Exploring Key Factors of Idle Land as Food Estate Area using Delphi Method

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ARTICLE INFO	ABSTRACT
	In the context of globalization and climate change, research on determining the location of utilization of Indonesian Navy idle land is becoming increasingly relevant to face new challenges in agriculture and the environment. The efforts to optimize the utilization of idle land through quality research will provide long-term benefits for the sustainability of natural resources and food resilience. In addition, the sustainability of the logistical aspects of idle land production can support the ability to carry out the Navy's operational tasks. This research aims to identify key factors in empowering Indonesian Navy idle land as a food estate area to support national food resilience. Land Use Planning Theory, and resilience theory support this research. Qualitative analysis is used as a research method supported by the Delphi method. The Lantamal III working area was used as the research locus, because in this area there are still several areas as idle land. The results of the identification of factors using the delphi method approach, obtained six related factors namely 1) Soil Fertility; 2) Risk of Natural Disaster; 3) Labor; 4) Agricultural Technology; 5) Infrastructure Access; 6) Financial. Utilization of Indonesian Navy idle land is driven by soil fertility, manageable risk of natural disasters, abundant labor supply, understanding of agricultural technology, good infrastructure access, and good financial conditions.

1. Introduction.

President Jokowi officially appointed Indonesian Defense Minister Prabowo Subianto as the 'leading sector' in the national food estate project on 13 July 2020. The term "food estate" refers to the idea of food development that is incorporated into a certain industry, such as plantations, agriculture, coffee, rubber, cocoa, and spices (cinnamon, nutmeg, cloves) (Fauzan et al., 2023). Food estate development is expected to contribute a large portion of Indonesia's food needs in the face of a food crisis in the coming years (Ngongo et al., 2023). Given Indonesia's size and the possibility of its effects spreading to other important areas, the food crisis is one of the most concerning challenges. This will certainly threaten national food resilience. As

an effort to overcome the declining agricultural land area, the fulfillment of land needs can at least be anticipated by utilizing idle land.

The Indonesian Navy itself has several idle lands that can be applied in the process of developing food. The Indonesian Navy itself has opened 796.3 hectares of idle land throughout Indonesia. In the Lantamal III working area there are still a lot of undeveloped, idle areas that are not being used., including in the Bogor, Padalarang, Banten, Lampung, Cirebon and several other areas with an area of 145.8 hectares. By utilizing the Indonesian Navy's idle land for food estate, it can help achieve food sovereignty, reduce dependence on food imports, and maintain national food resilience. The construction of a food estate on the Indonesian Navy idle land Land can serve as a venue for research and innovation in agriculture, including the development of superior plant varieties, sustainable agricultural techniques, and efficient management of natural resources. However, there has been no study on the determination of the utilization of Indonesia Navy idle land in supporting the food

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estate program.

In their research, Anggriana and Lusi (2022) explain the impact of MIFEE (Merauke Integrated Food and Energy Estate) implementation. Padagang et al (2023), explained about Community Empowerment through the Food resilience Land Clearing Program in Beka Village as a Pilot Village. Rumagit and Memah (2018) also explained about the Utilization of Sleeping Land to Improve Agricultural Business in Walian Satu Village, Tomohon City. Meanwhile, Dusni (2021) in his research explains the stages of community empowerment through the utilization of idle land into tourist attractions in Jorong Kaluang Tapi Nagari Koto Tanggah, Tilatang Kamang District, Agam Regency and its impact on the community. Therefore, it is necessary to determine the empowerment of Indonesian Navy idle land as a food estate area to support national food resilience.

Figure 1: One of the Indonesian Navy's idle lands in Cariu, Bogor.

Source: Authors.

The research about determining the location of utilization of idle land of the Indonesian Navy has a significant impact on regional and agricultural development. Choosing the right location to utilize idle land can increase agricultural productivity, reduce losses due to soil erosion, and support environmental sustainability. Decisions related to land use can be based on valid and measurable data. In the context of globalization and climate change, research on determining the location of utilization for the Indonesian Navy's idle land is becoming increasingly relevant to face new challenges in agriculture and the environment. Efforts to optimize the utilization of idle land through quality research will provide long-term benefits for the sustainability of natural resources and food resilience. In addition, the sustainability of the logistical aspects of idle land production can support the ability to carry out the Indonesian Navy's operational tasks.

