

ANALYSIS OF THE IMPACT OF ACCELERATION OF CORN PLANTING IN INDONESIA ON EXPORTS TO SOUTH KOREA

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ABSTRACT

Maise (Zea mays L.) is a strategic commodity that plays a vital role in supporting national food security and the animal feed industry in Indonesia. To boost production and reduce dependence on imports, the Indonesian government has launched an accelerated maise planting program across key production regions. This study aims to analyse the impact of the accelerated maise planting policy on Indonesia's export opportunities to South Korea. The research employs a descriptive-qualitative method, utilising literature review and policy analysis based on secondary data. The findings indicate that while the acceleration program has significantly increased national maise production, it has not yet directly translated into higher export volumes to South Korea. This is primarily due to post-harvest quality issues, logistical infrastructure constraints, market access disparities, and unmet technical and sustainability standards required by the destination country. Therefore, Indonesia's maise export strategy should focus on integrating upstream production enhancement with downstream export system strengthening. This includes modernising post-harvest handling, improving quality certification, empowering export-oriented cooperatives, and advancing bilateral trade diplomacy. This study contributes to the discourse on export policy grounded in domestic production and offers practical recommendations for policymakers to reinforce sustainable agricultural exports.

Keywords: *Planting acceleration, corn, exporting, agricultural policy, South Korea*

INTRODUCTION

Maise (*Zea mays* L.) is one of Indonesia's strategic agricultural commodities due to its multifunctional roles as food, animal feed, and industrial raw material (Serna-Saldivar, 2023). In addition to serving as an alternative carbohydrate source to rice, maise plays a crucial role as the primary raw material for the feed industry, which supports the national livestock sub-sector. Over 60% of the country's maise production is absorbed by the feed industry, a figure that continues to rise in line with growing domestic demand for chicken meat and eggs (Sibanda et al., 2023). Globally, maise is a high-value commodity that is widely traded, with global trade volumes exceeding 170 million tons in 2021 (Food, 2023). Given such high demand, maise holds a vital position not only in the context of national food security but also in supporting rural economic growth, improving farmer welfare, and strengthening the trade balance (Patel et al., 2024).

However, high domestic consumption has not been fully met by domestic production. As a result, Indonesia remains reliant on substantial imports to cover supply shortages,

particularly in the pre-harvest period. In an effort to reduce dependence on imports and enhance national production capacity, the Indonesian government introduced a maize planting acceleration policy in mid-2017 (Arifani, E. N., & Mahfudz, 2022). This program focuses on developing production centres in agro-climatically suitable and economically viable regions, such as South Sulawesi, East Java, and West Nusa Tenggara. Policy interventions include the provision of high-yield seeds, agricultural machinery, subsidised fertilisers, and technical training to farmers. According to the Central Statistics Agency, this policy contributed to an increase in national maize production, which reached 23.2 million tons in 2022, an approximately 6.4% rise compared to the previous year (Statistik, 2024).

This increase in production capacity theoretically opens opportunities to expand export markets, particularly to key trading partners with high demand for maize, such as South Korea. The country is one of the largest maize importers in Asia, with total annual imports exceeding 10 million tons, primarily for the feed and processed food industries (OECD, 2022). However, despite the high demand in the South Korean market, Indonesia's maize exports contribute only a small and relatively uncompetitive share compared to major suppliers such as the United States, Brazil, and Ukraine (Firmansyah et al., 2017). Increased domestic production does not automatically translate into higher export volumes due to various barriers, including products that do not meet international technical standards, uncompetitive pricing, and insufficient preparedness for export logistics (Sari, 2024). Further emphasise that supply stability and product quality are key factors considered by South Korea when selecting trade partners for agricultural commodities, including maize (Fang & Wang, 2024)

Although several studies have examined the relationship between increased production and Indonesia's maize export potential, most of this research remains limited to quantitative aspects or general trade performance comparisons. Few have specifically evaluated how the accelerated planting policy has impacted export performance to particular partner countries. Moreover, discussions on environmental sustainability, supply chain readiness, and the national quality assurance system in the context of maize exports are often overlooked. Yet in today's global trade landscape, sustainability and quality governance have become integral components of agricultural product competitiveness. This highlights a pressing research gap that requires a more in-depth, policy-oriented analysis tailored to the specific context of the target export country.

