

Topic 1: Should Singapore do more to reduce plastic waste?

Introduction

In Singapore, the issue of plastic waste has garnered significant attention due to its impacts on the environmental and sustainability concerns. Despite existing initiatives and regulations aimed at reducing plastic usage and encouraging recycling and eco-friendly practices, the large volume of plastic waste generated continues to be a pressing challenge. As such, some individuals feel that there is a need for more comprehensive measures to tackle this issue. With the rise of public awareness campaigns, educational programs, and Singaporeans becoming increasingly environmentally conscious, there is an increasing push for stronger policies to deal with the issue of plastic waste. Moreover, the adverse effects of plastic pollution on marine ecosystems and public health underscore the urgency for decisive action. However, implementing stricter regulations or getting companies to take on more corporate responsibility to reduce plastic usage might pose economic challenges or logistical hurdles for businesses. Thus, there is a need for policymakers to weigh the potential benefits of environmental conservation against the practical implications such as reduced profit margins. Representatives will need to consider current efforts, recognise the various impacts of plastic waste management measures and suggest a viable course of action to target plastic waste.

Historical Overview

Singapore's approach to plastic waste management has evolved significantly over the years, reflecting a concerted effort to address environmental challenges. Historically, Singapore relied heavily on landfills as a primary disposal method. However, recognizing the limitations of this approach, Singapore pivoted towards waste-to-energy incineration plants. According to the National Environment Agency (NEA) of Singapore, these plants were established as early as the 1970s and have played a crucial role in reducing waste volume while generating energy. The Ministry of the Environment and Water Resources reported that our 5 incineration plants collectively processed about 7600 tonnes of waste including plastics in a day (Ministry of the Environment and Water Resources & National Environment Agency, 2019), contributing to Singapore's waste management strategy.

Furthermore, Singapore has continually reinforced its commitment to recycling initiatives. The introduction of comprehensive recycling programs, such as the 2001 National Recycling Programme and the 2020 Mandatory Packaging Reporting framework, has encouraged citizen participation in recycling efforts. The NEA highlighted that in 2020, Singapore achieved a recycling rate of 52%, demonstrating the effectiveness of these programs (National Environment Agency, 2022). Moreover, collaborations with private sectors to promote sustainable packaging and the adoption of eco-friendly alternatives have further bolstered Singapore's waste management approach.

Additionally, technological advancements have been instrumental in enhancing waste sorting and recycling capabilities in Singapore. Innovations like smart waste bins and automated sorting systems have streamlined recycling processes, improving efficiency and supporting the country's

goal of sustainable waste management (Ocampo, 2022). Singapore's commitment to addressing plastic waste is evident through its holistic approach, combining policy implementation, technological innovation, and community engagement.

Timeline of Developments

Singapore's efforts to reduce plastic waste

1970	Plastic waste sent for disposal reached 1,260 tonnes per day.
1978	PET (polyethylene terephthalate) bottles replaced glass bottles in most applications globally.
1996	Singapore signed the <i>Basel Convention</i> .
2001	The National Environment Agency launched the <i>National Recycling Programme</i>
2017	Plastic waste sent for disposal reaches 8,443 tonnes per day.
2018	The Ministry for the Environment and Water Resources announced that the ministry would not be implementing a mandatory plastic bag levy.
2019	Launch of Singapore's inaugural <i>Zero Waste Masterplan</i>
2021	The Plastics Recycling Association of Singapore was launched.
2022	Total plastic waste generated reached 1,001 thousand tonnes.
2023	Major supermarkets started charging customers at least \$0.05 for each disposable plastic bag taken.

Current Situation

Types of plastics used in Singapore

Plastic waste is a broad category of waste products, and in order to fully understand the extent of plastic waste generated in Singapore, it is first necessary to know the major types of plastic wastes that are generated. This can in turn help uncover the root causes of high levels of plastic waste generation, and evaluate the effectiveness of current measures used to solve this issue. Plastics can be divided into a few major types, mainly, Polypropylene (PP) used especially in bottle caps and straws, High Density Polyethylene (HDPE) used in plastic bags, Low Density Polyethylene (LDPE) which includes garbage bags, and PET (Polyethylene Terephthalate) used in plastic bottles. (FLEDGE, 2018). A study by the Singapore environmental council found that people in Singapore use about 1.76 billion plastic items each year. This figure includes 820 million plastic bags from supermarkets, 467 million PET bottles, and 473 million plastic disposable items like takeaway containers. ("Consumer Plastic and Plastic Resource Waste in Singapore 2018," n.d.). The volume of PET bottles used in one year is equivalent to that of 94 olympic-sized swimming pools ("Consumer Plastic and Plastic Resource Waste in Singapore 2018," n.d.). While most of these types of plastic are said to pose only a mild to low overall hazard, it does not make them any less harmful, because of how much we are using them.

