases. First, the introduction as the basis behind the research objectives. Second, materials and methods include design and variable components, basic data, and data analysis techniques. Third, includes the findings with discussion arguments. Fourth, the final conclusion which narrates the findings about the investigation, theoretical implications for the development of further studies, and policy proposals through alternative solutions.

2 Material and Methods

2.1 Research Design and Variables

In principle, inductive research is modified into the causality method. The study was designed on 4 samples: Balikpapan, PPU, Kutai Kartanegara, and Samarinda. Figure 3 describes the study observations.
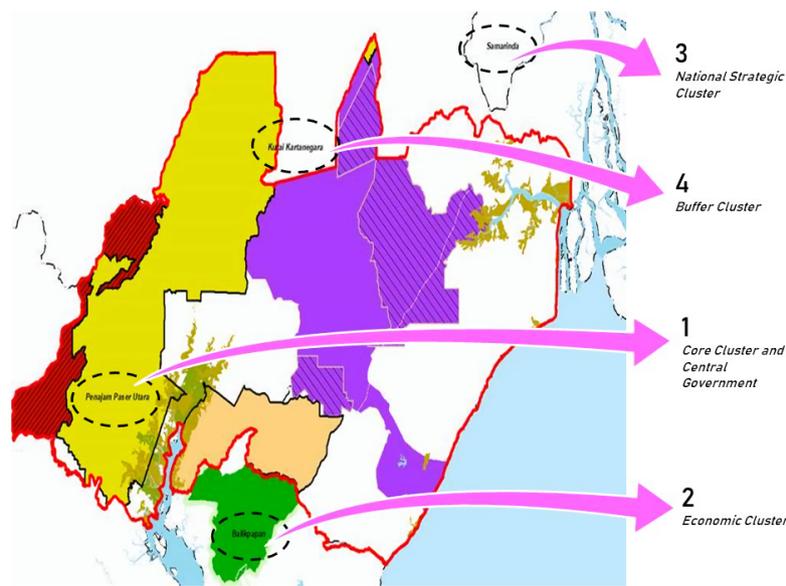

Figure 2 The proposed framework.

Figure 3 IKN objectivity. Source: elaboration by authors.

The variable instrument is organized into two parts. Technically, food security is positioned as the dependent variable and 4 independent variables: small and medium industry, population, food consumption, and economic growth of agriculture, forestry, and fisheries. Completely, the composition of variables is summarized in Table 1.

The five variables SMI (Sudrajat & Siregar 2021), Pop (Darma, Purwadi & Wijayanti 2020), FC (BPS – Indonesia 2022a), EG_AFF (Isnaini, Agustono & Barokah 2022; Wisnujati & Patiung 2020), and FS (BPS – Indonesia 2022b) have their respective calculations whose formulation is instructed in Equations 1, 2, 3, 4, 5 and 6.

$$SMI = SI + MI \qquad (1)$$

where *SMI* is Small and Medium Industry, *SI* is Small Industry: food and drink, and *MI* is Medium Industry: textiles, apparel, leather, leather goods and footwear, wood, wood and plaited goods, paper and paper goods, printing and reproduction of recording media, chemicals and chemical goods, pharmaceuticals (chemical and traditional medicines), rubber and plastics, non-metallic minerals, computers, electronics and optics, electrical equipment, machinery and other equipment, motor vehicles, transportation equipment, furniture, repair services, installation of machinery and equipment, and other processing industries.

$$Pop = (B - M) + (I - E) \qquad (2)$$

where *Pop* is Population, *B* is Birthrate, *M* is Mortality, *I* is Immigration, and *E* is Emigration.

Table 1 Variables and terms.

