SAFSES
Social Agriculture, Food System, and Environmental Sustainability
IASSSF 3(1): 1–17
SAFSES 3047-8022

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

Analysis of potential and development strategies for bird's eye chili (*Capsicum frutescens*) agriculture

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Received Date: December 20, 2025 Revised Date: February 13, 2026 Accepted Date: February 19, 2026

ABSTRACT

Background: Batam City, as an industry and service-based metropolitan area, exhibits high dependence on external food supply, reflected in its agricultural sector's contribution of merely 1.45%. This research aims to analyze the potential and formulate a development strategy for bird's eye chili (*Capsicum frutescens*) as a leading local commodity in Galang and Nongsa Districts to support food security. **Methods**: This qualitative research with an intrinsic case study strategy utilized secondary data from the Batam City Central Statistics Agency (2021-2025) and SWOT analysis. **Findings:** The findings reveal complementary potential between the two districts. Galang, with its eight agriculture-based villages, represents an ideal production base, while Nongsa, adjacent to tourism areas and the airport, has the opportunity to become a marketing and agritourism hub. **Conclusion**: The local market is highly promising for bird's eye chili, with household expenditure on vegetables at 3.74% and an educated population supportive of technology adoption. However, key challenges include sharp fluctuations in harvested area, land conversion pressure, and inter-island logistics vulnerability. **Novelty/Originality of this article:** The effective bird's eye chili development requires an integrated strategy: establishing Galang as a certified production center and Nongsa as an agritourism zone, supported by direct market partnerships, digital technology utilization, and policy protection for sustainable agricultural land. This model offers a concrete pathway for economic diversification and food security in an industrial archipelagic region.

KEYWORDS: bird's eye chili; food security; urban agriculture; swot analysis.

1. Introduction

Batam City, a metropolitan area with an economy dominated by the industrial and service sectors, faces a strategic challenge in achieving local food security. Its high dependence on external food supplies, evidenced by the agricultural sector's minimal contribution, makes economic diversification and the strengthening of its agrarian foundation imperative. To address this vulnerability, a targeted approach focusing on high-value, nutrient-dense crops suitable for urban cultivation is essential. Such an approach must prioritize commodities that can thrive within spatial constraints while directly impacting both economic stability and dietary patterns. In this context, horticultural

Cite This Article:
Arista, N. I. D., & Susanto, D. N. (2026). Analysis of potential and development strategies for bird's eye chili (*Capsicum frutescens*) agriculture. *Social Agriculture, Food System, and Environmental Sustainability, 3*(1), 1-17. https://doi.org/10.61511/safses.v3i1.2026.3302

products with robust cultural and market demand emerge as strategic leverage points for enhancing food system resilience (Ahmad et al., 2026).

The strategic importance of bird's eye chili in Batam's food security context warrants particular attention. As a staple ingredient in Indonesian cuisine and an essential component of traditional dishes, bird's eye chili represents more than merely a horticultural commodity—it constitutes a critical element of culinary culture and household food expenditure. The commodity exhibits characteristics of high economic value, characterized by consistent demand elasticity and relatively stable market prices despite seasonal fluctuations (Rozi et al., 2023). Moreover, bird's eye chili cultivation offers substantial advantages in terms of land-use efficiency, as it generates high returns per hectare compared to other crops, making it particularly suitable for land-constrained metropolitan environments. The nutritional profile of bird's eye chili, rich in vitamins A and C, capsaicin, and antioxidants, further elevates its significance beyond economic considerations, positioning it as a commodity that contributes to both food security and nutritional adequacy within urban populations (Ali et al., 2025; Azlan et al., 2022).

Paradoxically, despite Batam's geographical position within an archipelagic region potentially conducive to agricultural production, the city remains heavily dependent on inter-island supply chains for this essential commodity. Current market data reveals that the majority of bird's eye chili consumed in Batam originates from external sources, primarily from Sumatra's mainland provinces such as Lampung and North Sumatra, as well as from Java, resulting in price volatility linked to transportation costs, supply chain disruptions, and seasonal availability constraints. This external dependency manifests in several problematic dimensions. First, transportation across maritime routes introduces significant cost margins—estimates suggest that logistics and distribution expenses account for approximately 30-40% of the final retail price in Batam's markets. Second, the reliance on external supply chains exposes consumers to vulnerability during periods of regional production failure, adverse weather conditions affecting inter-island transportation, or macroeconomic shocks that disrupt distribution networks. Third, seasonal scarcity during planting or transitional periods creates price spikes that disproportionately affect lower-income households, for whom vegetables and spices constitute a substantial portion of monthly food expenditure.

This persistent reliance on imported bird's eye chili, despite the presence of agricultural land in districts such as Galang and the emerging development potential in areas like Nongsa, underscores a fundamental misalignment between resource availability and utilization. The economic implications of this dependency are substantial. Based on household consumption survey data from BPS (2024), Batam residents allocate a significant proportion of their food expenditure to vegetables includes bird's eye chili representing one of the most frequently purchased items. When multiplied across the metropolitan population, the aggregate outflow of financial resources for a commodity that could feasibly be cultivated locally represents a considerable missed opportunity for regional economic retention and multiplier effects. Furthermore, the current supply configuration limits opportunities for employment generation in the agricultural sector, perpetuating the structural imbalance of economic activity concentrates in industrial and service sectors, leaving minimal space for diversified livelihoods, particularly in sub-districts where land and labor resources suitable for agriculture remain underutilized (Kalogiannidis et al., 2023).

The development of local bird's eye chili production in Batam thus addresses multiple interconnected challenges simultaneously. From a food security perspective, local production would enhance availability, accessibility, and stability of supply, reducing vulnerability to external shocks. From an economic development standpoint, it would create value addition opportunities, retain purchasing power within the local economy, and generate employment in both production and ancillary services such as processing, packaging, and distribution. From a spatial planning perspective, strategic cultivation in designated districts could serve dual purposes: preserving green spaces in an increasingly urbanized landscape while maintaining productive agricultural zones that contribute to

ecosystem services. Finally, from a policy coherence viewpoint, promoting local bird's eye chili aligns with national food sovereignty objectives, regional development priorities emphasizing economic diversification, and municipal goals of enhancing resilience against external dependencies (Kementerian Koordinator Bidang Pangan, 2025). These multifaceted benefits provide compelling justification for prioritizing bird's eye chili as a focal commodity in Batam's agricultural development strategy, particularly within districts such as Galang and Nongsa, which possess differentiated comparative advantages conducive to establishing an integrated production-marketing system.