This study aims to address the identified research gap by comprehensively examining the impact of Indonesia's accelerated maize planting policy on exports to South Korea. Employing a qualitative-descriptive approach and an in-depth literature review, the research seeks to identify how the policy affects production, distribution, quality, and logistics within the maize sector. It also analyses the structural barriers that hinder the realisation of export potential. In addition, this study explores the challenges and opportunities of maize export within the frameworks of sustainability and trade diplomacy, both of which are increasingly relevant to the demands of the South Korean market. As such, the study contributes not only theoretically to the academic discourse on agricultural policy and international trade but also offers a policy recommendation framework for decision-makers to formulate more responsive and competitive export strategies grounded in national production capabilities.

RESEARCH METHODS

This study adopted a descriptive qualitative approach aimed at systematically and factually describing conditions, phenomena, and the relationships between phenomena in this

case, the impact of Indonesia's accelerated maize planting policy on exports to South Korea. Qualitative research was conducted to understand phenomena experienced by research subjects holistically and to describe them in words and language within a specific natural context (Fadli, 2021). Accordingly, this research relied on data collection through literature review and document analysis of relevant policies and trade data. The analysis process involved several stages. First, the study identified and traced historical data on Indonesia's maize production and export trends to understand the sector's development dynamics in recent years. Second, the policy on accelerated maize planting introduced by the government was analysed, including its background, implementation on the ground, and its impacts on agricultural actors and the environment. Third, the study evaluated the status of maize exports to South Korea by examining export volume, value, market requirements, and consumer preferences in the destination country. The research further explored the relationship between the policy's implementation and the performance of maize exports to South Korea, as well as its implications for bilateral trade relations between the two countries. Data analysis was carried out in three main stages. First, thematic analysis was conducted to identify patterns and correlations between the accelerated planting policy and export performance. Second, content analysis was employed to examine policy documents and uncover the factors influencing policy implementation at the field level. Third, a qualitative evaluation was performed on export data, focusing on product quality, price competitiveness, and supply sustainability.

RESULTS AND DISCUSSION

Findings on increased maize production in key regions, such as East Java, South Sulawesi, and West Nusa Tenggara, indicate that the government's accelerated planting initiative has successfully boosted national harvest volumes. However, this increase has not yet translated into a significant contribution to export volumes to South Korea. This outcome can be attributed to non-production factors, including post-harvest quality, compliance with international quality standards, and logistical efficiency. Increases in domestic maize production do not automatically lead to higher exports unless supported by strengthened infrastructure, efficient distribution chains, and product quality certification (OECD & FAO, 2018). On the demand side, South Korea tends to be highly selective in choosing trade partners, prioritising consistency of supply, competitive pricing, and stable quality (Fang & Wang, 2024) highlight that "quality and supply reliability are the two dominant factors determining South Korea's selection of maize suppliers." Therefore, to address these challenges, policy integration is required between upstream production acceleration and downstream export competitiveness enhancement. Such integration would ensure that the accelerated planting initiative not only supports domestic food security but also contributes to the development of a sustainable and competitive export strategy. To fully understand the causes behind the low export contribution, further analysis is needed on the enabling factors within Indonesia's maize supply chain and export governance system.

Increasing National Production and Infrastructure Challenges

In recent years, the implementation of Indonesia's accelerated maize planting policy has had a tangible impact on increasing national maize production. This program was introduced as a response to rising domestic demand and the broader goal of achieving national food self-sufficiency. According to data from Statistics Indonesia (Statistik, 2024), maize production reached 23.2 million tons in 2022, representing a 6.4% increase compared to the previous year. This growth was particularly notable in key maize-producing provinces such as East Java, South

Sulawesi, and Lampung. These regions possess favorable agro-climatic conditions for maize cultivation and have benefited from strong support from local governments in accelerating program implementation. On the ground, both national and regional governments have provided substantial assistance through the distribution of agricultural machinery, training on modern cultivation technologies, and production incentives aimed at improving land efficiency and productivity.