Reasons for excessive plastic usage in Singapore

Currently, Singapore is a massive consumer of plastic products. In 2023, Singapore was ranked 8 in the world for most plastic consumption per capita, with a whopping 143.96 kilograms of plastic waste generated per individual in one year (*Plastic Pollution by Country 2023*, 2023.). There is such a large demand for plastics in Singapore because people find them extremely useful and convenient. Moreover, Singapore is a wealthy nation, ranked third in the world in terms of GDP per capita with a statistic of \$133,895 per capita (Ventura, 2023). Unsurprisingly, some individuals tend to refrain from spending lavishly on their wants. This rising affluence especially in the whole Asia-Pacific region has resulted in the ubiquity of single-use plastic, such as sachets to sell products like detergent pods in small quantities (Hicks, 2023). In Singapore we use plastics for a variety of purposes such as plastic bags for waste disposal (“Consumer Plastic and Plastic Resource Waste in Singapore 2018,” n.d.) as well as disposable plastic packaging for online parcels.

Handling plastic waste in Singapore

Plastic wastes are handled well as Singapore takes the efforts to make sure that they are responsibly disposed of. Singapore tries its best to not contribute to pollution or contaminate resources such as water bodies. Consistent efforts by both the general public and the government are necessary to ensure this and Singapore has quite a number of successful programmes such as a large-scale recycling programme, and the Recycle Right Movement (*Plastic Pollution and Waste Management in Singapore*, n.d.-b)

Case for more to be done to reduce plastic waste

Legislative and Regulatory Compliance

In Singapore, there are legislative and regulatory measures in place to reduce plastic waste. Singapore's need to enhance her efforts in reducing plastic waste is strongly reinforced by the necessity of legislative and regulatory compliance, both at the domestic level and in alignment with global standards. Singapore has a robust regulation framework governing waste management, including the control of plastic use and disposal. For instance, Singapore's Extended Producer Responsibility (EPR) framework holds producers accountable for the environmental impact of their products, including plastic packaging. Under the Mandatory Packaging Reporting (MPR) scheme, companies must report their packaging data and their 3R (reduce, reuse, recycle) plans to NEA annually. These plans include, for instance, using packaging materials made from recycled content or reducing the overall weight of packaging in their products. (Tan, 2023)

By further strengthening these regulations and potentially introducing new policies, such as implementing stricter guidelines for single-use plastics or promoting eco-friendly alternatives, Singapore can ensure compliance with evolving international norms and agreements. Aligning with global initiatives like the Basel Convention, which addresses the control of transboundary movements of hazardous waste (National Environment Agency, n.d.), Singapore can reinforce its commitment to responsible waste management while ensuring a cleaner environment. These efforts could help bolster Singapore's reputation for regulatory excellence and could serve as a catalyst for other nations to follow suit in addressing plastic waste challenges.

Global Responsibility and Image

Singapore is often known as a global city and a responsible member of the international community. As such, some feel that Singapore holds a responsibility to lead by example in reducing plastic waste to bolster its global image and fulfil its environmental commitments. Singapore's reputation as an environmentally conscious and forward-thinking country could be significantly enhanced by taking proactive measures against plastic pollution. For instance, Singapore participates in the United Nations Sustainable Development Goals (SDGs) which emphasise the importance of balancing social, economic and environmental sustainability. Goal 12 in particular, emphasises responsible consumption and production, including reducing plastic waste. (*Sustainable Development Goals*, n.d.) By showcasing a commitment to sustainability, Singapore can positively influence global perspectives and encourage other nations to adopt similar initiatives. Moreover, in a world increasingly focused on environmental issues, Singapore's actions in curbing plastic waste could position her as a leader in sustainability efforts, fostering partnerships and collaborations on a global scale.

