



Vegetables for Food Security and Economic Growth

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Abstract. The agriculture sector is one of the sectors that showed a positive trend during the Pandemic Covid-19 in Indonesia. This positive trend is partly contributed by an increase in horticultural products such as fruits and vegetables during the period. Vegetables are considered a highly-valued commodity recently because the demand for vegetables shows a steady increase in domestic and international markets. The growing number of middle-income class people in urban areas consider vegetables an essential source of nutrition for their dietary lifestyle. This is an opportunity for the agriculture sector in Indonesia to capture a larger market for vegetables both domestically and globally to contribute toward national food security and economic growth purposes. However, vegetable farming in Indonesia still faces several challenges, both in productivity and structurally, to gain a competitive advantage. Using secondary data, this paper aims to explore vegetable farming in Indonesia by assessing market potential, production, and supply chain issues. The paper finds that the domestic market is as potential as the international market for vegetable products. Yet, farmers are still experiencing low productivity and high production costs that impact their incomes; the structure of vegetable farming is still dominantly conducted by small-scale farmers; a long supply chain; and other environmental issues such as the high use of chemical fertilizers and pesticides; and the expansion of vegetable farming in protected areas. To overcome these challenges, some approaches could be taken: improving the quality of inputs, involving the youth, promoting good agricultural practices, introducing off-season technology, and improving financial access for farmers.

Keywords: Competitive advantage · High value products · Youth

1 Introduction

Agriculture sector in Indonesia is one of the most important factors for the country's economic growth. According to National Bureau Statistics [1], agriculture contributed almost 14% toward Gross Domestic Product (GDP), and rank second in term of contribution toward Indonesia's GDP. The market value of the agriculture sector has also shown steady increase in the last 5 years. Since 2014 to 2020, the market value of the sector has increased by 70%. This increase in agriculture sector partly is contributed by increase demand in horticulture crops such as fruits and vegetables. The sector is a key sector not only in Indonesia but for many other developing countries. Agriculture is still

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regarded as the backbone of most economic that are shown by growing market and the trend of healthy, sustainable and technologically innovative for food, especially vegetables [2, 3]. Similar case also applies in vegetable production in Indonesia, where most of people in rural areas relies on agriculture sector including vegetables as their main source of incomes both for internal consumption and for commercialization purposes. This shows by growing production of vegetable production in Indonesia. According to National Bureau Statistics [1], key vegetable crops such as: chili, shallot, garlic, and others have increased in production in the last 5 years.

Increase in middle-class people in big cities and other rural areas with higher income contribute to this growing demand for vegetables. Many studies show the importance of vegetables as the essential sources of nutrition has promoted consumption for vegetables. World Health Organization and FAO reports adults to consume at least five servings of fruits and vegetables per day has been associated with positive health impact, and they are considered as a good investment in terms of cost benefit ratio [4]. In addition to that, highly use of social media by current generation make space for promotion of vegetables consumption for healthier dietary habits that exists through social media and other media sources to contribute to this increase demand for vegetable crops. At the time of global health crisis, vegetables products are highly sought in order to increase immunity. During the intensity of Pandemic Covid-19, the demand for vegetables increased by 7.85 in the fourth quarter of 2020 [5]. This growing demand for vegetable crops is an opportunity for vegetable farming in Indonesia to meet with this growing market.

In supply side, vegetable crops recently are considered to be highly-valued commodities and the demand for variety vegetable crops are continually to increase both globally and domestically. Farmers consider that vegetable farming is more profitable compared to other agriculture commodity such as paddy or other seral crops. Expansion of vegetables farming area through land market or by forest clearance are some of the facts to indicate growing in vegetable farming. However, this increase in productions of major vegetable crops are still met by consistent high import of vegetable products. Import for major vegetable crops remains high despite increase in domestic vegetable production. High import indicates that there are domestic markets that have not been filled by domestic products. Indonesia vegetable domestic markets are still providing high potential for domestic products to fill the gap that currently are filled with imports. With Indonesia has more than 250 million people, it provides potential domestic market for vegetable products, and this should be treated as opportunities to accelerate production. To be able to compete with imports, Indonesia's domestic vegetable farming need not only by increasing production, but also by increasing its competitiveness. Vegetables sub-sector should be moved toward intensification and commercialization to be able to increase competitiveness. Market-oriented vegetable farming not only creates income for smallholder farmers but also (industries) and helps to build their resilience to external risks [6]. At this moment vegetable farming in Indonesia still faces several challenges both in production and structural that might provide obstacles for vegetables farming to effectively fill the market demand. To ensure readiness to meet the markets' demands both in term of quantity and quality, better approaches must be taken by actors within the vegetable chain, government and other stakeholders to overcome those challenges.

Using literature review and secondary data, this paper aims to explore domestic vegetable production in Indonesia and see the market opportunities of Indonesia’s vegetable products. The paper seeks to understand the key areas to improve vegetable production in Indonesia.