Despite this positive trend in production, the results have not been fully supported by adequate agricultural infrastructure at the local level. Many areas, particularly outside Java, still face significant constraints in terms of supporting infrastructure such as farm access roads, efficient irrigation systems, and post-harvest handling facilities that meet industry standards. The limited availability of storage warehouses, drying machines, and sorting facilities has resulted in suboptimal post-harvest processes. Consequently, the physical quality of the maize often deteriorates, reducing its market value both domestically and in export contexts. These infrastructure limitations significantly diminish the potential contribution of increased maize production to export performance, especially to markets with stringent technical specifications, such as South Korea.

In addition to infrastructure challenges, the distribution of agricultural inputs, particularly quality seeds and subsidised fertilisers remains a persistent structural issue. Access to high-quality maize seeds is still uneven across regions, especially in eastern Indonesia. Many farmers continue to rely on local seed varieties or reused seeds from previous planting seasons, which have often undergone genetic deterioration in terms of germination rates and resistance to pests and diseases. As a result, land productivity remains suboptimal and is particularly vulnerable to crop failure under extreme weather conditions. This situation underscores a systemic gap between the macro-level design of the accelerated planting program and the micro-level production capacity in the field (Fadda et al., 2020).

Beyond seed quality, the distribution of subsidised fertilisers also faces numerous bottlenecks, including delayed delivery, mismatched quotas that do not reflect actual field needs, and cases of misallocation by certain actors. Inefficiencies in fertiliser distribution have been a major constraint on the overall improvement of maize productivity, as farmers lack timely access to critical inputs (Ssemugenze et al., 2025). The uncertainty surrounding fertiliser availability makes it challenging for farmers to manage their land optimally, resulting in actual yields that often fall short of the land's potential capacity. This condition not only reduces farm-level efficiency but also negatively affects the quality and consistency of maize products, both of which are essential requirements in international grain trade.

Overall, the accumulation of infrastructure limitations, input distribution inefficiencies, and regional disparities has prevented the accelerated maize planting program from making a significant contribution to Indonesia's maize exports. Although national production volumes have increased, the quality and consistency of harvest outcomes remain highly variable, failing to meet the stringent standards set by importing countries such as South Korea. That country places strong emphasis on quality, supply stability, and product safety as key indicators in selecting trade partners (Fang & Wang, 2024). Without structural reforms and enhanced cross-sectoral coordination, the accelerated planting initiative risks generating domestic surpluses that are difficult to absorb into international markets due to unmet technical and logistical criteria required by global trade **systems**. These limitations directly impact the final quality of the product, one of the primary barriers to accessing high-standard export destinations, such as South Korea.

Product Quality and Export Standard Barriers

One of the primary challenges in enhancing Indonesia's maize exports to the South Korean market is the mismatch between product quality and the stringent standards imposed by the destination country. South Korea enforces rigorous import requirements for maize, including a maximum moisture content of 14%, low levels of aflatoxin, physical cleanliness of kernels, and uniform grain size. The majority of Indonesia's maize harvests still fall short of these standards, primarily due to post-harvest technological limitations, such as inadequate drying and storage facilities. Traditional sun-drying methods, which are still widely practised, make it difficult to precisely control moisture levels, while the lack of proper storage facilities increases the risk of aflatoxin contamination. Aflatoxin levels in Indonesian maize range from 10 to 150 ppb, whereas the national standard (SNI) sets the maximum allowable limit at 50 ppb (Rahmawati, 2005). This highlights the urgent need for targeted interventions along the value chain from cultivation to distribution to ensure the production of maize with low aflatoxin levels and compliance with international safety and quality standards.