Based on this, this research raises the main problem of what factors influence the empowerment of Indonesian Navy idle land as a food estate area to support national food resilience. This research is supported by Land Use Planning theory, and resilience theory. The qualitative method is used as a research method supported by the delphi method. The Lantamal III

working area is used as a research locus, because in this area there are still several areas as idle land.

This research is important to execute, by utilizing idle land as a food estate area, it can significantly increase food production and reduce dependence on food imports. This research analyzes the potential of idle land to be developed as a food estate, this research will help in optimizing the utilization of existing natural resources. This will support efficient food production and sustainable land management. The development of food estate areas from idle land can also have a positive impact on the local economy, such as the creation of new jobs and increased income for local communities.

2. Literature Review.

2.1. Land Use Planning Theory.

Land use planning theory is a basic concept in urban and regional planning that aims to guide the development and management of land resources in a sustainable and efficient manner (Almeida, Costa and Nunes da Silva, 2017). One of the key principles of land use planning theory is the recognition that land is a limited and valuable resource that must be carefully managed to meet the needs of current and future generations (Asur and Alphan, 2018). This may involve zoning regulations, infrastructure development plans, conservation initiatives, or other interventions aimed at optimizing the use of land resources (Aubrecht, Sergio Freire and Klaus, 2012). Land use planning theory serves as an important framework to guide sustainable and equitable land development practices (Ahmad et al., 2023). It includes spatial analysis, zoning regulations, comprehensive planning, stakeholder engagement, environmental considerations, and social justice principles to address the complex challenges associated with land use management. By integrating these components, planners can facilitate balanced growth, conserve natural resources, and enhance the resilience and liveability of communities for current and future generations.

2.2. Resilience Theory.

At its core, resilience theory argues that resilience is not a fixed trait but rather a dynamic process involving interactions between individuals and their environment (Greene et al., 2004). It recognizes that resilience is influenced by a complex interaction between internal factors (such as cognitive abilities, coping strategies, and personality traits) and external factors (such as social support, economic resources, and environmental conditions). One key aspect of resilience theory is the focus on protective factors that promote resilience in individuals and systems. These protective factors can include personal attributes such as optimism, self-efficacy, and problem-solving skills, as well as external resources such as social support networks, access to healthcare, and economic stability (Laboy and Fannon, 2016).

Resilience theory also highlights the role of adaptive processes in enhancing resilience. Adaptive processes refer to the ability of individuals and systems to adjust their behaviors, attitudes and strategies in response to changing circumstances.

This flexibility enables effective problem-solving, goal-setting and decision-making in the face of adversity (Southwick et al., 2014). By encouraging adaptive processes, individuals can build their capacity to navigate challenges and setbacks successfully. By focusing on protective factors, adaptive processes and learning from experience, resilience theory provides valuable insights into how resilience can be nurtured and maintained over time (Van Breda, 2018)

3. Methodology.

The type of research used in this study is qualitative research. Qualitative method as an approach to identify related factors by delphi assistance. Delphi data analysis is supported by Nvivo software and Microsoft Excel. The research will be conducted over a period of six months. During this time, contact was made with sources related to the research. Data will be obtained from seven expert sources. The research will be aimed at the Jakarta Lantamal III working area, because in this area there are still some areas as idle land.

3.1. Delphi Method.

The delphi method is a methods where the decision-making process involves several experts. The experts are not brought together directly (face to face), and the identity of each expert is hidden so that each expert doesn't know the identity of the other experts. This aims to avoid the dominance of other experts and can minimize biased opinions (Al-Jawhar and Rezouki, 2012). The delphi method is defined as a group process that involves interaction between a researcher and a group of experts on a particular topic through the help of a questionnaire. This method is used to gain consensus on future projections/trends using a systematic information gathering process (Schippmann, 2015). This method is useful when the opinions and judgments of experts and practitioners are needed in solving problems. This is especially useful when experts cannot be present at the same time. This method collects judgments about complex matters when precise information is not available (Nercessian, 2019).