Research in this area is critical because building food resilience in a densely populated industrial archipelago involves not just ensuring food availability but also stabilizing prices and empowering local economies amidst the dominance of non-agricultural sectors. This paper examines the potential for developing horticulture, specifically high-value and strategic commodities like bird's eye chili (*Capsicum frutescens*), as a tangible solution.

The discourse on agriculture in urban and industrial areas often centers on land-use competition, economic viability, and sustainability. Several studies, such as those by Colson-Fearon & Versey (2022), indicate that urban farming can play a significant role in micro-scale food supply. Meanwhile, Olumba et al. (2025) argues that primary constraints lie in access to land and water, while Pradhan et al. (2024) suggests integration with modern markets is key to success. However, a gap remains in conducting a comprehensive analysis that maps the specific potential of locations within an archipelagic metropolitan region, considering its unique demographic structure, consumption patterns, and spatial configuration. Previous research has predominantly focused on general technological implementation or social aspects, leaving a need for designing commodity-specific development strategies grounded in regional macro-data analysis and micro-area potential.

This research aligns closely with the work of Duan et al. (2021), who examined horticultural cluster models in urban buffer zones, as this study also considers the aspect of regional grouping based on function. However, this study differentiates itself by specifically investigating two districts with distinct characteristics within a single administrative region, the agrarian Galang and the developing Nongsa, serving as a policy laboratory. Consequently, the contribution of this study lies in proposing a strategy of differentiation and synergy between a production zone (Galang) and a marketing zone (Nongsa) within an integrated bird's eye chili agribusiness system in Batam. The significance of this study is threefold. First, from an economic perspective, bird's eye chili is a commodity with inelastic demand and a guaranteed market share, as reflected in Batam households' significant expenditure allocation for vegetables and spices. Second, from a social perspective, this development has the potential to absorb labor and empower communities in administrative areas where villages still rely primarily on agriculture for income. Third, from a policy standpoint, this research can serve as a reference for formulating precise, data-driven food security programs.

This research investigates the potential and development strategy for bird's eye chili as a leading local commodity in Galang and Nongsa Districts, Batam City. This paper aims to analyze the development potential of bird's eye chili in these two districts in terms of land availability, human resources, and market access; to identify the main inhibiting and supporting factors in its development; and to formulate effective strategies for sustainably optimizing this potential. This paper analysis employs statistical secondary data to identify challenges and opportunities using SWOT analysis, and ultimately formulate contextual strategic recommendations. It presents a case study of two districts within one city, representing the dynamic between traditional agrarian and developing urban areas, with the expectation that the findings will provide a tangible contribution to strengthening Batam's local food security.

2. Methods

This study employs a qualitative approach, aiming to deeply understand the potential and dynamics of bird's eye chili development in two specific locations with distinct

characteristics within Batam City. The intrinsic case study was selected due to the researcher's inherent interest in understanding this unique case, the effort to develop an agricultural commodity in the heart of an industrial region, rather than to illustrate a general phenomenon. The research design is descriptive-analytical, focusing on describing the subject's condition based on available secondary data and subsequently analyzing it to formulate a strategy.

The research relies entirely on publicly available secondary data. The primary data sources consist as follows: first, official government documents, all quantitative data analyzed were obtained from publications by the Batam City Central Statistics Agency/*Badan Pusat Statistik (BPS) Kota Batam*. This includes data on employment by sector, harvested area of vegetable crops (specifically bird's eye chili), Gross Regional Domestic Product (GRDP) by business field, population characteristics (education, expenditure, poverty), administrative data (number of villages/sub-districts per district by primary income source), and disaster data per district. Secod, literature review, journal articles, books, previous research reports, and other scientific publications discussing urban agriculture, chili agribusiness, food security in archipelagic regions, and regional development.

The study locations were selected purposively based on specific considerations to obtain a comprehensive overview. Galang District was chosen as it is the only district in Batam where all (8 out of 8) villages/sub-districts have a majority of the population's primary income source from the agricultural sector, signifying its role as the agricultural core area of Batam. Nongsa District was selected as it represents a developing transitional or peri-urban area with mixed characteristics, its proximity to strategic areas (airport, tourism) also makes it representative for studying land conversion pressure and closer market opportunities.

Data analysis was conducted in stages using the following methods: first, quantitative descriptive analysis, Central Statistics Agency/*Badan Pusat Statistik (BPS)* statistical data were processed, presented in tables and narrative, and described to provide an objective overview of demographic, economic, agricultural, and consumption conditions in Batam City in general, and implicitly in the two districts (based on aggregated city data and district characteristics). Second, comparative analysis, used to compare the potential, opportunities, and challenges between Galang and Nongsa Districts, based on indicators such as village economic base, disaster vulnerability (based on historical data), and their position within Batam's urban spatial structure. Third, SWOT analysis (Strengths, Weaknesses, Opportunities, Threats), this method formed the core of the strategic analysis. Factors identified through descriptive and comparative analysis were categorized into the four SWOT quadrants—internal Strengths and Weaknesses, and external Opportunities and Threats. The resulting SWOT matrix was then used as the basis for formulating four contextual strategic alternatives (SO, ST, WO, WT).

This research has several limitations. First, the analysis is based on aggregated city-level secondary data; thus, district-specific data such as available land area, actual chili productivity, and the socio-economic conditions of farmers in Galang and Nongsa were obtained indirectly through the interpretation of broader data. Second, ony several field surveys or interviews, the study cannot directly explore the perceptions, motivations, and operational constraints faced by farmers and business actors. Nevertheless, this research is expected to provide a preliminary assessment and a strategic framework useful for further research or policy formulation.

3. Results and Discussion

3.1 Overview of agriculture and demography: A foundation for development strategy

The significant decrease in the poverty rate from 5.05% (2021) to 3.81% (2025) indicates the success of economic development and poverty alleviation programs (Table 1). However, this table must be interpreted within the context of the highest population growth

rate in the Riau Islands Province (1.57% as of 2025), which also has the largest absolute population (1.297 million) (Table 2). Consequently, even as the percentage declines, efforts to lift people out of poverty must continue aggressively to offset the annual population increase. This reduction in poverty is likely driven by the dominance of the industrial and service sectors in Batam.