Public Health Concerns

The imperative to intensify efforts in reducing plastic waste in Singapore is intimately tied to public health concerns stemming from improper waste management practices. The improper disposal of plastic waste poses significant health risks as these materials degrade over time. Plastic pollution can alter habitats and natural processes, reducing ecosystems' ability to adapt to climate change, directly affecting millions of people's livelihoods, food production capabilities and social well-being (UN Environment Programme, n.d.) . By addressing plastic pollution, Singapore can mitigate these risks and safeguard public health. Additionally, the incineration of plastic waste releases pollutants into the air, contributing to air quality degradation and respiratory issues among the population. Singapore's initiatives to promote waste reduction and recycling, coupled with public awareness

campaigns emphasising the health implications of plastic pollution, can lead to improved public health outcomes.

Economic Opportunities

The impetus for Singapore to escalate her actions in reducing plastic waste is tied to the prospect of unlocking substantial economic opportunities. Transitioning towards sustainable practices presents a chance for the nation to stimulate economic growth through innovation, job creation, and the development of a burgeoning green industry. Initiatives geared towards reducing plastic waste, such as investing in research and development for alternative materials or advanced recycling technologies, can spawn new industries and employment opportunities. For instance, the adoption of biodegradable materials or the establishment of recycling facilities could generate a demand for skilled labour and foster entrepreneurship in the green technology sector. Moreover, by positioning Singapore as a hub for sustainable practices and innovative solutions, Singapore can attract investments, collaborations, and partnerships with global entities interested in eco-friendly technologies. One such partnership is the one with the German recycling and environmental services company, ALBA, which was awarded a contract to improve waste management efforts in the Jurong urban region (Krishnan & de Forges, 2020). In addition, according to the UN environment programme, by shifting to a circular economy in which more products, including plastic, are shared, leased, reused, repaired or refurbished for as long as possible (European Parliament, 2023), the UN projects that by 2024 not only will greenhouse gas emissions be decreased by 25 per cent, an additional 700,000 additional jobs would be created (UN Environment Programme, 2022).

Such endeavours not only propel Singapore towards a greener future but also fortify its status as a competitive and forward-thinking nation.

Case against more to be done to reduce plastic waste

Hindrance of plastic based developments

Over the past few decades, there has been a drastic increase in the use of plastic based products because plastic is cheap, durable and convenient. It is a material that can be moulded and shaped into various different forms (EuroPlas, 2023). There have been many plastic innovations that have greatly served to benefit society such as the Janger and the Reswirl toothbrushes which are sustainable products. (Federation, n.d.) and the Polyguard Peerless Plastic Sheets. (EuroPlas, 2023)

However, If too much is done to discourage people from using plastics, there is the potential threat that the plastic industry will shrink. Given that the plastic industry has the potential of providing many beneficial solutions to day to day issues that we face such as the need for convenient and cheap appliances in households, this is undesirable too.

Sufficiency of public education campaigns

Singaporeans are generally concerned about the environment and would have basic knowledge about the overuse of plastics. According to the OCBC Climate Index, in 2021, Singaporeans attained an average score of 8.3 out of 10 for environmental awareness. (Subhani, 2021) This shows that Singaporeans are for the most part aware about the environmental issues we face which includes those caused by plastic waste. This could possibly be the effects of some of Singapore's public education programmes such as the promotion of subsidised SkillsFuture courses in areas including waste management to help Singaporeans upskill and seize new opportunities in the Green Economy under the SG Green Plan (SG Green Plan, n.d.). It can be seen that Singapore's population is well aware of the issues posed by plastic waste since many

actively attempt to prevent the overuse of plastics. (“Consumer Plastic and Plastic Resource Waste in Singapore 2018,” n.d.). As such, some feel that current publicity measures are sufficient and extra efforts may not presently be required. With Singapore’s limited resources, it can be argued that it is more important to direct efforts towards other more pressing causes such as combating poor health amongst Singaporeans and increasing economic stability (Tjin & Tjin, 2022) , while maintaining the current efforts undertaken to manage plastic waste in the future.