The data collection process in the Delphi method has a systematic approach but is different according to the purpose and structure of each method. In the Delphi method, data collection begins with the selection of expert panels who are relevant to the research topic. These experts are then asked to complete a questionnaire in several rounds. There are four important stages in the Delphi method, namely (Shi et al., 2020): a) Exploration of opinions; b) Summarizing the experts' opinions and communicating them back; c) Seeking information about the experts' reasons for the opinions expressed; d) Evaluation.

3.2. Content Validity Index (CVI).

Data processing using CVI for the Delphi technique. A methodical way of evaluating the content validity of items assessed by a panel of experts is to use the Content Validity Index (CVI) in conjunction with the Delphi method data processing. (Kovacic, 2018). Within the Delphi process, data is collected through several rounds of questionnaires which experts provide their assessment of the significance of each item in respect to the study subject. After each round, the experts' responses were analyzed to identify those things that obtained consensus on their content validity. (Sinclair et al., 2020).

CVI was employed to measure the degree to which the expert panel agreed on the significance of the items. Each item is rated by experts on a specific scale (e.g., 1-5, where 1 = not relevant and 5 = very relevant). The CVI is calculated by dividing the number of experts who gave a high rating (4 or 5) to each item by the total number of experts who rated the item. The individual item CVI value (I-CVI) indicates the proportion of experts who consider the item to be valid. In addition, the scale CVI value (S-CVI) can be calculated as the average of the I-CVI for all items, providing a measure of the questionnaire's overall content validity. (Coimbra et al., 2021).

4. Results.

Surabaya, The Indonesian Navy has 14 Main Naval Bases (Lantamal) spread in several regions throughout Indonesia including Lantamal III Jakarta. Lantamal III Jakarta has a strategic value with the working area overshadowing the national capital, has the Sunda Strait as one of Indonesia's strategic straits and coke points. The working area of Lantamal III oversees the working areas of Lanal Palembang, Lanal Lampung, Lanal Babel, Lanal Banten, Lanal Cirebon, Lanal Bandung and waters along the Jakarta Bay and Thousand Islands.

Figure 2: Jakarta Lantamal III Working Area.
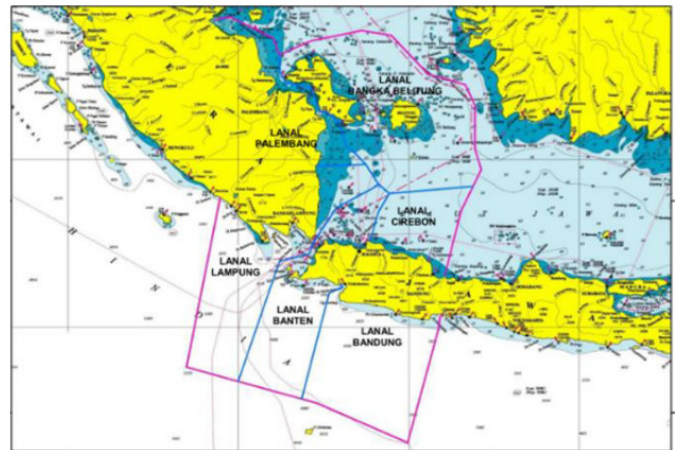
Source: Kusuma et.al (2021).

Factor identification using the Delphi Method with the assistance of NVivo software involves the integration of qualitative techniques to analyze data more efficiently and in depth. In the initial stage, researchers collected data through a series of rounds of Delphi questionnaires designed to identify and clarify important factors related to the research topic from several experts. The combination of the Delphi method and NVivo provides advantages in the processing and analysis of qualitative data, increasing the reliability and validity of the study's result.

Table 1: Results of the first, second, and third rounds of expert opinion.

No	Factor	Round 1		Round 2		Round 3	
		CVI	Result	CVI	Result	CVI	Result
1	Soil Fertility	0.86	Very Valid	0.86	Very Valid	0.86	Very Valid
2	Water Availability	0.57	Less Valid				
3	Land Topography and Slope	0.86	Very Valid	0.71	Less Valid		
4	Market Accessibility	0.57	Less Valid				
5	Risk of Natural Disaster	0.86	Very Valid	1.00	Very Valid	1.00	Very Valid
6	Government Policy	0.43	Less Valid				
7	Environmental Sustainability	0.71	Less Valid				
8	Labor	0.86	Very Valid	0.86	Very Valid	1.00	Very Valid
9	Agricultural Technology	1.00	Very Valid	1.00	Very Valid	0.86	Very Valid
10	Infrastructure Access	0.86	Very Valid	1.00	Very Valid	1.00	Very Valid
11	Social and Cultural	0.86	Very Valid	0.57	Less Valid		
12	Financial	0.86	Very Valid	0.86	Very Valid	1.00	Very Valid

Source: Authors.