Table 1. Percentage of poor population in Batam City

Year	Percentage of Poor Population (%)
2021	5.05
2022	5.19
2023	5.02
2024	4.85
2025	3.81

(Statistics Indonesia of Batam City, 2025a)

Based on the 2025 demographic data for the Riau Islands Province, Batam stands out as the dominant urban and economic center, accommodating a population of approximately 1.297 million people. This table represents a substantial majority of the province's total population of 2.2135 million, underscoring the city's primacy and its role as the primary hub for migration and economic agglomeration within the archipelago. Furthermore, Batam records the highest population growth rate in the province at 1.57 percent, surpassing both the provincial average of 1.38 percent and the rates of all other regencies and cities.

Table 2. Number of population and population growth rate by regency/city in the Riau islands province, 2025

Regency/City	Number of Population (thousand people), 2025	Population Growth Rate (%), 2024–2025
Karimun	266.0	1.03
Bintan	170.5	1.37
Natuna	86.8	1.28
Lingga	103.0	0.98
Kepulauan Anambas	50.4	1.41
Batam	1,297.0	1.57
Tanjungpinang	240.0	1.10
Total	2,213.50	1.38

(Statistics Indonesia of Batam City, 2025a)

This elevated growth rate suggests continued urbanization and dynamic demographic expansion, likely fueled by the city's industrial sector and its strategic position, thereby reinforcing its demographic and economic dominance over smaller administrative regions such as Karimun, Bintan, and the Anambas Islands. Table 3 reveals that the majority of Batam's workforce (52.05%) has only completed senior high school or its equivalent, while the proportion of university graduates remains relatively low (14.98%). This situation creates a paradox: Batam has successfully reduced poverty and attracted population, yet its economic transformation still relies on a workforce with mid-level education.

Table 3. Percentage of population aged 15 years and over by highest educational attainment and gender in Batam City, 2025

Highest Certificate/Diploma	Male (%)	Female (%)	Male + Female (%)
No Certificate	2.17	4.15	3.14
Primary School/Equivalent	11.96	11.20	11.59
Junior High School/Equivalent	16.56	19.95	18.23
Senior High School/Equivalent	55.37	48.64	52.05
Higher Education	13.93	16.06	14.98
Total	100.00	100.00	100.00

(Statistics Indonesia of Batam City, 2025a)

Then this situatiation could potentially become a bottleneck for the transition towards higher value-added industries and an innovation-based economy. Furthermore, a gender disparity is evident at the highest educational attainment level. A higher percentage of females lack a formal diploma (4.15% vs. 2.17% for males), yet simultaneously, a higher proportion of females attain a higher education (16.06% vs. 13.93% for males), indicating uneven dynamics in equality. Batam's future success is highly dependent on its ability to enhance human resource quality through education and vocational training aligned with industrial needs, in order to realize inclusive and sustainable economic growth. This finding aligns with Yudhoyono (2024), which asserts that effective educational cultivates innovation, augments workforce competencies, and narrows the divide between academic outcomes and labor market requirements.

Based on Table 4, the one-year period (2023-2024) provides a stark illustration of the dynamics within Batam's labor market. The most dramatic shift occurred within the Self-Employed category, which experienced a severe absolute decline from 471,669 individuals to 346,201 individuals—a reduction of approximately 125,468 individuals, or about 26.6%. This sharp contraction likely reflects the impact of macroeconomic pressures, such as high operational costs, intense competition, or a contraction in purchasing power, which have rendered small and independent businesses unsustainable. Concurrently, significant increases were observed in the Not Employed category (an increase of ~29,183 individuals) and the Student category (an increase of ~20,814 individuals). This trend may indicate two phenomena: first, the entry of new labor force participants, such as graduates, who have not yet been absorbed by the job market, and second the possibility that some former self-employed individuals, having been adversely affected, are now categorized as "not employed." Stagnation in formal sectors like Civil Servants (which declined) and minimal growth in professional sectors such as Teaching and Healthcare point to the limited capacity of formal employment to absorb labor, thereby increasing pressure on the informal sector and open unemployment.

Table 4. Population by occupation

Occupation	Unit	2023	2024
Unemployed/Not Working	Persons	362,293	391,476
Student/University Student	Persons	196,919	217,733
Retiree	Persons	1,086	1,176
State Official/Civil Servant	Persons	15,428	13,499
Educator/Teacher	Persons	8,184	8,778
Entrepreneur/Self-Employed	Persons	471,669	346,201
Farmer/Plantation Worker	Persons	4,372	4,779
Fisherman/Fisheries Worker	Persons	10,982	10,895
Religious/Spiritual Figure	Persons	630	514
Healthcare Worker	Persons	3,198	3,255

(Department of Communication and Informatics of Batam City, 2025)

On one hand, the economic structure is overwhelmingly dominated by the industrial and service sectors, which collectively accounted for over 98% of the Gross Regional Domestic Product (GRDP) in 2024, with agriculture contributing a mere 1.45%. On the other hand, there exists a robust demographic and consumer foundation supporting the development of local agribusiness. Although the number of workers directly employed in the agriculture/plantation sector is relatively small (4,779 people), there is a significantly large self-employed population (346,201 people) with the potential to be recruited or redirected into the agribusiness value chain, whether in upstream activities (input supply), downstream activities (marketing, processing), or supporting services.