Alternatives to plastic are equally or more harmful

As people move away from using plastics, they start using other alternatives. Oftentimes, some of these alternatives are not as environmentally friendly as they promise to be. Some shocking examples include paper, which has been widely used in the manufacture of straws and paper bags. Although these items are marketed as biodegradable, the amount of energy and resources needed to manufacture and safely dispose of these products are not factored in. A 2007 study commissioned by the American Recyclable Plastic Bag Alliance found that, compared to making plastic bags, making paper bags takes 3.4 times as much energy, produces five times as much solid waste, emits twice as much greenhouse gases, and uses 17 times more water. (Bailey, 2022) Since the majority of the population is under the false impression that some of these alternatives are (Bell & Cave, 2011), in fact, environmentally friendly, people erroneously encourage the use of these harmful materials. Therefore in some cases, plastics may be the most viable option and there is no need for Singapore to take extra efforts to reduce the usage of plastics and hence reduce plastic waste. The main priority should thus be on handling plastic waste safely and responsibly without letting it contaminate the environment and other important resources as sometimes, these alternatives to plastics may bring about more harm to the environment.

Unaffordability due to expensive yet environmentally friendly alternatives

While as ascertained in the previous paragraph some alternatives to plastic are harmful, there are environmentally friendly alternatives. However, while these alternatives are safe, they are often financially unfeasible due to their high price point. For instance, cloth bags can range from \$2 to \$20 (Maheshwari,2023), compared to plastic which will usually cost less than a dollar. While it is good to adopt these more environmentally friendly alternatives, we will need to also be mindful of how a reduction in consumer spending can affect the Singapore economy.

Current solutions

Government initiatives

The Singapore government plays a key role in rolling out national initiatives. In the last few decades, the government has decided to manage and cut down on plastic waste and has implemented some initiatives, some of which have been quite successful. In 2001, The National Recycling Programme (NRP) was introduced to increase recycling rates and reduce waste sent to landfills. The NRP provides households with recycling bins and a scheduled collection service for recyclables such as paper, plastics, metal, and glass. This programme turned out to be quite successful. In 2022, the recycling rate for overall waste in Singapore was 57%, an improvement from 2021's rate of 55%. (*Plastic Pollution and Waste Management in Singapore*, n.d.).

Some other more popular strategies include the mandatory bag charge, enforced by the National Environment Agency. This strategy involves the majority of large supermarket operators or two-thirds of all SFA-licensed supermarket outlets in Singapore (NEA, n.d.)

Non-governmental Organisation initiatives

Non-governmental organisations play a vital role in educating private companies as well as the public on specific issues, in this case the issue of excessive usage of plastics. For example the World Wildlife Foundation (WWF) in Singapore started a business initiative called PACT Plastic ACTION (PACT) based on WWF's No Plastics in Nature Initiative. PACT aims to educate companies to make responsible and environmentally-friendly choices to reduce the consumption of plastics. Since the formation of PACT, a number of companies have committed to charging for single-use carrier bags in their outlets, with the proceeds donated to WWF for plastics-related work. Collectively, the usage of single-use plastic bags has reduced by over 60%, and over 300 000 bags are saved every month. (Plastic Action by WWF SG, 2023) Another non-profit organisation is Zero Waste SG (ZWSG) which was formally established in 2015 as a non-profit

and non-governmental organisation dedicated to help Singapore eliminate the concept of waste, and accelerate the shift towards zero waste and the circular economy. Its more recent campaigns are Let's Recycle Together, BYO (Bring Your Own) Singapore and BYOB (Bring Your Own Bag) Singapore, where they worked together with the government and companies to reach out to the general public. (*Cutting Down on Plastic Disposables*, n.d.)