In addition, the weak national certification and quality control system further undermines the competitiveness of Indonesian maize in the global market. Currently, no integrated quality assurance system spans the entire supply chain, from upstream to downstream, to consistently ensure product quality. This lack of standardisation creates uncertainty for importers, who cannot rely on the consistent quality of Indonesian maize over time. Supply stability and quality consistency are among the most critical factors in South Korea's procurement decisions (Cooper, 2024). The country tends to favour trade partners capable of delivering consistent volumes with predictable quality, which explains its preference for major exporters such as the United States and Brazil. These countries have long-established professional quality assurance and logistics systems. Without comprehensive reforms to Indonesia's national certification framework, increases in domestic maize production will not automatically translate into improved export performance, particularly to markets that impose stringent technical and non-tariff standards. Strengthening the national quality system and expanding farmers' access to post-harvest technologies are therefore strategic imperatives that the government must urgently accelerate. For instance, a comparison of aflatoxin levels illustrates the severity of the quality issue. While Indonesia's national standard (SNI) allows a maximum of 50 ppb, South Korea enforces a stricter limit of 20 ppb. In contrast, the highest aflatoxin content in domestically produced maize is approximately 150 ppb, significantly exceeding both thresholds (Shabeer et al., 2022). This disparity underscores the critical quality gap that continues to hinder Indonesia's maize exports to high-standard markets like South Korea.

High logistics costs are also a major factor hindering the competitiveness of Indonesian maize in the export market. Logistics expenditures in Indonesia account for approximately 23.5% of the national Gross Domestic Product (GDP), significantly higher than the global average of around 15% (Haris et al., 2022). This issue is further exacerbated by the lack of adequate agricultural port facilities; many ports are still unequipped with storage silos, bulk drying units, or packaging systems that meet export standards. As a result, transporting maize from production centers to export terminals is both time-consuming and expensive, particularly due to uneven road infrastructure. For example, the shipment of maize from Gorontalo to feed industries in Banten continues to face substantial logistical challenges. These limitations not only inflate operational costs but also diminish the international competitiveness of Indonesian maize.

In addition to external distribution challenges, institutional weaknesses in the post-harvest system are evident in the underutilisation of the Warehouse Receipt System (WRS). The absence of an effective WRS forces farmers to sell their crops immediately after harvest,

depriving them of price leverage. The WRS is a strategic instrument that allows farmers to store their commodities in certified warehouses and receive a receipt as proof of ownership, which can be used as collateral for accessing credit. However, the implementation of the WRS in Indonesia faces numerous obstacles, including limited awareness among farmers and a shortage of certified warehouse facilities. As a consequence, farmers tend to sell their produce during peak harvest periods when prices are typically low, reducing their potential profits and discouraging efforts to produce export-quality maize. Studies have shown that farmers utilising the WRS can increase their income by selling during periods of higher market prices. Therefore, strengthening and expanding the implementation of the Warehouse Receipt System is a critical step toward improving farmer welfare and enhancing the global competitiveness of Indonesian maize (Gunawan et al., 2019).

Market Access Inequality and the Role of Export Institutions

The structure of maize export trade in Indonesia remains heavily centralised, dominated by large-scale distributors or medium-to-large private exporters who have privileged access to international markets, capital, and logistical networks. In contrast, smallholder farmers and local cooperatives continue to face numerous structural barriers in penetrating export markets, including regulatory complexities, limited access to financing, and inadequate market information. The direct participation of farmers in export activities remains minimal due to the complexity of export procedures, high certification costs, and a general lack of understanding regarding international quality standards (Arief Daryanto & Sahara, 2017).

This asymmetry in market information and network access significantly weakens farmers' bargaining power, making them highly dependent on intermediaries who often extract a disproportionate share of the final selling price. Consequently, much of the export value-added is not accrued by the primary producers namely, the farmers themselves. Further supports the view that Indonesia's agricultural trade system remains largely oligopolistic, with market power concentrated in the hands of a few dominant players. This concentration undermines market efficiency and limits the equitable distribution of economic gains, thereby impeding improvements in farmer welfare and reducing incentives to meet export-grade quality (Severová et al., 2011).