The agricultural sector, while currently very small in scale, holds significant long-term strategic potential. However, its role should not be envisioned as a primary economic driver, but rather as a supporting pillar for food security, a creator of resilient alternative employment, and a means to embrace economic diversification based on local resources (Béné et al., 2020; Hertel et al., 2023). Its development requires targeted policy

intervention, support for urban agricultural technology, and training to transform the workforce into modern farmers or cultivators (Chen, 2025). The strategic potential of agriculture, particularly urban and peri-urban horticulture, becomes crucial. This potential lies in several key areas: first, local food security, reducing dependency on supplies from outside the island, which are vulnerable to logistical disruptions and price volatility. Cultivating high-value commodities like chilies could more stably meet local market demand. Global upheavals, such as the Russian invasion of Ukraine, threaten global food security, necessitating a comprehensive and holistic global approach to address these vulnerabilities (Hellegers, 2022). Another international case experienced by Indonesia, the COVID-19 pandemic, exacerbated the nation's classic food security challenges while simultaneously creating opportunities to raise awareness and refocus attention on local potential (Rozaki, 2021). Second, labor absorption, the agricultural sector can create new technical and semi-formal job opportunities, absorbing a portion of the labor force category or former self-employed individuals in need of occupational transition. Third, land efficiency and high economic value, as noted in the context of chili cultivation, urban agriculture does not require extensive land but yields a high economic value per square meter, making it suitable for dense urban areas like Batam. Fourth, economic diversification, developing a high value-added agricultural sector, including agro-processing, can serve as a pillar for economic diversification, thereby reducing the city's vulnerability during slowdowns in primary industrial sectors such as manufacturing. Therefore, the sector's future development depends on its ability to enhance human resource quality through education and vocational training tailored to modern agricultural needs, paving the way for more inclusive and sustainable economic growth.

Table 5. Percentage of employed population by business sector in Batam City, 2022-2025

Business Sector	2022	2023	2024	2025
Agriculture	3.02	3.30	1.45	2.83
Manufacturing	40.56	44.07	41.33	40.90
Services	56.43	52.63	57.22	56.27
Total	100.00	100.00	100.00	100.00

(Department of Communication and Informatics of Batam City, 2025)

The potential of the agricultural sector, particularly horticulture, in Batam must be understood within its unique geographical and economic context. As an archipelago region with constraints on arable land and a high dependency on external supply, the development of local agriculture holds strategic value that transcends mere statistical output. Based on Table 6, the high proportion of household expenditure on food (40.89%), dominated by staple commodities such as rice, fish, and meat, indicates substantial basic needs. However, the specific allocation for vegetables (3.74% or IDR 104,070 per capita/month) and seasonings (0.75% or IDR 20,941) represents a significant opportunity for high-value-added commodities like chili. These figures, when multiplied by a population of nearly 1.3 million, reveal a tangible market worth billions of rupiah per month. Furthermore, the consistent downward trend in the poverty rate serves as a robust indicator of rising community purchasing power, which is typically accompanied by dietary diversification, including increased quality and quantity of fresh vegetable consumption such as chili. Therefore, agricultural development in Batam should prioritize precision and intensive farming models that optimize land, such as fertigation systems using Internet of Things. These approaches aim to produce chili with high-value commodities with relatively low storability (Tinaprilla et al., 2024), thereby reducing dependency on imports from other islands.

The opportunity for chili cultivation, particularly bird's eye chili (*Capsicum frutescens*), in Batam is highly promising and strategic. Chili is a key component within both the "Vegetables" and "Seasonings & Spices" categories, rendering its demand multidimensional. This opportunity is reinforced by several key factors: first, its high economic value per unit weight makes it suitable for land-constrained areas; second, its perishable nature grants

locally supplied chili an absolute competitive advantage in freshness over imported counterparts subjected to long-distance logistics; third, price stability for chili is frequently disrupted by supply fluctuations from major production centers, thus local producers can act as market stabilizers while ensuring supply continuity. To realize this potential, a technology and data-driven agribusiness approach is essential. Farmers or investors need to adopt controlled cultivation systems to mitigate climatic and pest challenges inherent to the archipelago environment (Saptaji et al., 2025). Additionally, establishing robust partnerships with modern supply chains—such as supermarkets, major traditional markets, and Batam's rapidly growing culinary industry—is critical. It aligns with the research of Rachmaniah et al. (2022), this study showed that the market supply and demand of red chili and cayenne peppers are simultaneously interconnected, acting as both complementary and substitute products, and that integrated, collaborative strategies are essential to support an innovative and sustainable chili enterprise system. By leveraging data on increasing public purchasing power and actual market demand, chili cultivation in Batam is not only commercially viable but also constitutes a strategic step toward a more self-reliant and sustainable local food system.

Table 6. Average monthly per capita expenditure of Batam City residents and its percentage distribution by type of expenditure, 2025

Type of Expenditure	Value (IDR)	Percentage (%)
Food and Beverages	1,137,664	40.89
Cereals	82,764	2.97
Tubers	12,727	0.46
Fish/Shrimp/Squid/Shellfish	126,842	4.56
Meat	66,155	2.38
Eggs and Milk	75,381	2.71
Vegetables	104,070	3.74
Nuts	16,353	0.59
Fruits	75,231	2.70
Oil and Coconut	27,293	0.98
Beverage Ingredients	20,833	0.75
Spices and Condiments	20,941	0.75
Other Food Items	17,417	0.63
Processed Food and Beverages	394,567	14.18
Tobacco	97,090	3.49
Non-Food Expenditures	1,644,765	59.11
Housing and Utilities	809,092	29.08
Miscellaneous Goods and Services	440,023	15.81
Clothing, Footwear, and Headgear	71,321	2.56
Durable Goods	109,699	3.94
Taxes, Levies, and Insurance	193,763	6.96
Ceremonial and Festivity Expenses	20,869	0.75
Total Expenditure	2,782,430	100.00

(Statistics Indonesia of Batam City, 2025a)

3.2 Analysis of potential and vulnerability of bird's eye chili

Bird's eye chili (*Capsicum frutescens*) occupies a unique and strategic position within Batam's vegetable agriculture sector. Fluctuations in its cultivation area, from 47 hectares (Ha) in 2022, surging to 59.5 Ha in 2023, then plummeting sharply to 30.5 Ha in 2024, reflect both the vulnerability and significant opportunity inherent in this commodity (Table 7). These extreme fluctuations are highly likely driven by technical challenges, including the rapid spread of pests and diseases in confined cultivation areas, the impacts of the archipelago's climate (strong winds, salinity), and a high dependency on imported agricultural inputs with volatile prices. Therefore, Across cultivar adaptability, pest–disease dynamics, climate-driven disease risks, and landscape-level agricultural resilience, the studies collectively highlight that sustainable chili and agroecosystem productivity depends

on climate-adaptive genotypes, optimized irrigation and controlled environments, and integrated, ecosystem-based management strategies to strengthen long-term food security (Ahmad et al., 2024a; Ahmad et al., 2024b; Singh et al., 2023; Ginésy & Biasi, 2025). Amid this volatility, however, bird's eye chili demonstrates strong economic appeal for farmers. Compared to large chilies (*Capsicum annuum*), which have shown minimal development (only 3 Ha in 2024), the relatively larger cultivation area of bird's eye chili indicates greater market acceptance and a more established cultivation base. The area fluctuations themselves can be interpreted as signals of farmer responsiveness to highly attractive consumer prices, prompting rapid expansion followed by contraction due to production constraints.