Projection into Future

Looking ahead, Singapore's commitment to managing plastic waste remains steadfast in the face of imminent environmental challenges and the continued expansion of its population and economy. Given the latter, there is a pressing need to navigate the surge in product consumption and subsequent plastic waste generation. Anticipating this, Singapore plans to intensify its efforts through enhancing existing strategies and having more forward-looking initiatives. Building upon the foundation laid by the National Recycling Programme and the Singapore Zero Waste Masterplan, Singapore is projected to escalate its waste management endeavours, with a potential for a fourfold increase in plastics reuse and recycling by 2030. (Ministry of the Environment and Water Resources & National Environment Agency, 2019)

Conclusion

The discussion surrounding plastic waste has always been a heated one. With many stakeholders such as consumers, multiple industries and the government, it is undeniable that reducing plastic waste will result in consequences, both positive and negative. Although doing more to reduce plastic waste will help with the environment and economy, there is a need to acknowledge that the alternatives to plastics may not be feasible due to its higher costs and the alternatives not being environmentally friendly. We also need to recognise that this drive to reduce plastics may also impact the economy. As such, a balance needs to be drawn between reducing plastic waste while ensuring that our economies are not too adversely affected.

Questions a Resolution Must Answer

1. What are the potential impacts society will face by reducing plastic waste?
2. What strategies can be implemented to ensure the effective implementation of plastic reducing policies?
3. Is recycling truly the best solution to reducing the threat caused by plastic waste?
4. How can various plastic-reducing policies from other countries be adapted to a Singaporean context?

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Topic 2: Should Singapore allocate more land for food production?

Introduction

Singapore has long faced a perennial challenge – the capability of its agri-food industry in providing for its people. A small, urban city state with limited resources that is by no means immune to global developments spanning from climate change, geopolitical developments and global supply chain disruptions, Singapore has faced increased pressure in recent years to ensure the sustainability and resiliency of its agri-food industry (SFA, 2022). Given that only 1% of Singapore's land is currently allocated for local food production (SFA, 2019), some advocates propose that more land should thus be reallocated for food production. Allocating land to cater to various needs is complex, a process that involves weighing between trade-offs and compelling priorities (Synergia Foundation, 2019). As a country striving to achieve greater food security amidst an increasingly uncertain outlook, it is important for this issue to be seriously considered. Representatives will need to consider what constitutes a resilient food future, recognise Singapore's constraints, weigh the pros and cons of allocating more land for food production, and consider if doing so is even viable or necessary in the first place.

Historical Overview

Urbanising cities around the world have long faced the double threats of urban food insecurity and land scarcity. In most developed countries, agriculture is not recognised as an independent land-use category in municipal zoning plans (Cabannes and Maroccino,2018). However, more and more governments have come to recognise the significant role zoning decisions plays in impacting urban food supply. As such, there are more examples of cities such as Chicago, and Vancouver incorporating agriculture into urban policy as a legitimate land use (Cabannes and Ross, 2018; Verburg et al., 2013). Asian cities have also initiated cross-sector policies to support commercial urban agriculture. Some examples include Taiwan's Garden City Initiative and Hong Kong's Rooftop Republic. In recent times, these multi-functional urban land uses that integrate rather than separate agriculture from other land uses are perceived to be critical adaptations for the sustainability of future cities.

Likewise, Singapore was once an agrarian economy in its early years of nation building, effectively self-sufficient in foods such as eggs and poultry (SFA, 2022). The push for rapid economic growth post-independence resulted in the phasing out of farms. The reason for the phasing out of farms was articulated by then-minister for National Development Lawrence Wong, who said that Singapore lacks the land needed for traditional agricultural production (Ann, Sweeney, Wong, 2020). Singapore has since attempted to strengthen the resiliency and sustainability of its food supply chains. The following timelines outline Singapore's efforts to do this, and the global developments which have destabilised the global food supply chains and affected Singapore.

Timeline of Developments

What Singapore has done to strengthen its food supply chain

2009-2013	S\$30 million Food Fund established and strengthened in 2011 and 2013, to support food diversification efforts and productivity by enhancing local farm capabilities.
2014 Agriculture Uses and Development Master Plan	Percentage of agricultural land increased marginally from 1.04% to 1.25%, an expansion of 5.3 kilometres of land area concentrated in the areas of Lim Chu Kang and Pulau Ubin.
2014	\$63 million Agriculture Productivity Fund (APF) announced to support the growth of local agri-food industry.
2015-2019	Continuation of local efforts to shore up food security: Agri-food and Veterinary Authority (AVA) continued efforts to diversify food sources. National Environment Agency's and Health Science Authority's regulation of food hygiene. Grooming of local talent in research and development.