In the first round, seven expert panels received a questionnaire by google form with a description and explanation of the research and its purpose. The questionnaire consisting of 12 variables as assessment tools was distributed to the experts using a Likert scale of 1-5, with an estimated completion time of 10-15 minutes. In the first round of review, Item-CVI ranged from a minimum of 0.43 to a maximum of 1, which validated every component of the instrument. In the first round, four things were removed from the subfactors (Water availability, Market accessibility, Government policy, Environmental sustainability), from the first round delphi results obtained from 12 items to 8 items. The four subfactors were rejected because they had CVI values below 0.78.

In the following round, experts were requested to rank the CVI of 8 items. Item-CVI (I-CVI) ranged from a minimum of 0.57 to a maximum of 1, which validated all items of the instrument using a Likert scale of 1-5, estimated completion time of 10-15 minutes. The results indicated that all dimensions were fundamental to the building of the assessment tool as the mean importance rating of each dimension was greater than 3 (mean). In the second round, 2 items were removed from the sub-criteria (Topography, Socio-Culture). The outcome of the second round obtained from 8 items to 6 items.

After reformulation, the instrument was sent to a third round of evaluation to assess final validity with an estimated completion time of 10-15 minutes. Findings indicated that all dimensions were fundamental to the building of the assessment tool as the mean value of each dimension's importance rating was greater than 3 (mean). For almost all items, the I-CVI value was 1, which represents 100% agreement among experts with an S-CVI of 86%. The I-CVI was rated as excellent, thus completing the overall validity stage. Furthermore, no new round of evaluation was required as all items fell into the valid and highly valid categories and had met the agreement regarding the delphi. A Result of the delphi analysis, six related factors were obtained, namely 1) Soil Fertility; 2) Risk of Natural Disaster; 3) Labor; 4) Agricultural Technology; 5) Access to Infrastruc-

ture; 6) Financial.

5. Discussion

Determining the location of TNI AL idle land in favor of the Food Estate program involves various factors that are very important to ensure efficient and effective operations. As a result of the criteria identification, six factors pertaining to the place determination were obtained, i.e.:

a. Soil Fertility.
   The impact of soil fertility factors on the utilization of idle land in the Indonesian National Army (TNI) environment is quite large while figuring out the potential productivity and sustainability of agriculture. Soil fertility includes various components like nutrient availability, pH level, organic matter content, and soil structure, all of which are important for plant growth. Fertile soil provides essential nutrients that plants need to thrive, including nitrogen, phosphorus and potassium. If TNI's idle land has high soil fertility, it can be efficiently utilized for farming or other agricultural activities, thereby contributing to food resilience and reducing dependence on external food supplies.

b. Natural Disaster Risk.
   The influence of natural disaster risk factors on the utilization of idle lands in Transnational Institutions (TNI) is a crucial consideration in land management and development. Natural disasters such as floods, earthquakes, hurricanes and forest fires can pose serious risks to idle lands, affecting their suitability for various uses. This risk factor may deter potential investors or developers from utilizing idle land due to concerns over vulnerability to natural calamities.

c. Labor.
   The availability and skill level of labor determine the feasibility and efficiency of converting idle land into productive land. A sufficient supply of labor is essential for

an assortment of agricultural activities, including land preparation, planting, maintenance, and harvesting. If the military have access to adequate and skilled labour, they can effectively manage and cultivate idle land, resulting in increased agricultural yields and resource optimization. Skilled labor is essential in the use of modern agricultural techniques and technologies that may rise productivity and sustainability.

d. Agricultural Technology.