Variables and abbreviations	Indicators	Remarks
Small and Medium Industry (SMI)	Units	Medium and micro industrial routines that actively produce various types of goods for human use. SMI that operates legally certified/licensed.
Population (Pop)	Person	A group of individuals with similar characteristics and living in a certain area.
Food Consumptions (FC)	Rp (IDR)	Average nominal expenditure per capita in a year based on food groups: cigarettes, prepared food and beverages, spices, beverage ingredients, oil and coconut, fruits, nuts, vegetables, eggs and milk, meat, fish, shrimp, squid, shellfish, tubers, grains, and other consumptions.
Economic Growth of Agriculture, Forestry and Fisheries (EG_AFF)	Percent (%)	Contribution or economic structure of each economic structure: food crops, forestry, animal husbandry, plantations, and fisheries.
Food Security (FS)	Index	Measures of several compositions that are used to calculate composite scores such as: utilization, availability, and affordability of food that describe the situation of food security in an area.

Source: elaboration by authors.

$$Y_2 = \frac{Y_1}{PPP} \qquad (3)$$

$$Y_1 = \frac{Y}{CPI} \qquad (4)$$

where Y is Expenditure per capita in a year, Y_2 is Adjusted per capita expenditure, Y_1 is Expenditure per capita constant price, *CPI* is Consumer Price Index, and *PPP* is Purchasing Power Parity.

$$EG\_AFF = \frac{GRDP\_AFF_t - \left(GRDP\_AFF_{t-i}\right)}{\left(GRDP\_AFF_{t-i}\right)} x100\% \qquad (5)$$

where *EG_AFF* is Economic Growth of Agriculture, Forestry and Fisheries, *GRDP_AFF* is Gross Regional Domestic Product of Agriculture, Forestry and Fisheries, *t* is year after, and *t–i* is base year.

$$\overline{X} = \frac{\sum_{i=1}^{3} \overline{X}_1}{3} \qquad (6)$$

where $\overline{X}$ is Average score, *i* is Each dimension, and $\sum_{i=1}^{3}$ is Value range of $0 < \overline{X} < 23$ or $0\% < \overline{X} < 100\%$.

Evaluation in explaining the IKP, the IKP score is transformed into 3 keys. If IKP < (μ – 1 σ), then the IKP in a "small". Then, (μ – 1 σ) < IKP < (μ + 1 σ), then the analyzed area is "moderate". If the IKP ≥ (μ + 1 σ), then the area has a "high" IKP.

2.2 Data

Secondary data are collected from annual reports released by government institutions (Young & Ryu 2000). Material using panel data throughout 2015 – 2021. The database of the five variables is selected and configured in a simplified unit of account. The logarithm mechanism (ln) supports 4 indicators that have different units. There is an exception for EG_AFF which is separated from other variables, considering the small value of economic growth, and it is not possible to tabulate it into ln.

2.3 Analysis Procedure

A series of statistical tools is projected to examine the relationship between SMI, Pop, FC, and EG_AFF to FS. Statistical interpretation applies comparative linear regression. In its actualization, there are two parameters:

simultaneous effect and partial effect. The econometric model is written below in Equations 7 and 8.

$$Y = \alpha + X\beta + ... + \varepsilon \qquad (7)$$

$$ln\left(Y_{FS}\right) = \alpha + ln(X_1\beta_{SMI}) + ln(X_2\beta_{Pop}) + ln(X_3\beta_{FC}) + (X_4\beta_{EG\_AFF}) + \varepsilon \qquad (8)$$

where *ln* is Logarithm, Y_{EG_AFF} is Coefficient on Food Security, α is constant, $X_1\beta_{SMI}$ is Coefficient on Small and Medium Industry, $X_2\beta_{Pop}$ is Coefficient on Population, $X_3\beta_{FC}$ is Coefficient on Food Consumptions, $X_4\beta_{EG\_AFF}$ is Economic Growth of Agriculture, Forestry and Fisheries, and ε is Residue.