2019	Singapore tops the Global Food security Index amongst 113 countries.
2019 Singapore Food Agency conceptualisation and formation	Formation of Singapore Food Agency on 1 April 2019 which saw the conceptualisation of the <i>Three Baskets Policy</i> .
2019 “30 x 30”	<p>Announcement of the nation's direction towards the “30 by 30” plan by 2030.</p> <p>\$30 million “30 by 30” Express Grant announced to support growth and transformation efforts of local farms and the agri-food industry.</p> <p>Plans for Agri-food Innovation Park to facilitate high-tech farming research and development facilities.</p> <p>Successful pilot of commercial farming on the rooftop garden of a HDB multi-storey carpark.</p>
2020	SFA expansion of tenders for urban farming on HDB multi-storey carparks.

	Plans announced to redevelop Lim Chu Kang area to boost productivity and harmonisation of the agri-food industry.
2021	New \$60 million Agri-food Cluster Transformation fund (ACT) replaces the APF to support the transformation and growth of the agri-food industry.

The current developments threatening Singapore’s food supply resiliency

2007-2008	Global Food Crisis saw a spike in global food prices. Singapore, with most of its food sources imported, saw food inflation, with food prices increasing by 12% on average.
2018	A gradual rise in global food protectionism sentiments. An example includes neighbouring country, Malaysia announcing deliberations over possible halting of egg and seafood exports.
2020	COVID-19 pandemic led to restrictions in exports and global supply chain disruptions.

2021	<p>Malaysia bans chicken exports to Singapore.</p> <p>China reports the worst drought, declares winter wheat crop to be “worst in history”.</p> <p>War in Ukraine led to price spikes in food items and supply chain disruptions.</p>
2022	<p>Indonesia tightens palm oil exports.</p> <p>India restricts wheat and sugar exports.</p>

Current Situation

As a small country covering only 720 square kilometres with a population of 5.92 million (NPTD, 2023), Singapore faces competing land uses, resulting in Singapore only utilising 1% of its land for food production, specifically eggs, seafood and vegetables. This is done so through the 150 land-based food farms and 110 sea-based food farms (DOS, 2023). Due to limited local produce, Singapore imports 90% of her food, mostly from nearby countries such as Vietnam, Indonesia, Malaysia and China. Due to the high reliance of Singapore’s food supply on imports, the Singapore government has recognised this as a potential risk and has tried to mitigate this risk. For instance, Singapore has diversified its food sources to reduce reliance on any one country for a particular item. Additionally, the Singapore Food Agency (SFA) has encouraged local companies to expand

their urban food operations to other countries, allowing them to not only benefit from the economies of sale but also to export these produce to Singapore (MSE, n.d).

The "30 by 30" plan, which the SFA has implemented, intends to produce 30% of the country's nutritional needs internally by 2030. The SFA has acknowledged that, given how quickly the globe is changing, it is imperative to improve food security and lessen reliance on imports. Thus, numerous measures have been set in place to achieve this aim, including the allocation of more land for food production (NEA, 2019). Plans were announced to redevelop the Lim Chu Kang area to boost productivity and harmonisation of the agri-food industry in both 2014 and 2020 (NEA, 2022).

Case for more land being allocated for food production

Boost food security and resiliency to external shocks

Despite efforts to diversify food imports from more than 190 countries, Singapore remains vulnerable to emerging trends. The combined impacts of the COVID-19 pandemic, climate change, and the Russia-Ukraine conflict on global food prices have led to rising protectionism, prompting many major food exporting countries to impose export bans on agricultural commodities in the interest of safeguarding domestic food security (Akter, Rawat, Rijo P, 2023). For instance, between May to July 2022, India introduced a ban on wheat exports, and imposed restrictions on the export of flour (NDTV, 2022). Malaysia, which Singapore obtains more than a third of its supply from, implemented curbs on poultry exports such as chickens. Chicken is the most widely consumed meat in Singapore, with a per capita consumption of 36 kg in 2020, according to the Singapore Food Agency (SFA, 2020). This led the consumers and sellers alike to scramble for new sources of chicken.