Table 7. Vegetable planting area

Vegetable Type	Unit	2022	2023	2024
Long Bean	ha	112	157	144.5
Large Chili	ha	7	2	3
Bird's Eye Chili	ha	47	59.5	30.5
Eggplant	ha	14.5	23	21
Green Bean	ha	6	9	14
Cucumber	ha	134	175	148
Water Spinach	ha	206	285.75	266
Spinach	ha	205	258.75	265.5
Bitter Gourd	ha	270	0	65
Pitula	ha	258	0	49.25
Mustard Greens	ha	108.5	164	191.5
Spring Onion	ha	41	51	38.5

(Department of Communication and Informatics of Batam City, 2025)

Examined specifically for Batam, bird's eye chili presents a realistic opportunity for development through production intensification and stabilization. The fact that its cultivation area remains significantly below that of leafy vegetables such as water spinach (>265 Ha) positions bird's eye chili as a "niche" commodity characterized by higher capital intensity and risk, yet also by potentially greater profit margins. The primary opportunity lies in transforming the volatile production pattern into a stable, high-quality output. This can be achieved through a paradigm shift from conventional open-field cultivation to Controlled Environment Agriculture systems. Implementing precision irrigation and fertigation technologies, alongside integrated pest management, would reduce vulnerability to weather and disease, thereby breaking the cycle of planting-failure-harvest that triggers land area fluctuations. It aligns with several studies showing that found integrating crop rotation, precision pesticide application, and real-time sensor-based irrigation scheduling provides an effective, resource-efficient strategy to improve soil health, control pests and diseases, and enhance overall agricultural sustainability (Ahmad et al., 2026; Hassan et al., 2025; Li et al., 2025). Furthermore, Batam's status as a hub for trade and tourism ensures demand for bird's eye chili not only from households but also from the hospitality sector (hotels, restaurants, cafes) and the processed food industry, all of which require fresh and consistent supply. Consequently, the development focus should not be on massive land expansion but on enhancing productivity and supply continuity from existing cultivated areas. This approach would position Batam's bird's eye chili as a premium product capable of reducing import dependency and securing a share of the proven and growing local market.

3.3 Analysis of specific potential and challenges in Galang and Nongsa

Based on Table 8, which delineates the primary livelihood sectors across sub-districts in Batam, reveals a distinct and systematic spatial pattern: agriculture is concentrated in the archipelago and peripheral regions, while manufacturing dominates the urban core. The studies reveal that sustainable urban–rural economic integration depends on balanced

governance, inclusive urban expansion policies, and livelihood-restoration mechanisms, as uneven development and land expropriation without adequate socioeconomic support can undermine long-term urban–rural sustainability (Li, 2025; Talema & Nigusie, 2023). Among the 21 villages/urban wards with an agricultural base, Galang stands out as the densest agricultural enclave (all 8 of its villages), establishing it as the primary production hinterland. Conversely, Nongsa represents a unique transitional pattern: the majority of its villages (3 out of 4) have shifted to manufacturing, yet it retains one agriculturally based village. More significant than the mere count of farming villages, Nongsa's strategic position—proximity to Hang Nadim Airport and access to primary infrastructure—renders it an ideal logistical and marketing node. Therefore, these data not only indicate production locations but also suggest a potential synergistic, functional role division: with Galang as a production center and Nongsa as a distribution hub in building Batam's food resilience, particularly for high-value commodities like bird's eye chili. While urban food systems remain nutritionally insufficient, inequitable, and disruption-prone, requiring integrated governance, urban agriculture, and circular strategies to achieve resilient and sustainable food security (Jensen & Orfila, 2021)

Table 8. Number of villages/subdistricts by district and main source of livelihood of the majority of the population, 2025

District	Agriculture	Manufacturing	Service	Total
010 Belakang Padang	6	–	–	6
020 Bulang	6	–	–	6
030 Galang	8	–	–	8
040 Sei Beduk	–	4	–	4
041 Sagulung	–	6	–	6
050 Nongsa	1	3	–	4
051 Batam Kota	–	4	2	6
060 Sekupang	–	7	–	7
061 Batu Aji	–	4	–	4
070 Lubuk Baja	–	2	3	5
080 Batu Ampar	–	2	2	4
081 Bengkong	–	3	1	4
Batam	21	35	8	64

(Statistics Indonesia of Batam City, 2025b)

The sub-districts of Galang and Nongsa constitute the final bastions of the agricultural sector in Batam, a sector increasingly pressured by rapid industrialization and urbanization. Data indicates that all villages in Galang (8 villages) and one village in Nongsa still rely on agriculture as the primary livelihood for the majority of their populations, distinguishing them significantly from other sub-districts now dominated by manufacturing and services. This condition positions Galang and Nongsa as the potential hinterland or food granary for Batam. Galang, with its archipelagic characteristics and land potentially more isolated from industrial centers, presents an opportunity for developing more extensive and integrated agricultural systems. Meanwhile, Nongsa, which borders the city center and serves as a primary gateway via Hang Nadim Airport and tourism areas, holds a critically strategic logistical access advantage. These two sub-districts are ideal locations for developing a bird's eye chili (*Capsicum frutescens*) cultivation cluster exclusively oriented toward supplying the Batam market. Agricultural land here must be perceived as a rare and high-value asset requiring intensive, value-added cultivation approaches rather than conventional extensification.