2 Demand for Vegetable Products

Agriculture (vegetables) issues are correlated with food security and economic growth: from issues of human quality, agricultural production, technology, diversification, climate change, markets, economic, to issue of health and consumption. At recent years, vegetable products have been the key commodities that affect crops choice in the production areas as well as food choice of people in consumption areas. Availability, affordability and essentiality for nutrition source have been the main factors of consuming vegetables at all income level of both in urban and rural areas. Growing fruit and vegetables in and around cities increases the supply of fresh, nutritious produce and improves the urban poor’s economic access to food [7]. Other research also shows that vegetables are the source of food substitutes in times of inadequacy of other major foods. Vegetable have played a significant role as food supplements during times of drought and to fortify diets in many societies in the world [8]. In a way, vegetables can be said as one of the important contributors for food security. Several literatures have supported this statement. Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life [9]. Significant increases in human populations, especially in Asia, suggest new ways of facing food security studies have examined associations between food insecurity and consumptions [10]. The decreases of high fruit and vegetable consumer were accompanied by food insecurity that underline the potential correlation of vegetable and fruit consumptions to food security (Turnbull and Ensaff 2021).

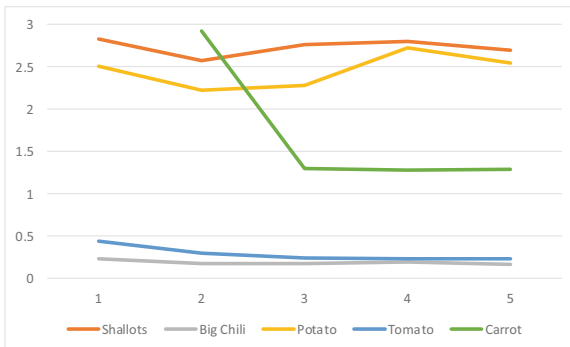


Fig. 1. Yearly consumption of major vegetables in Indonesia 2016–2020 in kg/capita/year (ministry of agriculture).

Annual consumption per capita of major vegetables in Indonesia remain constant (Fig. 1). With the growing population and recent issues of food security, this rate of consumption is expected to stable or increase. Thus, provides domestic and market opportunities for Indonesia domestic vegetable production to gain market shares. According to Indonesia Bureau of Statistics [1], Indonesia's exports for key commodities such as shallot, carrot and potato have increased over the last 5 years, while exports for chili has decreased. However, the imports value of vegetables remains high within the same period. Major sources of vegetable imports are coming from China and East Asia. High imports of vegetables open an opportunity for domestic production to enter high quality products that regularly filled by imports.

3 Vegetables Production

3.1 Production

Domestic vegetable products in Indonesia showed increase in production for majority of key crops between 2016–2020 (Fig. 2). Important vegetables that have impacted toward inflation rate such as shallot, garlic, big chili, small chili, potato, tomato, and carrot increased by small portion between 2 to 11% with exception for garlic that reach more than 100% increase [11].

Even the domestic production is continuing to slightly increase over the period for certain major vegetables, with the current increase rate, the supply of domestic vegetable products will not be able to effectively accommodate domestic demand and compete competitively with import products. Indonesia's vegetable farming still facing several challenges that prevent its competitiveness in the market. Structurally, vegetable farmers in Indonesia dominantly are smallholders who own or manage relatively small land-size. According to household surveys conducted ACIAR [12], the average plot-size owned or managed by smallholder is less than 0.3 ha. The vegetable sector is dominated by small farms, with most vegetable households owning less than 2,600 m squares resulting high production cost and lowering price competitiveness. In addition, most vegetable farmers in Indonesia do not adopt adequate technology to increase productivity nor to

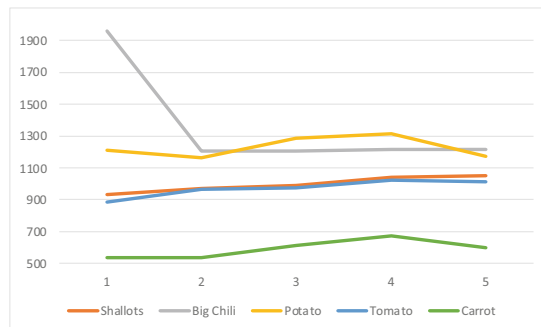


Fig. 2. Domestic production of major vegetables in Indonesia in thousand kg 2016–2020 (ministry of agriculture).

adopt with seasonal and climate pattern [13]. Both small land-size and inadequate use of technology resulting low yield and productivity.

To ensure future competitiveness, vegetable farming should focus on commercialization agriculture with high intensification farming. Centralize large production areas or food estates should be established to achieve production efficiency and economic of scale. Transaction and transportation costs can also be reduced through these integrated food estates. Use of high-quality seeds and inputs can also be placed to generate higher yields and better-quality products. For smallholders who are limited with land-size, adopting new low-cost technology of inputs and cultivation techniques are an alternative to improve productivity.