Growing environmental problems, coupled with a projected rise in the global food demand set to increase by 50% by 2050 (SFA, 2020) are projected to further strain global food supply chains. In 2021, one of the world's largest producers of wheat, China experienced its most severe drought on record, and said that its wheat crop was 'the worst in history' (BBC, 2022). In 2024, it was projected that a severe El Nino effect will exacerbate the impacts of global warming, leading to extreme heat and dry weather in many other parts of the world. This will further affect crop yields globally, affecting countries like Singapore who outsource its food supply (Akter, Rawat, Rijo P, 2023).

Increasing local food production via the allocation of more land may thus expedite Singapore's goal of achieving its "30 by 30" plan by 2030 and strengthen its buffer against the aforementioned geopolitical developments, global shocks and environmental projections. This lowers the country's susceptibility to risks and can therefore boost food security.

Quality assurance

Allocating more land to local food production can enhance food safety and ensure quality assurance of Singapore's food products. With 90% of its food products currently imported from various countries, these products are susceptible to contamination and diseases. Singapore has put in place strict guidelines on food imports. For instance, given how the poultry produce may be affected by bird flu outbreaks from time to time (SFA, 2020), SFA mandates that only accredited sources that meet Singapore's food safety and animal health standards will be allowed to export such food items to Singapore. Similarly, licensing requirements for egg importers and Business Continuity Plans are also in place (SFA, 2019). As of 2022, only 42 countries were allowed to export poultry items to Singapore. These measures bear testament to the unpredictability of global

diseases and contamination on Singapore's imported food items yet Singapore can be assured of its due diligence to ensure food safety.

Increased local food production also shortens farm-to-table distances which enables local produce to arrive faster. This enables local produce to retain more nutrients, delivering nutritious and fresh food products to local consumers. Freshly harvested fruits, vegetables, and other perishable items generally retain more of their nutritional content compared to those that have been stored and transported over longer distances as they are imported from abroad (SAFEF, 2020). As prolonged storage results in nutrient loss, goods that are transported over shorter distances spend less time in storage, reducing the chances of nutrient degradation. Local production also involves less processing and preservation, preserving the quality and nutritional content of products (Trace X, 2023).

Accessibility and affordability

With disruptions in the global food supply chains in recent years, Singapore is not immune to food inflation. According to Joseph Glauber, a senior research fellow at the International Food Policy Research Institute, prices for grains like soybeans and some vegetable oils spiked about 50% to 60% and is near a record after the invasion of Ukraine choked off crop exports and rattled supply chains (Jacobo & Zahn, 2023). According to the Monetary Authority of Singapore and Ministry of Trade and Industry, food prices rose by 4.1% in April 2022 from a year earlier, up from 3.3% in March in 2022 (MAS, 2022).

While it is acknowledged that local produce currently costs 30% more than imported food items (CNA, 2023) due to the high cost of land and raw materials, with increasing government support for local production through the APF and ACT, and lower transportation costs and reduce tariffs

and duties, in the future, local food produce may be more accessible and affordable for the local consumers.

Environmental sustainability

Allocating more land to increase local food production can contribute to a more environmentally sustainable food system. The true cost of food includes the often invisible environmental impacts of food that has to be shipped over long distances and requires resources like storage space. Transporting and storing food currently account for over 26% of global greenhouse gas emissions (Rosser, Ritchie, Rosaldo, n.d.). Hence, shorter farm-to-fork distances can contribute to a reduction in energy-intensive transportation and storage methods, reducing Singapore's carbon footprint. Furthermore, shorter supply chains mean less time between harvesting and reaching the market, reducing the likelihood of spoilage during transportation. This reduces wastage and supports more efficient and sustainable food production.

Case against more land being allocated for food production

Environmental Sustainability

Unsustainable agriculture practices could cause detrimental impacts to the environment, specifically when there is poor land and water management. It comes as no surprise that vegetation needs to be cleared to make way for agriculture. In 2022, Singapore lost about 103 hectares of vegetation to make way for developments in both the agriculture and urbanisation sectors (GFW, n.d.). The large amount of deforestation could lead to serious soil erosion which refers to the wearing down of the top most layer of soil. Reduced ground cover from overgrazing can make land more susceptible to wind and rain-induced erosion and compaction. This damages soil microorganisms and causes significant erosion of the land by reducing the capacity of plants to develop and for water to permeate the soil (WWF, 2023). Additionally, soil erosion could also lead to surface runoff entering nearby waterways, potentially damaging the living conditions for aquatic life.