Strategies for developing bird's eye chili in Galang and Nongsa must be specifically designed based on their respective comparative advantages. For Galang Sub-district, the primary strategy should be establishing a Core Production and Research Zone. Here, model farms utilizing controlled environment technologies can be developed to stabilize production and address the historical challenge of fluctuating cultivation areas. Galang is suitable as a center for superior seedling production and a field laboratory for testing bird's

eye chili varieties resilient to archipelagic conditions, employing precision technologies alongside conventional cultivation to compare yield outputs and costs. Conversely, Nongsa Sub-district should be focused as an "Agro-industrial and Marketing Zone." Its strategic location near the airport and tourism areas enables it to function as a hub for washing, sorting, grading, and packaging bird's eye chili to meet modern market standards (hotels, restaurants, supermarkets). This strategy creates a clear differentiation: Galang as the reliable supply base, and Nongsa as the marketing and distribution front. Core-plasma partnerships between farmers in both sub-districts and off-takers from Batam City's hospitality and retail sectors need to be fostered. Consequently, chili development would not only enhance local farmer income but also consolidate the position of Galang and Nongsa as competitive buffers for the food security of the metropolitan Batam area

Table 9. Disaster Data

District	Landslides	Floods	Flash Floods	Earthquakes	Tsunamis	Tidal Waves
Belakang Padang	2	–	–	–	–	3
Bulang	–	–	–	–	–	–
Galang	–	–	–	–	–	2
Sei Beduk	2	4	–	–	–	–
Sagulung	–	–	–	–	–	–
Nongsa	1	3	–	–	–	4
Batam Kota	–	–	–	–	–	–
Sekupang	5	5	–	–	–	–
Batu Aji	–	–	–	–	–	–
Lubuk Baja	–	–	–	–	–	–
Batu Ampar	2	–	–	–	–	1
Bengkong	–	–	–	–	–	–
Total	12	12	–	–	–	10

(Statistics Indonesia of Batam City, 2025b)

Based on disaster data, the sub-districts of Galang and Nongsa present a relatively lower risk profile for the development of intensive vegetable agriculture in Batam. This is particularly evident when compared to other sub-districts prone to flooding (Sei Beduk, Sekupang) or landslides (Belakang Padang, Batu Ampar). Galang recorded only two tidal wave events during the observed period. Such events typically impact immediate coastal areas, and their risk can be mitigated by selecting cultivation sites further inland. Nongsa, while recording one landslide, three flood events, and four tidal waves, exhibits a risk pattern that is predictable and technically manageable. The flooding in Nongsa is most likely associated with local drainage conditions and waterlogging rather than major river floods. Consequently, this risk can be addressed through land engineering solutions such as constructing raised beds and implementing effective drainage systems. Therefore, both sub-districts possess significant potential as strategic locations for horticultural development zones, specifically for bird's eye chili (*Capsicum frutescens*) cultivation.

3.4 Integrated development strategy

The analysis reveals a unique strategic context for bird's eye chili (*Capsicum frutescens*) development in Batam. Internally, a strong foundation exists, characterized by land with a low disaster risk profile—a crucial factor for long-term investment—geographical proximity to the high-purchasing-power urban market of Batam, and a proven, locally adapted cultivation base. However, these strengths are counterbalanced by fundamental weaknesses, including fluctuating production due to vulnerability to pests and climate, dependence on inefficient traditional market and distribution systems, limited access to modern agricultural technology, and the persistent threat of land conversion, which erodes productive assets. This situation positions the cultivation enterprise in a state of high potential yet significant fragility, necessitating strategic intervention to convert weaknesses into strengths.

To capitalize on the substantial and growing market opportunities and the increasing community purchasing power, offensive strategies (S-O) are formulated by leveraging internal strengths. This strategy proposes a role differentiation based on the comparative advantages of each sub-district. Galang, with its more established land and production base, is directed to become a "Bird's Eye Chili Island" through the implementation of Good Agricultural Practices (GAP), technology adoption, and strong branding to stabilize and enhance production quality. Meanwhile, Nongsa, with its strategic infrastructure access and location, is developed as an integrated agritourism and education hub that sells not only products but also experiences, simultaneously functioning as a marketing and distribution center. Diversification strategies (S-T) are also required to address threats, such as establishing robust core-plasma partnerships with HORECA (Hotel, Restaurant, Catering) networks to create stable and predictable demand, thereby protecting farmers from sharp price fluctuations in the spot market.

Conversely, defensive and transformative strategies (W-O and W-T) are essential for addressing internal shortcomings in the face of external threats. The W-O approach focuses on capacity building through intensive digital-based training for farmers, encompassing modern cultivation techniques, digital marketing, and financial management. Concurrently, Nongsa can be specifically focused on precision farming methods such as hydroponics to optimize limited land and manage agritourism. Defensive strategies (W-T) are crucial for mitigating existential risks, particularly the threat of land-use conversion. Urgent measures, such as advocating for the formal designation of a Sustainable Agricultural Zone, constitute a fundamental policy to protect productive land. Furthermore, strengthening the cold chain is imperative to maintain product freshness and quality during distribution, while promoting crop insurance can serve as a financial mechanism to safeguard farmers from harvest failure risks due to extreme weather and pests. Collectively, this strategic framework aims not merely for commercial growth but for establishing a more resilient, high-value-added, and sustainable bird's eye chili agribusiness system in Batam.

Table 10. SWOT matrix and development strategies for a sustainable chili farming area

Category	Description
Strengths (S)	1. Low disaster-risk land
	2. Close to Batam market
	3. Proven local cultivation base
	4. Availability of agricultural land
Weaknesses (W)	1. Fluctuating production
	2. Traditional market dependence
	3. Limited modern technology access
Opportunities (O)	1. Growing demand
	2. Rising purchasing power
	3. Agritourism & value-added products
	4. Precision agriculture tech
Threats (T)	1. Extreme weather & pests
	2. Price fluctuation
	3. Land conversion
	4. Costly off-island inputs
SO Strategies	• Galang: “Bird’s Eye Chili Island” (GAP, branding, technology)
	• Agritourism & education hub
WO Strategies	• Digital farmer training
	• Hydroponics & agritourism focus
ST Strategies	• Core plasma with HORECA
	• Ensure stable supply
WT Strategies	• Protect sustainable ag. zone
	• Cold chain logistics
	• Crop insurance

The SWOT analysis indicates that the development of a sustainable chili farming area is supported by key strengths, including low disaster-risk land, proximity to the Batam

market, and an established local cultivation base, although these advantages are tempered by weaknesses such as fluctuating production, dependence on traditional markets, and limited access to modern technology. Emerging opportunities, namely growing demand, rising purchasing power, agritourism potential, value-added products, and precision agriculture, provide a strategic pathway to enhance competitiveness and resilience. However, significant threats persist, including extreme weather and pest pressures, price volatility, ongoing land conversion, and high off-island input costs. To address this complex landscape, a comprehensive set of integrated strategies is required. These include capacity-building initiatives such as digital farmer training and hydroponic innovation to overcome internal weaknesses, and protective measures like sustainable agricultural zoning, cold-chain logistics development, and crop insurance schemes to mitigate external vulnerabilities. Collectively, these measures underscore the need for a technologically enabled, market-oriented, and climate-resilient production system to ensure long-term sustainability and value creation.