The symbol "α" also represents a short term reaction and "β" indicates a long term reaction. Based on the mathematical equation above, the hypothesis testing is set at 5% on the simultaneous and partial path (Lee & Lee 2018; Pesaran 2015). After the data is converted with ln, then it is synchronized into the Statistical Program for Social Science (SPSS). The systematic assumption of the hypothesis is simulated as follows:

- **H$_0$:** SMI, Pop, FC, and EG_AFF have no effect on FS.
- **H$_1$:** SMI, Pop, FC, and EG_AFF affect FS.

3 Results and Discussion

3.1 Empirical Findings

Table 2 dissects the calculation of descriptive statistics per variable (n = 28). Overall, the five variables based on variation in descriptive statistics obtain various scores. From the diagnosis, such as kurtosis and skewness, where there are striking values (positive vs. negative). If the highest versus lowest scores are sorted for the two types of descriptive statistics, it is explained that SMI is the only variable with the highest value among the others (Kurtosis = 0.324; Skewness = 1.366). The four variables (Pop, FC, EG_AFF, and FS) have negative kurtosis. On the one hand, FC and EG_AFF are positive in skewness, where the values are 0.401 and 0.211. Although the scores of the two variables are not as high as SMI, they are better than Pop and FS which consistently have negative values. The results of the assessment found that the three attributes (mean, maximum, and minimum) were so striking. The most prominent are Pop (Mean = 600,273.500; Max. = 872,768; Min = 154,235) and FC (Mean = 648,376.107; Max. = 901,569; Min = 420,739). The analogy that underlies

the two is relatively prominent is the larger data scale than the other three variables. Quantitatively, only EG_AFF has the lowest value, both from the mean, maximum, and minimum. Specifically for the minimum value, EG_AFF is the lowest among the others.

Table 3 describes the simultaneous determination of the independent variables on the dependent variable. The regression output accomm odates the correlation score (R) in Balikpapan: 0.987, PPU: 0.970, Kutai Kartanegara: 0.952, and Samarinda: 0.689. Only Samarinda has an R value in the interval 0.50–0.69 or "strong relationship". Practically, in Balikpapan, PPU, and Kutai Kartanegara, the correlation is "near perfect", where >0.90 indicates a collective relationship. In fact, based on determination (R Square), the coefficients of Balikpapan: 0.974, PPU: 0.942, and Kutai Kartanegara: 0.907 also imply the feasibility of the model. The error terms were 2.6%, 5.8%, and 9.3% beyond the research capacity. In Samarinda, 52.6% of the variables are not discussed in this study because the value of R Square: 0.474 which only validates the relationship between SMI, Pop, FC, and EG_AFF to FS.

Referring to simultaneous causality, SMI, Pop, FC, and EG_AFF bridging a significant relationship to FS in Balikpapan ($\rho = 0.036 < 0.05$; F-statistics = 18.737), PPU ($\rho = 0.014 < 0.05$; F-statistics = 8.052), Kutai Kartanegara ($\rho = 0.027 < 0.05$; F-statistics = 4.884), and Samarinda ($\rho = 0.045 < 0.05$; F-statistics = 0.451).

Using the sample ($N = 28$), independent variables appear to have a positive impact on FS in Balikpapan, PPU, and Samarinda in the short term, but any increase in SMI, Pop, FC, and EF_AFF is negatively associated with FS in Kutai Kartanegara. Spontaneously, the more the four increased, the FS in Balikpapan: 1.564%, FS in PPU: 3.209%, and FS in Samarinda: 17.203%. The case study in Kutai Kartanegara is exactly the opposite, where the increase in the four independent variables decreases FS by 8.058%. Surprisingly, both in Balikpapan, PPU, Kutai Kartanegara, and Samarinda, independent variables proved to have no significant effect on FS.