Land Constraints

Singapore as a small country covering 720 square kilometres, has a very limited land supply. Currently, 17% of Singapore's land is allocated for housing, 11% for transport infrastructure, 18% for defence requirements and just 1% for agriculture (SFA, 2019). The remaining land is used for vegetation, transport and community facilities (CSC, 2017). Thus, any move towards allocating more land for agriculture would require the reallocation of land from other sectors. Considering how the housing sector utilises the largest proportion of land, it is likely to be the main sector affected by this redistribution of land for crop production. Specifically, there could be scarcity of available housing if the amount of land designated for housing declines due to greater allocation for agriculture, driving up housing costs. Higher prices will not only worsen inequity but spark social distrust. This is one of the main reasons the Singapore government has refrained from

increasing land allocation for agriculture. One possible solution to combat the lack of space is to invest in rooftop gardens and vertical farming (Synergia, 2019).

Food Security Strategies

With multiple strategies in place to ensure sufficient food resources, the need to allocate more land for food production has decreased. Land can therefore be used in other areas in order to further develop the nation. Due to its limited resources, Singapore imports about 90% of its food supply from countries all over the world. However, this has resulted in multiple worries regarding Singapore's food security, especially with the volatile supply chain. To combat this, the government has implemented multiple policies to ensure food security. Specifically, with the aim of decreasing the reliance on one supplier for a particular food item, Singapore has spread out its food sources (MSE, 2023). Thus, in the event that a single source is disrupted, Singapore is well-positioned to collaborate with its importer network to access alternate food sources and guarantee the security of our food supply. Furthermore, by integrating agriculture into the pre-existing urban landscape through rooftop gardens (Tay, 2023) , Singapore will not have to allocate any extra land, increasing its food supply while ensuring stakeholders do not bear the consequences of doing so.

Economic Considerations

As previously stated, Singapore only allocates 1% of its land for food production. If more plots of land were to be allocated for food production, other sectors would be impacted. This could be a potential problem since other sectors like the export sector, which require extensive infrastructure, is where the majority of Singapore's income comes from. In 2022, trading made up roughly 7% (Turner, 2019) of Singapore's Gross Domestic Product and 170, 000 jobs, significantly contributing to the economy. While Singapore's strategic location and global connections helped Singapore achieve its title of 'World's Best Port', Singapore's continued success was only possible due to the huge amount of resources, both monetary and land, being invested. Singapore plans to complete the Tuas Port by 2040 which will span 1337 hectares of land and be capable of handling the largest of container ships (MPA, 2023). Allocating more land to food production may result in substantial opportunity costs as projects like the Tuas Port expansion may no longer be feasible. The economic advantages of maintaining and developing trade-related infrastructure outweigh the possible benefits of increasing food production, since the trading sector is essential to generating revenue and maintaining jobs. As such, maintaining Singapore's economic resilience and success requires finding a careful balance.

Projection into Future

Singapore's agricultural landscape is about to undergo a massive change as the country works towards achieving better food security and stability while navigating the difficulties of its limited land resources. As previously mentioned, the "30 by 30" target aims to generate 30% of Singapore's nutritional needs locally by 2030, indicating the importance of a strategic focus on resilient and sustainable food production. To do so, this plan aims to utilise technology in order to reduce wasted resources (Huiying, 2023).

Using agriculture technology (Agritech) potentially frees farming operations from the limitations of physical labour, climate, and space. The Singapore Food Story Research and Development Programme was introduced in 2019 as a way for Singapore to boost agritech. Thus far, the government has invested nearly SG\$300 million for this scheme (GuideMe Singapore, 2023). Given the government's commitment to ensuring food security, it is possible that in the near future, Singapore will not only reduce its reliance on imports but also create new jobs, further boosting its economy.

Questions a Resolution Must Answer

1. Is the current 30X30 plan still feasible considering recent developments? How can this plan be improved?
2. What impacts does the increased allocation of land towards food production have on society?
3. What factors must Singapore take into account to make an informed decision about allocating land for food production and why?
4. Why is the allocation of land for food production a pressing matter for Singapore?

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The information is accurate as of 16 February 2024.