4. Conclusions

Galang and Nongsa Districts possess distinct yet complementary potentials that, when strategically integrated, can establish a resilient bird's eye chili agribusiness system in Batam. Galang District, where all eight villages remain agriculturally based with low disaster risk profiles, is optimally positioned as a production hinterland capable of supplying consistent yields through the implementation of controlled environment agriculture and Good Agricultural Practices. Conversely, Nongsa District's strategic proximity to Hang Nadim Airport and tourism corridors positions it as an ideal marketing and distribution hub, capable of facilitating post-harvest handling, premium packaging, and direct supply arrangements with the hospitality sector. This functional differentiation addresses the critical vulnerability revealed in the production data, which underscores the urgent need for production stabilization through technological intervention and institutional support.

The analysis further reveals that market fundamentals strongly support such development, with household vegetable expenditure reaching 3.74 percent of total monthly consumption and a declining poverty trend indicating growing purchasing power. However, realizing this potential requires addressing systemic weaknesses through a multi-pronged strategy encompassing farmer capacity building in digital and precision agriculture technologies, establishment of cold chain infrastructure to maintain product freshness, and policy interventions to designate Sustainable Agricultural Zones that protect productive land from conversion pressures. Future development must prioritize the transformation of conventional farming practices into technology-driven, climate-resilient enterprises through partnerships with research institutions for variety improvement, integration with digital marketing platforms, and development of crop insurance mechanisms to mitigate production risks. This integrated approach offers a replicable model for industrial archipelagic regions seeking to balance economic diversification with food security imperatives.

Acknowledgement

The authors would like to express gratitude to the reviewers for their invaluable feedback and insightful recommendations, which significantly enhanced the quality and clarity of this manuscript.

Author Contribution

This work were solely conducted by N.I.D.A., & D.N.S., who were responsible for the conceptualization, methodology, data collection, analysis, and writing of the manuscript.

Funding

This research received no external funding.

Ethical Review Board Statement
Not available.

Informed Consent Statement
Not available.

Data Availability Statement
Not available.

Conflicts of Interest
The authors declare no conflict of interest.

Declaration of Generative AI Use
The authors declare that no generative artificial intelligence tools were used in the preparation, writing, analysis, or editing of this manuscript. All contents were produced entirely through the authors' own reasoning, interpretation, and analysis based on existing data and published literature.

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References
Ahmad, A. Y. A. B., Alzubi, J. A., Chanthirasekaran, K., Urooj, S., Shahzad, M., & Yogapriya, J. (2026). Automated smart drip irrigation system in internet of things using adaptive residual hybrid network for precision farming. *Scientific Reports, 16*, Article 4327. https://doi.org/10.1038/s41598-025-31804-6

Ahmad, F., Kusumiyati, K., Soleh, M. A., Khan, M. R., & Sundari, R. S. (2024a). Assessing the climate adaptive potential of imported Chili in comparison with local cultivars through germination performance analysis. *BMC Plant Biology, 24*(1), 553. https://doi.org/10.1186/s12870-024-05168-4

Ahmad, F., Kusumiyati, K., Soleh, M. A., Khan, M. R., & Sundari, R. S. (2024b). Chili cultivars vulnerability: A multi-factorial examination of disease and pest-induced yield decline across different growing microclimates and watering regimens. *BMC Plant Biology, 24*(1), 979. https://doi.org/10.1186/s12870-024-05541-3

Ali, M., Khalid, N. I., Wondi, M. H., Haris, N. I. N., & Megat Ahmad Azman, P. N. (2025). Exploring the nutritional values, volatile compounds, health benefits, and potential food products of chilli (*Capsicum annuum*): A comprehensive review. *Food Chemistry, 490*, Article 145091. https://doi.org/10.1016/j.foodchem.2025.145091

Azlan, A., Sultana, S., Huei, C. S., & Razman, M. R. (2022). Antioxidant, anti-obesity, nutritional and other beneficial effects of different chili pepper: A review. *Molecules, 27*(3), 898. https://doi.org/10.3390/molecules27030898

Statistics Indonesia of Batam City. (2025a). *Indikator kesejahteraan rakyat Kota Batam 2025*. Badan Pusat Statistik Indonesia. https://batamkota.bps.go.id/id/publication/2025/12/29/fdfe3789b16abe486d122e8d/indikator-kesejahteraan-rakyat-kota-batam-2025.html

Statistics Indonesia of Batam City. (2025b). *Statistik potensi desa Kota Batam 2025*. Badan Pusat Statistik Indonesia. https://batamkota.bps.go.id/id/publication/2025/12/30/c55194b020e1c0eb40170763/statistik-potensi-desa-kota-batam-2025.html

Béné, C. (2020). Resilience of local food systems and links to food security – A review of some important concepts in the context of COVID-19 and other shocks. *Food Security, 12*(4), 805–822. https://doi.org/10.1007/s12571-020-01076-1

Chen, X. (2025). The role of modern agricultural technologies in improving agricultural productivity and land use efficiency. *Frontiers in Plant Science, 16*, Article 1675657. https://doi.org/10.3389/fpls.2025.1675657

Colson-Fearon, B., & Versey, H. S. (2022). Urban agriculture as a means to food sovereignty? A case study of Baltimore City residents. *International Journal of Environmental Research and Public Health, 19*(19), 12752. https://doi.org/10.3390/ijerph191912752

Duan, Y., Tang, J., Li, Z., Yang, B., Yan, Y., & Yang, Y. (2021). Vegetated buffer zone restoration planning in small urban watersheds. *Water, 13*(21), 3000. https://doi.org/10.3390/w13213000