Partially, SMI: $\rho = 0.008 < 0.05$ and FC: $\rho = 0.016 < 0.05$ had a significant effect on FS in Balikpapan. Although the coefficient is positive, Pop and EG_AFF have no significant effect on FS. Understanding Table 4, the SMI coefficient in PPU is positive, but it has no significant effect on FS. Pop and EG_AFF actually decrease FS negatively and also have no significant effect on FS. The only variable that has a positive and significant effect is FC: $\rho = 0.005 < 0.05$. Like the case in Kutai Kartanegra, EG_AFF also had a negative impact on FS and had no significant effect. Even so, Pop and FC had a positive impact. When compared between the two, Pop has a significant effect on FS: $\rho = 0.035 < 0.05$. The SMI variable reduces the performance of FS in Kutai Kartanegara and the results have no significant effect. There are similar results with Balikpapan and PPU, FC in Samarinda has a positive and significant impact on FS: $\rho = 0.046 < 0.05$. At the same time, although EG_AFF does not directly have a significant effect on FS, the impact is positive. Empirical calculations conclude that the increase in SMI and Population actually reduces FS in Samarinda not significantly.

Table 2 Descriptive statistical matrix.

Variables	Kurtosis	Skewness	Mean	Max.	Min.
SMI	0.324	1.366	385.500	1,235	117
Pop	-0.763	-0.973	600,273.500	872,768	154,235
FC	-0.333	0.401	648,376.107	901,569	420,739
EG_AFF	-0.903	0.211	2.361	7.63	-3.85
FS	-0.274	-0.290	83.020	88.74	75.35
Obs.	28	28	28	28	28

Source: verification by SPSS.

Table 3 Simultaneous regression estimation.

Items	Balikpapan	PPU	Kukar	Samarinda
R	0.987	0.970	0.952	0.689
R Square	0.974	0.942	0.907	0.474
F-statistics	18.737	8.052	4.884	0.451
Prob.	0.036	0.014	0.027	0.045
Obs.	28	28	28	28

Source: verification by SPSS.

Table 4 Partial regression estimation.

Variables	Balikpapan	PPU	Kukar	Samarinda
Constant	1.564 (0.588)	3.209 (0.492)	-8.058 (0.329)	17.203 (0.493)
SMI	0.048* (0.008)	0.091 (0.485)	-0.079 (0.308)	-0.072 (0.614)
Pop	0.017 (0.948)	-0.346 (0.473)	0.931* (0.035)	-0.962 (0.560)
FC	0.177* (0.016)	0.370* (0.005)	0.033 (0.823)	0.052* (0.046)
EG_AFF	0.001 (0.608)	-0.005 (0.707)	-0.005 (0.397)	0.000 (0.960)
Obs.	28	28	28	28

Source: verification by SPSS; Noted: $*p < 5\%$. In the context of this study, the authors used a 5% probability standard in determining whether there was significant partial and simultaneous causality or not.

3.2 Justification

Within the "market equilibrium" insight, food volumes must be maintained (FAO 2006). Thus, the quality of food availability, which is limited in the country, is effectively adjusted to import supplies (Zhou 2019). Access, utilization, and food stability are highly dependent on the development of local food commodity wisdom. The preference for the concept of nine staples in Indonesia or synonymous with "sembako", the industry plays a role in food distribution, including supply chain systems such as stock storage and sales. The reason is, if small and medium-sized industries are late in marketing food, it can hamper the supply chain which leads to an increase in the price of many products and this triggers inflation at a certain time (Darma, Pusriadi & Hakim 2018).

Referring to Figure 4, the average SMI in Kutai Kartanegara is relatively dominant (233 units) compared to SMI in Balikpapan, PPU, and Samarinda. As an illustration, SMI in Kutai Kartanegara is almost 4 times that of Balikpapan, which has 233 SMI units. Samarinda is slightly more than PPU, to be precise, the difference is 45 units or 188 units compared to 143 units. The reputation of the industry in Kutai Kartanegara is growing rapidly because it is supported by small-scale industries, such as beverages and food. There are also medium-sized industries engaged in non-metallic minerals, but now the quantity is limited. The popularity of the beverage and food industry in the area was developed by the urbanites and the down streaming of the opening of beverage and food factories. Then, non-metallic minerals are growing because the natural wealth in Kutai Kartanegara is supported by mineral heritage and abundant coal reserves. Besides, the sector that supports Kutai Kartanegara is agriculture. There are many medium-sized industrial companies in Balikpapan that process machinery and other equipment, motor vehicles, transportation equipment, electrical equipment, repair services, installation of machinery and equipment.