The use of agricultural technology also addresses challenges related to labor shortages and skills gaps within the TNI. Advanced machinery and automated systems can reduce reliance on manual labor, permitting the administration of larger areas of land with fewer workers. Technology such as drones to monitor crop health and automated irrigation systems can provide real-time data and automate routine tasks, making it easier for personnel to perform other important tasks. Furthermore, the application of technology can compensate for the absence of extensive agricultural expertise among TNI personnel, permitting them to achieve high levels of productivity even with limited farming experience.

e. Infrastructure Access.

Infrastructure access impacts the long-term sustainability and scalability of agricultural projects on idle land. Proper storage facilities help reduce post-harvest losses by keeping products fresh and safe from pests. Market access through good transportation networks ensures farmers can market their goods at competitive prices, thus encouraging continued investment in agricultural activities.

f. Financial.

Financial factors influence the possibility of improving and expanding agricultural activities on idle land. With adequate financial resources, TNI can invest in advanced agricultural technologies, personnel training, and infrastructure improvements, all of which contribute to higher productivity and efficiency. Financial stability also allows TNI to explore diversification of agricultural ventures, such as high-value crops or animal husbandry, which can increase profitability and improve food resilience. Securing adequate financial resources is therefore critical for TNI to not only initiate but also sustain and expand the productive use of idle land, thereby maximizing its contribution to national development goals and food resilience initiatives.

5.1. Implications.

The study of the crucial elements in determining land that is not used as a food estate to support food resilience has several theoretical implications. First, it provides insights into land use theory, particularly the principles of land suitability and optimal utilization of marginal or underutilized land by emphasizing the importance of assessing soil fertility, water resources, climatic conditions, and topographic features to convert unused land into productive agricultural areas. Secondly, this research highlights the theoretical framework of sustainable development, focusing on how to utilize unused land without causing adverse impacts on the environment. Third, the research supports the idea that strategic land use can improve food resilience, create jobs, and stimulate local economies linked to theories of agricultural economics and rural development, which explore how agricultural productivity can drive socio-economic growth and reduce poverty.

Practical implications. First, farmers can use the insights from this study to select the most appropriate crops and farming methods for a particular region by understanding the traits of the land in selecting crops that best suit the soil and climatic conditions, resulting in higher yields and more efficient use of inputs such as water and fertilizer. Second, This research promotes sustainable agricultural practices by emphasizing the importance of environmental factors. Third, Policy makers can use the findings from studies to create regulations that promote the usage of land that is not used for food production. Fourth, Governments and organizations can allocate resources more efficiently by focusing efforts on the most promising areas for agricultural development, including directing funding, research and infrastructure development to areas identified as suitable for food farming, ensuring that investments yield maximum benefits.

Conclusions.

In the Lantamal III working area there are still many abandoned land that cannot be utilized, among others inside the Bogor, Padalarang, Banten, Lampung, Cirebon and several other areas with an area of 145.8 hectares. But there isn't study about the determination of utilization of idle land of the Indonesian Navy in supporting the food estate program. This study aims to identify key factors in the empowerment of idle land of the Indonesian Navy as a food estate area to support national food resilience. This study is significant., by utilizing idle land as a food estate area, it can significantly increase food production and reduce dependence on food imports. From the research results, six related factors were obtained, namely 1) Soil Fertility; 2) Natural Disaster Risk; 3) Labor; 4) Agricultural Technology; 5) Infrastructure Access; 6) Finance.

Limitation and Future Work.

Studies on the key factors in determining which land is not used as food estate to support food resilience, while valuable, has several limitations. First, accessibility and Quality of Data. Accurate and comprehensive data on soil quality, water resources, climatic conditions and land ownership are difficult to obtain. Incomplete or outdated data can lead to inaccurate land suitability assessments, impacting the effectiveness of food estate planning. Future research could address this with more accurate data.

Secondly, key factors identified in one region may not be applicable in other regions due to variations in because of environmental, socio-economic and cultural conditions. This limits

the ability to be applied broadly the research findings, requiring local studies to tailor recommendations to specific contexts. Future research could further discuss the influence of cultural, environmental, socio-economic elements affecting the sustainability of TNI idle land utilization.

Third, converting idle land into productive agricultural plantations requires large investments. The viability from an economic standpoint of such projects, including costs associated with land preparation, infrastructure development, and ongoing maintenance, is not always adequately addressed in research studies. Future research could address the feasibility study of some land as a food estate.

Acknowledgements.

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