In response to these structural challenges, several studies have recommended strengthening farmer institutions through the establishment of community-based export cooperatives and inclusive partnership schemes. Demonstrates that professionally managed farmer cooperatives can significantly improve the efficiency of the maize supply chain, enhance post-harvest aggregation systems, and facilitate collective access to export markets. Cooperatives can serve as aggregators, enabling product standardisation, quality certification, and direct price negotiations with international buyers. Moreover, direct government support through export-quality training programs, access to financing, and fiscal incentives for farmer cooperatives is a critical prerequisite for enhancing local institutional capacity (Purnima et al., 2023).

Environmental Impact and Its Relevance to Export Image

Indonesia's accelerated maize planting program, which primarily focuses on increasing production volume, has achieved significant quantitative outcomes. However, the program has largely been implemented through an exploitative approach to natural resources, without adequate integration of environmental conservation strategies. Uncontrolled agricultural intensification has led to the widespread conversion of forested areas into maize cultivation land, particularly in regions under high land pressure such as Kalimantan, Sulawesi, and Nusa

Tenggara. This large-scale deforestation has led to biophysical degradation, characterised by declining soil fertility, increased erosion rates, and disruption of local hydrological cycles. Such practices not only destabilise local ecosystems but also generate a negative ecological footprint for maize commodities, potentially damaging Indonesia's reputation among increasingly environmentally conscious global consumers (Apoorva & Kundlas, 2024).

Moreover, the heavy reliance on chemical fertilisers and synthetic pesticides presents another major environmental concern. Under the accelerated planting scheme, farmers are encouraged to adopt tighter cropping cycles, which technically require higher input intensification. This practice increases the risk of groundwater and surface water contamination due to chemical runoff, while simultaneously diminishing soil microbial diversity, a crucial component of sustainable agroecosystems. A study by Fan et al. (2024) found that continuous maize monoculture without crop rotation reduced soil microbial populations by up to 37% compared to diversified farming systems. As soil quality deteriorates and chemical input dependency grows, production costs rise, and long-term sustainability becomes increasingly precarious. This situation presents a structural dilemma: production gains are achieved at the expense of environmental quality and agroecosystem health.

In the context of international trade, sustainability is no longer optional; it has become a prerequisite for accessing competitive global markets. Countries such as South Korea, Japan, and members of the European Union have adopted various environmental regulations within their trade systems, including the implementation of green trade barriers, eco-friendly product certifications, and assessments of carbon footprints and socio-ecological sustainability in agricultural production. Agricultural products failing to demonstrate sustainable production practices risk rejection or the imposition of higher non-tariff barriers. In the case of Indonesian maize, failure to meet such standards could damage the country's trade image, with consumers and trade partners perceiving Indonesia as neglecting sustainability principles. This would not only weaken Indonesia's bargaining position in global markets but also hinder the expansion of maize export potential (Syuaib, 2016).

To address these challenges and improve export credibility, maize production systems must shift toward environmentally oriented and sustainable agriculture. One viable strategy is crop rotation with legumes, which has been shown to improve soil structure, naturally enhance nitrogen availability, and suppress pest outbreaks through biological control (Rahayu, 2024). Furthermore, the adoption of eco-friendly inputs such as organic fertilisers, biopesticides, and conservation agriculture technologies should be promoted through government-led extension services and targeted incentives. These strategies are crucial not only for preserving natural resources but also for enhancing the export value of Indonesian maize through a sustainable and environmentally friendly product image. By integrating environmentally conscious practices into maize production, Indonesia can maintain existing export markets and potentially access new ones that prioritise ethical and sustainable supply chains. In this way, sustainable maize production is not only ecologically imperative but also a strategic component of national export branding.