The intensity of SMI in Samarinda tends to grow by both types of industries, including furniture, repair services, textiles, apparel, leather, leather goods and footwear, wood, wood and woven goods, paper and paper goods, printing and reproduction of recording media, chemicals and goods from chemicals, pharmaceuticals (chemical and traditional medicines), rubber, and plastics. The lack of aggressiveness of SMI in PPU, which is far from the three cases above, is caused by residents who are concentrated in the profession in the service industry, installation of machinery, equipment, and other processing industries.

During 7 periods, the average population in Samarinda reached 839,235 people and around 651,723 people domiciled in Balikpapan, 746,195 people in Kutai Kartanegara, and 163,940 people in PPU. Rationally, although Balikpapan has a narrow area compared to Kutai Kartanegara, the population growth from 2020 to 2021 is the highest (0.76%) among others. In contrast, population growth in Kutai Kartanegara: 0.44%, Samarinda: 0.31%, and PPU as a new IKN candidate increased sharply to 0.83%. Referring to the density ratio, with an area of 512.25 km^2, the population density in Balikpapan is 1,357.32 per km^2. Then, at the level of East Kalimantan, the population density in Samarinda is the second largest. The population of Samarinda is around 716.53 km^2, so the density reaches 1,160.40 per km^2. The discourse of moving the center of a new government that has been blowing hard since a few years ago has made the PPU population density ratio increase from 61.11 per km^2 in 2020, now to 61.79 per km^2. In fact, the area of the PPU reaches 2,923.73 km^2, this is considered an anti-climax. The motive for the movement of people outside the East Kalimantan is still low, triggered
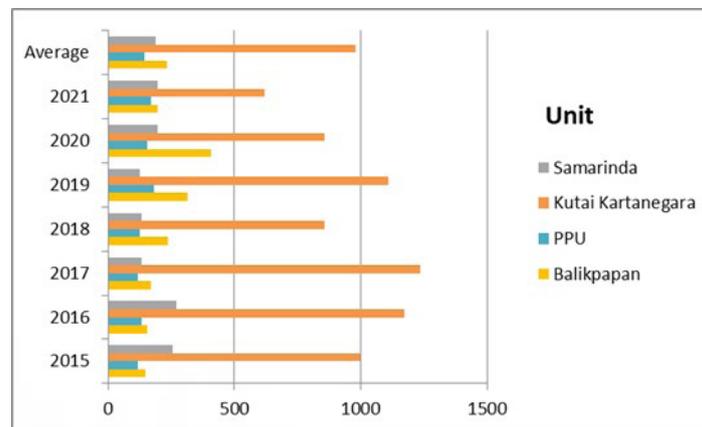
Figure 4 Chart of SMI, 2015–2021. Source: compilation from BPS – East Kalimantan Timur (2022).

by the high prices of real estate and land in PPU. Consumer interest in speculative steps in IKN is also spearheaded by a minimal investment atmosphere. It is estimated that from an area of 25,988.08 km², the population density in 2021 Kutai Kartanegara is 28.23 per km². There is a drastic decrease from 2020 to 2021 reaching 0.44%.

Although the distance between these four areas is far apart, there is a population decline in Kutai Kartanegara: -7.22% and Samarinda: -5.13%, especially from 2019 to 2021. Surprisingly, this is in contrast to Balikpapan and PPU for the same period. There, the population growth increased by 5.06% and 11.04%, respectively. This trend of population decline, when Covid-19 infects part of the population and causes an increase in the death rate (see Figure 5).