3.2 Supply Chain

Premium markets that require quality standard for vegetable products will depend on the post-harvest processes such as cleaning, sortation, grading, and so on. Yet, vegetable post-harvest handlings are still conducted in traditional manner in Indonesia [14]. Many farmers still sell fresh products just after harvest without adding post-harvest handlings to create added value for premium price. In commodity such as shallot, farmers usually would sell shallots on-ground, which then post-harvest activities mainly are conducted by the wholesalers/traders who employ farmers' household members to conduct the activities. Many cases farmers aware and understand the relation of the above quality with selling prices. However, unclear information in the market, low perception and inconsistency of farmers for good quality vegetable products preventing access toward modern markets for premium prices. The absence of market incentives for added value products prevent farmers to put more efforts in post-harvest activities, thus just sending their household members to work for extra incomes.

Long marketing channel, with many actors and middle man in vegetables also resulting low farmgate price-level received by farmers. Long supply chain from vegetables producers to the end buyers creates inefficiency marketing channel particularly in middle man, affect bargaining level of farmers. This might occur as a result from the way farmers are individually deal with the buyers that limit the quantity traded and bargaining power. Farmers would better off if they work collectively in selling their vegetables/products within a farm group or cooperative. With larger quantity, farmers can directly do transactions with large buyers such as wholesaler or traders at wholesale markets in the cities. To this case, a contract farming could be promoted in order to improve farmers' market access. Contract farming will not only reduce the transaction costs for farmers and the buyers, but can also shortened the supply chain and increase the incomes shares of not only the farmers but also other actors within the chain.

There should be efforts to increase national food security by improving vegetables supply chain particularly in food estate areas, including in terms of distribution and food availability and also diversification. Government should impose policies that promote the growth of digital marketplace to accelerate distribution of vegetable products and increase supply chain efficiency, it includes production and productivity. Government should also promote youth engagement in horticulture and vegetable sub-sector. The youth participation is essential as many young people in rural area are now becoming

involved in agriculture sector, including vegetable products, from production to processing. Characteristics of the youth who are initiative, technological adaptive and responsive to change can accelerate transformation toward modern agriculture (vegetables) into a more modern and market oriented.

4 Impacts on Environment

Horticulture crops such as vegetables are considered to be more profitable compared to staple crops. Many land-owner farmers shift to vegetables for higher incomes. Landless farmers usually go into land market for renting a plot or more for vegetable farming. This practice has becoming common in many production areas. A plot is usually rented for one to more planting season or even in annual base. The scope of such land market has already expanded to inter province and inter island. People from highly intensive vegetable farming area in Java In a study of Indogreen [15], there are evidence that show many landless farmers from Bandung Area in West Java migrated to Sumatera to rent agriculture plots to cultivate vegetables. Yet, growing supplies for vegetables production has a side effect. Forest encroachment for vegetable farming purposes has occur in several places. Such practices could endanger environment and increase threat for erosions. Issues in using dryland for food crops in the upper watershed area are mainly related to land degradation, topography/land slope level, and water availability. These factors will affect land fertility and further on crop productivity. Land erosion is a serious problem, especially for upland drylands with steep topography [16, 17].

In addition to the above circumstance, many vegetable farmers practice improper farming techniques. Indonesia is an agricultural country where farmers are using conventional methods, such as using synthetic chemicals to pest problem and soil fertility for fast and abundant harvest purposes [18]. High use of chemical fertilizer, herbicides and pesticides in production and controlling pest and disease is a major problem. Excessive levels of pesticide residues have now reached such a level that has negative impacts toward soil and environment quality. Farmers' low access to land causing deforestation at several high land areas for vegetables farming. Actors in downstream supply chain should be encouraged to increase their involvement and participation in disseminate low-cost technologies and Good Agriculture Practice (GAP).

5 Conclusion

Vegetable products are high-valued commodities that provide food security for the people, country's economic growth and income generator for farmers. The growing demand and markets for vegetable products must be anticipated by domestic production with strategies that effectively increase production, productivity and quality to improve domestic vegetable products competitiveness in the markets. Government policies should be effectively targeted the key factors that could accelerate production and improve productivity. Establishment of food estates should be focused on major vegetable crops to achieve economic of scale and production efficiency. Promoting the use of latest and low-cost technology to improve productivity could also be imposed. This includes off season and post-harvest technologies for farmers. Government should also increase farmers'

access to good quality inputs. There should be regulations and market incentives to promote the practice of good agricultural practices in vegetable farming.

An efficient supply chain will reduce marketing cost which therefore improve products' price competitiveness. Promotion of collective actions for farmers in marketing and selling their vegetable products is important to improve farmers' bargaining power and create efficient supply chain. Farmers are encouraged to enter contract farming with off-takers through farm groups and cooperatives. Promoting the use of marketplaces can also shortened supply chain from producers to end consumers.

Efforts to improve agriculture activities and increase production including vegetables must consider environmental impacts. Government should also put emphasize in dealing with agriculture expansion in protected area. Policies that regulate vegetable farming in upper agriculture area should be imposed to ensure that agriculture activities do not endanger surrounding environment. Intercropping with hard crops can be an alternate way for vegetable farming in upper agriculture land areas. Market actors, especially at downstream chain must be encouraged to promote the use of Good Agricultural Practice (GAP) toward vegetable producers to promote sustainable agriculture farming as one of quality factors.

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