Department of Communication and Informatics of Batam City. (2025). *Kompilasi Data Statistik Sektoral Pemerintah Kota Batam Tahun 2025.* Dinas Komunikasi dan Informatika Kota Batam. https://satudata.batam.go.id/web/wp-content/uploads/2025/07/Kompilasi-Statistik-Sektoral-Tahun-2025.pdf

Ginésy, M., & Biasi, R. (2025). New insights into agriculture on small Mediterranean islands: A systematic review. *Land, 14*(9), 1874. https://doi.org/10.3390/land14091874

Hassan, M. A., Raza, A., Bashir, S., Song, J., Sajad, S., Khan, A., Malik, L., & Awan, Z. A. (2025). Regenerative agriculture and sustainable plant protection: Enhancing resilience through natural strategies. *Plants, 15*(1), 113. https://doi.org/10.3390/plants15010113

Hellegers, P. (2022). Food security vulnerability due to trade dependencies on Russia and Ukraine. *Food Security, 14*(6), 1503–1510. https://doi.org/10.1007/s12571-022-01306-8

Hertel, T., Elouafi, I., Tanticharoen, M., Ebi, K. L., Godfray, C. J., & Smetana, S. (2023). Diversification for enhanced food systems resilience. In J. von Braun, K. Afsana, L. O. Fresco, & M. H. A. Hassan (Eds.), *Science and innovations for food systems transformation* (pp. 203–222). Springer. https://doi.org/10.1007/978-3-031-15703-5_11

Jensen, P. D., & Orfila, C. (2021). Mapping the production-consumption gap of an urban food system: An empirical case study of food security and resilience. *Food Security, 13*(3), 551–570. https://doi.org/10.1007/s12571-021-01142-2

Kalogiannidis, S., Papadopoulou, C. I., Loizou, E., & Chatzitheodoridis, F. (2023). Risk, vulnerability, and resilience in agriculture and their impact on sustainable rural economy development: A case study of Greece. *Agriculture, 13*(6), 1222. https://doi.org/10.3390/agriculture13061222

Kementerian Koordinator Bidang Pangan. (2025). *Peraturan Menteri Koordinator Bidang Pangan Republik Indonesia Nomor 1 Tahun 2025 Tentang Rencana Strategis*. Kementerian Koordinator Bidang Pangan Indonesia. https://peraturan.go.id/files/717631648-no-1-tahun-2025.pdf

Li, W., Luo, Y., Jiang, P., Dong, X., Tang, K., Liang, Z., & Shi, Y. (2025). A sustainable crop protection through integrated technologies: UAV-based detection, real-time pesticide mixing, and adaptive spraying. *Scientific Reports, 15*(1), Article 35748. https://doi.org/10.1038/s41598-025-19473-x

Li, X. (2025). Spatial-temporal evolution and influencing factors of urban-rural economic circulation in China's agricultural areas: A case study of Jianghan Plain. *PLoS ONE, 20*(7), Article e0313355. https://doi.org/10.1371/journal.pone.0313355

Olumba, CN, Garrod, G., & Areal, F. (2025). Investigating the constraints and mitigation strategies for the adoption of sustainable land management practices in erosion-prone areas of Southeast Nigeria. *Environmental Management, 75*(6), 1504–1519. https://doi.org/10.1007/s00267-024-02104-y

Pradhan, P., Subedi, D. R., Dahal, K., Hu, Y., Gurung, P., Pokharel, S., Kafle, S., Khatri, B., Basyal, S., Gurung, M., & Joshi, A. (2024). Urban agriculture matters for sustainable development. *Cell Reports Sustainability, 1*(9), Article 100217. https://doi.org/10.1016/j.crsus.2024.100217

Rachmaniah, M., Suroso, A. I., Syukur, M., & Hermadi, I. (2022). Supply and demand model for a chili enterprise system using a simultaneous equations system. *Economies, 10*(12), 312. https://doi.org/10.3390/economies10120312

Rozaki, Z. (2021). Food security challenges and opportunities in Indonesia post COVID-19. *Advances in Food Security and Sustainability, 6*, 119–168. https://doi.org/10.1016/bs.af2s.2021.07.002

Rozi, F., Santoso, A. B., Mahendri, I. G. A. P., Hutapea, R. T. P., Wamaer, D., Siagian, V., Elisabeth, D. A. A., Sugiono, S., Handoko, H., Subagio, H., & Syam, A. (2023). Indonesian market demand patterns for food commodity sources of carbohydrates in facing the global food crisis. *Heliyon, 9*(6), Article e16809. https://doi.org/10.1016/j.heliyon.2023.e16809

Saptaji, K., Tumada, A., Baihaqi Alfakihuddin, M. L., Ayu Wardani, D., Kusuma Dewi, T., Adiati Junaisih, O., Rausyan Fikri, M., & Hendrawan Achmad, M. S. (2025). Challenges in the implementation of Internet of Things (IoT) in irrigation and fertilizer management system in Indonesia. *Jurnal Keteknikan Pertanian, 13*(2), 265–283. https://doi.org/10.19028/jtep.013.2.265-283

Singh, B. K., Delgado-Baquerizo, M., Egidi, E., Guirado, E., Leach, J. E., Liu, H., & Trivedi, P. (2023). Climate change impacts on plant pathogens, food security and paths forward. *Nature Reviews Microbiology, 21*(10), 640–656. https://doi.org/10.1038/s41579-023-00900-7

Talema, A. H., & Nigusie, W. B. (2023). Impacts of urban expansion on the livelihoods of local farming communities: The case of Burayu town, Ethiopia. *Heliyon, 9*(3), Article e14061. https://doi.org/10.1016/j.heliyon.2023.e14061

Tinaprilla, N., Muflikh, Y. N., Yanuar, R., & Permata, K. I. (2024). The roles of smart fertigation in chili farming. *Jurnal Manajemen Dan Agribisnis, 21*(1), 95. https://doi.org/10.17358/jma.21.1.95

Yudhoyono, A. H., Suhariadi, F., Supriharyanti, E., & Haqq, Z. N. (2024). Economic transformation: A systematic literature review. *Sustainability, 16*(24), 11189. https://doi.org/10.3390/su162411189

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