Maisonet-Guzman (2011) investigated the causality between population growth and food production operating in Oceania, Latin America, North America, Europe, Asia, and Africa. Since the 21st century, the proportion of population and agricultural growth in these agricultural areas contradict each other and are not in line with the "neo-Malthus model". Kousar et al. (2021) clarify if population growth and urbanization have a positive impact on food scarcity in Pakistan.

Valuable publication by Hjelm, Mathiassen and Wadhwa (2016) regarding GDP per capita in the share of income, supply, and food consumption in prosperity, expresses that specifically in low-income countries, there is a high gap between actual consumption and supply. The gap is different for high-income countries that are transitioning from suppressing the night, turning to empowering agriculture that allows supplementing nutritional energy (Gerbens-Leenes, Nonhebel & Krol 2010). According to Harini et al. (2021), IKP in Yogyakarta–Indonesia in the "high" qualification. For this reason, the study thought of concrete solutions related to nutritional literacy to spur

household management. At least, a positive harmonization between GDP per capita and food security in Oman (Devesh & Affendi 2020).

Household consumption, or the so-called "expenditure per capita" per year by food group, is calculated similarly to the non-food group. Complexly, the grouping phase refers to purchasing power parity: standard of living cost, lifestyle, wage level, and inflation. Figure 6 claims about the progress of expenditure per capita in Balikpapan, PPU, Kutai Kartanegara, and Samarinda which averaged IDR 776,861, IDR 587,298, IDR 556,050, and IDR 673,295. Amalia, Lestari and Nurjanana (2020) responds to the behavior of residents in East Kalimantan who tend to spend their income on non-food types rather than food. Moreover, the depletion of the population when dealing with the risk of the Covid-19 outbreak. Surprisingly, there is a spike in the nominal decline in per capita expenditure in Balikpapan: 2018 to 2019, PPU: 2020 to 2021, and Samarinda: 2017 to 2018, but this is not for Kutai Kartanegara whose per capita consumption has always increased in 7 years.

In general, there are 3 scenarios of economic growth grouped by Jayani (2019). First, "low growth" in the range of 5.3% – 5.5%. Second, "moderate growth" in the range of 5.4% – 6.1%. Third, "high growth" in the range of 5.5% – 6.5%. Figure 7 informs the graph of EG_AFF in Balikpapan, which averages 2.04%. Average growth in PPU: 0.46%, Kutai Kartanegara: 4.6%, and Samarinda: 2.69%. This means that the EG_AFF typology in these 4 regions does not meet the criteria or is under classification. On the other hand, year-on-year, EG_AFF in Balikpapan and Samarinda was categorized as "high growth" or >7%, to be precise in 2018: 7.63% and 2015: 7.62%. Likewise, with Kutai Kartanegara, whose growth was "moderate" in 2019: 5.96% and "high" in 2015: 6.75% and 2018: 6.85%.
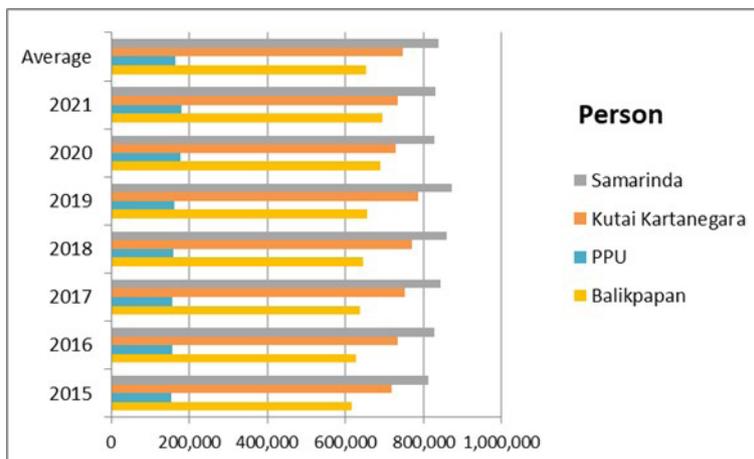
Figure 5 Chart of population, 2015–2021. Source: compilation from dari BPS – East Kalimantan Timur (2022).
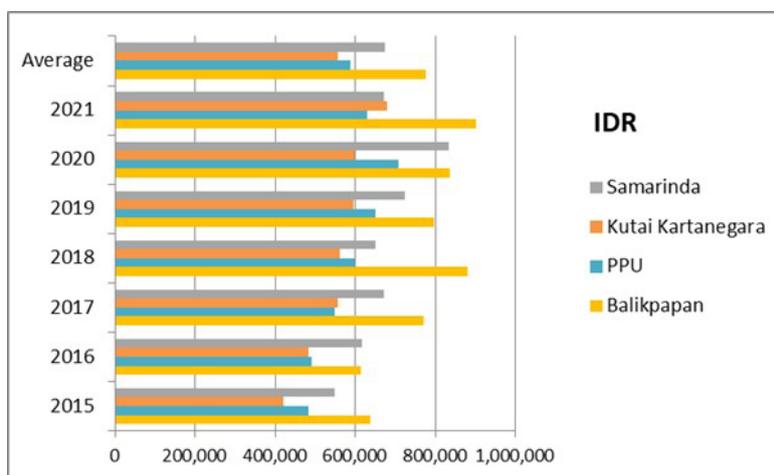