Opportunities and Strategies for Improving Exports to South Korea

The increase in maize production resulting from the nationally implemented accelerated planting program carries significant implications for Indonesia's export potential, particularly to South Korea. South Korea is one of the world's largest maize importers, with an annual import volume exceeding 10 million tons, primarily for livestock feed and food processing industries (OECD & FAO, 2018). However, Indonesia's contribution to South Korea's total maize imports remains marginal. This indicates a gap between the increased domestic production capacity and

Indonesia's ability to access export markets effectively. Therefore, the utilisation of increased production resulting from accelerated planting must be directed through downstream strategies and strengthened export competitiveness.

Analysis shows that a major constraint in boosting maize exports to South Korea is the suboptimal post-harvest infrastructure and logistics systems supporting export activities. Maize produced in key regions such as South Sulawesi, East Java, and West Nusa Tenggara is not yet fully processed and stored using modern technologies capable of maintaining quality in accordance with international standards. Post-harvest losses of maize in Indonesia still range between 10 and 20 per cent due to the lack of industrial-scale drying facilities, adequate storage (silos), and high-quality sorting equipment (Sekretariat Jenderal Kementerian Pertanian). Product quality inconsistency, especially in terms of moisture content and aflatoxin levels, remains a primary barrier to meeting South Korea's stringent technical standards (Fang & Wang, 2024). In this context, accelerated planting has yet to deliver a tangible contribution to export growth without being accompanied by improvements in post-harvest handling quality.

To address these obstacles, an integrated export strategy that spans from upstream to downstream must be developed urgently. First, modernisation of post-harvest infrastructure should be a top priority, including the construction of drying facilities, certified silos, and digital-based quality labelling systems. Second, the implementation of quality certification aligned with South Korea's technical standards is crucial to ensure consistency and build trust with trading partners. Third, diplomatic and trade efforts are needed to negotiate bilateral agreements aimed at securing special quotas or preferential export schemes for Indonesian maize. Fourth, empowering farmers and local cooperatives as key actors in the export value chain must be strengthened. This can be achieved through export-oriented cultivation training, facilitated access to international markets, and institutional support for export cooperatives. As highlighted by (Ssajakambwe et al., 2020), farmer participation in community-based export systems has proven effective in shortening the distribution chain and enhancing the efficiency of the national maize trade network.

Furthermore, this strategy also has implications for enhancing the international trade image of Indonesian maize. Export destination countries such as South Korea now emphasise not only quantity and price but also sustainability and supply chain transparency. Products that fail to demonstrate compliance with environmental and social standards risk rejection through non-tariff barriers such as green trade barriers (Zhao, 2024). Thus, the export strategy must not be solely technical but must also incorporate sustainability dimensions. This approach underscores that accelerated maize planting is not only instrumental in strengthening domestic food security but can also be optimised as a foundation for developing high-quality, sustainable, and competitive agricultural exports in the global market, particularly to South Korea.

CONCLUSION

The maize acceleration policy implemented by the Indonesian government has had far-reaching impacts across multiple sectors, particularly agriculture, the environment, and the economy. In the agricultural industry, this policy has significantly boosted maize production, which in turn has the potential to strengthen food security and create export opportunities. One of the most promising target markets is South Korea, a country with high demand for maize for use in animal feed and processed food industries. However, success in penetrating export

markets depends not only on production volume but also on product quality, distribution efficiency, and compliance with international standards.

Several critical challenges remain, including the low quality of harvested maize, unsustainable cultivation practices, and high logistical costs. Therefore, a series of comprehensive policy recommendations is required to address these issues holistically. First, the government must integrate sustainability principles into the maize acceleration program, such as implementing crop rotation systems to preserve soil fertility and reducing excessive use of chemical inputs. Second, consistent investment in research and development of high-quality seeds and adaptive agricultural technologies is essential to enhance productivity and harvest quality. Third, logistics systems and export infrastructure must be strengthened, including road improvements, the construction of modern storage facilities, and the development of ports oriented towards agribusiness. Lastly, expanding bilateral cooperation with South Korea through commodity-specific trade agreements can enhance Indonesia's bargaining position and open up more stable and profitable market access for farmers and agribusiness stakeholders.

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