Figure 6 Chart of average expenditure per capita in a year by food group, 2015–2021. Source: compilation from BPS – East Kalimantan Timur (2022).
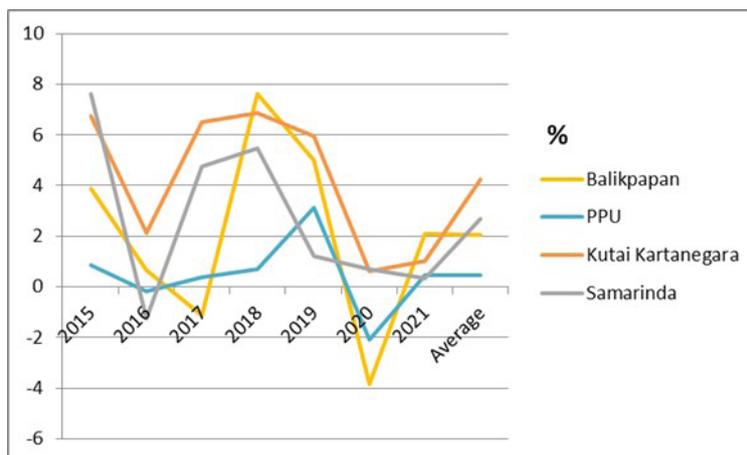

Figure 7 Economic growth of agriculture, forestry and fisheries, 2015–2021. Source: compilation from BPS – East Kalimantan Timur (2022).

In PPU, which has the largest coastal record compared to the 3 regions, but the small contribution of this sector to the EG_AFF aggregate in PPU, is triggered by traditional marine fishing cultivation. In Balikpapan, which also has a large marine area, fishermen generally switch to adopting modern techniques and leaving conventional fishing methods. Furthermore, despite the limited land area, residents in Balikpapan, who work in agriculture, are relatively adaptable to developing secondary and tertiary agricultural and plantation products. The high EG_AFF in Kutai Kartanegara is getting more advanced, driven by the large area of sub-agriculture: food crops, plantation cultivation such as industrial forest plantations and productive factory farms. The expansion of river fish farming in Kutai Kartanegara is also supported by the longest Mahakam River Basin from downstream to upstream. The strength of EF_AFF in Samarinda, whose percentage growth has always been positive from 2015 to 2021, is supported by the services of skilled workers. The high level of population density and limited agricultural land in Samarinda, actually stimulate competitive opportunities. With the talent and quality of human resources in agricultural workers, stimulating the flow of investment, quality human resources, and improving the labor market, so that farmers outside the Samarinda area are relatively recruiting agricultural workers from Samarinda.

Fernandes and Samputra (2022) explore the positive correlation in the causal relationship between food security and economic growth in many nations pursuing macroeconomic policies. Food security has an impact on economic growth in developing markets, especially those based on dry land (Manap & Ismail 2019). The attention of this paper also relates the causality between economic growth and food security. Regardless of the relationship, there are still few papers that call for the impact of economic growth on food security, whereas scholars are actually measuring the impact of food security on economic growth (Koning 2017; Świetlik 2018; Yudhatama et al. 2021).

Naturally, humans are very dependent on food. The most primary cycle of human needs is food security. Besides economic factors, food security is determined by security, social and political. To anticipate hunger, malnutrition, death, discrimination and stunting, food supply is the most important health instruction that must be considered by the competent authorities. With the decision to relocate the old government center to East Kalimantan, IKN is speculated to be an ambitious mega project. Ideas that must be encouraged and implemented now about new breakthroughs to open up large areas of agricultural production, build transportation for the food chain, collaboration between food-related elements, open trade routes in every branch that are close

to residential areas, and empower the farmer. Apart from functioning as a regulator, the government also mediates and introduces residents to implementing urban farming.

Initially, the relocation of the center of government to a new location did not automatically bring drastic changes. All divisions must be addressed and complied with, including food security which requires a long transition. From the landscape described in the previous paragraph, only a few countries have succeeded in integrating sustainable food sovereignty amid the demands for expensive transfer fees. Anuada and Melodillar (2017) and Potts (1985) revealed that the new enthusiasm after the transfer of the new capital was shown by the Philippines (from Quezon to Manila) and Malawi (from Zomba to Lilongwe) which succeeded in restoring the economy through food stability. By shaping the business climate, food estate, competitiveness, food diversification, and the skills of farmers, this will trigger positive progress towards food security. Contrary to the article written by Schatz (2004) who considered that the failure of relocation in Kazakhstan (from Almaty to Astana) was caused by food problems. This situation is a dilemma considering that the activities of the Capital center are adjusted based on social routines, commercial facilities, public spaces, and logistics centers with high economic transactions, but domestic food security is neglected.

4 Conclusion

Looking at the urgency, there is not much scientific literature that focuses on food security and its relation to economic, demographic, and welfare elements. This study distributes knowledge sharing related to integration in small and medium industries, population, food consumption, and economic growth of agriculture, forestry and fisheries on food security in the selected IKN clusters. The empirical argument finds that the positive relationship between independent variables on food security is explained by a simultaneous effect. The more the four of them increase, it makes food security significantly. Talking about the partial linkages, small and medium industries, population, food consumptions, and economic growth of agriculture, forestry and fisheries, have a positive impact on food security in Balikpapan, PPU, and Samarinda in the short term. It is clear that only Kutai Kartanegara has had a negative effect. The similarity in the short term in the IKN cluster, these four variables proved to have no significant effect on the sustainability of food security. In the long term, this finding concludes that in a positive relationship, small and medium industries and food consumptions have a significant effect on food security in Balikpapan. Uniquely, food consumption also has a positive and significant impact on PPU and

Samarinda. Case study from Kutai Kartanegara, regression analysis witnessed a significant positive relationship between population and food security.

From the research output, food security is not only centered on food supply, but also about the distribution system and consumption patterns. However, to regulators at the center, local authorities need to make decisions related to integral agrarian reform. Weak technocratic policies in food security, recommends designing food productivity management that does not only rely on seasonal agricultural types, but also maneuvers to annual agricultural maintenance.

In the sustainability process of the food security discipline, insights in the context of the approach are considered. In this momentum, initiate and reference for future study directions that discuss the economy, demographics, and welfare of food security in IKN. Although there are doubts that loom over food security at an extreme level, it is more educative for next publications to highlight other dimensions beyond the models reviewed.

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6 References

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Conflict of interest

The authors declare no conflict of interest.

Data availability statement

All data included in this study are publicly available in the literature.

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